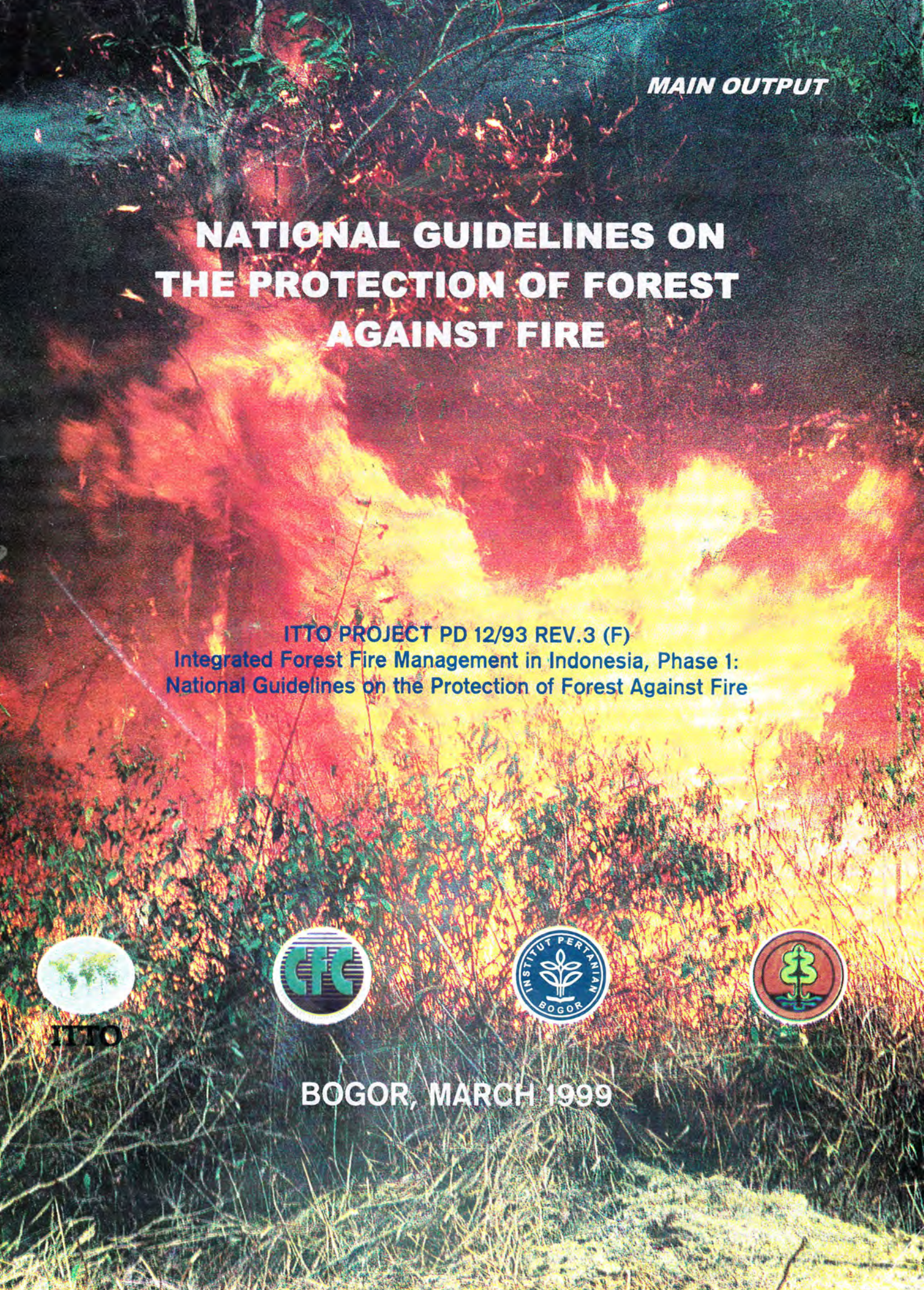

MAIN OUTPUT

NATIONAL GUIDELINES ON THE PROTECTION OF FOREST AGAINST FIRE

ITTO PROJECT PD 12/93 REV.3 (F)
Integrated Forest Fire Management in Indonesia, Phase 1:
National Guidelines on the Protection of Forest Against Fire

ITTO

BOGOR, MARCH 1999

Editors:

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Publisher: Faculty of Forestry, Bogor Agricultural University

PREFACE

The extent of forest fire occurred respectively in recent years is an indicator that shows the effort in forest fire so far has been minimal due to lack of institutional capacity, personnel and lack of guidelines both at national and regional levels. Due to this condition, the Directorate General of Forest Protection and Nature Conservation (now Directorate General of Nature Protection and Conservation), Ministry of Forestry and Estate Crops in collaboration with International Tropical Timber Organization (ITTO), Common Fund for Commodities (CFC) and Faculty of Forestry, Bogor Agricultural University implemented ITTO Project PD 12/93 Rev.3 (F) entitled: *Integrated Forest Fire Management Phase 1: National Guidelines on the Protection of Forest Against Fire*. The agreement was signed in Amsterdam (Netherlands) and Balikpapan (Indonesia) in October 20 and 21, 1996 respectively.

This **National guidelines on the protection of forest against fire** is expected to be national reference through ministerial decree (Ministry of Forestry). Beside the main output, the project also established ten specific outputs and four extra outputs as follows:

Specific outputs

No.	Output title	ITTO	CFC
1.	Cohesive National Policy to Guide Forest Protection Against Fire	✓	✓
2.	Appropriate Mission and Organization Structure of Central Forest Fire Management	✓	-
3.	Forest Fire Incident Monitoring and Reporting System	✓	✓
4.	National Network for Communication and Forest Fire Dispatch	✓	-
5.	National Standard to Guide Fast Burning System	✓	-
6.	National Standard on Appropriate Equipment for Forest Fire Management	✓	-
7.	National and Regional Coordination Guides to Prevent and Suppress Forest Fire	✓	✓
8.	National Forest Fire Prevention and Suppression Education Program and Curriculum	✓	-
9.	Proceedings of 1st International Workshop on National Guidelines on the Protection of Forests Against Fire	-	✓
10.	Proceedings of 2nd International Workshop on Forest Fire Control and Suppression Aspects	-	✓

Extra outputs

No.	Output title
1.	The Use of Fire on Shifting Cultivation Activity in Indonesia
2.	Socio-Economic Impact of the Forest and Land Fire in Indonesia
3.	Rehabilitation System of Forest Affected by Fire
4.	Compilation of Law and Decrees on Forest Fire Management in Indonesia

The above outputs are the final report provided by the project executing agency, Faculty of Forestry, Bogor Agricultural University (IPB) established by the following teams:

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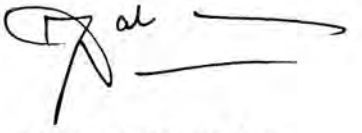
4. Other institutions

During the project implementation, the project had organized once national workshop in Lampung, twice international workshops in Bogor, field test, sampling and field visits. Technical meetings attended by representatives from Consultative Group on Indonesian Forestry (CGIF), Agency of National Coordination for Disaster Control (BAKORNAS PB), Office of State Minister of Environment as well as representatives from the on-going forest fire projects in Indonesia such as European Union (EU), Deutsche Gessellschaft für Technische Zusammenarbeit (GTZ) and Japan International Corporation Agency (JICA) are also conducted to derive inputs for developing the draft. The main output was developed progressively, started from draft 1 to draft 5. The sixth draft is final draft that has been revised based upon correction and inputs derived from both national and international consultants as well as second international workshop participants held in Bogor 16-18 February 1999.

On behalf of the project executing agency, we would like to extend our appreciation and acknowledgment to all parties who assisted and gave inputs to the project team. We hope that these guidelines could be useful for sustainable forest management, particularly on the protection of forest against fire.

Bogor, March 1999
Project Director,



Prof. Dr. Zahrial Coto

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LIST OF ABREVIATION

ABRI	Angkatan Bersenjata Republik Indonesia (Armed Forces of the Republic of Indonesia)
APBD	Anggaran Pendapatan dan Belanja Negara (National Budget)
APBN	Anggaran Pendapatan dan Belanja Daerah (Regional Budget)
ASOEN	ASEAN Senior Officials on Environment
ASOF	ASEAN Senior Officials on Forestry
BAKORNAS PB	Badan Koordinasi Nasional Penanggulangan Bencana (National Coordination Agency for Disaster Management)
Bapedal	Badan Pengelolaan Dampak Lingkungan (Agency for Environmental Impact Management)
Bapedalda	Badan Pengelolaan Dampak Lingkungan Daerah (Agency for Regional Environmental Impact Management)
BASARNAS	Badan Search and Rescue Nasional
BMG	Badan Meteorologi dan Geofisika (Meteorology and Geophysical Agency)
CFC	Common Fund for Commodities
CGIF	Consultative Group on Indonesian Forestry
CIFOR	Center for International Forestry Research
Dephutbun	Departemen Kehutanan dan Perkebunan (Ministry of Forestry and Estate Crops)
Deptrans & PPH	Departemen Transmigrasi dan Pemukiman Perambah Hutan (Department of Transmigration and Forest Encroached Settlement)
Dirjen PHPA	Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam (Director General of Forest Protection and Nature Conservation)
Dirjen PKA	Direktur Jenderal Pelindungan dan Konservasi Alam (Director General of Nature Protection and Conservation)
EU	European Union
FFPCP	Forest Fire Prevention and Control Project
FFPMP	Forest Fire Prevention and Management Project
GBHN	Garis-garis Besar Haluan Negara (State Guidelines)
GPS	Global Positioning System
GTZ	Gesellschaft für Technische Zusammernarbeit (Kerjasama Teknis Jerman)
HPH	Hak Pengusahaan Hutan (Forest Concession)
HPHTI	Hak Pengusahaan Hutan Tanaman Industri (Industrial Plantation Forest Concession)

