

# Programs and Abstracts

## - Impacts of Fire and Human Activities on Forest Ecosystems in the Tropics -

Third International Symposium on Asian Tropical Forest Management

Samarinda, 20 - 23 September 1999



Organized by  
Tropical Rain Forest Research Center (PUSREHUT), Mulawarman University

Supported by  
Ministry of Education and Culture, Indonesia  
Japan International Cooperation Agency (JICA)

Collaborated by  
Fire Ecology Research Group of the Max Planck Institute for Chemistry,  
Freiburg University  
Rehabilitation Research Group of the Center for International Forestry Research (CIFOR)

# Programs and Abstracts

## - Impacts of Fire and Human Activities on Forest Ecosystems in the Tropics -

Third International Symposium on Asian Tropical Forest Management

Samarinda, 20 - 23 September 1999



Organized by  
Tropical Rain Forest Research Center (PUSREHUT), Mulawarman University

Supported by  
Ministry of Education and Culture, Indonesia  
Japan International Cooperation Agency (JICA)

Collaborated by  
Fire Ecology Research Group of the Max Planck Institute for Chemistry,  
Freiburg University  
Rehabilitation Research Group of the Center for International Forestry Research (CIFOR)

# 3rd International Symposium on Asian Tropical Forest Management

Organized by

Tropical Rainforest Research Center (PUSREHUT), Mulawarman University

## -Impacts of Fire and Human Activities on Forest Ecosystems in the Tropics-

Date : September 20-23, 1999

Place : Mesra International Hotel, Samarinda-Indonesia

Registration 20th Sept. 16:00-18:30 and 21st Sept. 8:30-12:00

Welcome Party 20th Sept. 19:00  
Mesra International Hotel

### Opening Ceremony

21st 9:00-10:00 at Mancong Room

#### Personnel

Dr. Mansur Fatawi	Report on Symposium by the Chairman of the Organizing Committee.
Mr. Hideki Wakabayashi	Opening speech by the Representative of Embassy of Japan.
Mr. Hiroyoshi Ihara	Opening speech by the Resident Representative of JICA Indonesia Office.
Prof. Jajah Koswara	Opening speech by the Director of Research and Community Service Development.
Prof. Rachmad Hernadi	Welcome speech by the Rector of Mulawarman University.
H. Suwarna, AF.	Welcome speech by the Governor of East Kalimantan.
Drs. Rachmad Suud, M.Sc.	Praying

### Keynote speeches

21st 10:30-11:30 at Mancong room

Time	Speakers	Title	Abst.
10:30	Dr. Goldammer, J.G.	Impacts of fire on Dipterocarp forest ecosystems in South East Asia.	1
11:00	Dr. Tagawa, H.	Pioneer stages of the natural recovery of a tropical rain forest in Kutai National Park, East Kalimantan, Indonesia from a large scale fire in 1982-83.	2

**Session 1 Forest fire in the tropics****21st 12:30-17:30 at Mancong room****Chairman: Dr. Johann G. Goldammer****Co-Chairman: Ripto Permono, M.Sc.**

Time	Speaker	Title	Abst.
12:30	Menon, A.R.R.	Impact of fire on moist deciduous forest ecosystem of Southern Tropical Forest of India.	3
12:45	Musa, S.	Forest fire in Peninsular Malaysia: A New and Recurring Threat.	4
13:00	Mori, T. <i>et al.</i>	Forest fire and climate in Bukit Soeharto Education Forest, East Kalimantan in 1998.	5
13:15	Gouyon, A.	Fire in the rubber jungle -Fire prevention and sustainable tree crop development in South Sumatra.	6
13:30		Discussion	
13:45	Sawada, Y. <i>et al.</i>	Development of Forest Fire Monitoring Network using Satellite Remote Sensing.	7
14:00	Yamaguchi, T. <i>et al.</i>	Assessment of Forest Fire in East Kalimantan -Using Satellite Remotely-sensed Data-	8
14:15	Jaya, N.S.	Evaluation of Forest Damage Due to '97/'98 Fire in East Kalimantan using Spot Imagery : A case study in ITCI Ltd. Concession Area.	9
14:30		Discussion	
14:45		Tea Break	

**Chairman: Dr. Soeyitno Soedirman****Co-chairman: Dr. A. Delmy**

15:15	Murti Laksono, K.	Policy of forest and land fire control in Indonesia: Paradox and implication.	10
15:30	Saharjo, B. H.	The role of human activities in Indonesian forest fire problems.	11
15:45	Sukmajaya, E.W.	The relationship between community living around and inside forest and the forest fires (Case study in Sungai Wain Protection Forest).	12
16:00		Discussion	
16:15	Morita, K.	Reinforcement of forest fire prevention network with human resource development.	13
16:30	Nicolas, M. J. V.	Fire management in the logging concessions and plantation forest of Indonesia.	14
16:45	Hoffmann, A.A	Aspects of a fire information system for East Kalimantan.	15
17:00	Abberger, H. M.	Forest fire prevention strategies for East Kalimantan.	16
17:15		Discussion	

**Session 2 The impacts of forest fires on abiotic environment****21st 12:30-17:30 at Luwai room****Chairman: Dr. Seiichi Ohta****Co-chairman: FX. Dwi Susanto, M.Agr.**

Time	Speaker	Titles	Abst.
12:30	Hardwinarto, S.	Assessment of soil erosion on the rehabilitated land after forest fire by "Taungya" planting system in the Bukit Soeharto Education Forest, East Kalimantan.	17
12:45	Arifin, M.	Study on the compatibility of lesle-model in the Bukit Soeharto Education Forest.	18
13:00	Priyono, C.N.S.	The Trend of Soil Erosion on the Area of Clear Cutting Pine ( <i>Pinus merkusii</i> ) Forest Plantation.	19
13:15	Kusumandari, A.	Soil conservation for rehabilitating ex burning tropical forest.	20
13:30		Discussion	
13:45	Kusumandari, A.	Impacts of forest fire to soil characteristics at Teak Forest Area.	21
14:00	Iriansyah, M.	The Effect of forest fire on soil properties : A case study at Sungai Wain Protection forest, East Kalimantan.	22
14:15	Nuruddin, A.A.	Post-Forest fire effect on soil temperature at <i>Acacia mangium</i> Plantation Forest.	23
14:30	Effendi, R.	Effect of forest fire on leaf decomposition of four Dipterocarps species at Sungai Wain Protection Forest, East Kalimantan.	24
14:45		Discussion	
15:00		Tea Break	

**Chairman: Dr. Daddy Ruhiyat****Co-chairman: Dr. Sigit Hardwinarto**

15:30	Ohta, S. <i>et al.</i>	Soils under degraded ecosystems in East Kalimantan -A comparison of <i>Imperata</i> grassland, secondary forest and primary forest -.	25
15:45	Surata, K.	Effects of land clearing by slash-and burn technique on soil condition and plant growth of industrial forest plantation in Kupang, East Nusa Tenggara.	26
16:00	Morisada, K. <i>et al.</i>	Changes in soil nutrient status after abandonment of swidden agriculture at Benuaq Dayak village.	27
16:15		Discussion	
16:30	Tanaka, N. <i>et al.</i>	Vertical transportation of chemical elements in different vegetation.	28
16:45	Syahrinudin	Nutrient cycle as a tool for the plantation sustainability assessment.	29
17:00	Hadisuparto, H.	The Impacts of forest fire on soil water regime under pine plantation of Nanga pinoh in West Kalimantan.	30
17:15	Sukresno	The impact of forest fire on hydrological characteristics : A case study at Konto Subwatershed, upper brantas watershed, East Java.	31
17:30		Discussion	

### Session 3 The impacts of forest fires on living organisms

22nd 9:00-11:30 at Luwai room

Chairman: Dr. Agung Sarjono

Co-chairman: Dr. Teruki Oka

Time	Speaker	Titles	Abst.
9:00	Ishida, A.	Morphological and physiological protections for photoinhibition in the top canopy leaves of tropical and sub-tropical trees.	32
9:15	Kitayama, K.	Responses of tropical rain forests to the 1997-1998 drought in standing- litter fuel load and litter flux on a slope of Mt. Kinabalu, Borneo.	33
9:30	Toma, T.	Human and fire impacts on aboveground biomass of lowland dipterocarp forests in East Kalimantan.	35
9:45		Discussion	
10:00		Break	
10:30	Suherman, O.	Potential of residual stand after different treatment of felling and forest fire.	36
10:45	Priadjati, A.	The impacts of forest fires on seedlings and saplings structure in primary dipterocarp forest at Sungai Wain Protected Area, East Kalimantan, Indonesia.	37
11:00	Sumardi	Forest fire intensity, the resulting damage and the correlation with regeneration.	38
11:15	Kobayashi, S. et al.	Initial phase of secondary succession at the burnt logged-over forest in Bukit Soeharto, East Kalimantan, Indonesia - Which vegetation types are facilitation or competition process?.	39
11:30		Discussion	

(Poster Session)

22nd 13:30-17:15 at Luwai room

Chairman: Dr. Shigeo Kobayashi

Co-chairman: Dr. Triyono Sudarmadji

13:30	Oka, T.	Effects of the forest fire 1998 on the family of gibbon - A family in need is a family indeed.	40
13:45	Susilo, A.	The effects of drought & Fire on Orangutans re introduce to S. Wain.	41
14:00	Djuwantoko	The role of gallery forests as an refugee for wildlife communities against forest fire.	42
14:15		Discussion	
14:30	Rahayu, S.	The impact of fires on the biomass of Mushroom Fungi.	43
14:45	Iskandar, E.	Microbial status before and after fire in Bukit Soeharto Education Forest Samboja East Kalimantan.	44
15:00		Discussion	
15:15		Tea Break	
15:30	Roliadi, H.	Evaluation on the properties of wood materials from the fire attacked forests.	45
16:00	Budi, A. S.	Fire impact to wood biology.	46
16:30	Suherman, O.	Determination of local volume for three species of commercial trees (Meranti, Kapur and Bangkirai) in the area of HPH PT, Kiani Lestari, East Kalimantan.	47
16:45	Siahaya, J.	Yield prediction models for dipterocarps natural forest stand in Bukit Soeharto in preparation of forest planning.	48
17:00		Discussion	

**Session 4 Rehabilitation of degraded forests****22nd 9:00-12:00 at Mancong room****Chairman: Dr. Deddy Hadriyanto****Co-chairman: Dr. Sumaryono**

Time	Speaker	Titles	Abst.
9:00	Oka, N.P.	Do burnt tropical rain forest need to be rehabilitated ?.	49
9:15	Okimori, Y.	Current option of rehabilitation techniques for degraded mixed dipterocarp forest.	50
9:30	Sutisna, M.	Taungva experiment for rehabilitation of burnt-over forest in Bukit Socharto, East Kalimantan.	51
9:45	Fatawi, M.	Prospect of combination planting among <i>Peronema canescens</i> and three species of grass in the rehabilitation program of degraded forest affected by fire.	52
10:00		Discussion	
10:15		Tea Break	
10:45	Hardiwinoto, S.	Trial plantation of some exotic Fast-growing tree species on abandoned slash-and-burn agriculture-land in Jambi, Sumatera.	53
11:00	Suhardi	Forest conservation and food production after fire.	54
11:15	Thaiutsa, B.	Tree introduction for rehabilitating the degraded forests in the North of Thailand : A case of the royal project foundation.	55
11:30	Imron, A.M.	Rehabilitating Ex Burning forests with local communities.	56
11:45		Discussion	

**(Poster session)****22nd 13:15-17:15 at Mancong room****Chairman: Dr. Hideo Tagawa****Co-chairman: Dr. Takeshi Toma**

Time	Speaker	Titles	Abst.
13:15	Lahjie, A.M.	Typical techniques for the use of managed fires in forest rattan plantation.	57
13:30	Otsuka, M.	Mid-term assessment of participatory green belt trials for follow-up development.	58
13:45	Sunyoto	Social forestry on Sebulu Experimental Forest and it's effect on forest fire Prevention and containment.	59
14:00		Discussion	
14:15	Nakamura, K.	Propagation of tropical trees by tissue culture and cutting.	60
14:30	Matsune, K.	Possible source of seeds and seedlings for artificial planting and natural regeneration of Dipterocarps for forest rehabilitation.	61
14:45	Soda, R.	Growth of dipterocarp species in early stage of artificial plantation.	62
15:00		Discussion	
15:15		Tea Break	

**Chairman: Dr. Tokunori Mori****Co-chairman: Dr. Djumali Mardji**

15:45	Setiadi, Y.	The roles of arbuscular mycorrhizal fungi for enhancing rehabilitation of degraded forest land in Indonesia.	63
16:00	Santoso, E.	Recent development in <i>Pisolithus arrhizus</i> ectomycorrhizal research and their techniques for rehabilitating degraded forests.	64
16:15	Suhartoyo, H.	Rehabilitation of degraded forest due to coal mining activities: Results from North Bengkulu.	65
16:30	Sagala	Holistic Forestry Design: Production Forest Management Unit.	66
16:45	Rahayu, S.	The occurrence of pest and disease of <i>Shorea</i> spp. in Bukit Socharto.	67
17:00		Discussion	

## Poster Presentation

22nd 11:45-13:15 at Luwai Room

Speaker	Titles	Abst.
Heriansyah, I. <i>et al.</i>	Rehabilitation of degraded forest at leuwiliang, West Java using Meranti cuttings.	68
Kinuura, H. & Makihara, H.	Effects of forest fire on various coleopterous insects in a tropical rain forest of East Kalimantan.	69
Kiyono, Y. & Hastaniah	A process of forest degradation under slash-and-burn agriculture in East Kalimantan, Indonesia.	70
Marjenah & Toma, T.	Effects of selective logging and forest fire on microclimate of lowland dipterocarp forest in Bukit Soeharto, East Kalimantan.	71
Schindler, L.	The Integrated Forest Fire Management Project (IFFM) in East Kalimantan - Development Cooperation between the Governments of Indonesia and Germany.	72
Subiakto, A. <i>et al.</i>	Cutting technique of Meranti using fog-cooling system.	73
Kustiawan, W. <i>et al.</i>	Effects of forest fire on soil erosion and nutrient loss in Bukit Soeharto Education Forest.	74

## Closing remarks

22nd 17:30-17:45 at Mancong room

Closing Remarks	Dr. Mansur Fatawi (the Chairman of Organizing Committee)
Farewell Remarks	Prof. Rachmad Hernadi (the Rector of Mulawarman University)

## One day Tour to Bukit Soeharto Education Forest

23rd 8:00-16:00

- 08:00 Leave Mesra International Hotel.
- 10:30 Arrive at Bukit Soeharto Education Forest.  
Discussion in the field and lunch.  
Rehabilitation trials.  
Long-term monitoring sites (towers, permanent plots, insect traps).  
Burning and Extinguished coal seam fires.
- 14:00 Leave Bukit Soeharto Education Forest.
- 16:00 Arrive at Samarinda or Balikpapan.



# IMPACTS OF FIRE ON DIPTEROCARP FOREST ECOSYSTEMS IN SOUTH EAST ASIA<sup>1)</sup>

By  
Johann G. Goldammer<sup>2)</sup>, Anja A. Hoffmann<sup>3)</sup>, and Hartmut Abberger<sup>3)</sup>

## ABSTRACT

Abundant charcoal in forest soils gives evidence of prehistoric and historic natural and anthropogenic wildfires in perhumid lowland and in seasonal dipterocarp forest types of continental and insular South Asia. Favourable conditions for the occurrence of historic and contemporary rain forest fires are associated with cyclic droughts caused by the El Nino-Southern Oscillation [ENSO] event. The escalating pressure of wildfires on the dipterocarp forest originates from swidden agriculture systems and forest conversion programs. A detailed study of the ecological consequences of the wildfires of 1982-83 was conducted on an area of 2.7 million ha of rain forest in East Kalimantan. The results show that dipterocarps are very susceptible to fire and are replaced by pioneer and fire-tolerant species which occupy the disturbed sites or survive the immediate fire effects. Fire-degraded rain forests are more flammable than undisturbed forests, and the risk of second and third fire occurrences increases after an initial disturbance. Repeated wildfires on degraded forests or abandoned agricultural sites lead to the formation of pyrophytic alang-alang (*Imperata cylindrica*) grasslands which are subjected to recurrent (annual) fires.

The seasonal forests of mainland South East Asia show remarkable adaptations to fire. Annual surface fires are characteristic features of these ecosystems and favour species with thick bark, resprouting capabilities and those which require mineral seedbeds for germination. In high-elevation forests dipterocarps are often replaced by highly competitive fire-tolerant pine species (*Pinus* spp.).

Fire management strategies must consider the different types of fire regimes and fire impacts in Southeast Asian vegetation types. The International Tropical Timber Organization (ITTO) Guidelines on Fire Management in Tropical Forests and the draft national Indonesian fire management guidelines, also supported by the ITTO, recommend a fire management approach which considers the specific requirements of vegetation types and the needs of land users to utilize fire as well. The Integrated Forest Fire Management (IFFM) project in East Kalimantan, a joint Indonesian-German development project, builds on a partnership approach in integrating land and fire users into a forest resources protection and fire management concept. At the same time the project utilizes advanced technologies to monitor fire occurrence and impacts in the region of responsibility.

At international level fire management and policy development is supported by the Global Fire Monitoring Center (GFMC) which is hosted by the Fire Ecology Research Group and the IFFM project. The GFMC provides capabilities for fire monitoring and archiving and the ecological, socio-economic and political interpretation of fires.

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Max Planck Institute for Chemistry, Biogeochemistry Department, PO Box 3060, D-55020 Mainz, Fire Ecology and Biomass Burning Research Group, c/o Freiburg University, PO Box, D-79085 Freiburg, Germany.

<sup>3)</sup> Integrated Forest Fire Management IFFM/GTZ, Jln Harmonika, Perkantoran Dinas Kehutanan, Samarinda 75001, Phone: +62-541-32625, Fax: 62-541-33519 & Max Planck Institute for Chemistry, Biogeochemistry Department, PO Box 3060, D-55020 Mainz, Fire Ecology and Biomass Burning Research Group, c/o Freiburg University, PO Box, D-79085 Freiburg

**PIONEER STAGES OF THE NATURAL RECOVERY OF A TROPICAL  
RAIN FOREST IN KUTAI NATIONAL PARK, EAST KALIMANTAN,  
INDONESIA  
FROM A LARGE SCALE FIRE IN 1982-83<sup>1)</sup>**

By  
**Hideo TAGAWA<sup>2)</sup>**

**ABSTRACT**

Tropical rain forests in East Kalimantan, Indonesia and Sabah, Malaysia were exposed to severe drought continuing 11 months from July 1982 to May 1983 and 3,100,000 ha of the forest were light and heavily damaged by the fire. We, the collaboration team with the Japanese and the Indonesians, made first research in 1986 deep into Kutai National Park. We could discriminate 11 secondary forest stands three years after the fire. Only one primeval forest dominated by *Dryobalanops* sp. was found unburnt near the Camp at 45km from Teluk Kaba. The secondary forests were distributed like a patch work. There were many types of early seral stages after lumbering and fire. They selected their habitat condition from altitudes (150m-324m), surface soil and soil water condition, and degree of forest burning. Only two species produced coppices after cut and fire. Shimokawa estimated erosion rate of soil by measuring the height of exposed horizontal roots of the species germinated after the fire such as *Macaranga*. The erosion rate is proportional with slope gradient, and in lumbered and burnt area it is more than 10 times higher than unburnt area on the slope of 30. Carbonized roots was found 30cm deep in the soil of *Dryobalanops* forest, and it was estimated to be carbonized about 200BP. So forest fires are thought to frequently brake out even in the past in East Borneo.

In 1992-93 we set up 4 permanent quadrates on different types of secondary forest and 2 on the *Shorea* forests which were a little damaged from 1982-83 fire. *Macaranga* trees have begun to fall down after reaching 30cm in DBH, but no dominant species subsequent to *Macaranga* trees. It is the most important problem to reproduce tropical rain forests in the way of natural recovery. To our regret all these plots caught 1997-98 fire again.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Kagoshima Prefectural College, Midorigaoka 12 - 13, Kagoshima 892-0874, Japan..

# IMPACT OF FIRE ON MOIST DECIDUOUS FOREST ECOSYSTEM OF SOUTHERN TROPICAL FORESTS OF INDIA<sup>1)</sup>

By  
A.R.R. Menon<sup>2)</sup>, A.O. Varghese<sup>2)</sup> and K.J. Martin Lowel<sup>2)</sup>

## ABSTRACT

One of the most complex problems facing in tropical forests, particularly the deciduous forests, is the recurrent incidence of fire. It is well known that fire causes extensive damage in the forest ecosystem by quantitatively as well as qualitatively. In India 75 % of the total forest cover are coming under highly fire prone forest types like moist deciduous, dry deciduous and thorn forest. The main objectives of the present study are to characterise the physical aspects of fire in the moist deciduous forest, to study the changes brought about by fire on vegetation and their regeneration and to explore the feasibility of silvicultural techniques such as stump planting to improve upon fire survival of tree seedlings. The study area is located in the moist deciduous forest of Thrissur forest division, Kerala State, India. Impacts of fire on forests mainly depend on the intensity and periodicity of fire. Hence, to study fire ecological aspects, twelve 0.25ha (50m x 50m) plots were established for different burning treatments, viz. Early-burn, late-burn, one year and two year fire frequencies and control, with three replications. Regenerating elements of tree species (1-10cm, dbh), shrubs (with height above 50cm and dbh below 1cm) and herbs (below 50cm height) were identified, tagged and enumerated in all plots before and after prescribed burning and compared with the control (no burn) plots.

It is observed that once the fuel quantity and fuel moisture content cross a certain limit which is sufficient for occurrence of fire, further change in fire behaviour is controlled by fuel porosity and fuel continuity. Other factors which control the rate of fire spread are size and thickness of leaves, rate of decomposition, soil moisture regime, wind and presence of grasses. The paper elucidates the different aspects of this experiment the result indicate that impact of fire is more in lower diameter classes (1-2.5cm dbh and 2.6-5cm dbh), whereas regeneration above 5cm dbh is less effected. Among the different moist deciduous tree species, thick bark species such as *Gmelina arborea* and *Pterocarpus marsupium* were found to be more resistant to fire. Paper concludes on the possible impact of fire on the status of moist deciduous forests in this part of India.

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics. Samarinda, Indonesia. September 20 - 23, 1999.

<sup>2)</sup> Kerala Forest Research Institute, Peechi, Thrissur, Kerala, India - 680 653.

# FOREST FIRES IN PENINSULAR MALAYSIA: A NEW AND RECURRING THREAT<sup>1)</sup>

By  
Samsudin Musa<sup>2)</sup> and Puat Dahlan<sup>2)</sup>

## ABSTRACT

Forest Fires and the resultant haze are relatively new experiences to Malaysia. However, the problems seem to be increasing in intensity and recurring periodically. Last year haze forest fires caused a serious environmental problem to Malaysia, Singapore, Brunei and Indonesia. Most of the forest fires reported in Malaysia occurred in degraded or logged-over peat swamp forests, both in the east and west coasts of Peninsular Malaysia and the coasts of Sabah and Sarawak. The extent of peatland destroyed by fires is not known precisely, but a prolong extreme dry period early 1998 had exacerbated resurgence of peat fires over a wide areas in Malaysia.

Although peat forest fires in Peninsular Malaysia were not of the same magnitude as that of our neighbor, Indonesia, they have caused significant damage to property, vegetation, wildlife, environment and public health. Fire has been identified as one of the major threat to the losses of peat swamp forest in several states in Malaysia. Serious occurrences of forest fire last year are due to improper peatland management, slash and burn activities and poor water management rather than climatic factors such as a long dry spell. The condition is worsened because mitigating measures were not in place and the understanding and technical know-how in forest fire fighting were clearly lacking.

The fires mainly involved peat and beris forest/bush areas and are slow and patchy in nature but widespread. It spreads slowly through the thick peat layers making it extremely difficult to detect and extinguish. In such areas, although the surface fires are extinguished, the peat underground will continue to burn unless a large amount of water is used to completely drench the peat layers. Consequently, those involved in extinguishing the fires were put in an extremely difficult situation because not only do they lack the necessary tools and experience, they were also not trained to handle forest fires. In addition the remoteness and ruggedness of the terrain exacerbated the problem even further. In many of the affected areas, there were logistic problems.

The forest fire and haze problems have also resulted in relevant government agencies such as the Fire and Rescue Department, Forestry Department and the Department of Environment in Malaysia to seriously reexamine their capacity in dealing with the issue. Relevant measure are being undertaken by these agencies to address the issue. In the long-term, an awareness campaign on the importance of peat swamp forests and forest fire hazards initiated at all levels i.e. the relevant government agencies, the public and schools would have to be in place. An integrated approach of managing peatlands (agriculture, forestry, aquaculture etc.) is also believed to be the best solution to avoid serious forest fire from recurring again.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Research Institute, Malaysia.

**FOREST FIRE AND METEOROLOGICAL CONDITIONS IN BUKIT  
SOEHARTO EDUCATION FOREST, EAST KALIMANTAN IN 1998. -  
COMPARATIVE STUDY ON THE CASES IN 1997 AND 1998-<sup>1)</sup>**

By

Tokunori MORI<sup>2)</sup>, Takeshi TOMA<sup>2)</sup>, HASTANIAH<sup>2)</sup> and Dadang I. GHOZALI<sup>2)</sup>

**ABSTRACT**

Most primary forests in Bukit Soeharto Education Forest were burned during the dry period from January to April 1998 (a second drought). However, they were not burned during the dry period from July to October 1997 (a first drought), even though many forest fires occurred in a surrounding area of the Education Forests. The meteorological records in the Education Forest indicated that maximum temperature was higher and minimum relative humidity was lower in 1998 than in 1997. Weak wind blew from the southeast, the Makassar Sea, in the first drought period but in the second drought period, relatively strong wind blew from the northeast, crossing over the Sambaliung Mountains. This northeast wind brought hot and dry air and, the air covered lowland Kutai for more than 3 months. The average minimum relative humidity for the last 7 days on every day was calculated as an indicator of drying condition of fuel complex on the forest floor. This indicator always kept above 55% (mostly 60%) during the first drought period but declined below 40% in the second one. This low air humidity probably caused easy fire ignition of fuel complex by the sparks. Furthermore, Canopy leaves in dipterocarp forest was scanty in the second drought because of twice of defoliation for about 6 months. And a lot of sunlight could penetrate to the forest floor and induced unusual dry conditions on the floor during the second drought period. These facts seem to result in a big difference in burned forest area of the Kutai district, East Kalimantan between the first and the second drought periods.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> PUSREHUT, Mulawarman University, Samarinda, East Kalimantan, Indonesia.

**FIRE IN THE RUBBER JUNGLE...  
FIRE PREVENTION AND SUSTAINABLE TREE CROP DEVELOPMENT  
IN SOUTH SUMATRA<sup>1)</sup>**

By  
**Anne Gouyon<sup>2)</sup>**

**ABSTRACT**

This paper investigates the interactions between tree crop development and vegetation fires in South Sumatra. Since 1910, farmers have turned rice-based, slash-and-burn cultivation into rubber-based agroforestry, replacing the forest fallow with a mixture of rubber and other tree species. This system sustains densities of population up to 100 people per sq. km in a forest environment, with a limited use of fire.

Since the 1970s, new patterns of land use have been imposed by the government and private groups. Logging, transmigration, large-scale planting of oil palm and *Acacia mangium* have destroyed large areas of forest traditionally belonging to the local people. This has led to the increased use of fire in land clearing, land disputes, and the replacement of forests with fire-prone vegetation, especially *Imperata cylindrica*.

Fires affect tree crop farmers by destroying their plantations, their forest reserves, and making it more risky for them to invest into more productive rubber plantations using high-yielding clones. Participatory smallholder tree crop development programs could reduce the incidence of fires by limiting its use in large-scale land clearing, helping farmers to convert degraded forest into productive plantations with adequate control of *Imperata cylindrica*, while respecting the rights of local people to avoid land disputes.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Ide-Force/CIRAD, Consultant for the Forest Fire and Prevention Control Project, Indonesian Government – European Union.

# DEVELOPMENT OF FOREST FIRE MONITORING NETWORK USING SATELLITE REMOTE SENSING<sup>1)</sup>

By

Yoshito Sawada, Haruo Sawada, Naoki Mituzuka, Hideki Saito<sup>2)</sup>

## ABSTRACT

Early detection and early warning of forest fire are essential issues for preventing big forest fire. Satellite remote sensing plays very important role for monitoring forest fire. The Forest fire detection system has been developed using NOAA and HIAMWARI(GMS) satellite in 1997 for the Forest Fire Prevention Management Project in Indonesia by JICA. The DMSP, which shows lights instead of temperature, is also available for disaster mitigation project by NOAA and the new operational system is going to include these three satellites for monitoring forest fires every day. The system is under developing in Japan and the products on forest fire will be delivered to related countries through network system. The base map, such as vegetation map, road networks, elevation data and daily NOAA data are also used for the risk assessment at the fire spot detected. The network capacity is also play a key role for the project. Integration of different types of satellite data into the system makes up very reliable information on forest fire.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forestry and Forest Products Research Institute, Japan, Telp. +81-298-73-3211 ext.248, Fax: +81-298-73-1541.

# ASSESSMENT OF FOREST FIRE IN EAST KALIMANTAN USING SATELLITE REMOTELY-SENSED DATA<sup>1)</sup>

By  
YAMAGUCHI Tsunashi<sup>2)</sup>, TSUYUKI Satoshi<sup>2)</sup>, SISWANTO Hari<sup>3)</sup>,  
and RUSLIM Yosep<sup>3)</sup>

## ABSTRACT

A large-scale forest fire is difficult to assess with ground surveys alone. Satellite remote sensing techniques, which enable monitoring over a large area in a multi-temporal time scale, is employed to map the extent and degree of the forest fires occurred between mid 1997 and early 1998. Change detection analyses are introduced to map land cover changes caused by the forest fires in East Kalimantan, using Landsat TM data (path: 116, row: 61) on 13th April and 3rd August 1997, and on 26th January and 31st March 1998. Image interpretation techniques with limited ground information are employed to identify the detected changed areas. The main emphasis is to identify forests that are burned during the fire. A GIS (Geographic Information System) database is constructed in an effort to establish the relationships between the forest loss due to the fire and human activities. The database comprises spatial data such as digital elevation model, road and drainage networks, land use, the detected changed areas and the latest land cover map of the study area. GIS, together with remote sensing techniques, has provided a basis for long term monitoring on the forest resource at a regional scale.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Department of Global Agricultural Science, Graduate School of Agriculture and Life Sciences, The University of Tokyo, Japan.

<sup>3)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan, Indonesia.



**EVALUATION OF FOREST DAMAGE DUE TO '97/'98 FIRE  
IN EAST KALIMANTAN USING SPOT IMAGERY :  
A CASE STUDY IN ITCI LTD. CONCESSION AREA<sup>1)</sup>**

**Dr. I. Nengah Surati Jaya<sup>2)</sup>  
Mr. Endang Ahmad Husaeni<sup>2)</sup>**

**ABSTRACT**

This paper describes the use of SPOT imagery to evaluate forest damage caused by the '97/'98 fire in East Kalimantan. In order to be useful for establishing forest rehabilitation plan, a spatial analysis using GIS was also performed. Criteria of forest damage were established base upon percentage of life trees in the area.

Distribution of degree of damage based upon cutting year, topography, road density was also evaluated. The study shows that finer resolution of satellite data may provide useful information on condition of post-fire vegetation. Severily slightly, fairly and damaged forest could be recognized successfully using digital SPOT images. It was found that major part of the ITCI Ltd. Concession area was severily burnt.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Bogor Agriculture University, Kampus IPB Darmaga, P.O. Box 168, Bogor.

**POLICY OF FOREST AND LAND FIRE CONTROL  
IN INDONESIA :  
PARADOX AND IMPLICATION<sup>1)</sup>**

By  
**Hariadi Kartodihardjo and Kukuh Murti Laksono<sup>2)</sup>**

**ABSTRACT**

The six repeated huge forest and land fires in Indonesia – with loss of billions rupiah during the last 20 years – have not been taken as a lesson by most of the stakeholders. The most terrible forest fire of 1987/1988 was happening even after the early warning system was being implemented. It is, therefore, justified that the repeated fires were just causing an artificial loss. It is just due to an institutional problem in such the causes of loss and its consequence – the loss itself – is independent.

There was a very limited time available between situation where technology applied to extinguish fire is effective (burned area <2 hectare) and that where it doesn't effective anymore, especially when the burned area is becoming huge. On the other side, the extinguished fires were not due to efforts implemented but the rainfall in the beginning of rainy season. Therefore, the success of fire control can not be expected from the centralised coordinating institutions, but depends highly on willingness and capability of the local society (farmers, dwellers, forest and estate concession holders, etc.).

There are two things should be considered why stakeholders likely have no awareness of forest and fire. First, poor preconditions as institution, economic and politic problems. It consists of land use conflicts, insecure of land and forest property right, poor economic incentive/disincentive, and law enforcement. Second, poor centralised coordination which creates high transaction cost.

Realisation of the society willingness and capability improvement to prevent forest and land fires depends on the success of the government in recognising the local society's *property right* on forest and land. Aside from that, the government must immediately cancel policy of land clearing without burning and replace it with *performance bond* policy. Each of the government institutions related with effort of forest and land fire prevention must implement *natural resource accounting* as their performance indicator. Implementation of these three aspects is predicted to consume plenty of time.

Key words: fire causes and consequences, institution, performance bond, property right, resource accounting.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Lecturer of Bogor Agricultural University, Bogor, Indonesia, respectively <hariadi@indo.net.id ; pertaipb@bogor.indo.net.id>

# THE ROLE OF HUMAN ACTIVITIES IN INDONESIAN FOREST FIRE PROBLEMS<sup>1)</sup>

By  
Bambang Hero Saharjo<sup>2)</sup>

## ABSTRACT

Forest fire in Indonesia in 1997/1998 has destroyed at least 15 million hectares of forest and land, cost damaged billions US\$, excluding its negative impact on flora, fauna, human being and relationship between neighboring countries. The sources of fire were suspected and believed comes from land preparation using fire for forest plantation, estate crops, logged over forest areas and slash and burn agriculture. Fire is used because of easy, cheap, and very simple.