HTI	Hutan Tanaman Industri (Industrial Plantation Forest/Timber Estate)
ICRAF	International Center for Research on Agroforestry
IFFM	Integrated Forest Fire Management
IPB	Institut Pertanian Bogor (Bogor Agricultural University)
IPK	Ijin Pemanfaatan Kayu (Timber Utilization License)
ITCI	International Timber Corporation Indonesia
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
Kanwil	Kantor Wilayah (Regional Office)
KORNASKARHUTLA	Koordinasi Nasional Kebakaran Hutan dan Lahan (National Coordination Forest and Land Fire)
KPSA	Kelompok Pelestari Sumberdaya Alam (Nature Resources Conservation Group)
LAPAN	Lembaga Antariksa dan Penerbangan Nasional (Institute of National Aeronautics and Space)
Linhut	Perlindungan Hutan (Forest Protection)
LSM	Lembaga Swadaya Masyarakat (Non Government Organization)
Meneg LH	Menteri Negara Lingkungan Hidup (State Minister for Environment)
Menko Ekuwasbang	Menteri Koordinator Bidang Ekonomi, Keuangan dan Pengawasan Pembangunan (Coordinating Minister for Economic, Finance and Development Supervision)
NOAA	National Oceanic and Atmospheric Administration
Pemda	Pemerintah Daerah (Regional Government)
PKHL	Penanggulangan Kebakaran Hutan dan Lahan (Forest and Land Fire Prevention)
PLTB	Pembukaan Lahan Tanpa Bakar (Zero Burning Land Preparation)
POB	Prosedur Operasional Baku (Standard Operational Procedure)
Poskolak	Pos Koordinasi Pelaksana (Post of Organizer Coordination)
PPKHL	Pencegahan dan Penanggulangan Kebakaran Hutan dan Lahan Forest and Land Fires Prevention and Suppression)
PUSDALKARHUTNAS	Pusat Pengendalian Kebakaran Hutan Nasional (National Forest Fire Control Center)
RTRWK	Rencana Tata Ruang Wilayah Kabupaten (Regency Spatial Plan)

RTRWN	Rencana Tata Ruang Wilayah Nasional (National Spatial Plan)
RTRWP	Rencana Tata Ruang Wilayah Propinsi (Provincial Spatial Plan)
Satkorlak PB	Satuan Koordinasi Pelaksana Penanggulangan Bencana (Coordination Unit of Disaster Prevention Executor)
Satlak	Satuan Pelaksana (Executor Unit)
SDM	Sumberdaya Manusia (Human Resources)
SEAMEO	South East Asia Ministry of Education Organization
SISKAMLING	Sistem Keamanan Lingkungan (Environmental Security System)
SKK	Sistem Komando Kejadian (Incident Command system)
SOI	Southern Oscillation Index
UN-CSD	United Nation Commission on Sustainable Development
UNDP	United Nation Development Program
UPT	Unit Pelaksana Teknis (Technical Executor Unit)
USAID	United States Agency for International Development
UUPK	Undang-undang Pokok Kehutanan
WMO	World Meteorological Organization

I. INTRODUCTION

Forest fires in Indonesia have caused enormous economical, ecological and political losses to the country. Fire losses often make it impossible to reach sustainable forest management or comply with ecolabling regulations. Economically, forest fires have caused damage and loss to the potential timber and non-timber forest products, which are part of the national development basic capital. Ecologically, forest fires can reduce the quality of ecosystem which functions as a life-support system. They also decrease the biodiversity of flora, fauna, and germ plasm resources thus changing forest hydrological function, local and regional rain patterns and increasing global warming. The smoke from fires also degrades the environment of both Indonesia and neighboring countries.

The largest tropical forest fire episode ever recorded in Indonesia occurred in 1982/1983. This fire in East Kalimantan burned 3.7 million hectares of forest. Other major fires have occurred in Indonesia in 1986, 1991, 1994 and 1997/1998. These fires are generally caused by human activities in using fire inside or around forest for various interests. Actually fires also occurred in other years but in years where major fires occurred, fires were stimulated by natural conditions such as burning coal seams, dry peat layers and climatic phenomenon which is known as El-Nino.

The large population increase from 147 million in 1980 to 200 million in March 1997 has had many consequences. Among these is conversion of the natural forests for agricultural purposes and new settlements to accommodate the population increase. In the process of conversion fire is used as one of the inexpensive and easily used tools; however, fire often escapes from the prescribed boundaries. Fire is also used in the conversion of the tropical natural forests to planted forests or to estate crops.

These situations, conditions and phenomena have not only attracted the attention of the nation, but also the international community. Therefore, ITTO and CFC are assisting the Indonesian Government by creating the **National Guidelines on the Protection of Forest From Fire** as a guide for policymakers, forest managers from various levels to develop policies, programs, projects, activities and forest fire management actions including communities in and around forests. Further, these guidelines act as guidance for forest fire crews and other related parties including communities living inside or adjacent to forests.

The scope of these guidelines includes national policy and legislation, forest fire management strategy, monitoring and evaluation, research and development, institutional framework and its development capacity, socio-economic consideration, forest resource management and utilization, and training and education. These guidelines are made based on the present and expected future conditions and situations in Indonesia, and are applicable to forest areas, including production forests, protection forests, and conservation forests and other areas under the jurisdiction of Ministry of Forestry and Estate Crops. The discussion on fire uses outside the forest area is due to the fact that the forest fires are often a result of a fire source from outside the forest.

These guidelines are written in general form to provide clear and comprehensive direction for all types of forest ecosystems in Indonesia. To be more practical,

operational and suitable, they need to be clarified in detail for the respective province or forest management units, including estate crops.

II. NATIONAL POLICY AND LEGISLATION

Scope

This chapter includes national policy and legislation concerning forest fire management.

1. National Policy

Principle No. 1: Forest Utilization

a. Indonesian forests are considered a natural gift from God. They are for the benefit and use of the Indonesian nation and the rest of the world.

b. Indonesian forests are part of the basic capital in national development. They need to be used wisely and sustainedly for the prosperity of the communities both now and in the future and in accordance with the five basic national principles (*Pancasila*).

Activities No. 1

a. Strengthen the coordination between all sectors of government and private institution in utilizing forests and land in sustainable and continual manner so that the utilization actions are always based on long-term environmental benefits.

b. Motivate and encourage all citizens in both government and private sectors to consciously and voluntarily protect the forest resource from disturbances that can decrease the sustainable functions and benefits of a well-managed and protected forest.

c. Encourage private sectors and government agencies in forest utilization activities that are oriented to the prosperity of the community.

Principle No. 2: Forest Protection

a. State guidelines (GBHN) entrust that forestry development continues to be upgraded and directed to ensure the continuity of forest products. This will aid the development of industries, work sectors, business opportunities, national income, and regional development. Forestry development is to maintain its function in the ecosystem, benefitting hydrology, gene pool, soil fertility and climate. Forest protection is meant to secure the sustainability of forests maintain the continuity of forest development.

b. Forest protection includes all efforts, initiatives, activities and measures to prevent and limit the damages to forests and forest products. Humans, livestock, fire, natural disaster, pest and disease can cause damages. Forest protection also includes preserving national rights concerning forests and forest products.

Activities No. 2

a. Encourage regional forestry institutions and forest concession holders to carry out all efforts, measures and activities to prevent and limit the damages to the forest and forest products.

b. Ensure that communities from all levels understand the functions and benefits of forests. This will encourage community support in protection and prevention from damaging wildfires.

c. Create a functional stand-alone security system that is supported by facilities, infrastructure, funding, standard operation procedure, and adequate human resources in term of quality and quantity.

d. Develop regulations on land clearing utilizing both fire and other means of vegetation removal.

Principle No. 3: Protection Priority

Protection Forests, National Parks, Nature Reserves and other Nature Conservation Areas that support tropical forest ecosystems are part of the world's natural heritage. These areas can be damaged by fire caused by human activities. Therefore, the protection of forests from fire should be considered a priority in these areas. This does not exclude the purpose of the production forest areas as basic capital items for national development.

Activities No. 3

a. Develop a master plan on the protection of forest against fire for each conservation area.

b. Motivate forest concession holders to develop the above master plan in their respective working areas.

c. Establish regulations on the fire uses within each conservation area.

Principle No. 4: Community Participation in Forest Protection

Beside the national government, the local community is also responsible for implementing forest protection policies to maintain and manage the environment, to prevent and overcome damages, and reduce pollution as well as to sustain the natural resources.

Activities No. 4

a. Inform and educate throughout the Indonesian society on the function of the forest and its role in national development. There are still many community members who see the forest as merely a source of income for timber and non timber forest products. This short term economic goal has led to the drastic damage and deforestation of forests to the point that the existence and quality of the forest resources have declined greatly.

b. Encourage stand-alone forestry extension efforts and also other general public extension such as rural development, and law conscious extension.

c. Encourage civic organizations such as NGO's, Indonesia Boy Scout Movement (*Gerakan Pramuka*), Islamic Training Center (*Pondok Pesantren*), religious

organizations, women's groups, listener-reader-viewer groups (*Kelompencapir*), law conscious group, conservation cadre (KPSA) and environmental organizations to upgrade their understanding and appreciation of forests through their participation in regular activities and exchanges of information.

d. Enhance the role of the civic organizations in motivating community participation in forest protection, particularly in prevention and suppression of forest fires.

Principle No. 5: The Success of Policy Implementation

The protection of forests from fire can succeed if the communities and all levels of government understand, appreciate and implement all policies of forest protection from fire, based on the existing forest fire management legislation and technical provisions. In fact, the government and the community have implemented fire protection. In order to achieve more successful protection, several steps aiming at a more concrete intersectorial coordination have been taken, include:

1). The "Bandung Conference" in 1992 concerning producing "Long Term Integrated Foret Fire Management Strategy".

2). National coordination meeting on the environmental management and continuous development on 4 October 1994.

3). Order of Minister of Industry and Trade No. 335/MK.INDAG/10/1994, dated 26 October 1994.

4). Coordination meeting between the Coordinating Minister for Economic, Finance and Development Supervision, National Board for Development Planning (*Bappenas*), Department of Industry and Department of Trade dated 27 February 1995, which highlighted the importance of intersectoral coordination in forest and land fire management.

5). Speech of the President of the Republic of Indonesia in relation to the National Call for Readiness (*Apel Siaga*) concerning Forest Fire Management at Muara Enim, South Sumatra on 1 June 1995, which called Indonesia to be free from smoke pollution caused by forest and land fires.

6). Minister of Forestry Decree No. 188/Kpts-II/95, dated 31 March 1995 to establish a National Forest Fire Control Center (PUSDALKARHUTNAS). Minister of Environment Decree No. Kep.18/MENLH/3/1995 on 31 March 1995 to establish a National Coordination Agency of Land Fire which followed the decree of forest and land fire.

7). Decree of the President of Republic of Indonesia, 1998 on Cabinet Ministers of Development VII, which merged the Directorate General of Estate Crops into the Ministry of Forestry that later became Ministry of Forestry and Estate Crops (MOFEC). This combination was done to simplify the management and control of fires that occur in forests and estate crops areas under one technical organization.

Activities No. 5

a. Synchronize understanding of forest protection policy on fire with other government policies through intensive communications including formal correspondence, meetings, seminars and workshops.

b. Formulate an integral forest and land management policy including forest and land fire aspects. The fire elements must be balanced with other elements and

must be acceptable to all the involved parties. The formulated policy should be easily understood, accepted by all parties and implementable.

c. Implement the policy of forest protection from fire by motivating private sectors to allocate adequate resources for forest and land fire management programs.

2. Legislation

Principle No. 6: Indonesia as a Nation of Laws

a. The Constitution/basic law of 1945 and its general explanation states that Indonesia is a state based on law and not on power. Thus, all actions of state apparatus are based on laws, including those actions carried out to protect forests from fire.

b. Advance coordination between forestry and other institutions is required prior to implementing forest fire rules and regulations.

c. In order to get a comprehensive forest protection system that includes items of various importances, numerous legislative acts have been enacted. Given that forest and land fire problems are very complex and continue to change over time, there is a need to stabilize and simplify this legislation into technical instructions that are more practical for use in the field.

d. These acts must be widely publicized, so that all community levels, government and private sectors can understand, accept and implement them correctly.

Activities No. 6

a. Study the existing laws and formulate a new one to accommodate increasing fire protection problems particularly on technical aspects. These provide for implementation gradually in annual work plan.

b. Encourage all government levels, the private sector, and those communities which lead in implementing the new regulations, to develop standard procedures that are appropriate to the field situation. Inform higher level organizational units about these procedures and manner of use.

c. Publicize the regulations and legislation on the protection of forests against fire to enhance awareness. Use formal and informal education processes to disseminate information through various mass media, communication forums, correspondences, seminars, workshops, etc.

d. Enhance law enforcement efforts through cooperation and coordination between enforcement personnel and related institutions. To support these efforts, the Ministry Forestry and Estate Crops plans to increase Forest Protection Personnel (Jagawana) at least up to 15,000 persons, while Perum Perhutani targeted to 5,000 persons. In addition, to assist in law enforcement, one-third of the Jagawana force will be empowered to be a Government Investigating Officer (PPNS).

III. FIRE MANAGEMENT STRATEGIES

Scope

This chapter describes the aspects of forest fire management planning, prevention, suppression, post-fire activities, and the role of the community.

1. Fire Management Plan

Principle No. 7: Management Plan

Forest fire management, as a management activity should be carried out based on a proper planning. A forest fire management plan is an integral part of forest mangement plan. The plan is developed at national, provincial, regency and field levels. Fire management planning is a continual process and the plan itself needs to be renewed and up-dated periodically.

Activities No. 7

a. Provide sufficient resources (manpower, facilities, infrastructure and funding) for the development of a comprehensive fire management plan at each of the various governmental levels (national, povincial and lova levels).

b. Identify all factors affecting forest fire management including:
   1). Forest fire history
   2). National Spatial Plan (RTRWN), Provincial Spatial Plan (RTRWP) and Regency Spatial Plan (RTRWK)
   3). Ecosystem type (relates to fuel type) that includes peat forest, low land, hill and mountain rain forests, monsoon forest and savanna.
   4). Climate and weather conditions
   5). Socio-economic condition of the communities
   6). Structural and non-structural organizations

c. Integrate the forest and land fire management plans into development plans and include within the forestry sectors long- and mid-term planning.

d. Develop annual forest fire management plans that include:
   1). Fire management objectives
   2). Detailed management programs, scheduling, source of fund and the amount required.

2. Fire Management Options

Principle No. 8: Approach and Application of Forest Fire Management Options

There are several approaches in forest fire management that can be applied in any one province or area. These approaches are based on the specific situations and conditions found in their respective areas. One management approach is an

Integrated Forest Fire Management System whereby all aspects of prevention, suppression and fire use are considered together. This approach is the correct option for Indonesia considering the complexity of the fire problem. This problem is related to the diversity of communities in terms of ethnic groups, economy, customs and biophysical environmental factors within the given provincial area.

Activity No. 8

Develop an integrated forest fire management system to protect forest from fire by considering not only the technical fire management aspects but also emphasizing the socio-economic and cultural aspects of local communities.

3. Fire Prevention

Principle No. 9: Fire Prevention Plan

Fire prevention is the key to overcome the forest fire problem. In Indonesia, forest fires are generally caused by human activities. Thus, prevention should be emphasized by enhancing people's awareness of the danger of fire without neglecting other technical and strategic efforts in forest fire prevention.

Activities No. 9

Develop general forest fire prevention plan according to the following outline:

a. Develop basic plan
   1). Fire occurrence map with numbers and locations of past fires
   2). Fire statistics showing dates and times of fires, fire cause, size, etc.
   3). Fire risk map showing locations where human activities might increase the possibility of a fire start
   4). Hazard map showing fuel types according to their flammability
   5). Thematic maps (hydrology, road network, important places, etc)

b. Determine prevention objectives

c. Develop prevention activities plan, infrastructures, prevention fund, and scheduling:
   1). Encourage forestry officials and other forestry-related human resources
   2). Campaign/dissemination of information
   3). Extension
   4). Education and training,
   5). Prevention engineering (fuel management, silvicultural treatment, etc.)
   6). Encourage the role of communities

d. Develop monitoring and evaluation plan

e. Develop funding plan and its sources (from forest manager, concession holder, or government).

Principle No. 10: Implementation of Forest Fire Prevention

The success of fire prevention is determined by:

1). Appropriate selection of activities and programs for each target group.

2). Appropriate selection and implementation of preventive techniques and scheduling.

3). Adequate facilities, infrastructure and funding.

4). Adequate number and quality of human resources as executors.

5). Other related resources.

A national fire danger rating system needs to be implemented to reach an effective fire prevention.

Activities No. 10

a. Develop an operational guideline for forest fire prevention which takes into account the 5W + 1H (Why, What, Who, Where, When, and How).

b. Implement the education and extention activities by using the following methods:

   1). Personal contact

   2). Interview/discussion with target groups: boy scouts, farmers and fishermen groups, women's groups, conservation cadres, environmentalists, forest visitors, concessionaires and persons conducting land clearing operations.

   3). Use of printed and electronic media.

   4). Schools, especially primary and secondary schools.

   5). Exhibitions, festivals and parades.

   6). Re-greening and National Nature Conservation Week, *"Apel Siaga"*, National Forest Fire Prevention Week, Living Environment Day and other national holidays.

   7). National campaign on wildfire prevention using "Si Pongi" mascot.

   8). Sign and warning notice boards especially at fire risk areas.

c. Technical action and regulation

   1). Patrol and control/guard of fire risk areas,

   2). Fuel treatment (fuel modification, fuel isolation, fuel reduction including prescribed burning), utilization of logging waste,

   3). Construct and maintain fire breaks, fuel breaks and green belts, small dams, and silvicultural treatment,

   4). Inform the dry season forecast and El-Nino oscilation,

   5). Socialize and enforce laws including custom and traditional laws.

d. Implement formal and informal education and training,

e. Involve the communities in all prevention activities including the construction of fire breaks, fuel breaks, and prescribed burning, whether done by the communities or by forest concession holders.

4. Role of Communities

Principle No. 11: Role of Communities

a. An effective and efficient forest fire prevention and suppression strategy is based upon an understanding of the socioeconomic culture and the bio-physical situation of the communities and their use of fire. The forest fire prevention and suppression programs rely on good relationship between the rural communities around the forest and forest manager and officer. There is a joint participatory approach based on mutual trust and help (community-based forest fire management).

b. Forest managers/concession holders are required to implement forest fire prevention program at their own areas and actively participate in general forest and land fire prevention and suppression program continuously.