This situation worsen by unskilled and unequipped firefighter team due to their equipment stored at the province and district storage office which rusty and unorganized because they do not know how to use it. This worst condition again supported by government rules and laws that can do nothing to fight forest concessionaires and estate crops which using fire for their land preparation out of control. Now, government comes again with zero burning policy as one solution to reduce fire break out in the near future. Unfortunately this method is warn out, useless and a replication of 1995 declaration made by Ex-President Suharto in Subanjeriji, South Sumatera, June 1, 1997. This method never works due too costly and out of control, it was proved by 1997/1998 forest fires that bigger than 1982/1983-forest fire in East Kalimantan followed it. One possible solution, then, should be to allow the use of fire but eliminate problems of smoke and environmental damage.

Key words: Forest fire, Human activities, Fire impacts, Fire management, Indonesia.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Laboratory of Forest Protection, Division of Forest Management, Faculty of Forestry, Bogor Agricultural University, P.O. Box 168, Bogor 16001, West Java, Indonesia.

**THE RELATIONSHIP BETWEEN COMMUNITY LIVING  
AROUND AND INSIDE FOREST AND THE FOREST FIRES  
(CASE STUDY IN SUNGAI WAIN PROTECTION FOREST)<sup>1)</sup>**

By  
**Emila Widawati Sukmajaya<sup>2)</sup>**

**ABSTRACT**

Sungai Wain Protection Forest is a lowland dipterocarp forest located in East Kalimantan about 15 km North from Balikpapan. The total area is 10.025 ha. At the Northeast side the forest borders the main road from Balikpapan to Samarinda over a distance of 4 km. The presence of this road made people to settle along the road and inside the protection forest. There live 644 people belong to 147 families inside the forest and they have converted about 364 ha forest into fruit orchards and farmland. Almost all people were well aware of the fact, that their presence in the area is illegal, but they do not expect consequences because no legal action has ever been taken to prevent forest encroachment. Some activities of the community around and inside protection forest may be able to cause fires such as slash and burn for preparing the farmland. This activity could not be proved however, to cause forest fire in 1997-1998. Forest fires in 1997-1998 burned more than half of the area. Fires burned about 35% of the land and burned crops that cultivated by people. Almost of the people just paid attention to prevent their land from spreading the fires and neglected the forest.

Key words : Sungai Wain, protection forest, forest fire, community.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Agroforestry and Social Forestry Researcher from APhi at The International Ministry of Forestry and Estate Crops-Tropenbos Kalimantan Project, Wanariset Samboja.

# REINFORCEMENT OF FOREST FIRE PREVENTION NETWORK WITH HUMAN RESOURCE DEVELOPMENT<sup>1)</sup>

By  
Kazuyuki Morita<sup>2)</sup>

## ABSTRACT

Large-scale forest fires have occurred in Indonesia periodically at the interval of several years. Forest fires bring about huge economic losses and devastation of ecosystem. Control of forest fire is given the highest priority among the policies of the Government of Indonesia. Since 1996, FFPMP-JICA/MOFEC has tried to enhance forest fire detection and early warning systems by applying satellite information, and develop techniques to facilitate field-level activities for prevention and initial suppression of forest fires at the local community level. These activities coincide with some of the necessary measures indicated in National Guidelines on the Protection of Forests Against Fire. The on-going activities have evidently motivated both foresters and local people to cooperate with each other for not only fire control but also better management and conservation of forests. This paper compiles current progresses of the fire prevention activities and discusses possible conceptions of follow-up programs after termination of the present phase of the project.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Team Leader Forest Fire Prevention Management Project (FFPMP) JICA/MOFEC.

# FIRE MANAGEMENT IN THE LOGGING CONCESSIONS AND PLANTATION FORESTS OF INDONESIA<sup>1)</sup>

By  
Marc V.J. Nicolas<sup>2)</sup>

## ABSTRACT

Fire management is the key to over-coming the recurring problems of forest fires within the logging concessions and plantation forests of Indonesia. The Integrated Forest Fire Management Project (GTZ) and the Forest Fire Prevention and Control Project (European Union) assist the government of Indonesia to strengthen the country's fire management capacity in the provinces of East Kalimantan and South Sumatra.

A joint publication EU-GTZ gives suggestions on practical methods of fire prevention and pre-suppression in logging concessions (HPH) and plantation forests (HPHTI). The training of forest firefighters to work in the concessions and plantations, and the techniques used to suppress fires are covered in a second document prepared also by the two projects.

This paper contains recommendations on fire management that are based on a field-level, 'hand-on' approach to the problem gained working with HPH and HPHTI of East Kalimantan and South Sumatra. The numbers of fire control staff and fighting equipment stipulated by law are insufficient. Simple method to calculate the minimum number and example for fire information system are given.

With cooperative agreements, it is essential if fire management is to be successful, that neighboring concessions cooperate and coordinate to protect their areas from fire. Strong links need to be established as well with the district forestry head offices. The role of local communities in fire prevention is examined.

The technical aspects of fire prevention and pre-suppression are explained in detail: fuelbreaks, firebreaks and access roads. Water supply and lookout towers are also covered. Sections deal with pre-attack planning, fire management standard operating procedures and fire management organization.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> IFFM-GTZ, Samarinda, East Kalimantan, Indonesia.

# ASPECTS OF A FIRE INFORMATION SYSTEM FOR EAST-KALIMANTAN<sup>1)</sup>

By  
Anja A. Hoffmann<sup>2)</sup> and Johann G. Goldammer<sup>3)</sup>

## ABSTRACT

The Fire Information System (FIS) is a system, which manage fire-related data and information in an integrated manner. It is a computer-based system being built up and implemented in the IFFM Interagency Office in East-Kalimantan. FIS components are a part of the system with a particular function and role such as monitoring and detection, determining fire danger criteria, data analysis and information dissemination. The out put data of the FIS supports fire management planning and hence policy decision-making, prevention work and fire suppression. Input data are actual land use maps for East Kalimantan, in which the boundaries of all forest concessions, plantations and transmigration/settlement areas are outlined. Moreover, road infrastructure, human activities as well as drought index data generated from meteorological data will be integrated. Satellite imageries such as NOAA-AVHRR/NDVI, Landsat TM data and ERS-2-SAR data are the basis for further input data. Satellite information taken from NOAA-AVHRR, ERS-1/2 and Landsat TM provide useful and relevant fire information such as daily fire detection in real time, burn scar mapping, different vegetation types, vegetation and fuel conditions. Output data of the FIS will be on the provincial level as well as on district level, fire danger criteria and fire danger maps derived from the drought index (FDR), vegetation maps as well as the approximate fire location taken from AVHRR hotspot data. Based on this information effective prevention measures can be done on the local level. The detection and monitoring information and decisions made upon the FIS has to be distributed via telecommunication technology like radio, fax machine, e-mail and so on to the district fire centers. FIS information has to be further combined with information of resource availability (human resources and equipment) to ensure effective distribution of resources for fire management.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Integrated Forest Fire Management IFFM/GTZ, Jln. Harmonika, Perkantoran Dinas Kehutanan, Samarinda 75001, Phone: +62-541-32625, Fax: 62-541-33519 & Max Planck Institute for Chemistry, Biogeochemistry Department, PO Box 3060, D-55020 Mainz, Fire Ecology and Biomass Burning Research Group, c/o Freiburg University, PO Box, D-79085 Freiburg.

<sup>3)</sup> Max Planck Institute for Chemistry, Biogeochemistry Department, PO Box 3060, D-55020 Mainz, Fire Ecology and Biomass Burning Research Group, c/o Freiburg University, PO Box, D-79085 Freiburg.

# FOREST FIRE PREVENTION STRATEGIES FOR EAST KALIMANTAN<sup>1)</sup>

By  
Hartmut M. Abberger<sup>2)</sup> and Johann G. Goldammer<sup>3)</sup>

## ABSTRACT

After the fires of 1997/98 in Indonesia, particularly in the province of East Kalimantan, it is obvious that current fire management capacities and efforts are far from sufficient or suitable to handle such a problem. Although it is certainly necessary to build up fire suppression capacities so as to be able to fight fires efficiently and successfully, the overall fire management policy has to be prevention of fires of starting at all.

Community based fire management is one of the crucial approaches for the prevention of forest fires in protected forest areas as well as in concession areas. If fire management efforts are to be successful the participation of local people is a must.

The IFFM Fire Information System (FIS) as the basic planning tool provides data to help with the selection of communities in areas of concern that should be integrated into a step-by-step program. This program includes identification of fire related aspects, prevention campaigns, training and other steps necessary to build up an integrated fire management system at village level. It considers cultural and economic conditions, customary regulations (adat) as well as land use practices and conflicts. Chances and constraints for the success of such a program are addressed in the context of underlying fire causes.

Furthermore, this paper will discuss the role of the local government and also of concessions. It is hoped that in the long run, a network between the local government, communities, and concessions can be established.

A further issue is the awareness of the general public concerning the impacts of forest fires in East Kalimantan, that needs to be increased in a continuous process. IFFM has therefore designed a program to promote the Indonesian fire prevention mascot, "Si Pongi". Various extension materials have been produced so far and a school program is in process. Various media and forums are used with the intention of distributing the fire prevention message not only to East Kalimantan, but also all over Indonesia.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Fire Prevention Expert, Integrated Forest Fire Management Project (IFFM), Jln. Harmonika, Perkantoran Dinas Kehutanan, Samarinda 75001, Phone: +62-541-32625, Fax: +62-541-33519, email: [abberger@smd.mega.net.id](mailto:abberger@smd.mega.net.id); [iffmfire@smd.mega.net.id](mailto:iffmfire@smd.mega.net.id)

<sup>3)</sup> Fire Ecology Research Group, Max Planck Institute for Chemistry, Fire Ecology Research Group, The Global Fire Monitoring Center (GFMC), Max Planck Institute for Chemistry c/o Freiburg University, P.O.Box, D-79085 Freiburg, GERMANY, Fax: ++49-761-808012, Tel: ++49-761-808011, email: [jggold@uni-freiburg.de](mailto:jggold@uni-freiburg.de)



**ASSESSMENT OF SOIL EROSION ON THE REHABILITATED LAND  
AFTER  
FOREST FIRE BY “TAUNGYA” PLANTING SYSTEM IN THE UNMUL  
EDUCATION FOREST-BUKIT SOEHARTO, EAST KALIMANTAN<sup>1)</sup>**

**By  
Sigit Hardwinarto<sup>2)</sup>**

**ABSTRACT**

This research was conducted in the UNMUL Education Forest-Bukit Soeharto, East Kalimantan. A part of the area has been burnt in 1997/1998. The objective of this research was to clarify the quantity and quality of eroded soil on the rehabilitated land after forest fire by applying “Taungya” Planting System. The research sites comprised three rehabilitated lands by “Taungya” Planting System and one site without planting (after land clearing) as control. The eroded soil was measured directly by using the soil erosion plots and this data analyzed statistically.

The results revealed that “Taungya” Planting System was able to reduce the potential soil loss below the tolerable soil loss and the different results of soil nutrient in each erosion plot. The classification of erosion risk index on the research sites included in the low level category. The averages of soil loss from the smallest to be biggest were the planting combination between *Rubber & Corn*, *Shorea sp. & Paddy*, *Shorea sp. & Soybean*, and without planting (as control) respectively. The different soil loss was affected by some parameters such as planting space, rate of growth and crown cover area of the planting combination.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Laboratory of Soil and Water Conservation, Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**STUDY ON THE COMPATIBILITY OF USLE-UNIVERSAL SOIL LOSS  
EQUATION MODEL IN THE BUKIT SOEHARTO EDUCATION  
FOREST AREA<sup>1)</sup>**

**By  
Mubarizi Arifin<sup>2)</sup>**

**ABSTRACT**

Four vegetation cover were selected as erosion plot; that were underbrush and Alang-alang (*Imperata cylindrica*) desert represent the natural vegetation and corn as well as Pepper (*Piper nigrum*) plantation represent the artificial vegetation. Small plot experiment (22 x 4m in size for natural vegetation and 22 x 2m for artificial vegetation) was used to measure the actual erosion rate in the field. The main objective of the study is to know the compatibility of Universal Soil Loss Equation – USLE – model to the actual erosion in Bukit Soeharto forest area.

The result shows the USLE-model could be applied in Bukit Soeharto forest area, especially in the natural vegetation cover; However, in implementation, the USLE-model needs to be modified by considering the other factors of the Characteristic of precipitation and changing of physical soil properties.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**THE TREND OF SOIL EROSION  
ON THE AREA OF CLEAR CUTTING PINE (*Pinus merkusii*)  
FOREST PLANTATION<sup>1)</sup>**

By:

C. Nugroho Sulistyono<sup>2)</sup>, Chairil Anwar<sup>2)</sup> and Sadhardjo Siswomartono<sup>3)</sup>

**ABSTRACT**

*Pinus merkusii* forest plantation in Java island is usually planted in high elevation areas with steep slope, high rainfall and vulnerable to soil erosion. A research on the trend of soil erosion in the area of clear cutting pine forest plantation was carried out in Pekalongan Timur Forest District, Central Java under the collaboration between Watershed Management Technology Centre (WMTC) and Perum Perhutani, The State Forest Company from 1995-1997. The research was done to determine the trend of soil erosion on the clear cutting areas of *Pinus merkusii* using small plot measurements as artificial catchments in the last five years of the cutting time. This research also determined the critical time where the soil erosion rate is the same as or less than the tolerable erosion.

The result of the research shows that the erosion rate is very high in the first year after cutting time (16.80-24.47 ton/ha/year) and significantly decrease after 3 years from the cutting time. This means that the critical time is 3 years from the cutting time. The reforestation area using multiple cropping system (tumpangsari) is identified having very high erosion rate compared with the direct planting system (banjarharian). If the tolerable erosion is assumed to be the same as the soil development (2.77 ton/ha/year) and the cutting return period is 30 years, total erosion of these reforestation system (tumpangsari and banjarharian) would be below total soil development. In terms of forest land management, these systems are sustainable management because soil degradation during the critical time would be recovered back within the cutting return period. The special attention has to be taken in tumpangsari areas since the areas result in very high erosion rate during the critical time. An intensive of soil conservation practices is recommended as part of the reforestation system in the tumpangsari areas.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Researchers of Watershed Management Technology Centre (WMTC) Surakarta, Forestry and Estate Research and Development Agency, Ministry of Forestry of Indonesia.

<sup>3)</sup> Chief of Development and External Relations of Perum Perhutani, State Forest Company.

# SOIL CONSERVATION FOR REHABILITATING EX BURNING TROPICAL FOREST<sup>1)</sup>

By  
**Ambar Kusumandari<sup>2)</sup>**  
**Muhammad Ali Imron<sup>2)</sup>**

## ABSTRACT

Forest fire made different condition of the forest it self after the burning. The canopy fire types destroy most of canopy of big trees and fauna that live on there. The forest floor fire types destroy the ground cover, macro and micro fauna, and organic matters in the soil. Both of forest types changes the ecosystem of tropical forest.

Some efforts planned for rehabilitated this ex burning forests. Most of them tried to improve the vegetation condition. Site preparation is the beginning step for that improvement. It will effects to the soil condition. Cleaning the ground cover will effected to soil erosion, especially if there are in large areas. The soil quality will decrease, both on soil physically and soil chemistry condition.

The ex burning trees that still standing in the forest are another problem that facing on the efforts of rehabilitating forests. That trees are potentially to be row material for forest fire. It's needed to be finished where it will carry our of the forests or let the nature finishing the evolution process. Soil conservation technics that can be used for facing that problems will discussed in this paper.

Key words : Soil Conservation, Ex Burning Tropical Forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta.

# IMPACTS OF FOREST FIRE TO SOIL CHARACTERISTICS AT TEAK FOREST AREA<sup>1)</sup>

By  
Ambar Kusumandari<sup>2)</sup>

## ABSTRACT

Fire in teak forest is closely related with the social economic condition of forest people. Forest fire already caused impacts, one of them is impact to soil.

The objective of this research is to study the physical and chemical characteristics of soil in teak forest after burned. Besides, the objective is to understand the changes of soil physical and chemical characteristics after burned.

This research was carried out by taking some soil samples both in after burned teak forest and unburned. Soil samples were carried to the laboratory to be analyzed, both physical and chemical. The research result was analyzed statistically by using t-test.

The research result showed that forest fire reduces the soil physical characteristic showed by the reducing of porosity. On the other hand, forest fire increases the soil chemical characteristics showed by the increasing of pH, CEC, OM, N total and P available. Statistically, only OM and N total which were significant at burned and unburned teak forest. However available K was reduced because of forest fire.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta.

**THE EFFECT OF FOREST FIRE ON SOIL PROPERTIES : A CASE STUDY  
AT SUNGAI WAIN PROTECTION FOREST, EAST KALIMANTAN<sup>1)</sup>**

**By**

**Waliadi, Maming Iriansyah and Riskan Effendi<sup>2)</sup>**

**ABSTRACT**

Forest fire occurred at Sungai Wain protection forest in 1998 had caused various effect and one of them was on soil properties. Bulk density, soil pH, organic matter, carbon, nitrogen, CEC, Al<sup>3+</sup> and H<sup>+</sup>, available P, porosity and soil texture originated from both burnt and unburnt areas were studied. Soil samples were taken from 0-10 and 10-20 cm deep. The location of soil samples were upper, middle and lower slopes. The result presented in the paper include changes of soil physic : bulk density, porosity, infiltration and changes of soil chemical : pH (H<sub>2</sub>O and Kcl), Al<sup>3+</sup> and H<sup>+</sup>, organic matter, Nitrogen, Carbon and, available P.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Researchers at Forestry Research Institute Samarinda, Jl. Wahab Syahrani, P.O. Box 1206, Telp. 62-541-42298, Samarinda, East Kalimantan.