Activities No. 11

a. Encourage the establishment of community groups, and strengthen those already existing groups, which are concerned about forest fires.

b. Enhance the community's participation in planning, implementation, monitoring and evaluation for all forest and land fire prevention and suppression activities through development of an incentive system.

c. Establish a systematic and continuous community movement on fire prevention and suppression.

d. Encourage the creation of volunteer prevention group through public education and extension.

5. Fire Suppression

Principle No. 12: Pre-Suppression

Effective and efficient forest fire suppression can be carried out only when appropriate preparation is taken prior to the required suppression activity. Pre-suppression includes preparation, staffing, organizing, equipping, funding, and training of the people to do the suppression. Cooperative agreements between parties need to be mutually developed. Standard suppression procedures need to be established as do detection and early warning systems. Procurement and maintenance of equipment must be arranged.

Activities No. 12

a. Preparation

1). Prepare data and information needed in suppression operation including topographic map, risk area map, accessibility (road) map, and supporting location map, hydrologic map, annual statistical data on forest and land fire, list and note of the available suppression resources.

2). Make an inventory of available equipment, infrastructure and manpower to be needed in an area to ensure the readiness for mobilization.

3). Study and evaluate past suppression needs.

4). Identify the fire hazard and fire risk level based on field observations.

b. Develop and Initiate Cooperative Support

1). Consolidate policies and action among all organizations established at national, provincial, regency and local/field (lead forest manager) through coordination meetings.

2). Ensure the readiness of elements in various organizations through exchange of data and information; i.e: seasonal weather forecast, general weather patterns, risk and hazard areas, inventory of facilities, infrastructure and manpower, funding and software.

3). Ensure the readiness of aid resources between and among related institutions. These include Home Affair Department, Public Work Department, Social Department, Health Department, Agricultural Department, Transmigration and Forest Encroached Settlement (*PPH*) Department, Armed Forces of the Republic of Indonesia, Search and Rescue Agency and National Coordination Agency for Disaster Prevention (*BAKORNAS PB*), including the complete staff members of the departments and their working partners at regional and local levels.

c. Strengthen Standard Procedures

1). Identify criteria to determine the caution level and preparedness.

2). Strengthen procedures for all elements within the suppression operation. This includes procedures for size-up, mobilization of manpower and equipment, communication and command system, procedures for mobilizing of cooperating organization's resources, research and investigation, personal safety and accident report, etc.

3). Develop incident command system for each level of fire incident.

4). Ensure the executability of standard procedures by identifying and, if necessary, by building required infrastructures in the field. This would include appropriate transportation systems, identification of water sources (river, lake, sea, reservoir, dam, etc.) electrical power sources, communication systems, etc.

d. Equipment Preparation

1). Check, maintain and ensure all detection and early warning equipments, including fire lookout, satellite image receiving station and telecommunication facilities are fully functioning and usable.

2). Check, maintain and ensure the equipment at the suppression centers and guard posts according to existing standad procedure.

3). Check, maintain and ensure the equipment at the suppression centers and guard posts is ready to be mobilized and dispatched as required.

4). Identify and ensure readiness of any needed supporting equipment for suppression operation based on conditions of existing equipment (type and number) that in line with the standard procedure.

5). Build warehouse (cache) for forest fire suppression equipment at national, province and field level to face emergency situation. Development priority should be given to field level.

e. Early detection and warning

1). Develop, equip, check and ensure facilities for early detection and warning systems at national, provincial, regency and local levels are fully functioning. Included are the items such as look-out tower (equipped with binocular, compass, communication tools and forest map), weather station (rain gauge, thermometer, anemometer, hygrometer and heliometer), remote sensing facility (satellite image receiving station), and procedures for gathering information from surveillance and military aircraft (fire detection with thermal imaging device).

2). Define forest fire risk and fire hazard areas.

3). Increase patrolling and inspecting high fire risk areas.

4). Define allert areas and disseminate information of these areas.

5). Post and maintain the daily Fire Danger Index signs.

f. Manpower preparation (recruitment and training)

1). Identify the manpower requirements for every forest management unit.

2). Recruit new staff for cadre and fire suppression crews.

3). Organize forest fire suppression training course at the basic and advanced level for existing fire crews. Conduct this training prior to fire season.

4). Encourage the formation of skilled volunteer fire crews from local communities and equip them with fire suppression tools and equipment.

g. Funding preparation

1). Prepare fire suppression fund

2). Use the pre-planned fund

3). Evaluate the fund spent

Principle No. 13: Forest Fire Suppression

a. In order to be effective and efficient, the forest fire suppression activities must be initiated at an early stage (initial attack), implemented progressively, organized properly with human safety as first priority, and control completed by mopping-up. Adequate early detection facilities, infrastructure and manpower must support fire suppression. Fire detection is an important factor and key to early suppression activity.

b. When initial attack forces cannot control the fire, then further steps are taken by mobilizing more resources (extended attack).

Activities No. 13

a. Fire detection

1). In order to be able to conduct initial attact, all fire detection potential should be employed, including detection from fire lookouts, ground and air

patrol, satellite imagery, and use of information/reports from the local public and communities.

2). Measure need to be taken to increase the awareness of the part of the public and rural residents as to the need for early detection and rapid reporting of emergent fires to the responsible protection organization.

b. Implementation of Fire Suppression

1). Increase knowledge and skill levels of all parties involved in fire suppression, particularly the fire fighting team as to the methods of proper forest fire suppression. These methods include:

- Analyze the fire situation (size up) and define initial attack method.
- Supervise all fire fighting crews based on the above analysis.
- Carry out early control actions, rapid initial attack to contain and prevent fire from spreading.
- Suppression action using appropriate suppression methods; direct, parallel or indirect attack depending upon the topography, fuel and weather.

2). If fire escapes initial action and is expected to increase appreciably in size or develop into a national emergency, there is need to report promptly to the higher organization level following the chain of command in order to mobilize additional suppression resources. Establish fire suppression emergency plan that includes all involved governmental institutions, other organizations and local communities. This plan should be based on clearly defined responsibilities from various parties to prevent duplication of efforts and to optimize human resources and funding. Consideration should also be taken to request appropriate international aid. Funding arrangements should be agreed upon prior to the declared danger situation.

c. Logistics Preparation

Prepare sufficient logistics in case of continued suppression operation. The logistics includes back-up team, equipment, water for any needs, food and first aid. There is a need to prepare facilities and infrastructure to mobilize these logistics on time and at specified location.

d. Escape/rescue

Determine an action plan and route for self-escape when the situation becomes dangerous. Every member involved in suppression operation needs to clearly understand this plan and route. Also plan a rescue route from fire location.

e. Mop-up and patrol

1). All team members involved in the suppression operation must understand that they are required to stay at the fire location until the fire is completely extinguished.

2). Examine (patrol) the burnt area and extinguish all existing burning materials.

Principle No. 14: Post Fire

When the forest fire suppression activity is over or when the fire season in that year has passed, an extended activity review in form of evaluation of the fire suppression operation must be done. These evaluation outputs are used for revision or improvement of the next fire management plan.

Activities No. 14

a. Develop forest fire statistics that include the number of fire occurrences, burnt over areas, fire location, fire sources, and vegetation type affected.

b. Evaluate the success and failures of fire suppression and analyze the results of this evaluation.

c. Estimate the economical, social and ecological damages and losses caused by the fire, both inside and outside the forest areas.

d. Estimate the fire control costs and compare with the previously planned budget.

e. Evaluate the overall fire management plan and its implementation.

f. Conduct fire investigation procedure to determine the need for further law enforcement.

6. Rehabilitation of Burnt Over Area

Rehabilitation of burnt forests is not often discussed as part of forest fire management, because the rehabilitation planning and implementation is seldom done by the fire management organization. However, rehabilitation is a common and effective means to reduce fire hazard and to re-establish the functions of the burnt forests.

Principle No. 15: Rehabilitation Techniques

To re-establish the burnt forest's function, there is a need to initiate reforestation action, enrichment planting, or to keep up the burnt over area from burning again so that natural regeneration could take place.

Activities No. 15

a. Evaluate the feasibility of rehabilitating burnt over forest area and identify appropriate rehabilitation efforts.

b. Develop a rehabilitation plan for the burnt over area, based on the existing condition of vegetation and the original function of the forest. Rehabilitation can be carried out by means of keeping up the burnt forest from repeated fire to ensure natural regeneration, enrichment planting and close planting.

7. Tools, Equipment and Facilities for Fire Prevention and Suppression

Principle No. 16: Requirement Plan

The success of forest fire prevention and suppression depends not only on the manpower and applied method, but also on the provision of adequate equipment and facilities. The type and number of the provided equipment and facilities must

be suitable for the local situation and the condition of the local communities. This is to ensure that the equipment and facilities are functioning well for effective and efficient fire prevention and suppression.

Activities No. 16

a. Make a list of an ideal requirement of tool and equipment based upon local condition and situation, to ensure the best prevention and suppression effort. A suggested grouping of tool and equipment by facility follows:
   1). Mobile fire detection team
   2). Stationary fire detection/fire look out team
   3). Hand tool team
   4). Water pump team
   5). Mechanical/heavy equipment team
   6). Air attack team
   7). Logistic, evacuation and medical team
   8). Fire danger rating team

b. Conduct an inventory of tools, equipment and other supporting facilities that already exist.

c. Develop a requirement plan of tools and equipment.