**POST-FOREST FIRE EFFECT ON SOIL TEMPERATURE  
AT *Acacia mangium* PLANTATION FOREST<sup>1)</sup>**

By  
**Ahmad Ainuddin Nurudin<sup>2)</sup> and Hanafi Muda**

**ABSTRACT**

This study was conducted to investigate the soil temperature and moisture changes after forest fire. This study was conducted at *Acacia mangium* in compartment 35, Hutan Simpan Rantau Panjang Selatan, Batu Arang, Selangor where 0.1 ha of the stand was burnt on the 30 May, 1998. Plots were established side by side at the burnt and unburnt part of the stand. Microclimatic parameters such air and soil temperature and soil moisture were monitored during the study period. Soil temperature measurements were carried out at different depth; 1 cm and 5 cm for burnt area and 1 cm depth at unburnt area. Soil moisture was also measured at two different depths, 1 cm and 5 cm in burnt and unburnt along a transect. The result showed that mean soil temperature during the study period at 1 cm depth for burnt and unburnt were 26.28°C and 26.01°C respectively. T-test analysis shows that the soil temperature at 1 cm depth was significantly higher at burnt and unburnt area. Soil moisture at both burnt and unburnt area was higher at 1 cm depth compared to 5 cm depth. At 1 cm depth, soil moisture at unburnt site was higher compared to burnt site. This study indicates that eventhough the burnt and unburnt area were few meters apart, the soil microclimate were different.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Malaysia.

**EFFECT OF FOREST FIRE ON LEAF DECOMPOSITION OF FOUR  
DIPTEROCARPS SPECIES AT SUNGAI WAIN PROTECTION FOREST,  
EAST KALIMANTAN<sup>1)</sup>**

By  
**Riskan Effendi and Maming Iriansyah<sup>2)</sup>**

**ABSTRACT**

The research was conducted at burnt and unburnt forest area at Sungai Wain Protection Forest. This protection forest was burnt in 1998. Four Dipterocarp species ie *Shorea laevis*, *S. ovalis*, *S. smithiana* and *S. parvistipulata* had been selected for this study. Leaves collection were done using leaf-trap placed under the selected trees about 1.3 m above ground. The leaves with certain weigh were put into leaf boxes made of alumunium covered with plastic net, measuring 50x50x15 cm. They were then placed on the forest floor at burnt forest (four location) and unburnt forest (four location). The distance between the boxes and the edge of burnt forest was about 100 m. A preliminary result of leaf decomposition in three months time were presented.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Researchers at Forestry Research Institute Samarinda, Jalan Wahab Syahrani, P.O. Box 1206, Telp. & Fax: 62-541-42298, Samarinda, East Kalimantan.



**SOILS UNDER DEGRADED ECOSYSTEMS IN EAST KALIMANTAN  
- A COMPARISON OF IMPERATA GRASSLAND, SECONDARY FOREST  
AND PRIMARY FOREST -<sup>1)</sup>**

By  
Seiichi OHTA<sup>2)</sup>, Kazuhito MORISADA<sup>2)</sup>, Nagaharu TANAKA<sup>3)</sup>, Yoshiyuki  
KIYONO<sup>4)</sup> and Syarif EFFENDI<sup>5)</sup>

**ABSTRACT**

Soils under *Imperata* grasslands and degraded secondary forests were compared with those under primary forests in East Kalimantan, Indonesia. The results revealed that forest degradation into grasslands or secondary forests does not cause deterioration in status of total C, N and P. On the contrary, the degraded ecosystems especially of the *Imperata* grasslands were even higher than in the primary forests. It was also noteworthy that the soils of the degraded ecosystems were not deteriorated in pH and exchangeable Ca, Mg and K, but were, on the contrary, ameliorated than the primary forest. Relatively short period (10-20 years) of forest degradation history in the area was presumed to enable the raised status of exchangeable bases and pH by ash supply to maintain at relatively higher levels. These findings demonstrate that the widely held belief that the soils of degraded ecosystems are deteriorated is not always true, and deterioration in base status may differ depending on degradation history. On the other hand, however, the soils under degraded ecosystems were revealed to be deteriorated distinctly in status of N and P, and their qualitative deterioration seemed to be a common phenomenon induced by forest degradation in the humid and monsoon tropics.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Environment Div., Forest and Forest Products Research Institute (FFPRI), P.O. Box 16, Tsukuba Norin Danchi, Tsukuba, Ibaraki, 305-8687, Japan.

<sup>3)</sup> Hokkaido Research Center, Forestry and Forest Products Research Institute, Hitsujigaoka 7, Toyohiraku, Sapporo, 062-00451, Japan.

<sup>4)</sup> Kansai Research Center, Forestry and Forest Products Research Institute, Nagaikyutaro-kan-yuchi, Momoyamacho, Fusimiku, Kyoto, 612, Japan.

<sup>5)</sup> Tropical Rain Forest Research Center, Mulawarman University, P.O. Box 1165, Samarinda 75117, East Kalimantan, Indonesia.

**EFFECTS OF LAND CLEARING BY SLASH-AND BURN TECHNIQUE ON  
SOIL CONDITION AND PLANT GROWTH OF INDUSTRIAL FOREST  
PLANTATION IN KUPANG, EAST NUSA TENGGARA<sup>1)</sup>**

By  
**I. Komang Surata<sup>2)</sup>**

**ABSTRACT**

The implementation of land clearing by slash-and-burn technique on Industrial Forest Plantation is preferred because the technique of burning is a way of land clearing that is the fastest and the cheapest and thus can be performed by the forest plantation company under its limited capability. This kind of cultivation as it is believed, brings on many problems and losses in the form of fire or forest fire, erosion and acceleration of decrease in soil fertility and biodiversity.

The aim of the experiment was to observe the effects of burning on soil condition on growth mahogany and teak and yield of corn on an Industrial Plantation Forest site. Two treatments, burning and no burning and three replicates of 2500 m<sup>2</sup> each were arranged in a completely randomized block design. The thicket in all plots were cut in August at 10 cm above soil surface. Burning treatment was undertaken in September, the green part of shrubbs thicket in unburn plot were left in the plots while the woody parts were moved out of the plots. No soil treatment was done in the preparation of planting site. The mahogany, teak and corn then panted early as soon as the rainy season come.

Results showed that in short term (i.e 1 year) burning will improved the availability of some nutrients such as Carbon, Nitrogen, P<sub>2</sub>O<sub>5</sub>, Potassium, Calcium and Magnesium and decrease the weed population (especially grasses). The burning was also increase the growth of mahogany, teak and the yield of corn. On the other hand, the burning increased run off and soil loss of each C-organik, Nitrogen and Fosfor.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Researcher, Forestry Research Centre, Kupang, Indonesia.

# CHANGES IN SOIL NUTRIENT STATUS AFTER ABANDONMENT OF SWIDDEN AGRICULTURE AT BENUAQ DAYAK VILLAGE<sup>1)</sup>

By  
Kazuhito MORISADA<sup>2)</sup>, Seiichi OHTA<sup>2)</sup>, and Syarif EFFENDI<sup>3)</sup>

## ABSTRACT

Soils under swidden agriculture at Benuaq Dayak village, East Kalimantan, Indonesia were studied. Comparison of the soils with 1, 3, 15 and 30 years fallow periods revealed that the nutrient stock in the soil changed with the fallow periods. The soils in the study area were much sandy and infertile as a whole. The nutrient stock in the soil was not necessarily replenished with 30 years of fallow. Soil carbon and available phosphorus were not built up for at least 15 years, and soil productivity was thought to be at the midpoint after a 15-year fallow period. The results indicate that the fallow period of more than 30 years is needed to build up soil productivity, and the present average fallow periods with 10.6 years may threaten soil productivity.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Environment Div., Forest and Forest Products Research Institute (FFPRI), P.O. Box 16, Tsukuba Norin Danchi, Tsukuba, Ibaraki, 305-8687, Japan.

<sup>3)</sup> Tropical Rain Forest Research Center, Mulawarman University, P.O. Box 1165, Samarinda 75117, East Kalimantan, Indonesia.

## VERTICAL TRANSPORTATION OF CHEMICAL ELEMENTS IN DIFFERENT VEGETATION<sup>1)</sup>

By  
Nagaharu Tanaka<sup>2)</sup>, Darul Aksa<sup>3)</sup>, Syarif Effendi<sup>3)</sup> and Seiichi Ohta<sup>4)</sup>

### ABSTRACT

Vertical transportation of chemical elements, mainly nutrients, via water movement was compared in different types of vegetation, including natural forest, an *Acacia* plantation, and devastated grassland in the Lowland Dipterocarp Forest area in East Kalimantan, Indonesia. The chemical composition of bulk precipitation changes as it dissolves substances while passing through the canopy or Ao layers. The concentrations of  $\text{Ca}^{2+}$ ,  $\text{K}^+$ , and  $\text{Mg}^{2+}$  increased from the bulk precipitation to the throughfall and Ao-percolated-water, decreased in the soil-percolated-water, and increased again in the stream water. The  $\text{NH}_4^+$  concentration did not change significantly, except for slight increases in the throughfall in every vegetation type. On the other hand, the  $\text{NO}_3^-$  concentration increased markedly in soil-percolated-water, especially in the *Acacia* plantation, although it did not change very much in other pathways. The N flux in the mineral surface soil of the *Acacia* plantation was 2 to 3 times larger than in the natural forest or grassland. The fluxes of Mg and K in the *Acacia* were also 4 to 5 times larger than in the other types of vegetation. In contrast, in the natural forest and grassland only the Ca flux changed drastically in soil. The *Imperata* grassland was assumed to be capable of conserving basic elements to a similar extent as natural forests, while the *Acacia* plantation tends to lose more Mg and K than the other vegetation.

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Hokkaido Research Center, Forestry and Forest Products Research Institute, Hitsujigaoka 7, Toyohiraku, Sapporo, 062-00451, Japan.

<sup>3)</sup> Tropical Rain Forest Research Center, Mulawarman University, P.O. Box 1165, Samarinda 75117, East Kalimantan, Indonesia.

<sup>4)</sup> Forest Environment Div., Forest and Forest Products Research Institute (FFPRI), P.O. Box 16, Tsukuba Norin Danchi, Tsukuba, Ibaraki, 305-8687, Japan.

# NUTRIENT CYCLE AS A TOOL FOR THE PLANTATION SUSTAINABILITY ASSESSMENT<sup>1)</sup>

By  
Syahrinudin and D. Ruhiyat<sup>2)</sup>

## ABSTRACT

Approaches to estimate the nutrient cycling in a six-year-old *Eucalyptus deglupta* plantation system were conducted. These include the biomass inventory, nutrient accumulation, input and loss measurement as well as the internal nutrient transformation measurement.

A huge amount of nutrients was stored in above ground biomass which may lead to nutrient shortage for the following rotations, especially for Potassium. More than 50% of the K in the system was stored in the above ground biomass.

The rate of nutrient uptake by the plantation system was twice to three times as much as the precipitation input together with the turnover. It may imply that without any adequate additional input to maintain the tree growth and soil resources of the successive rotations, the sustainable plantation of this species will never be achieved.

Furthermore, the rate of nutrient uptaken by undergrowth has already surpassed that of planted trees, while the turn over of undergrowth was much lower. This may imply that a sound undergrowth management is utmost important.

Key words: Plantation management – *Eucalyptus deglupta* – biomass inventory – nutrient measurement – nutrient cycle – plantation sustainability.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**THE IMPACTS OF FOREST FIRE ON SOIL WATER REGIME  
UNDER PINE PLANTATION OF NANGA PINOH  
IN WEST KALIMANTAN <sup>1)</sup>**

By  
**Herujono Hadisuparto <sup>2)</sup>**

**ABSTRACT**

Acreege of pine plantation in West Kalimantan was initially introduced in the late seventies in the upstream area of Kapuas drainage basin within the Melawi watershed. The plantation forest has frequently been disturbed by means of fire, primarily during the dry months. The forest fire has significantly affected soil water regime in terms of soil infiltration capacities, available soil moisture, and of course throughfall or net precipitation reaching the ground. These hydrological factors, in turn, have affects on the catchment behaviour during the wet months.

Infiltration of water ponding on the forest floor results from the combined forces of capillarity and gravity in the soil. The infiltration capacity average of unburned pine forest was measured 27.52 cm hr<sup>-1</sup>, whereas on the burned forest the average was 19.67 cm hr<sup>-1</sup> or 28.5 % below. Soil organic matter content was measured 3.24 % in the unburned and decreased to 2.53 % in the burned forest. The "small channel system" within the soil changed following forest fire in accordance with reduced pore sizes, primarily in older pine plantation where the total pore decreased from 66.11 % to 63.60 %. Available soil moisture content was higher in the burned than unburned younger forest, in the contrary it was lower in the burned than unburned older forest. Due to both forest canopy interception and stemflow, therefore, throughfall lowered to 76.5 %, except in the burned plantation forest. Nowhere, the older the pine forest the less intense the throughfall, but the higher available moisture content in the soil of either burned or unburned forest.

Key word: forest fire, infiltration, soil moisture, throughfall, watershed.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management. Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Professor of Forestry, Tanjungpura University, Pontianak.

# THE IMPACT OF FOREST FIRE ON HYDROLOGICAL CHARACTERISTICS: A CASE STUDY AT KONTO SUBWATERSHED, UPPER BRANTAS WATERSHED, EAST JAVA<sup>1)</sup>

By  
Sukresno<sup>2)</sup>, Paimin<sup>2)</sup>, and Chairil Anwar<sup>2)</sup>

## ABSTRACT

The occurrence of forest fire in Indonesia during 1997 was presumed as an impact of El-Nino. There were degraded and damaged forest environment by at least 96.700 ha of forest concession area (HPH/HPHTI), 121.630 ha of estate area and 700 ha of pest soil forest area both in Java and outer islands. The impact of forest fire, as resulted by El-Nino occurrence during 1997, on watershed hydrological characteristics parameters were evaluated using a unit hydrological model. The hydrological parameters of unit hydrographs such as peak flow (qp), time to peak flow (tp), and time base (tb) were utilized as a basis of evaluation. The case study was conducted at Konto Subwatershed, the upper Brantas Watershed, Malang District, East Java Province, which covers an area of 5,725 ha. The subwatershed consists of 53 % of protective forest, 11% of productive forest, and 36 % of nonforest area where 114 ha of productive forest area was fired in 1997. Therefore, four time periods of 1995, 1996, 1997, and 1998 were chosen for this study that indicate the conditions of before, during, and after forest fire and El-Nino occurrence. Although the burned forest area only covered 2% of the catchment area, it significantly has had an impact on the hydrological characteristics condition. The results of study indicated: 1) The peak flow (qp) increased significantly from 0.535 m<sup>3</sup>/sec (1995) to 1.111 m<sup>3</sup>/sec (1997) and 0.951 m<sup>3</sup>/sec (1998), 2) The time to peak flow (tp) shortened significantly from 1.75 hour (199) to 1.14 hour (1998), 3) The time base (tb) shortened significantly from 14.25 hour (1995) to 8.08 hour (1997), and 4) One year after forest fire which incorporated with El-Nino occurrence have yet indicated an impact in increasing the peak flow (qp) and lessening the time to peak flow (tp).

Keywords: Forest fire                      El-Nino                      Peak flow (qp)  
Subwatershed (SWS)                      Time base (tb)                      Time to peak (tp)  
Unit hydrograph.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics. Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Researchers at The Watershed Management Technology Center (WMTC) of Surakarta, Forestry and Estate Research and Development Agency, Ministry of Forestry and Estate, P.O. Box 295, Surakarta, Telp/Fax. (062 271) 716709, 716959.

# MORPHOLOGICAL AND PHYSIOLOGICAL PROTECTIONS FOR PHOTOINHIBITION IN THE TOP CANOPY LEAVES OF TROPICAL AND SUB-TROPICAL TREES<sup>1)</sup>

By  
Atsushi ISHIDA<sup>2)</sup>, Takeshi TOMA<sup>3)</sup>, Takashi NAKANO<sup>4)</sup>, and Marjenah<sup>3)</sup>

## ABSTRACT

Avoidance mechanisms for photoinhibition were examined *in situ* in the top canopy leaves of several tropical and sub-tropical trees, from view points of morphological and physiological aspects. Vertical leaf inclination angles in *Macaranga confera* and dense-and-red hairs on leaf adaxial surface in *Planchorella obovata*, contributed to maintain relatively high photosystem II (PSII) quantum yield at daytime. When prolonged drought occurred in 1998 in East Kalimantan, net photosynthetic rate ( $P_n$ ) decreased at midday in the leaves of *M. confera*. The reduced  $P_n$  was mainly limited by low stomatal conductance and resulting reduced leaf intercellular  $CO_2$ , rather than by high leaf temperature. From simultaneously measurements of  $P_n$  and electron transport rate through PSII, it is estimated that ATP was mainly consumed by photorespiration rather than by  $P_n$ . The high photorespiration would protect PSII from chronic photoinhibition. Interspecific variations in photochemical capacity of PSII were found. Although *P. obovata* and *Hibiscus glaber* are co-exist species in Bonin islands, the photochemical capacity was lower in *P. obovata* than in *H. glaber*. The canopy showed higher leaf area index and more vertical leaves angles in *P. obovata*. The linkage between photochemical capacity and canopy structure would due to enhance a carbon gain at whole-plant level.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Environment Division, Forestry and Forest Products Research Institute (FFPRI), P.O. Box 16, Tsukuba Norin Danchi, Ibaraki 305-8687, Japan.