Principle No. 17: Utilization and Allocation

a. Equipment allocated for forest fire suppression should be exclusively used for that purpose. Use for other purposes is not allowed, particularly under First Alert situations. Exceptions may be permitted for facilities, which due to their characteristics, can be used for other purposes without detriment to the principal purpose of fire protection.

b. Use, maintenance and storage of all equipment will be according to standard procedures.

Activities No. 17

a. Strengthen and develop standard procedure for use, maintenance and storage of the forest fire equipment.

b. Develop standard procedures for permitting use of fire equipment and facilities for other purposes.

c. Develop information network fire equipment and facilities system at inter-regency inner-province, inter-province and central.

IV. MONITORING AND EVALUATION

Scope

Monitoring includes reviewing forest fire statistical data, monitoring potential forest fire areas as to their "fire readiness" (extent of drought), operating early detection systems and reviewing the information obtained.

Principle No. 18: Monitoring the Forest Fire Statistical Data

Forest fire statistical data is important information for preparing fire management plans. Statistical data can also be used to motivate and arouse the attention of other related institutions and the public. These statistics include, at a minimum, data on forest fire occurrence, emerging hot spots, manpower, facilities and infrastructure.

Activities No. 18

Encourage all forestry institutions and forest concession holders to develop:

a. Database on forest fire occurrence with emphasis on the data collection at local/field levels. At a minimum, data will include location, day, month and year of occurrence, elapse time between dispatch and first attack, time spent suppressing fire, size of burnt over area, cause, vegetation type affected, fuel burnt, damages, suppression efforts, and costs. Central forestry institutions are recommended to obtain and maintain hot spot statistical data for the entire country.

b. Database of manpower resources including, at a minimum, forest fire management staff and personnel, classified by their duties, education level, training courses attended, duty location and status (officer, public, etc.).

c. Database of facilities and infrastructure including number and location of hand tools, cutting devices, rakes, backpack pumps, firing devices, semi-mechanical and mechanical tools and suppression equipment for individual and group use such as tents, fire lookouts, guard posts and related supplies and equipment.

d. Adequate computer and software for data processing.

e. Standardized reporting tally sheets for computer processing

f. Staff, and trained personnel to carry out the above duties.

g. A hierarchical reporting system.

h. A way to evaluate the activities of the Regional Forest and Land Fire Management Center.

Principle No. 19: Monitoring of Fire Risk and Hazard Areas

It is important to determine those land areas susceptible to fire in order to set priorities for allocation of resources and concentration of actions. Fire potential can be determined based upon review of climatological data and weather information, human activities within the area and the vegetation condition. The

simplest approach is to analyze the climatological and weather data and information on both the national and local levels.

Activities No. 19

a. In the short-term, there is a need to determine the beginning of the dry season utilizing forecasts from the Meteorology and Geophysical Agency (BMG) and to disseminate this to whole country. This allows the local fire management organizations to anticipate the coming fire season and make any necessary preparations. Steps should be taken to strengthen the coordination between the MOFEC and the BMG. Information on weather conditions and forecasts must be readily shared between the BMG and all related forestry institutions. Field level staff must develop a network to share weather information between and among all involved institutions.

b. In the long-term, it is necessary to develop a National Fire Danger Rating System so that daily forest fire danger is known.

c. Notify all communities and organizations within high fire potential area as to their need to take necessary prevention actions. Provide guidelines to local communities on prevention measures to be taken under various fire danger ratings.

d. Encourage all regional/field forestry institutions to construct signs or warning notice boards displaying current forest fire danger levels.

e. Strengthen information network from central to field levels to provide information quickly so that field officers can make adjustments on the signs as reflected by the current fire danger level.

Principle No. 20: Early Fire Detection System

a. Early fire suppression may be achieved when an early detection system has been established and operates well at all levels. This achievement is closely related to the established organization and existing command line as well as simple bureaucratic procedures.

b. Early detection is possible by using the stable Environmental Security System (*SISKAMLING*) in villages, for instance by alerting villagers by use of wooden drums (*kentongan*) and *"getok tular"*. In addition, optimal use of existing means such as ground patrolling and observers in fire towers will insure that fire can be detected at an early stage.

c. For natural forests located in remote and inaccessible areas, and beyond the seen-area of a fire lookout, it is absolutely necessary to develop cooperative agreements with other institutions such as Ministry of Communication. The central level of the MOFEC should initiate construction of satellite receiving stations, such as NOAA, that can cover all the provinces of Indonesia. This information can be delivered via internet or facsimile.

Activities No. 20

a. Encourage all forest management units in the field level [HPH/HPHTI, Technical Management Unit (UPT)] to prepare detection facilities and infrastructure such as fire lookouts and to strengthen the detection system in their respective areas. Guidance by the Regional Forestry and Estate Crops

Department Office and the issuance of detection system guidelines are needed.

b. Regarding the participation of communities in early detection, there is a need to encourage every forest management unit to use the local *SISKAMLING* system in its entirety.

c. Use traditional tools in disseminating fire information such as wooden drum and/or *"getok tular"*. This is an easily understood means of communication in many rural areas.

d. Formalize cooperative agreements with related institutions to assist in early detection, particularly from the air.

V. RESEARCH AND DEVELOPMENT

Scope

This chapter describes the importance of research and development in the forest fire management area, including both basic and applied researchs. This chapter also covers the research need for coordination between organizations in conducting and sharing of research results.

Principle No. 21: Basic and Applied Research

Fire research will provide the basic information required in forest fire management. This information supports the development of fire management throughout the various Indonesian forest ecosystems.

Activities No. 21

Support cooperation between universities and local research institutions and, if necessary, with international partners, to undertake joint research on various aspects of forest fire, including:

a. Fire ecology: (a) with priority to study fire behavior at all types of Indonesian ecosystems, (b) gather and analyze past and present fire knowledge (fire occurrence and ecological impact), and (c) reforestation of fire-damaged forests.

b. Basic science of fire: (a) fuel inventory and fuel modeling, (b) fire behavior models, (c) fire danger index, (d) fire risk and hazard mapping, (e) fire weather forecasting (f) environmental impact modeling (social, economic and culture), and (g) impact of gaseous, smoke and particle emissions of fire on biogeochemical cycles, atmosphere and climate.

c. Socio-economic and culture of the communities: (a) socio-economics of fire use, (b) socio-cultural of fire use, (c) research on shifting cultivation and secondary forest and research on traditional collection and use of timber and non-timber forest products by the local communities, and community perception and attitude toward fire use and fire problems.

d. Smoke management: (a) application of burning technique that may reduce and control smoke production, (b) study of atmospheric aspects that allow smoke to be dispersed into the upper atmosphere and not collect at the land surface, (c) create a demonstration plot on land clearing for agricultural purposes without resorting to the use of fire.

e. Fuel management: (a) study the appropriate prescribed burning techniques suitable for the respective ecosystems in Indonesia, (b) develop demonstration module on non-traditional utilization of secondary forest for agriculture to reduce impact of land clearing using fire, and (c) study on fuel isolation techniques, including type, width, methods of contruction at all forest ecosystems and types of forest fire.

f. Utilization of wood waste and other organic material.

g. Develop zero-burning land preparation technology with attention to technical, economical, socio-cultural and environmental aspects.

h. Research on possible alternatives to shifting cultivation practice.

i. Establish a National Interdisciplinary Research Center for Forest Fire.

Principle No. 22: Coordination and Cooperation with International Institutions and Experts

Exchange of information on forest fire knowledge and fire management between the forestry experts and researchers from all over the world is very important in enhancing coordination and cooperation in fire prevention and suppression.

Activities No. 22

a. Select and organize training concerning information exchange methods. This would include internet and other electronic communication systems.

b. Organize periodic national and international seminars on forest fire management.

c. Bridge the fire knowledge with fire management and policy development by periodically issuing newsletter, journal, magazines, articles on forest fire Research and development.

d. Mutual use of personnel and equipment for forest fire management between neighboring countries.

VI. INSTITUTIONAL FRAMEWORK AND CAPACITY DEVELOPMENT

Scope

This chapter covers forest fire management institutions, institutional framework and cooperative relationships with national and international institutions, including the technical and financial aspects.

1. Institution and Institutional Frame Work

Principle No. 23: Institutional Development and Strengthening

a. Forest resources play an important role and have a long-term strategic value for national development. The forest is important and valuable because of its inherent character as a renewable natural resource. In order for the forest resources to be sustainable and protected from disruptive events, including forest fire, the management of the forestry sector is the responsibility of the national government. To insure proper and appropriate sustainable use of the forests of Indonesia, a strong national organization at the ministerial level, the Ministry of Forestry and Estate Crops was established.

b. In order for the policies concerning the protection of forest from fire to be implemented optimally, all the people must support the protection effort. This includes governmental and non-governmental institutions at all levels and the public community, especially those people whose lifestyles are related closely to the forest and forestry.

c. The development and strengthening of institutions involved in forest protection from fire needs to be given a high priority. This is particularly true at regional and local (field) levels. This development and strengthening is directed toward the creation of good coordination between both internal elements of the institution and between the institution and its external elements. This requires the availability of adequate quality and quantity of human resources, the provision of appropriate forest fire management equipment and availability of financial resources. It is extremely important that these financial resources be used in the most effective and efficient manner.

Activities No. 23

a. Strengthen the organization of the Ministry of Forestry and Estate Crops and its lower echelon so that they are capable to executing their duties and responsibilities, particularly in formulating and implementing the forest fire management policies. Even though protection of forest from fire may be assigned to one staff group or administrative division, all persons in other units within the forestry organization must, at times assist in this protection effort. Information, additional support, and staff may need to be provided to the fire staff in the event of a particularly severe fire season.

b. Strengthen the existing land and forest fire control institutions at national, provincial and field level. Improve the structure, duties, functions, responsibilities, and authority of the organization.

c. Establish an Inter-sectoral National Coordination Task Force on Forest and Land Fire Control (SATGAS KORNASKARHUTLA) within the National Coordination Agency for Disaster Prevention (BAKORNAS PB). In order to be effective and efficient, especially on funding, the minister who is responsible for the protection of the forest from fire coordinates this task force. As forest fire is a central focus and land fire is viewed as one source of forest fire occurrence, the appropriate minister is The Minister Forestry and Estate Crops. Every ministry/agency involved in the coordination task force should have well defined duties, functions, responsibilities and authorities.

d. Encourage the establishment of the regional to local level institutions under the supervision of the national coordination task force. Those regions which have established land and forest fire control organizations by the decrees of the governors or local regulations, need to strengthen their organization. The responsible person of the organization is the head of the region according to their rank.

e. Formulate regulations containing clearly defined tasks and responsibilities of related institutions in forest and land fire protection.

Principle No. 24: Institutional Framework

Forest fire management involves all parties concerned with the general land use, e.g., national forest, private forest, land under traditional right (*hak ulayat*), forest plantation concession, estate crops, etc. It is necessary to establish an institutional framework to ensure the implementation of national policy on inter-sectoral forest fire management and coordinate at both national and local levels.

Activities No. 24

a. Formulate and implement the duties of all levels of the forest fire management organization, that includes:

   1). Prevention

   2). Pre-suppression

   3). Suppression

   4). Prescribed burning

   5). Post-fire (evaluation and rehabilitation)

   6). Establish contacts with and coordinate among local communities

   7). Extension and education

   8). Implementing regulation (inspection, recognition, sanction, reporting, complaint, etc).

b. Build and strengthen the governmental infrastructure to establish the capability to control fire at provincial and local level. Establish or strengthen organization at provincial/local government level I (Pemda Tk. I) and regency/local government level II (Pemda Tk. II).

c. Develop and strengthen an appropriate mechanism and structure for organizations at national, provincial and regency levels so that forest fire organizations at sub-district or work units, including volunteer fire brigade, can be established.

d. Develop operational plans that establish the role of volunteer organization, especially NGOs and women's groups. Prepare and excecute training plans for upgrading their capabilities and readiness.

e. Forest fire management institutions, from provincial to field levels, should develop formal cooperative agreements with the rural communities, NGOs, forestry enterprise, and other related institutions and politicians.

f. Widely disseminate information concerning forest and land fire management institution to all national and international communities through mass media. By carrying out this activity, citizens will better understand their role in the institution and recognize their capacities to work hand-in-hand with the institution in increasing forest and land fire prevention and suppression efforts. Dissemination of information to international communities will be further evidence that Indoensia is realistically and seriously dealing with the fire problem.

g. Provide organization resources in the form of staff (human resources), hardware (tools) and software (plans, work program) for the coordination committees at every level.

h. Develop cooperation with communities through social organizations, NGOs, youth organizations, Boy Scout, women's groups, spiritual organizations, forestry enterprises, etc. for every forest fire management stage (planning, implementation, monitoring and evaluation). Education and training of land and forest fire prevention and suppression for members of these institutions should be given high priority.

2. Regional and International Cooperation

Principle No. 25: Forest Fire Effects to Neighboring Countries

Smoke pollution affecting neighboring countries needs to be minimized. This problem is not only damaging to those countries, but also to the prestige of Indonesia. Indonesian relations with neighboring countries, as well as other countries of the world, are adversely affected in both the political and economic realm.

Activities No. 25

a. Develop fire use technology in managing the natural resources that produces minimal smoke problems. Because the majority of smoke comes from fire used in land preparation for agriculture, plantation, transmigration, mining, forestry and others, there is a need to develop knowledge and technology in land preparation without burning or burning with less smoke, and in waste processing.

b. Increase information and knowledge exchange concerning forest fire management among the governments of ASEAN. The existing multilateral cooperation between the ASEAN countries through BIMP-EAGA, ASOEN Haze Technical Task Force, and ASOF (ASEAN Senior Officials on Forestry) should be increased.

c. Encourage cooperation of non-governmental institutions among ASEAN and with other Asian Pacific countries especially in education and research and development of forest fire management areas.

d. Support cooperation in forest and land fire programs that allow possible utilization of aid resources (manpower, equipment and funding) from neighboring countries when required for fire suppression emergencies.

Principle No. 26: International Cooperation

To support forest fire management capabilities, there is a need to master knowledge and technology in various fields that are directly and indirectly related to forest fires. This can be achieved through international cooperation agreements.

Activities No. 26

a. Develop and increase bilateral and multilateral cooperation with developed countries to prepare professional and skilled personnel in forest fire management. This can be done by (1) sending Indonesian personnel to attend education or training in those countries, (2) inviting experts from those countries to Indonesia to provide education or training, (3) support funding for education and training of Indonesian personnel in other countries.

b. Increase technical and financial (non-binding grant) cooperation with other countries to assist funding of forest fire management programs in Indonesia. This must be followed by internal support from the Indonesian Government in providing adequate counter budget that is generally required for these forms of cooperation.

c. Increase exchange of information quickly and continuously on regional and global weather and climatic conditions by becoming a member of world organizations that have direct or indirect relation with forest fire. This includes organizations such as Climate Change Convention, World Meteorological Organization (WMO), the Global Fire Monitoring Center (GFMC), South East Asia Ministry of Education Organization (SEAMEO, Biotrop-impact). This allows early preparation to anticipate change of severe weather or climate that will increase risk of or cause forest fire.

d. Increase participation in scientific meetings, seminars, workshops, conferences and other forums that have direct or indirect relationships to forest fire. Indonesia should increase their commitment to host such forums locally and likewise increase their participation in those forums abroad.

3. Funding and Implementation

Principle No. 27: Source of Funding

a. Protecting the forest from fire can only be achieved when supported by adequate financing used effectively and efficiently. Forest fires in Indonesia burn approximately 40,000 ha of forest annually in average. Besides the enormous direct economic losses, valued at several billion Rupiah, the forest fires also cause losses in environmental quality, human health, and ecosystem degradation. Considering these factors, the required monies needed for fire management would be less than the financial losses from forest fires.

b. Funding for forest fire management may be obtained from both governmental and non-governmental sources.

c. Funding for forest fire management must be available on time and on target.

Activities No. 27

a. Provide special budget for the above mentioned coordination committee at both the national and provincial levels so that they can function optimally. This budget is not part of the budget of one or several departments that are the elements of this committee.

b. Provide a special fund for preventing forest fires annually for every unit of forest management, primarily at the field level. Forestry companies are obliged to provide this special fund for preventing forest fires to cover their concession forest and surrounding areas.

c. Provide for and use effectively and efficiently a special fund for suppression of forest fire at every forest management unit, especially at field level. Forestry companies are obliged to provide this special fund for suppressing fire in their managed forest areas, and possibly to be used for suppressing fires in the surrounding area through mutual cooperative agreements.

d. Provide on-call budget for an emergency fire.

e. Support cooperation among local communities, private sector, NGOs and mass media to voluntarily and actively participate in prevention and suppression of forest fire. This voluntary participation indirectly creates an immediate-use-funding source.

f. Support funding in the form of non-binding grants through cooperation with other countries, regional and international institutions to increase capability in forest fire prevention and suppression.

g. Develop aid programs from donor countries for the protecting of forest from fire. This aid is available in the form of expertise, technology transfer and assistance in education, training, research and development of forest fire management.

h. Organize cooperation with United Nations Commission on Sustainable Development (CSD) in implementing program Agenda 21 for forestry. Emphasize forest fire aspects for international promotion of protecting the world's forests from fire. Utilize and provide information to the Global Fire Monitoring Center (GFMC) which is an activity of the UN International Decade for Natural Disaster Reduction (IDNDR) and co-sponsored by several UN agencies and international programs. Donor countries and institutions that may provide funding need to receive a proposal from Indonesia describing the impact of forest fire in the forest of Indonesia and how funds could alleviate this problem

i. Request support from Bali Partnership Fund established in International Tropical Timber Agreement (ITTA) in 1994. This fund could possibly provide financial support for forest fire protection projects.

VII. SOCIO-ECONOMIC CONSIDERATIONS

Scope

This chapter describes financial losses due to forest fire, the effectiveness of protection, utilizing local communities' experiences in fire uses, and the role of women in fire protection.

1. Economic Implications

Principle No. 28: Damage and Loss of Various Environmental Components

Forests damaged by wildfires will not be able to provide a large number of forest products that are vital to the life of the nation. This is a significant loss in term of production potential of forest resources. Forest fires also have a negative impact on other environmental components such as soil, water resources and air quality. All these cause both direct and indirect losses to the country. Considering that the program to protect the forest from fire is complex and costly, financial support from various sectors is needed.

Activities No. 28

Develop guidelines to estimate potential direct and indirect loss of the national economy due to forest fire. This estimate will assist in helping other parties to understand that programmed fire management cost is less than the losses suffered when fire occurs. The required steps for this estimation are:

a. Study and inventory the impacts, both direct and indirect;

b. Formulate methodology for estimating financial losses;

c. Determine loss caused by forest fire as per government regulations.

Principle No. 29: Cost-Effectiveness of Fire Prevention and Suppression

Rural communities are one of the main causes of fire. Rural residents often do not understand the value and function of the forest biosystem and use fire without prepared control measures, thereby allowing fire escape.