<sup>3)</sup> Tropical Rain Forest Research Center (PUSREHUT), Mulawarman University, P.O. Box 1165, Samarinda 75117, East Kalimantan, Indonesia.

<sup>4)</sup> Yamanashi Institute of Environmental Science (YIES), Fuji-Yoshida, Yamanashi 403-0005, Japan.



**RESPONSES OF TROPICAL RAIN FORESTS TO THE 1997-98 DROUGHT  
IN STANDING-LITTER FUEL LOAD AND LITTER FLUX ON A SLOPE OF  
MT. KINABALU, BORNEO<sup>1)</sup>**

By  
**Kanehiro Kitayama<sup>2)</sup> and Shin-Ichiro Aiba<sup>3)</sup>**

**ABSTRACT**

The amount and seasonal timing of litter flux are the two factors in determining the standing litter crop (i.e. fuel load), and hence the susceptibility of forests to fire. We investigated whether the tropical rain forests that occur at a range of altitudes under variable climates on a mountain slope differed in the response of litter flux to the 1997-98 drought on Mt. Kinabalu (4095 m). Dry weather conditions with rainfall <50 mm/mo started in December 1997, and culminated in March 1998 with rainfall <5 mm/mo. The peak of fine litterfall flux appeared in the same month (March) at all altitudes. The peak litter flux in March 1998 compared in March 1997 increased by 60% at 700 m, 80% at 1700 m, 100% at 2700 m, and 180% at 3100 m. Thus, upland than lowland forests were more susceptible to the drought, probably reflecting that upland trees were acclimatized to a cooler and wetter upland climate during normal years. Yearly mean standing litter crop (kg/m<sup>2</sup>) during normal years (1996-97) ranged from 0.66 at 700 m to 0.73 at 3100 m. Therefore, the drought resulted in dumping of considerable amounts of litter detritus on forest floor, particularly at higher altitudes.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Forestry and Forest Products Res. Inst., Tsukuba, Japan

<sup>3)</sup> Faculty of Sciences, Kagoshima U., Japan.

# PERSPECTIVES OF SEMI-NATURAL SILVICULTURE OF DECIDUOUS FORESTS IN THAILAND<sup>1)</sup>

By  
Dr. Horst Weyerhaeuser<sup>2)</sup>

## ABSTRACT

In 1938 more than 70% of Thailand was covered by forests. Of this, less than 20% remain. Large scale commercial and illegal logging together with a rapid increase of urban areas and industrial estates can be made responsible. Remaining forests are mostly disturbed and in different degrees of degradation. Fire plays a major role in impeding regeneration and overall species composition. No silvicultural management is applied.

This paper outlines structure, composition and silvicultural potential of DDF and MDF. The future prospects and potential of these forests in respect to semi-natural silvicultural management is investigated by:

- ◆ **Identification and classification of forest stands via aerial photograph analysis**
- ◆ **Set up of permanent research plots to assess species distribution, composition and community structure by cluster and correspondence analysis and growth and yield**
- ◆ **Assessment of Silvicultural Potential**

Based on the statistical analysis and DBH, height and crown diameter relationships, dependencies were investigated and utilised for a restricted growth prognosis. Growth prognosis revealed annual volume increment of 5 m<sup>3</sup>/ha for MDF. Applying semi-natural silvicultural techniques by selecting potential crop trees and their subsequent liberation and the refining of the stand resulted in an apparent volume growth reduction to 3.4 m<sup>3</sup>/ha.

Depending on structure and state of disturbance, high intensity and low intensity semi-natural management schemes can be suggested for economically feasible and sustainable future management.

Key words: Dry Dipterocarp Forest (DDF), Mixed Deciduous Forests (MDF), Semi-Natural Silvicultural Management, Fire Succession,

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Natural Resources Department ICRAF, P.O. Box 267, CMU, Chiang Mai 50202, Thailand.

**FIRE AND HUMAN IMPACTS ON ABOVEGROUND BIOMASS  
OF LOWLAND DIPTEROCARP FORESTS  
IN EAST KALIMANTAN<sup>1)</sup>**

By  
**Takeshi TOMA<sup>2)</sup>, Paulus Matius<sup>3)</sup> and Maman Sutisna<sup>3)</sup>**

ABSTRACT

Aboveground biomass depletion induced by selective logging and fire disturbance was examined in lowland dipterocarp forests in East Kalimantan. Changes in aboveground biomass of the studied forests were estimated from DBH inventory data and the allometric correlation method. Selective logging operation in primary dipterocarp forests at Meratus killed 105 trees ha<sup>-1</sup> and decreased the aboveground biomass from 367 to 180 t ha<sup>-1</sup>. The second felling operation in the Bukit Soeharto Education Forest (BSEF), where had been logged selectively before 1978 and burnt by the 1982-83 fires, killed 94 trees ha<sup>-1</sup> and decreased the aboveground biomass from 264 to 160 t ha<sup>-1</sup>. During the severe drought in 1998, wild fires occurred and burned the BSEF. Tree mortality induced by the 1998 fire in the felled and control stands in the BSEF was 80.9% and 68.5%, respectively. Aboveground biomass loss induced by the 1998 fire in the felled and control stands was 102 and 147 t ha<sup>-1</sup>, respectively. Aboveground biomass of the felled and control stands after the fire was 51 and 159 t ha<sup>-1</sup>, respectively.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Tropical Rain Forest Research Center, Mulawarman University, P.O. Box 1165, Samarinda 75117, East Kalimantan, Indonesia.

<sup>3)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

# POTENTIAL OF RESIDUAL STAND AFTER DIFFERENT TREATMENT OF FELLING AND FOREST FIRE<sup>1)</sup>

By  
Oman Suherman<sup>2)</sup>

## ABSTRACT

The research aimed to know the living and dead trees on burnt over forest area in Bukit Soeharto. Three level of limit cutting was applied consisting of 50 cm, 30 cm and no cutting. Each treatment was applied in one hectare each with three replication.

Result indicated that the stand living trees/ha were 62 trees (120, 78 m<sup>3</sup>), 65 trees (31,03 m<sup>3</sup>) and no cutting 163 trees (130,80 m<sup>3</sup>) while the dead trees/ha were 198 trees (136,55 m<sup>3</sup>), 178 trees (64,33 m<sup>3</sup>) and no cutting 249 trees (90,32 m<sup>3</sup>).

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**THE IMPACTS OF FOREST FIRES ON SEEDLINGS AND SAPLINGS  
STRUCTURE IN PRIMARY DIPTEROCARP FOREST  
AT SUNGAI WAIN PROTECTED AREA, EAST KALIMANTAN,  
INDONESIA<sup>1)</sup>**

**By  
Aldrianto Priadjati<sup>2)</sup>**

**ABSTRACT**

This research was a part of the "Integrated survey on the impact of fire and drought on the ecosystem of the Sungai Wain Protected Forest" that was executed by The International MOFEC-Tropenbos Kalimantan Project. The objectives of this research were to determine the impacts of fires on the structure and composition of seedlings and saplings, to comprehend the vegetation changes and species domination caused by fire and to know about succession phases running on damaged or opened forest. The other objective was to know the effect of the fire edge on the seedlings and saplings compositions.

In the end of September 1998, nine permanent plots were established in the burned primary forest and nine permanent plots in unburned primary forest that are located continuously. Each plot is divided into ten sub-plots that are placed in a Systematic Line Sampling Along 20-m intervals, each plot was divided into 5 m x 5 m and 2 m x 2 m sub-plots and arranged in nested sampling, respectively. All saplings which have height more than or equal to 150 cm and diameter at 130 cm less than 8 cm were numbered, measured, tagged and identified (enumerated) at all 5 m x 5 m sub plots. All seedlings that had height less than 150 cm and occurred in 2 m x 2 m sub-plots were numbered, measured, labeled and identified (enumerated) as well. Light intensity, humidity and temperature were also recorded along burned and unburned forest three times a day (07.00, 12.00 and 16.00) for a month period. Several indices such as species richness and important value index were used to evaluate the change in vegetation diversity due to forest fire. Curtis' importance value index has been used to describe and compare the species and family composition in both conditions. The complete results will be presented during the symposium.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> The International MOFEC-Tropenbos Kalimantan Project, Wanariset Samboja, P.O. Box 319 Balikpapan 76100, Indonesia.

# FOREST FIRE INTENSITY, THE RESULTING DAMAGE AND THE CORRELATION WITH REGENERATION<sup>1)</sup>

By  
Sumardi<sup>2)</sup>

## ABSTRACT

Damage of forest fire on regeneration and young trees were studied in burnt out tropical rain forest at three levels of fire intensity. New regeneration of undergrowth and tree seedlings was also measured using milliacre sampling plots. Fire intensity was determined following the existence category (IPB, 1999). The results showed that forest fire at all intensities burnt out undergrowth and young regeneration. Fire with high intensity also burnt out saplings and poles. Only small numbers of saplings and poles remained survive in areas with moderate forest fire, whereas light forest fire burnt out only small number of poles. No pattern could be formulated to differentiate resistance of tree species against fire in areas with the same forest intensity. Zingiberaceae, Cicas, rhizomes grass were those which predominated the early undergrowth coverage, indicating that soil temperature raised (far) bellow lethal point for regrowth. Earthworms and some soil insects found in the soil was also another indication of small temperature fluctuation during burning. At least ten tree species were recorded in areas 10 months after high forest intensity, where "mahang" and "medang" were the most species to be found. In moderate and light forest intensity, at least 15 tree seedlings were recorded on moderate and light forest intensity.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Lab. of Forest Protection, Faculty of Forestry, Gadjah Mada University, Yogyakarta

**INITIAL PHASE OF SECONDARY SUCCESSION AT THE BURNT  
LOGGED-OVER FOREST IN BUKIT SOEHARTO, EAST KALIMANTAN,  
INDONESIA – WHICH VEGETATION TYPES ARE FACILITATION OR  
COMPETITION PROCESS?<sup>1)</sup>**

By  
Shigeo Kobayashi<sup>2)</sup>, Maman Sutisna<sup>3)</sup>, Achmad Delmy<sup>3)</sup>, Takeshi Toma<sup>4)</sup>

**ABSTRACT**

Plant population dynamics on an initial phase of secondary succession will be suggested facilitation or competition process at a degraded burnt logged-over forest toward an original forest. This clarification of secondary succession process gives us the perspective for the rehabilitation of degraded forest ecosystems. Therefore, purpose of this study are to clarify the changes of vegetation at the initial phase of that secondary succession and determine the vegetation types which one is facilitation or competition process based on the species composition. We set 45 of 2m x 2m quadrat at 9 of each one hectare experimental plot at the burnt forest after experimental selective harvesting with two different intensities. Half and one year after burn, vegetation and their types change vigorously. We recognized five types of recovered vegetation such as woody shrub, climber, fern, herbaceous and *Imperata* types 15 months after burnt. Woody shrub is classified into two types, *Macaranga* type and *Trema* type. These vegetation types are depending on site conditions caused by soil, landform, and intensity of fire and harvesting. From the vegetation changing, Fern, Climber and *Imperata* types seemed to become competition process. The Woody shrub (two types are different behaviors) and Herbaceous types are playing more facilitation process.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Center for International Forestry Research (CIFOR), Bogor.

<sup>3)</sup> Faculty of Forestry, Mulawarman University, Samarinda.

<sup>4)</sup> Japan International Cooperation Agency (JICA), Samarinda.

EFFECTS OF THE FOREST FIRE 1998 ON THE FAMILY OF GIBBON  
—A FAMILY IN NEED IS A FAMILY INDEED<sup>1)</sup>

By  
Teruki OKA<sup>2)</sup>

ABSTRACT

The Bornean gibbon, *Hylobates muelleri*, is one of the most conspicuous species that characterizes the lowland tropical rainforest in Kalimantan. However, nowadays, many gibbon populations are limited in small isolated remnants and become vulnerable to local extinction. Worse still, the forest fires 1997-1998 in Indonesia, exacerbated by strong droughts related to the ENSO event, have devoured vast areas of their habitat. Here, I report how gibbons were influenced by the fire. The field survey was conducted at the Bukit Soeharto Education Forest before (December 1995 to October 1997) and after the fire (December 1998 to February 1999). As of 1997, there were 21 individuals from 6 different groups in the study area. Every group was a nuclear family based on a mated pair and highly territorial. Habitat degradation by the fire has caused disappearance of 6 individuals including 2 infants and disruption of one family. Home ranges of surviving groups have extended more than twice as large as they were. Furthermore, home ranges of 4 pairs have come to largely overlap each other. Application of the DNA fingerprinting technique employing minisatellite hypervariable regions of DNA has revealed that there is a quite possibility of kinship among these 4 pairs.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management. Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Primate Research Institute, Kyoto University, Inuyama, Aichi 484-8506.



# THE EFFECTS OF DROUGHT AND FIRE ON ORANGUTANS REINTRODUCED INTO SUNGAI WAIN FOREST, EAST KALIMANTAN<sup>1)</sup>

By  
Anne Russon<sup>2)</sup> and Adi Susilo<sup>3)</sup>

## ABSTRACT

The Wanariset Orangutan Reintroduction Project reintroduced 82 ex-captive orangutans to free forest life in Sungai Wain Protection Forest from 1992 to 1997. The lengthy drought of 1997-9 coupled with the fires that swept through Sungai Wain Forest in March and April of 1997 likely had serious effects on these orangutans. We concluded orangutan nests in the forest and analyzed available behavioral data in an effort to assess these effects. We censused nests throughout the unburned forest 25-45 months after the fires. This census indicated a total of no more than 13-17 orangutans remaining in the forest and distribution patterns of the nests suggest that orangutans moved towards the west side of the forest in response to the fires. We subsequently censused nests in adjacent burned-over areas of forest, along rivers within the forest and at the forest periphery, and in far northern areas of unburned forest; all three areas showed very low nest densities and very little evidence of current orangutan presence. A comparison of the age distribution of nests in Sungai Wain after the fires and similar distributions for wild populations surveyed during normal climatic conditions showed an unusually high proportion of older nests in Sungai Wain, suggesting that reintroduced orangutans left Sungai Wain forest, or died, under the combined effects of drought and fire. Behavioral data collected from 1996 to 1999 suggested some of the qualitative changes in the orangutans ranging and diets associated with drought and fires: their tendency was to shift their ranges to the west and to add new permanent foods to their diets. Overall, the orangutans remaining in Sungai Wain appear to have coped well with the fires and drought. The remaining populations in now, however, very fragile. It is too small to survive independently and it is highly vulnerable, given the reduced size of the reserve and increased human incursion. Despite these ex-captive orangutans' demonstrated abilities to survive independently under extremely adverse conditions, greater protection should be provided.

Key words: Sungai Wain, protection forest, orangutan distribution, forest fire, nest census.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Researcher, Orangutan Reintroduction Project at the Ministry of Forestry and Estate Crops-Tropenbos Kalimantan Project, Wanariset Samboja and Associate Professor of Psychology, Glendon College of York University, Toronto, Canada

<sup>3)</sup> Manager, Orangutan Reintroduction Project, and Researcher of Forestry Research Institute Samarinda.

# THE ROLE OF GALLERY FORESTS AS AN REFUGEE FOR WILDLIFE COMMUNITIES AGAINST FOREST FIRE<sup>1)</sup>

By  
Djuwantoko<sup>2)</sup>

## ABSTRACT

Base on landscapes perspective, forests can be classified of any types, including gallery forests which importance of protecting for wildlife habitat. Indonesia had much gallery forests that can be found on the wetland or inundated areas, e.g., forests in the vallery or along riverbank. Micro habitat of gallery forests had significant role as an protector for any kind wildlife communities against forest fire.

Gallery forests can play role as refugees the year around for wildlife communities in tropical rain forests, for examples in East Borneo, in Kutai National Park and in monsoon forest habitat such in teak forests (Jawa). Wild forest fire cannot burn gallery forests totally, but just the nearby areas. Gallery forests support of any wildlife requirements such as covers and food resources. Food items are not only forest flowers and fruits, but also the new growth of water grass, reeds, and vines, the immature seed head of water grass; bark, dried sap or gum, and insects.

Unfortunately, most of gallery forests had already been damaged by any human activities. This paper try to revitalice of ecological function and reposition status of the gallery forests in relating to presence situation for combating forest fire.

Key words : Gallery forest, refugee, wildlife communities.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Dr. Ir. Djuwantoko, M.Sc. Wildlife Ecology and Management, Lecturer at Faculty of Forestry, Gadjah Mada University, Bulaksumur, Yogyakarta.

# THE IMPACT OF FIRES ON THE BIOMASS OF MUSHROOM FUNGI<sup>1)</sup>

By  
Sri Rahayu<sup>2)</sup>

## ABSTRACT

In order to comprehend the different of mushroom fungi biomass after Forest fires, a research was carried out in Jambi. There were 3 plots with size of 40 x 40 m<sup>2</sup> i.e. A, B and C, each of plot split into 256 sub plots with size of 2,5 x 2,5 m<sup>2</sup>. Plot A was natural primary forest, plot B was secondary forest with less than 3 times of fires, and plot C was secondary forest with more than 3 times of fires.