Activities No. 29

a. Introduce and develop permanent agricultural systems, agroforestry and agrosilvopastoral as alternative solutions to shifting cultivation. Establish demonstration plots to show the above emphasizing proper fire management practices/measures.

b. Develop an incentive system to reward communities or individuals that apply appropriate land-use practices that prevent escaped fires or reduce fire-caused damages to the forest. In the case of individuals, the reward is often more effective to simply make formal recognition expressing that the individual has done a "respectful" thing (e.g., *kalpataru* in forestry).

c. Introduce and establish a program for environmental community awareness. The program must be appropriate to the social, economic and cultural

background of the community and emphasize the forest function in the environment and the negative impacts caused by fire.

d. Utilize research finding on the causes of fire. This will become the basis for formulating wildfire prevention, education and extension programs. Develop and implement nutrient cycling agricultural systems so that biomass is utilized optimally to enhance soil fertility. This program can be categorized as sustainable agriculture.

e. Establish demonstration plots showing non-burning techniques of land clearing. Implement beneficial and inexpensive soil and water conservation techniques.

2. Using Traditional Communities' Experience in Fire Utilization Outside Forest

Principle No. 30: Conflicts in Land Utilization Inside and Outside Forest by the Communities

Conflicts of land use rights between rural community and other land users, such as forest concessions, timber companies, contractors, and plantation owners, can lead to wildfires. The communities must get the direct benefits from the forest in order to have any incentive to protect the forest resources. Local communities use fire for economic, agricultural and cultural interests; and they will continue to do so in the future. A traditional experience on fire control in one particular place may be useful for a wider area (national context). There are many experiences in fire protection with varying levels of success. Lessons from these experiences may be incorporated in national fire management programs.

Activities No. 30

a. Arrange for consultations with local communities to resolve the conflicts on forestland utilization in order to protect forest from fire. Train local communities on fire prevention and suppression techniques so they are capable in preventing escaped fire from their prescribed burns. Eventually their new skills will become part of the traditions within the community.

b. Involve local government and communities in determining methods of controlling fire in their areas. The communities may also need financial assistance to control wildfires. Organizing community fire training should use a participatory approach in order to be effective and sustainable.

c. Develop exchange of information and experience concerning fire management with local communities. This exchange can be assisted by international organizations and NGOs as appropriate.

Principle No. 31: Role of Community around Forest, Community Leader, Spiritual Leader, NGO, and Women's Groups in Fire Management

Communities around forests, community and spiritual leaders, NGOs and women's groups play an important role in fire management. Women often play a big role in agriculture, raising livestock, collecting fuel wood and gathering non-timber forest products. They are sometimes more appreciative and caring for the natural environment, although it is often difficult to involve them in the education and extension programs due to culture. Their active participation in forest fire

management programs is very important in protecting the forest from wildfires. Besides, all of family members can be involved in the fire management activities.

Activities No. 31

a. Develop active participation of the communities residing around the forest. Include community and spiritual leaders, NGOs and women's groups in these fire management activities. Provide training on safe fire uses in agricultural activities, raising livestock, forestry, etc.

b. Develop an effective education for women on fire utilization both at provincial and local levels. Provide training on fire use technology. Encouraging experience exchange is an appropriate participatory program that can contribute to fire management.

c. Control wildfire and protect biodiversity by developing control activities through participation of local communities, provide education/extension to communities living adjacent or inside the forest.

VIII. FOREST RESOURCE MANAGEMENT AND UTILIZATION

Scope

This chapter includes fire management as a part of forest management. It covers utilization by all sectors, including forest concession holders, and the use of prescribed fire.

1. Forest Management

Principle No. 32: Forest Fire Management as an Integral Part of Forest Management

As an integral part of sustainable forest management, forest fire management should be based on precise land-use planning, considering all related aspects.

Activities No. 32

a. Integrate fire management into forest management planning. For instance, in forest inventory, it is appropriate to gather information on quantity of fuels (foliage, stems, branches, etc.) used to estimate fire hazard. Another example is the construction of forest road network which will serve both the purposes of access for transportation and should also serve as fire breaks if conditions are suitable.

b. Include forest fire protection in forest concession agreements.

c. Include forest fire protection in silvicultural practices.

Principle No. 33: Reducing Forest Fire Risk through Forest Management Activities

Increasing forest diversity, particularly in forest plantations may reduce fire risk. Diverse species, age and structure will reduce the extent of fire and increase the fire suppression opportunities. Reducing fire occurrence could also reduce potential of insect and disease attacks.

Activities No. 33

a. Consider the possibility of underplanting or intermixing the principal species with suitable endemic species of low flammability.

b. Give high priority to rehabilitation measures of fire damaged forest.

c. Reduce accumulation of biomass waste through logging waste utilization and low-impact logging.

d. Utilize forest road as fire breaks.

e. Use buffer zones to prevent fire from spreading into the forest.

f. Develop technical guidelines for special activities/practices such as site preparation for forest plantation, estate crops, etc.

Principle No. 34: Fire in Savanna and Seasonal Forest Ecosystem

Savannas and grasslands are an important ecosystem in Indonesia, such as those grasslands in the Nusa Tenggara islands. Fire plays an important role in these ecosystems. Fire must be adequately controlled in the ecosystem to avoid damage to the surrounding forest. The monsoon forest is a forest ecosystem that is fire prone and fire must be managed appropriately.

Activities No. 34

a. Determine fire effects and fire regimes for savanna, grassland and monsoon forest areas and develop fire management planning appropriate to maintain these ecosystems.

b. Consider the use of prescribed burning and other techniques to prevent wildfires.

c. Provide periodic training in proper fire-use techniques to communities within those ecosystems.

Principle No. 35: Prescribed Burning and Smoke Management

Fire use in land and forest management must comply with all administrative procedures. Prescribed burning procedures, as well as smoke management techniques, need to be defined by the Indonesian government and appropriate regulations issued.

a. Prescribed burning is carried out at locations ecologically suited to achieve the desired purpose.

b. Development of smoke management planning at respective provinces will reduce excessive smoke emission and pollution. Smoke management should cover the following matters: 1) location of smoke sensitive areas; 2) determine the burning zone; 3) determine strategy and technique in minimizing smoke emission; 4) obtain weather forecasts (wind direction and velocity, temperature, humidity, etc); 5) utilize meteorological information to ensure that smoke will not spread close to the surface; and 6) calculate the dryness index prior to initiating the burn.

Activities No. 35

a. Study and analyze all ecosystems in Indonesia to determine in what systems the use of prescribed fires will be an appropriate management tool.

b. Study and analyze the culture of traditional (indigenous) communities that use fire in land preparation. This is the easiest way to study the fire use, as they have long experiences and it has been tested from generation to generation.

c. Study prescribed burning systems that are successfully used in other countries for possible application in Indonesia.

d. Develop prescribed burning systems that stress on either technical or administrative requirements. To ensure that the prescribed burning can meet its objective, the burn plan and its implementation must be approved and supervised by the local fire organization.

e. Encourage all provinces to develop a general plan on prescribed burning and smoke management, including scheduling for burning so that smoke emission are minimized. To facilitate this, guidelines for preparing a prescribed burning should be developed.

f. Encourage related agencies such as the Meteorology and Geophysical Agency to obtain their assistance as to where and under what weather conditions prescribe burns can be safely carried out.

g. Encourage the Agency for Forestry and Estate Crops Research and Development and other research agency and institutions, who have interests to develop all related aspects concerning strategies, methodology and technique of prescribed burning for various ecosystems. The objective of this research is to minimize the negative impacts to those ecosystems and the general environment.

2. Forest Utilization

Principle No. 36: Logging and Fire Risk

One of the purposes of forest utilization is to produce timber. Logging operations involve various activities, including the construction of infrastructure and facilities such as roads, camps, workshops, fuel storage, etc. Heavy equipment such as tractors, dump truck, skidders, chain saws, trucks and other vehicles are frequently used in the logging operations. Workers frequently stay in the forest areas throughout the year. If the workers are careless or if there is poor equipment maintenance or improper equipment use, fire risk is increased.

Activities No. 36

a. Strictly control logging operations and clearly specify the use of all equipment and machinery in forest concession agreements to reduce fire risk. Use spark arresters to prevent fires from chain saws and other machinery. The transport, use and storage of fuel must be strictly controlled. A responsible forest officer should be appointed to oversee these aspects of the logging operation.

b. Encourage forest concession holders, timber companies and contractors to conduct special training in forest fire control on a regular basis. This will promote awareness and develop responsiveness in carrying out their daily activities, (i.e. prohibition of smoking while handling fuel).

c. Develop special guidelines on measures needed for extreme dry weather or high fire danger conditions. Such measures may be valid to all or part of the concession area. It may also be necessary to restrict/prohibit people from entering forest areas where logging will be conducted.

d. Clarify the forest concession agreement as the role and responsibilities of the concession holders in fire management, including suppression activities and rehabilitation costs of fire-damaged forests. Included in the agreement are requirements that their crews and equipment can be used during fire control activities.

e. Forest concession holders, timber companies and contractors must provide appropriate training for their employees, and possess standard operating procedures (SOP) in fire prevention and suppression during logging operations.

Principle No. 37: Logging Activities Resulting in Biomass Accumulation

Logging activities may result in biomass accumulation including logging waste and site invasion by weed species. The soil may also dry out and as a result increase fire risk. The careless use of fire during timber harvesting can result in large wildfires. These fires can cause significant economic losses to the country and also, require additional funds for rehabilitation.