Mushroom parameter recorded were total number of genus/plot, estimating biomass of each genus/sub plot and total biomass of all genus/plot. The data was analyzed by Anava and identification of genus name was done at the Laboratory of Forest Pathology, Faculty of Forestry, Gadjah Mada University, Yogyakarta.

In the primary natural forest (plot A), there were 20 genus of mushroom with 920,7 g of total dry weight that distribute in the 97 subplots (9/49 g/m<sup>2</sup>). In the plot B there were 16 genus of mushroom with 2851,9 g of total dry weight that distribute in the 52 subplots (54,8 g/m<sup>2</sup>) and in the plot C there were 10 genus of mushroom with 11.015,4 g that distribute in the 20 subplots (550,8 g/m<sup>2</sup>).

Key words : Fires impact, biomass, mushroom.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics. Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta

**MICROBIAL STATUS BEFORE AND AFTER FIRE  
IN BUKIT SOEHARTO EDUCATION FOREST SAMBOJA  
EAST KALIMANTAN<sup>1)</sup>**

By  
E. Iskandar<sup>2)</sup> and Ida Nurhifiani<sup>2)</sup>

**ABSTRACT**

The studies were conducted at Bukit Soeharto, Mulawarman University Education Forest which donated by Directorate General High Education Department of Education and Culture, Republic of Indonesia in 1997 (before fire) and CIFOR in 1998 (after fire) in the same plots (9 plots = 9 ha.) to investigate the amount of microorganisms especially Actinomycetes, Bacteria and Fungi.

Before fire 9 plots prepared as Control (undisturbed forest), Light cutting ( $\geq 50$  cm diameter) and Heavy cutting ( $\geq 30$  cm diameter), each treatment has 3 replicates. After fire almost all of the plots burnt in the same time and intensities. The soil sample taken by soil auger (8 cm diameter and 25 cm long) from the top, incline and valley of the hill in the depth of 0-25 cm. And 25-50 cm., each soil sample put in the polybag. In the laboratory each sample prepared for microbial analyses.

The results of studies were those amounts of Actinomycetes, Bacteria and Fungi in each treatments before fire smaller than after fire in each place. The identification of soil fungi known as *Alternaria* sp., *Aspergillus* sp., *Aerobasidium* sp., *Botrytrichum* sp., *Chrysosporium* sp., *Fusarium* sp., *Glyocladium* sp., *Mucor* sp., *Penicillium* sp., *Periconia* sp., *Phyalophora* sp., *Sepedonium* sp. and *Trichoderma* sp. After fire the species of fungi identified as *Aspergillus erythrocephalus*, *A. sydowii*, *Aspergillus* sp., *Gliocephalis* sp. *Mariannaea* sp. *M. ellegans*, *Mortierella polycephala*, *M. parvispora*, *Mortierella* sp. *Mycellia sterilia*, *Verticillium chlamiydospora* and *V. psalliotae*.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> The Staff member of Faculty of Forestry and PUSREHUT Mulawarman University.

# EVALUATION ON THE PROPERTIES OF WOOD MATERIALS FROM THE FIRE-ATTACKED FORESTS<sup>1)</sup>

By  
Han Roliadi<sup>2)</sup> and A. Ng. Gintings<sup>2)</sup>

## ABSTRACT

The recent Indonesian forest fire which broke-out almost beyond control has caused considerable damages to the country environmentally and financially. The financial loss was among others the destruction of production forest as recorded at approximately 62 percent. Accordingly, this could degrade the qualities/properties of naturally combustible wood materials from the fire-attacked forest. The question which may raise is whether the fire-attacked wood-materials are still useful, as with the undisturbed/regular woods, for their conversion into useful products, i.e. solid-wood structures, wood-composites, and pulp/paper, since these materials require certain related qualities/properties.

Fire-attacked woods can undergo reduction/changes in their qualities/properties, i.e. strengths, physico-chemicals, and durabilities. These changes depend on wood species in the fire-attacked forest, location of wood portion inside its burnt trees, and duration of the forest-fire's occurrences. Whatever changes, woods have some beneficial thermal-characteristics, i.e. low-heat conductivity, high-ignition temperatures, slow-charring rate, and effective-resistance to sudden substantial changes in temperatures. Consequently, some qualities/properties of the fire-attacked woods can expectedly be maintained, at some extent, comparable to the undisturbed/regular woods, and then still beneficial for useful products' conversion. Information about fire-attacked Indonesian woods' properties is still limited, therefore, intensive investigation on them is necessary.

Keywords: fire-attacked forest-woods, forest-fire, production-forest, qualities/properties of woods, thermal characteristics, undisturbed/regular forest-woods, and useful wood products.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Senior Research Scientist at the Forest Products Research and Development Center, P.O. Box 182, Bogor 16001, Indonesia, Telp. 011-62-251-326378 and -313613, Fax: 011-62-251-313613, E-mail: <slitbang@indo.net.id>

# FIRE IMPACT TO WOOD BIOLOGY<sup>1)</sup>

By  
Dr. Agus Sulistyo Budi<sup>2)</sup>

## ABSTRACT

Forest fire in East Kalimantan has destroyed almost wood-plants in the area, and to leave some categories of trees, namely: the death burned trees, moulted trees, stress trees and burning-proof trees.

Dendrochronology use the trees as object of recorded data in the past, for example if the trees in the burned juggle are still alive, the physical wounding will still be recorded in the wood tissue, whereas the reaction between the trees or individuals can be varieties depend on the species and the burning process. Generally they can be classified as followed: 1). The wood created the smaller pores but dense, in the concentric pattern. 2). There are a changing on dimension and intensity of axial parenchyma. 3). Producing more axial intercellular canal. 4). Becoming the rotten spots in the wood tissue. 5). Creating the concentrical structure of fibres area or too late in forming the vessels. 6). Creating the new calluses and to cause the unsilindrical bole. 7). The wood produced the abnormal included gums. 8). The bole becoming hollow.

The research indicated that the wood deterioration in the trees were more influenced by pasca-fire (after forest fire) conditions or attacking of fungi, bacteria and insects rather than by fire it self, where it's effect on woods were varieties depend on the durability and properties of wood. Here, we can group into Merabung/Sengon type, Akasia/Medang type, Ulin Type and Leda type.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Staff in Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**DETERMINATION OF LOCAL VOLUME FOR THREE SPECIES OF  
COMMERCIAL TREES (MERANTI, KAPUR AND BANGKIRAI)  
IN THE AREA OF HPH PT. KIANI LESTARI  
EAST KALIMANTAN<sup>1)</sup>**

By

**Ir. Oman Suherman, M.Sc.<sup>2)</sup>**

**Prof.Dr.Ir. J. Siahaya, M.F.<sup>2)</sup>**

**ABSTRACT**

Commonly the values of volume of a tree are counted by its diameter and height. In this paper, we only use the diameter as a key to recognize how the volume is, and the table of volume delivered is called "tariff".

The three kinds of tariff, each for meranti, kapur and bangkirai, have found as follows:

(1) Meranti,  $V = 0,000669 D^{2,100511}$ , ( $r^2 = 0,85$ ); (2) Kapur,  $V = 0,00248 D^{2,055521}$ , ( $r^2 = 0,79$ ), and (3) Bangkirai,  $V = 0,000248 D^{2,356924}$ , ( $r^2 = 0,82$ ).

Where:  $V$  = Volume of a tree (dbh  $\geq$  40 cm), m<sup>3</sup>.

$D$  = Diameter at breast height (dbh), cm.

$r^2$  = Coefficient of determination, in decimal or in percent.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

# YIELD PREDICTION MODELS FOR DIPTEROCARPS NATURAL FOREST STAND IN BUKIT SOEHARTO IN PREPARATION OF FOREST PLANNING<sup>1)</sup>

By  
J. Siahaya<sup>2)</sup>

## ABSTRACT

In preparation of forest planning a yield prediction model is badly needed since it can determine the values of yield table where the forest planning uses the table. To plan a forest stand cutting and caring there are three important elements needed to know and refer, namely: time, place and stand potency. Stand potency can be divided into three kinds: (1) The number of trees per hectare, (2) Basal area per hectare, and (3) Volume per hectare as a yield.

Two yield prediction models for Dipterocarps natural forest stand were developed and described in this paper. The first model was formulated as a system of two simultaneous equations involving basal area and yield as two endogenous variables. The system of equations was considered just identified. Hence, two-stage least squares (2SLS) method was used as an estimation procedure. The second model was a single yield equation whose parameters were estimated by ordinary least squares (OLS) method.

The results are as follows:

(1) The 2SLS method;

1.1. Basal area equation:  $B = -166.6723 + 0.0403 N^{**} - 1.2591 H + 181.5679 F - 0.1610 P + 0.7762 K^{**}$ ;  
 $R^2 = 0.7812^{**}$

1.2. Yield equation:  $Y = -137.5464 + 5.3432 B^{**} + 8.5633 H + 83.4272 F$ ;  $R^2 = 0.7738^{**}$

(2) The OLS method;

Yield equation:  $Y = -73.3405 + 4.4431 B^{**} + 8.3120 H + 18.1711 F$ ;  $R^2 = 0.7770^{**}$

Where:

B = basal area (m<sup>2</sup> / ha)

Y = yield (m<sup>3</sup> / ha)

N = number of trees per hectare

F = average tree form factor in the stand by diameter class

P = average slope of topography in the stand (%)

K = average circumference of trees in the stand (cm)

H = average height of stand (m)

R<sup>2</sup> = multiple determination coefficient

\*\* = significant at level 1%.

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.



# DO BURNT TROPICAL RAIN FOREST NEED TO BE REHABILITATED?<sup>1)</sup>

By  
Ngakan Putu Oka<sup>2)</sup>

## ABSTRACT

This successive study has been conducted in Kutai National Park from 1984 to 1994 to know the recovery process of tropical rain forest after fire, and than to consider what to do with the burnt forest areas. The recovery processes were compared among forest with different fire intensities. Results indicated that 11 years after fire, total basal area of trees in plot with high fire intensity was still much smaller than that in plot with low fire intensity. Although, the number of species in plot with high fire intensity has matched that in plot with low fire intensity, species composition of forest between the two plots was quite different. Plot with low fire intensity was dominated by primary species, while that with high fire intensity was dominated by secondary species. These data indicate that recovering process in the burnt over forest areas had gone on naturally.

However, in the intensively burnt areas, the process is still in early stage, even at 11 years after fire. Rehabilitation is necessary in the intensively burnt areas for accelerating the recovery process. Investigation made just after the 1997-98 forest fire indicated that forest burnt for the second time absolutely needs to be rehabilitated.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Lab. of Forest Ecology, Faculty of Agriculture, Hasanuddin University, Ujungpandang.

# CURRENT OPTION OF REHABILITATION TECHNIQUES FOR DEGRADED MIXED DIPTEROCARP FOREST<sup>1)</sup>

By  
Yasuyuki Okimori<sup>2)</sup>

## ABSTRACT

Objective of this research is to study effects of several rehabilitation methods on different types of degraded vegetation by means of, particularly, enhancing natural regeneration and enrichment plantings.

Research station was in Education forest of Gadjah Mada University, Jambi province, central Sumatra. Tree vegetation around the research station is roughly classified into residual forest after logging, secondary forests of fallow land, jungle rubber, *Imperata cylindrica* grass land. Reforestation methods should be adapted to the degraded conditions and their reforestation aims. 1) Releasing trees for creating artificial gaps enhance the growth of natural dipterocarp saplings, however the population structure may not become steady. 2) Enrichment planting exceeds the natural sapling growth under the forest. The species and releasing intensity should be best in moderate light intensity. 3) Mixed planting of dipterocarp seedlings with fast-growing trees or rubber trees. The above methods are applicable to rehabilitate the logged-over forest as a practical method. Combination should be more considered on silvicultural system between the enhancement of natural saplings and the enrichment plantings. Important thing is how to integrate these ecological techniques. Future subject is consideration of proper cost-performance in the plantation practice.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Biological Environment Institute, KANSO (Kansai Environmental Engineering Center) 8-4 Ujimatafuri, Uji, Kyoto, Japan.

# TAUNGYA EXPERIMENT FOR REHABILITATION OF BURNT-OVER FOREST IN BUKIT SOEHARTO, EAST KALIMANTAN<sup>1)</sup>

By  
Maman Sutisna<sup>2)</sup>

## ABSTRACT

The burnt-over forest lands should be rehabilitated through a physically and socially adapted method. Taungya system is considered as an appropriate method to rehabilitate burnt-over forest lands, because of its opportunity to gain immediate yield from the forest land in a form of agricultural harvest.

*Hevea brasiliensis* and *Shorea smithiana* seedlings grow well in the open site. Cassava and corn plantation among gum plantation initially grow well then destroyed all by the wild pigs. The wood fence of two meter height has no protective effect to the plantation. The first generation of soya bean and upland rice vegetatively grow well but no good corn yield because of lack of experience on fertilization.

The practice of taungya method needs further experiment to reach better yield of agricultural crops.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

**PROSPECT OF COMBINATION PLANTING AMONG *Peronema canescens*  
AND THREE SPECIES OF GRASS IN THE REHABILITATION PROGRAM  
OF DEGRADED FOREST AFFECTED BY FIRE<sup>1)</sup>**

By  
Mansur Fatawi<sup>2)</sup>

**ABSTRACT**

Research Cooperation Between Mulawarman University (The Center Study of Rehabilitation of Tropical Rain Forest - Faculty of Forestry) and Center for International Research Organisation (CIFOR) Japan International Cooperation Agency (JICA) Tropical Rain Forest Research Project.

Species of *Peronema canescens* has been planted in 1.5 ha of the burned over area of Mulawarman University Forest of Bukit Suharto on December 1994. Planting space is 3m X 3m. On March 1998, that area is burned again together with all of *Peronema canescens* plantation. Average size of diameter and height of burned of it species is about 8 – 14 cm and 5 – 8 m, respectively. On May-June 1998, about 80-90 % of burned of *Peronema canescens* plantation was sprout again. On March 1999, the sprout of *Peronema canescens* has age of 10 months, and every of it stump produced 5-12 of sprout stems.

Singling treatment or pruning sprout stem activities was done, with different number of the remaining sprout for to increased of it sprout stem increment. There is positive correlation to the growth of height, after three months treated.

The higher of the height growth was reached on the three number of remaining sprout stem(RSS-1), followed by RSS-2, RSS-4 or 3 and RSS>4, with of each values 96,5 cm; 93,8 ; 80,6 ; 79,7 and 53.0 cm per 3 months, respectively.

On the otherhand, for to increasing the production of forest land area, was inter-planted of three species of grass, namely (*Brachiaria brizantha*, *Paspalum sp.* and *Setaria sp.*) with *Peronema canescens*. The spacing of planted grass is 1m x 1m. On each planted hole of grass was fertilized by the dung of cattle(Doc), goat(Dog), chicken(Doch), combination dungs of(cattle-goat-chicken)(Cd) and unfertilized(Uf). The dosage of each dung is 500 grams of each planted grass hole, was applied. The harvesting of grass plantation was held 2 months after.

The higher production was reached at the grass of *Setaria sp.*, followed by *Paspalum sp.* and *Brachiaria brizantha*, with production values of each species was 92.14 ; 31.61 and 17.78 ton/ha/2months, respectively.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> The Director of Tropical Rain Forest Research Center (PUSREHUT) of Mulawarman University, East Kalimantan, Indonesia.

# TRIAL PLANTATION OF SOME EXOTIC FAST-GROWING TREE SPECIES ON ABANDONED SLASH-AND-BURN AGRICULTURE-LAND IN JAMBI, SUMATERA<sup>1)</sup>

By  
Suryo Hardiwinoto<sup>2)</sup>, Budiadi<sup>2)</sup>, and Sambas Sabarnurdin<sup>2)</sup>

## ABSTRACT

Slash-and-burn agriculture (SBA) is a farming system which has been practiced by farmers for a long time in Indonesia. The SBA practices have changed the tropical rain forests into secondary pioneer vegetation, bushes, weeds or coarse *Imperrata cylindrica* grassland, which are usually recognized as unproductive lands. Regreening of these unproductive areas is not easy to be executed due to the severe environmental conditions, and poor properties of the soils. Objectives of this study are : i) to quantify survival and growth rates of exotic fast-growing trees planted on the abandoned slash-and-burn agriculture-land in Jambi, and ii) to clarify the effects of fast growing trees on the relative light intensities and biomass of undergrowth vegetation.

Three species of exotic fast-growing trees, i.e. *Acacia mangium*, *Paraserienthes falcataria* and *Gmelina arborea* were planted during March-April 1994, using randomized completely block design with 6 blocks. Height, diameter and survival rates of the planted trees were measured after 2, 9, 15, 27 and 39 months. Biomass of the undergrowth vegetation and relative light intensities under the fast growing tree stands were measured in July 1996 and July 1997. Survival (adaptability) and growth rates of the exotic fast-growing trees, and their effects on the relative light intensities and the biomass of undergrowth vegetation are discussed in this paper.

Key words : Slash-and-burn agriculture, exotic fast-growing species, growth rate, and undergrowth vegetation.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta.

## FOREST CONSERVATION AND FOOD PRODUCTION AFTER FIRE<sup>1)</sup>

By  
Suhardi<sup>2)</sup>

### ABTRACT

Forest fire and food crisis have damaged the Indonesia economy recently. Beside that problem a lot of forest area have been converted to other uses. At the same time most of area of fertile agriculture has been converted to other uses such as housing, industries.

Based on that information therefore area for water conservation, food and wood production decreased all the year. Short of water food and wood could become a great problem after converting all these land to other uses.

Usually area for food, wood and water conservation are located in different area. These different function and location may causes the conflict and causes another the new problem. It is suggested that the combination of wood, food and water conservation could be used for solving the problem.

Food could be planted in the forest area with high production without damaging the forest itself. Water could also be granted more available in the long run. Silviculture by mixed planting forest trees and Cassava for example could be used to reduce the spread of alang-alang and at the same time could produce a lot of food production.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Profesor in Silviculture (Tree Physiologist), Faculty of Forestry, Gadjah Mada University, Yogyakarta, Indonesia.

# TREE INTRODUCTION FOR REHABILITATING THE DEGRADED FORESTS IN THE NORTH OF THAILAND : A CASE OF THE ROYAL PROJECT FOUNDATION<sup>1)</sup>

By  
Bunvong Thaiutsa<sup>2)</sup>

## ABSTRACT

The Royal Project Foundation was established according to H.M. The King's initiatives in 1969 having collaboration of volunteers, government officials, and foreign experts to perform the works and to make the hilltribes understand tremendous losses caused by deforestation and opium cultivation which is illegal. Highland Reforestation Project commonly known as the forestry project of the Royal Project Foundation was started in 1981 aiming to carry out field experiments on man-made forests for rehabilitating the degraded forests as a result of shifting cultivation. A number of forest tree and bamboo species were introduced from Taiwan, Japan, and China to Doi Angkhang in Chiangmai province where its altitude ranges from 1,200-1,800 m above mean sea level with the average annual rainfall of 1,745 mm, 17.4°C mean annual temperature, 66% relative humidity, and a critical minimum temperature of -7°C in January 1990.

The results could be concluded that *Paulownia taiwaniana*, *Acacia confusa*, *Liquidambar formosana*, and *Cinnamomum camphora* showed superior growth and development as well as four exotic bamboos, i.e., *Dendrocalamus latiflorus*, *Bambusa oldhamii*, *Phyllostachys makinoi*, and *Phyllostachys lithophila*. Agroforestry systems having *Dendrocalamus latiflorus* as a primary crop intercropped by wheat, barley, linen, and coffee also showed proper combination. The order of abundance in soil losses for various plots of the 7-year-old trees could be drawn as follows : *Acacia confusa* >> *Liquidambar formosana* > *Aleurites montana* > *Paulownia taiwaniana* > *Fraxinus griffithii* > *Zelkova formosana*. The amounts of water losses were found to be highest for *Aleurites montana*, followed by *Acacia confusa*, *Paulownia taiwaniana*, *Liquidambar formosana*, *Zelkova formosana*, and *Fraxinus griffithii*. Trends of such losses were decreased over time. If wood consumption at a local scale as well as soil and water conservation were emphasized, however, it was recommended to grow *Acacia confusa* and monopodial bamboos for rehabilitating this degraded highland.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Professor, Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

# REHABILITATING EX BURNING FORESTS WITH LOCAL COMMUNITIES<sup>1)</sup>

By  
**Muhammad Ali Imron<sup>2)</sup>**  
**Subeno<sup>2)</sup>**  
**Djuwantoko<sup>2)</sup>**

## ABSTRACT

Forest fires affected on forest for production purpose and non production purpose e.g parks, reserves, etc. Both of them degraded on biotic and non biotic components. It's needed to be rehabilitated. Different treatments for each forest type are recommended for the rehabilitation.

Any aspects should be considered (economical, ecological and social). Local communities based programme should be implemented in rehabilitating ex burning forests. This programmes such as planning, implementation, evaluation of rehabilitation ex burning forests. Cooperation between company and local communities will make sustainable forest management. Basically It's needed local habitat conditions on ecological and social communities for rehabilitation. So many silviculture technical used for this rehabilitation.

This paper tries to discuss how to involving local communities for rehabilitating the ex burning forests and evaluating some silviculture technics on this rehabilitation for sustainable forest management.

Key word : Ex Burning Forests, Local Communities.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta.



# TYPICAL TECHNIQUES FOR THE USE OF MANAGED FIRES IN FOREST RATTAN PLANTATION<sup>1)</sup>

By  
Abubakar M. Lahjie<sup>2)</sup>  
Ichiro Hongo<sup>3)</sup>  
Shirai Yuko<sup>4)</sup>

## ABSTRACT

This research was carried out in the area of Dayak Benuaq, in the villages of Besiq, Dempar, and Sembuan, in the Damai subdistrict, Kutai Regency, Kalimantan Timur, Indonesia. To Dayak Benuaq people, rattan is superior non-timber forest product because it is considered in their term "*galek judi sen*" which is more popularly known as cash crop. They have been cultivating rattan since the 18<sup>th</sup> century. They cultivate the rattan in the same time as they cultivate their staple food, especially dry field paddy, and other crops. Fire has been an important component in cultivating rattan for many centuries since it is economic, non-time-consuming, and utilizes simple technology. Moreover, it is easy to control.

This research covers the traditional folklore concerning use of managed fires, technical factors of fire management, burning techniques and social considerations in burning an area in rattan plantation forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Associate Academic at Center for Tropical Rain Forest Research, Mulawarman University.

<sup>3)</sup> Associate Professor of Forestry Department, Nihon University, Japan.

<sup>4)</sup> Graduate at Forestry Master Management (1997), Mulawarman University, Samarinda, East Kalimantan, Indonesia.

## MID-TERM ASSESSMENT OF PARTICIPATORY GREEN BELT TRIALS FOR FOLLOW-UP DEVELOPMENT<sup>1)</sup>

By  
Masahiro Otsuka<sup>2)</sup>

### ABSTRACT

FFPMP has carried out participatory trials of the integrated green belt at its site adjacent to the boundary of Berbak National Park in eastern Jambi Province. Although its technical model is attractive for community-based fire prevention around forests, the long-term sustainability of the program is often questioned in terms of its costs and benefits as well as participating farmers' self-reliance. The farmers' responses to the program are varied very much owing to their different contributions and benefit sharing, reflecting big variations in their socio-cultural backgrounds. Consequently self-help activities of the participating farmers have evolved in quite different ways, which would largely affect future orientations of the program. This session tries to analyse initial costs, incentives, and outputs of green belt activities and farmers' various responses, with a view to exploring next steps of the green belt development, focusing on its social and economic sustainability. The session addresses desirable development processes of the participatory green belt program, coupled with farmers' problem analyses and innovations for modified activities.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Participatory Methods for Forest Fire Prevention Forest Fire Prevention Management Project (FFPMP) by Japan International Cooperation Agency (JICA) in Collaboration with Ministry of Forestry and Estate Crops (MOFEC).

# **SOCIAL FORESTRY ON SEBULU EXPERIMENTAL FOREST AND IT'S EFFECT ON FOREST FIRE PREVENTION AND CONTAINEMENT<sup>1)</sup>**

By  
**SUNYOTO<sup>2)</sup>, Eka Noor WAHIDAH S.P<sup>2)</sup>, Eiichiro NAKAMA<sup>3)</sup>, Daud LEPPE<sup>4)</sup>**

## **ABSTRACT**

The main research theme of the Sebulu Experimental Forest is comprised of the artificial plantation, natural regeneration and social forestry. Proper combination of these will establish an integrated silvicultural technique for the sustainable management system of tropical forest

In 1991, up to March 1997, about 269 ha area and 390,637 seedlings have been planted with 47 species, mainly of Dipterocarp species. Unfortunately, the large forest fire occurred during August 1997 to March 1998 resulted 91,10 % of the area were heavily burned. But concerning social forestry area, only 20% of the area were burned. It means that social forestry is effective method not only for sustainable Forest Management but also for forest fire management. Furthermore, the new plantation with several experiments started in June 1998 till March 1999 on 100.43 ha and 175,857 seedlings.

In order to establish most suitable species and planting methods for social forestry, following items were examined. Combination planting of forest trees and crops by local farmers. The data of tree growth, crop harvest and social economic survey of local farmer. This paper attempt to present this study.

For the successful rehabilitation of tropical rain forest, commitment of all the related parties are required. Especially the issue of forest land utilization could not be solved by the private sector alone. We endeavor to commit ourselves to the rehabilitation of the Experimental Forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> PT. Kutai Timber Indonesia, Base Camp Sebulu KTI, Kecamatan Sebulu, Kabupaten Kutai, Kalimantan Timur, Indonesia.

<sup>3)</sup> Sumitomo Forestry Co. Ltd, Green & RD Division Tokyo, Japan No. 160-8360.

<sup>4)</sup> Forestry Research Institute Samarinda, Samarinda East Kalimantan.

## PROPAGATION OF TROPICAL TREES BY TISSUE CULTURE AND CUTTING<sup>1)</sup>

By  
Kentaro NAKAMURA<sup>2)</sup>, Ryo SODA<sup>2)</sup>, Yuji IDE<sup>3)</sup>, SUNYOTO<sup>4)</sup>, Erwinda  
KURNIASARI<sup>3)</sup>, Eka Noor WAHIDAH S.P<sup>4)</sup>

### ABSTRACT

The dipterocarps species has been propagated mostly through seeds and cuttings, however the seed production is erratic and infrequent, and seeds deteriorates rapidly in storage. In addition, cuttings from mature trees are difficult and the plagioscopic growth of shoots from cuttings is a problem in the production of stocks. To solve these problems, we have studied the propagation of dipterocarps species and fast growing trees by tissue culture and cuttings. On cuttings, the media species were tested in 13 dipterocarps species. In addition, the plus tree of *Shorea multiflora* and *Dryobalanops lanceolata* were selected and the propagation of the two species by cutting was tested. Tissue culture of three species, *Shorea roxburghii*, *Gmelina arborea* and *Peronema canescens*, were studied. Shoot apices were used as explants. To induce multiple shoots, the explants of *S. roxburghii* were cultured in a liquid medium and the explants of *G. arborea* and *P. canescens* were cultured in a solid medium. The shoots elongated from multiple shoots and were planted in a solid medium for rooting.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Sumitomo Forestry Co. Ltd, Tsukuba Research Institute, No. 3-2 Midorigahara Tsukuba, Ibaraki, Japan No. 300-2646.

<sup>3)</sup> Faculty of Agriculture, The University of Tokyo, 113 Japan.

<sup>4)</sup> PT. Kutai Timber Indonesia, Base Camp Sebulu KTI, Kecamatan Sebulu, Kabupaten Kutai, Kalimantan Timur, Indonesia.

**POSSIBLE SOURCE OF SEEDS AND SEEDLINGS FOR ARTIFICIAL  
PLANTING AND NATURAL REGENERATION OF DIPTEROCARPS FOR  
FOREST REHABILITATION<sup>1)</sup>**

By

Kenji MATSUNE<sup>2)</sup>, Ryo SODA<sup>2)</sup>, Masaya MASUMORI<sup>3)</sup>, Takeshi TANGE<sup>3)</sup>,

Hisayoshi YAGI<sup>3)</sup>, Katsumi KOJIMA<sup>4)</sup> and Satohiko SASAKI<sup>5)</sup>

**ABSTRACT**

Forests in the area of the Sebulu Experimental Forest, East Kalimantan, Indonesia have been suffered from repeated disturbances. Most parts of the area are covered with alang-alang (*Imperata cylindrica*) grass lands or secondary forests with pioneer species. Detailed survey, however, began to clarify that there are still many mature dipterocarps in this area. Two hundred fifty eight individuals had been counted and of these 223 had been observed their flowering or fruiting in a period from late 1997 to early 1998. They could be expected as sources of seeds and seedlings both for artificial plantings and for natural regeneration of dipterocarps.

In some places, dipterocarp seedlings are established by natural seedling around the large mature dipterocarps. We investigated the survival and growth of *Hopea rediformis* seedlings. We made four plots: Plot 1 (13m x 17m), Removed all vegetation except the Hopea seedlings; Plot 2 (13m x 15 m) and Plot 3 (14m x 17m), Removed understory vegetation; Plot 4 (18m x 18m), Not removed any vegetation. Seedlings showed high survival rate and continuous growths in all plots. In spite of sudden exposure by direct sun radiation, seedlings in Plot 1 showed best growths. Once established dipterocarp seedlings appeared to be able to survive and grow in understory of secondary forests and we can promote the seedling growths by opening upper canopies of secondary forests.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Sumitomo Forestry Co., Ltd., Tsukuba Research Institute, No. 3-2 Midorigahara Tsukuba, Ibaraki, Japan 300-2624.

<sup>3)</sup> Faculty of Agriculture, The University of Tokyo, 113 Japan.

<sup>4)</sup> Center for Asia Environment and Life Science, The University of Tokyo, 113 Japan.

<sup>5)</sup> Nihon University.

## GROWTH OF DIPTEROCARP SPECIES IN EARLY STAGE OF ARTIFICIAL PLANTATION<sup>1)</sup>

By

Ryo SODA<sup>2)</sup>, Kentaro NAKAMURA<sup>2)</sup>, Eiichiro NAKAMA<sup>2)</sup>, Noriyuki  
KOBAYASHI<sup>2)</sup>, SUNYOTO<sup>3)</sup>, Bambang SUMARSONO<sup>3)</sup>, Daud LEPPE<sup>4)</sup>

### ABSTRACT

Rehabilitation of degraded forest is one of the most important issues to be solved urgently. Almost all of the degraded forests in Sebulu region, East Kalimantan are abandoned land after shifting cultivation. We have been planting dipterocarp species with several planting methods for 8 years for reforestation technique development. Survival and growth of six dipterocarp species, *Shorea leprosula*, *S. multiflora*, *S. ovalis*, *S. seminis*, *S. pauciflora* and *Dryobalanops lanceolata*, varied much according to its planting methods which characterize different light conditions of planted seedlings. Survival and height growth of *S. leprosula* and *D. lanceolata* were greater than other species in all planting methods, and those of *S. pauciflora* were small. Height growths of 6 and half years old *S. leprosula* were observed in four plots. The highest average height was 10.2 m and DBH was 11.5 cm. Almost all the trees survived even in the heavy dry period from May 1997 to March 1998.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Sumitomo Forestry Co., Ltd. Tsukuba Research Institute, No. 3-2 Midorigahara Tsukuba, Ibaraki, Japan No. 300-2646.

<sup>3)</sup> PT. Kutai Timber Indonesia, Base Camp Sebulu KTI, Kecamatan Sebulu, Kabupaten Kutai, Kalimantan Timur, Indonesia.

<sup>4)</sup> Forestry Research Institute Samarinda, Samarinda, East Kalimantan.

# THE ROLES OF ARBUSCULAR MYCORRHIZAL FUNGI FOR ENHANCING REHABILITATION OF DEGRADED FOREST LAND IN INDONESIA<sup>1)</sup>

By  
Yadi Setiadi<sup>2)</sup>

## ABSTRACT

Reforestation program to rehabilitate the degraded sites has become a major attention of Indonesian Government and forest companies. This activities, however is not an easy task. Adverse adaphic and climatic conditions and low soil microbial activities are the major constraints which may limit the success rate of this activities.

To ensure trees establishment in such conditions, inoculation with effective and selective arbuscular mycorrhizal fungi (AMF) on seedling of reforestation tree species in the nursery and transplanted in the field conditions has been attempted.

The result shown that the growth performance and the survival percentage of mycorrhizal plants grown on degraded sites were consistently better than non-mycorrhizal plants. Among plants tested, (i.e. *Paraserianthes falcataria*, *Acacia mangium*, *Swietenia macrophylla*, *Gmelina arborea*, and *Sesbania grandiflora*) were highly responsive to inoculation with AMF. This implies that these trees may not grow well in reforestation sites unless inoculated with appropriate AMF.

The practical procedure for bulking up of mycorrhizal inoculum and a methode of raising colonized tree seedling in the nursery has been developed. The beneficial effects of mycorrhizal inoculation on promoting seedlings growth and increasing survival, enchancing tree establishment after transplanting in the field, reducing addition of commercial fertilizer, and lowering the operation cost of reforestation management are reported.

Strategies for accelerating forest regeneration should be minimized the input of capital and human labour, and maximize the natural processes, thus the practical application of AMF inoculum as an alternative low input technology for rehabilitated degraded forest can be recommended.

Keyword: mycorrhiza, reforestation, fast growing leguminous trees

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Biotechnology Laboratory, Inter University Center for Biotechnology Bogor Agricultural University, Jl. Puspa Kampus IPB Darmaga Bogor 16680, Indonesia.

**RECENT DEVELOPMENT IN *Pisolithus arrhizus*  
ECTOMYCORRHIZAL RESEARCH AND THEIR TECHNIQUES  
FOR REHABILITATING DEGRADED FORESTS<sup>1)</sup>**

By  
**Maman Turjaman<sup>2)</sup> and Erdy Santoso<sup>2)</sup>**

**ABSTRACT**

Ectomycorrhizal research have been shown to increase growth and yield of trees. They have been identified with both nutrient mobilization and nutrient cycling. Ectomycorrhizal play a significant role in Pines, Eucalypts and dipterocarps regeneration. The use ectomycorrhizal fungi would reduce dependence on chemical fertilizers besides minimizing environmental pollution. Ectomycorrhizae trees, especially pines in the tropic, grow poorly or may not survive in the field without their fungal symbiont. *Pinus merkusii* is tree species in the Pinaceae family require ectomycorrhizae. This has been convincingly demonstrated in attempts at afforestation in tree less areas such as grasslands, amended adverse sites, old agricultural lands, clear-cut forest areas, minelands and post-wildfire areas.

Many of ectomycorrhizal species have received wide application in forestry because of their favorable support for forest tree to growth and develop. A commercial preparation of *Pisolithus tinctorius* (*P. arrhizus*) with trade name "mycorrhiz" is available in the market. *Pisolithus arrhizus* has been the most extensively and intensively studied ectomycorrhizal fungus to date and is used successfully with native pines in the eastern United States and in other countries with the introduction of pines and eucalyptus throughout the world. Recent development of ectomycorrhiza is tablet of spore and vegetatif mycelium for mass production and application in large scale.

The present review addresses the progress that there has been the area of the ectomycorrhizal research. It also examines the potential of field applications of ectomycorrhizal biotechnology in forestry.

Key Words : Ectomycorrhizae, *Pisolithus arrhizus*, Degraded Forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forest Microbiology Laboratory; R&D Centre for Forest and Nature Conservation Ministry of Forestry and Estate Crops, Jalan Gunung Batu No. 5 Bogor, E-main : maman@usim.or.id



# REHABILITATION OF DEGRADED FOREST DUE TO COAL MINING ACTIVITIES: RESULTS FROM NORTH BENGKULU<sup>1)</sup>

By  
Hery Suhartoyo<sup>2)</sup> and Ali Munawar<sup>2)</sup>

## ABSTRACT

Mining activities leave unfavorable environment for plant growth. A research project was conducted in coal mining area in Taba Penanjung, North Bengkulu, Indonesia to search for methods in rehabilitation of mined land. The primary objective is searching for plant species suitable for minesoil reclamation. The experiment was placed at dumping area of six years age in the mining area of PT. Bukit Sunur, North Bengkulu. The experimental design was split plot with ripping treatment as main plot and mycorrhizal inoculation as sub plot. Four species was tested, namely: *Acacia mangium* (mangium), *Paraserianthes falcataria* (sengon), *Sesbania grandiflora* (turi) and *Pneronema canescens* (sungkai).

During the experiment, plant height and diameter as parameters of plant growth were measured every two weeks at the first six months and monthly after six months. Litter falls were also collected every two weeks.

The data showed that ripping improved plant growth. Inoculation of endomycorrhiza did not show significant effects on plant growth, except on early growth of *Acacia mangium*. *Sesbania grandiflora* and *Paraserianthes falcataria* grew relatively faster than sungkai and grew better in the ripped-plots than unripped-plots. *Paraserianthes falcataria* produced a higher litter production than *Sesbania grandiflora*.

Key words: Reclamation, Species selection, Minesoils.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forestry Department, Faculty of Agriculture, University of Bengkulu, Jl. Raya Kandang Limun, Bengkulu.

# HOLISTIC FORESTRY DESIGN : PRODUCTION FOREST MANAGEMENT UNIT<sup>1)</sup>

By  
APS. Sagala<sup>2)</sup>

## ABSTRACT

In Indonesia, there are about 50 millions ha of logged over area that can not be managed. A lot of them have been destroyed that can be seen from the increasing of grass population on the forest floor and some of them had burnt during last long dry season. This is because the logged over area do not have what is called "basic unit of management planning" or treatment unit, that I call "kuvio". And this is because we have made a big mistake by applying selective logging system. By using the selective logging system, in the logged area, there is no homogeneous object that can be used as the kuvio. The selective logging system is not tool for forest management, but it is for tree hunting. Therefore, Indonesian Selective Cutting and Planting System, Malaysia Selective Management and The Philippine Selective Logging System are useless.

Our problem is not logging damage but lack of kuvio. Without kuvio, it is impossible to manage the forest.

According to the result of our 10 year – research conducted since 1984, the suitable method for managing the production forest is "gap simulation cutting". By using this system, logged over area become manageable, because it will have the kuvio. We suggest to use this method which have been transformed into a field design. In preparing this design, aspects of management, technical, ecological, and socio – economic of local communities have been dissolved into field designs. These designs can be used for all forest types such as peat swamp forest and mangrove forest. These field designs are used as indicators and criteria for assessing the sustainable of production forest management unit. And will prevent our forest from fire.

In this method, we do not need these following activities : forest inventory, timber stand improvement, enrichment planting, and thinning. We have made about 425 kuvios in all forest types in Indonesia.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Forestry Research Institute, Jl. Sei Ulin No. 28B Banjarbaru 70714, South Kalimantan, Indonesia, Telp. +62-511-92085, Fax: +62-511-93222.

# THE OCCURRENCE OF PEST AND DISEASE OF *SHOREA* SPP. IN BUKIT SOEHARTO<sup>1)</sup>

By  
Sri Rahayu<sup>2)</sup>, Ida Nurhiftiani<sup>3)</sup>

## ABSTRACT

*Shorea* species which belong to Dipterocarpaceae grow widely in most of the tropical rain forest in Indonesia, especially in Borneo and Sumatra island. One of the factor that disturb the reforestation program of this *Shorea* spp. is the pest and disease problem. Forest fire can be influence the occurrence of pest and disease in the certain location. This paper provide information on some potential pest and diseases of *Shorea* seedlings and trees in Wanariset and Bukit Soeharto Forest Areas. Inventory and description of the types of disease symptom and total damages were made in compared of some area with different regeneration proces. The data recorded are status (severity and incidence), frequency and relative density of pest and disease.

There were five kinds of disease, namely proliferation, leaf blight or leaf spot, die back stem cankers and root disease and three kinds of pest namely leaf defoliator, gall mite and shoot sucker. Frequency, relative density and incidence of pest and disease in plantation forest and logged over area was almost the same as that in the natural forest.

Keywords : Pest and Disease, *Shorea* spp. Plantation forest, logged over area,  
Natural forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Gadjah Mada University, Yogyakarta.

<sup>3)</sup> Faculty of Forestry, Mulawarman University, Samarinda.

# REHABILITATION OF DEGRADED FOREST AT LEUWILIANG, WEST JAVA USING MERANTI CUTTINGS<sup>1)</sup>

By:

Ika Heriansyah<sup>2)</sup>, Atok Subiako<sup>2)</sup>, Hani S. Nuroniah<sup>2)</sup> and Chikaya Sakai<sup>3)</sup>

## ABSTRACT

Reforestation of degraded forest using meranti cuttings was studied on 70 Ha trial plot at Leuwiliang, West Java. Planting stock from cuttings and seedlings of two meranti species namely *Shorea leprosula* and *S. selanica* were planted at various spacing regime. This poster reports performance of meranti plantation at 18 months after planting. This preliminary results indicated that in this particular site *S. selanica* growth better than *S. leprosula*, planting stock from cutting of both species perform better than planting stock from seedlings, and closer spacing resulted better growth and survival than the wider one. These findings suggest that planting stock from cutting can be used to reforest degraded forest.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> The Forest and Nature Conservation Research and Development Center, Indonesia.

<sup>3)</sup> Advanced Research Department, Komatsu Ltd., Japan.

# EFFECTS OF FOREST FIRES ON VARIOUS COLEOPTEROUS INSECTS IN A TROPICAL RAIN FOREST OF EAST KALIMANTAN<sup>1)</sup>

By  
Haruo KINUURA<sup>2)</sup>, Hiroshi MAKIHARA<sup>3)</sup>

## ABSTRACT

During a prolonged drought period in 1998, a large scale forest fire occurred in East Kalimantan, Indonesia. The Bukit Soeharto Education Forest (BSEF) of Mulawarman University, where we have been investigating its insect profiles, was not an exception. The BSEF experienced frequent fire periods twice, from mid February to early March and from late March to early April 1998. The pair of fire burned out virtually all area of the BSEF only leaving some big stands of Dipterocarpaceae. There are many reports on the effects of the forest fire on insect populations. Almost of them were, however, done after long periods such as 1, 2, 10 years after the fire. We had been investigating the insect populations profiles of the BSEF forest prior to the fires using Malaise trap. We were, therefore, able to investigate the fluctuations of the species varieties and numbers of the insects for 10 months, from the original humid period, then drying and fire period, and the following normal rainy period. In this paper we discuss the effects of the forest fires on the coleopterous beetles based on the fluctuation data of the species and numbers of the beetles obtained from trap sampling especially for Cerambycidae: timber beetle, Bostrychidae: dried wood eater, and Platypodidae and Scolytidae: wood borer.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Lab. of Entomology, Tohoku Research Center, Forestry and Forest Products Research Institute, Shimokuriyagama, Morioka, Iwate, 020-0123 Japan.

<sup>3)</sup> PUSREHUT, Mulawarman University, Samarinda, East Kalimantan.

# A PROCESS OF FOREST DEGRADATION UNDER SLASH-AND-BURN AGRICULTURE IN EAST KALIMANTAN, INDONESIA<sup>1)</sup>

By  
Yoshiyuki Kiyono<sup>2)</sup> and Hastaniah<sup>3)</sup>

## ABSTRACT

A process of forest degradation after slash-and-burn use was observed for four years (1994-1998) at 29 localities between Samarinda and Bontang in East Kalimantan, Indonesia. Vegetation used for slash-and-burn farming in 1994 was mainly classified into two types: logged-over and burned forests (*Macaranga gigantea* and *M. triloba* are mainly dominant) and small-tree forests (*Macaranga tanarius* and *Trema orientalis* etc. are dominant). Within the following four years, slash-and-burn agriculture followed by various agricultural activities by recent migrants has replaced the original vegetation with exotic shrub communities (*Austroeupeatorium inifolium*) and *Imperata cylindrica* grassland although some of the fields have been kept as plantations of banana etc. The vulnerability to fire is higher in the case of main species of the original vegetation than in main species of the degraded vegetation, accordingly the original vegetation has rarely regenerated in the course of repeated slash-and-burn use.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 - 23, 1999.

<sup>2)</sup> Kansai Research Center, Forestry and Forest Products Research Institute, Nagaikyutaro-kan-yuchi, Momoyamacho, Fusimiku, Kyoto, 612, Japan.

<sup>3)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

EFFECTS OF SELECTIE LOGGING AND FOREST FIRE ON MICROCLIMATE  
OF LOWLAND DIPTEROCARP FOREST IN BUKIT SOEHARTO,  
EAST KALIMANTAN<sup>1)</sup>

By  
Marjenah<sup>2)</sup> and Takeshi TOMA<sup>2)</sup>

Tropical Rainforest Research Center, Mulawarman University

Diurnal changes in photosynthetic photon flux density (PPFD), air temperature and relative humidity (RH) were measured at forest floor in a dipterocarp forest. A 9-ha permanent plot was established in order to investigate the effects of second felling in a logged-over dipterocarp forest. After the experimental logging operation, wild fires occurred and burned the 9-ha plot. Both of logged and control plots were affected by the fire disturbance. Before the experimental logging, Relative daily PPFD to above top canopy (RPPFD), daily maximum air temperature ( $T_{max}$ ), and daily minimum relative humidity ( $RH_{min}$ ) was 6.95 %, 30.0 °C, and 62.68 %, respectively. The higher the logging intensity resulted in the larger changes in microclimatic condition. In heavily logged plots, RPPFD and  $T_{max}$  increased to be 19.71% and 30.37 °C, respectively, and  $RH_{min}$  decreased to be 59.21%. The tree mortality caused by the 1998 fire was higher in the logged subplots than in the control subplots, the changes in microclimatic condition were larger in logged plot than in control plots. In September 1998, six months after the fire, RPPFD,  $T_{max}$ , and  $RH_{min}$  in heavily logged and control plots was 54.37 %, 27.95 %, 31.06 °C, 30.75 °C, 51.47%, and 50.67%, respectively.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> PUSREHUT, Mulawarman University, Samarinda, East Kalimantan, Indonesia.

**THE INTEGRATED FOREST FIRE MANAGEMENT PROJECT (IFFM)  
IN EAST KALIMANTAN  
DEVELOPMENT COOPERATION BETWEEN THE GOVERNMENTS OF  
INDONESIA AND GERMANY<sup>1)</sup>**

**By  
Ludwig Schindler<sup>2)</sup>**

**ABSTRACT**

The German Government has been supporting Indonesia in building up fire management capacities in East Kalimantan since 1994. After a pilot phase which focussed on evaluating the needs, obstacles and chances of Fire Management, this project, which is implemented by MoFEC (Ministry of Forestry and Estate Crops), GTZ (German Agency for Technical Cooperation) and KfW (German Development Bank) is now in full swing.

Fire Centers are being established and fully equipped at province and forest district level all over East Kalimantan. Personnel are being trained at all levels to manage, prevent and combat forest fires. Apart from Government institutions, villages and concession companies form important partners in setting up fire management capacities.

This paper gives an overview about the German contribution, the dimension of the fire problem, the 1997/98 fires and the obstacles that need to be tackled. The three main sectors of the IFFM/gtz fire management approach – prevention, suppression and fire intelligence will be presented in individual papers during this conference.

As fire management needs sustainable forest management and vice versa, the two GTZ projects in East Kalimantan (SFMP: Sustainable Forest Management Project and IFFM) closely cooperate towards a more programme oriented approach.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Team Leader, Integrated Forest Fire Project (IFFM/gtz).



# CUTTING TECHNIQUE OF MERANTI USING FOG-COOLING SYSTEM<sup>1)</sup>

By :

**Atok Subiakto<sup>2)</sup>, Ika Heriansyah<sup>2)</sup>, Hani S. Nuroniah<sup>2)</sup> and Chikaya Sakai<sup>3)</sup>**

## ABSTRACT

A vegetative propagation technique of meranti by fog cooling system has been developed by the Forest and Nature Conservation Research and Development Center (FNCRDC) of the Ministry of Forestry in cooperation with Komatsu Ltd. The fog cooling system controls temperature (below 30°C), humidity (above 95%) and light intensity (about 5000 lux) inside the greenhouse. The technique is suitable for mass production of vegetative propagules of some meranti species. Rooting percentage of *Shorea leprosula* and *S. selanica* cuttings were 94.9%, and 91.9% respectively during experimental stage, and declined to about 67% at mass production stage recently. This decline is practically due to human error during maintenance of vegetative propagules. Planting stock production in 1997 and 1998 were 42000 and 53000 respectively. Cutting propagules produced by this project have been used to establish field trial at Leuwiliang, West Java (250 Ha) and Perawang, Riau (100 Ha).

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> The Forest and Nature Conservation Research and Development Center, Indonesia.

<sup>3)</sup> Advanced Research Department, Komatsu Ltd., Japan.

## EFFECTS OF FOREST FIRE ON SOIL EROSION AND NUTRIENT LOSS IN BUKIT SOEHARTO EDUCATION FOREST<sup>1)</sup>

By  
Wawan Kustiawan<sup>2)</sup>, Marlon Aipassa<sup>2)</sup>, Makhrawie<sup>3)</sup>

### ABSTRACT

Forest fire can cause various problems on vegetation, soil and water. A decrease of crown cover and a loss of organic matter on the forest floor result in significant influence on the development of surface soil. Many relationships between fire and geomorphic factors are mediated by vegetation, soil properties, and hydrology.

The objective of this study was to evaluate the influences of forest fire on soil chemical-physical degradation, particularly soil erosion and nutrients loss on the various slope gradients of burnt areas. This research was carried out in In Bukit Soeharto Education Forest, East Kalimantan.

Soil loss and run-off were measured by installing some traps of 3 meters width and 10 meters length. The traps were placed on the burnt areas in such a way so that the eroded soil and run-off could accumulated separately in each trap during rainy days. Manual rain gauges were placed in the study site to measure the volume and intensity of rainfall.

The amount of soil loss on the burnt areas trends to be increase in tandem with the increasing slopes. During the study period : 135 kg/ha, 139 kg/ha and 419 kg/ha were known in the slope of 15 %, 30 %, and 40 %, respectively. In the unburnt areas, smaller amount of soil loss was found, namely : 11 kg/ha. It was indicated that soil loss tends to be worst according to the increase of slope gradient. Moreover it was clearly observed that the higher intensity of run-off, the greater the soil loss will be.

Soil nutrient export on the burnt plot with 40 % slope gradient were identified as follows : 1 kg/ha nitrogen, 0.28 kg/ha phosphorous, and 0.70 kg/ha potassium while on the unburnt plot nutrient loss was found relatively lower than that of the burnt plot. The tendency of a high nutrient concentration on eroded soil implies that forest fire is even more destructive since the eroded soil brings the nutrients with it.

---

<sup>1)</sup> Paper presented on 3<sup>rd</sup> International Symposium on Asian Tropical Forest Management: Impact of Fire and Human Activities on Forest Ecosystems in the Tropics, Samarinda, Indonesia, September 20 – 23, 1999.

<sup>2)</sup> Faculty of Forestry, Mulawarman University, Samarinda, East Kalimantan.

<sup>3)</sup> Faculty of Agriculture, Mulawarman University, Samarinda, East Kalimantan.