Activities No. 37

a. Develop logging techniques that avoid creating large openings, reducing the drying of the forest soils, and the invasion of fire sensitive pioneer species.

b. Minimize logging waste through incentives and penalties. In addition, encourage local communities to utilize logging residues as long as this does not increase the fire risk.

c. Institutionalize and enforce laws, regulations or guidelines for forest operators/workers. If necessary, modify agreements to include fire prevention responsibilities by concession holders and contractors.

d. Levy penalties to forest concession holders to recover losses of forest values and costs for rehabilitation of fire-damaged forest due to negligence.

2. Other Forest Uses

Principle No. 38: Communities' Activities Inside the Forest

Communities in and around forest areas often have long-established traditions of hunting, fishing, collecting food and medicinal plants and gathering other forest products. Conversion of forest lands to other land uses and population pressures have increased the intensity of forest use by communities, resulting in greater fire risks. Fire risks are highly increased through recreation, camping and sporting activities.

Activities No. 38

a. Forest concession holders and contractors should provide assistance in organizing and supporting local communities, and encourage their active participation in forest fire prevention programs.

b. Manage community activities that use fire to reduce the risk of fire spreading into the forest.

c. Avoid conflict and misunderstanding between the local communities and forest concession workers through open and frank dialogue, respecting local traditions and customs. Concession holders and contractors must consider the welfare of local communities in providing employment opportunities and facilities.

d. Assist the local communities in their efforts to enhance traditional values and customs which have historically preserved natural resources.

e. Restrict recreation use of forests during periods of extreme fire danger. Fire uses in camping activities will be restricted to certain areas.

f. Patrol areas frequently visited by people to insure their compliance with rules and regulation, especially during the high fire risk periods and holiday seasons.

IX. PUBLIC TRAINING AND EDUCATION

Scope

Education includes formal, non-formal (training and extension) and informal education.

1. Training and Extension

Principle No. 39: Training for Forestry Officials, Managers, Workers and Staffs

a. Every government and non-government official responsible for forest and land management at any level needs to acquire and develop knowledge in forest fire management. The knowledge needed will vary with the level of responsibility and authority.

b. Every forestry staff and worker, both in governmental and non-governmental institutions, such as state-owned forest companies, forest concessionaries, etc, and particularly staff who are assigned forest protection duties, should acquire knowledge and skill in forest fire management.

c. Every official, manager, worker and staff member in forestry who is given duties and responsibilities for forest fire management must acquire knowledge and master the skills involved in the practice of forest fire prevention and suppression.

Activities No. 39

a. Identify the number of persons and the training needs for all staff involved in forest fire management at every forest management unit from the national level to the field level.

b. Identify information needs and appropriate training requirements for officials and managers. Training may be provided by dissemination of library materials, conducting seminars, workshops and short courses; and field training related to forest fire management principles and application.

c. Include a training plan for officials, managers, workers and staff of forestry into forest management plans at every forest management unit according to their rank. This plan includes a targeted number of persons to be trained and levels of training as well as allocation of budget.

d. Provide training and retraining for forest fire prevention and suppression for Forestry workers and staffs, particularly at field levels. Training needs to be conducted by the forest management unit itself (in-house training) or through the existing training centers.

e. Develop a national standard training curriculum and syllabus for training implementation.

f. Include integrated forest fire management as one of the subject in education for Jagawana and Forest Security Units, Forestry School students and Faculty of Forestry of universities.

g. Disseminate law and regulation including the guidelines on forest fire management, to all levels of government and to forestry enterprises.

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Principle No. 40: Training for Communities Adjacent to Forests

Governmental and non-governmental forestry institutions and the forestry related private sector are all responsible for providing education in forest fire management to those communities adjacent to the forests.

Activities No. 40

a. Prepare and organize training for forestry officers, concession holders and contractors' staff (training for trainer). They will be the future trainers who will give extension to the communities.

b. Identify and recruit appropriate community members to be trained in forest fire prevention and in the use of equipment for fire suppression.

c. Prepare basic training programs and extension materials for communities living adjacent to forests to enhance their awareness as to the importance of forest resources. Include materials on the role of fire in the forest.

d. Increase knowledge of fire prevention in communities through simulation, contests, prevention days, etc.

e. Provide basic tools under strict supervision for use in emergency situation by those trained in (B).

f. Provide a demonstration plot for forest fire management as one way to educate the public.

Principle No. 41: Influence of Community and Spiritual Leaders

Residents of communities living adjacent to the forest often have traditional values that influence their attitudes toward forest use and protection. Local communities are influenced by community leaders who can assist in disseminating information about protecting forests from fire.

Activities No. 41

a. Identify and recruit community officials, traditional and spiritual leaders as cadres in promoting the need to provide forest protection. Develop a program with both incentives and penalties.

b. Prepare and present training in forest fire management for community, traditional and spiritual leaders for their use as a guide in providing extension to communities.

c. Provide extension materials on forest fire for communities living within and around forests to enhance their awareness on the importance of the environment and protection of forests from fire.

d. Provide information to tourists (e.g., pamphlets, leaflets, stickers, posters and souvenirs) on the benefits of avoiding forest fires and their responsibilities in preventing fire that might start from camp fires, hunting or other recreational activities.

Principle No. 42: Education for NGOs and Women's Groups

NGOs and women's groups can provide effective and appropriate assistance in developing an awareness of the need for a forest fire management program.

Activities No. 42

Develop and organize courses for NGO group leaders and women's group leaders so that they can participate in the forest fire management program. Include information on the impacts of fires to the forest ecosystems, and the benefit of reducing fire risk to the environment of their communities.

2. Public Education

Principle No. 43: Public Education on Fire Uses and Fire Effects

Communities may suffer losses from forest fires in the form of property and income losses, personnel safety, and sustainability of the forest ecosystem. The Government, together with non-governmental institutions and entrepreneurs, are responsible to organize general education to communities on safe use of fire. Education will be more effective when given at an early age to school children and youth.

Activities No. 43

a. Establish and enhance cooperation between the Ministry of Forestry and Estate Crop and the Ministry of Education and Culture to develop an appropriate curriculum and organize educational programs for pre-school, primary and secondary schools on forest fire management.

b. Support involvement of non-governmental institutions and other civic groups in public awareness campaigns on forest and forest fire protection.

c. Use the media to provide information to communities on the underlying causes, impacts and management of forest fires. The success of the campaign depends on the selection of appropriate slogans and symbols to increase the public's understanding. Seek cooperation and involvement of religious organizations, civic groups and NGOs in the public awareness campaign.

d. Provide education on environmental issues, forest and natural resource management, as well as impacts from wildfires, at primary and secondary school levels.

e. Publish books on forest fire management and it's effect upon basic ecology and the economic situation of Indonesia.

f. Develop programs to enhance public awareness of forest fire management with emphasis on prevention.

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APPENDIX 1: FOREST FIRE TERMINOLOGY

Selected important forest fire terminology summarized in this appendix are used in this National Guidelines on the Protection of Forest against Fire or references.

1. **Backfiring:** A fire set along the inner edge of a control line to consume the fuel in the path of a forest fire and/or change the direction of force of the fire's convection column.

2. **Crown fire**: A fire that advances from top to top of trees or shrubs more or less independently of the surface fire. Sometimes crown fires are classed as either running or dependent, to distinguish the degree of independence from surface fire.

3. **Executor Command Post (POSKOLAK)**: An executor unit of fire suppression at District Forest Service level.

4. **Executor Coordination Unit for Disaster Management (SATKORLAK-PB)**: A coordination unit at provincial level consisting of local government, Arm Forces and other related institutions, to overcome every disaster, including forest fire.

5. **Executor Unit (SATLAK):** An executor unit for Forest Sub-district (BKPH)/ Forest Police Resort (RPH).

6. **Fire break:** Any natural or constructed discontinuity in a fuelled utilized to segregate, stop, and control the spread of fire or to provide a control line from which to suppress a fire.

7. **Fire danger:** The resultant, often expressed as an index, of both constant and variable danger factors affecting the inception, spread, and difficulty of control of fires and the damage they cause.

8. **Fire danger index:** A relative number indicating the severity of forest fire danger as determined from burning conditions and other variable facet of fire danger.

9. **Fire danger rating:** A fire management system that integrate the effects of selected fire danger factors into one or more qualitative or numerical indices of current protection needs.

10. **Fire hazard:** (1). A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of both ease of ignition and of fire suppression difficulty. (2). A measure of that part of the fire danger contributed by the fuels available for burning.

11. **Fire line:** A line cleared around an actionable fire, generally following its edge to prevent further spread of the fire and effectively control it.

12. **Fire risk:** (1). The chance of fire starting as determined by the presence and activity of causative agents. (2). A causative agent.

13. **Forest fire**: A fire burns a forest unintentionally (unprescribely), that cause damage to the forest and forest products that create economic, social, and environmental losses.

14. **Forest fire detection:** Activities done to discover and locate fire in forest as early as possible so that appropriate and prompt control measures can be taken before the tire spreads to wider areas.

15. **Forest fire management**: All activities required for the protection of burnable fit rest values from fire and the use of fire to meet forest management goals and objectives. Forest fire management includes prevention, suppression and fire use. and it is inseparable part of forest management.

16. **Forest fire prevention:** All activities concerned with minimizing the incidence of destructive fires.

17. **Forest fire protection:** All activities to protect forests from fire (prevention, pre-suppression, suppression).

18. **Forest fire suppression:** All the work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

19. **Forest fuel:** All organic materials in forests either alive (living fuel) or dead (dead fuel). Living fuels are naturally occurring fuels in which the moisture content is physiologically controlled within the living plant. Dead fuels are fuels having no living tissue and in which the moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), air temperature, and solar radiation.

20. **Forest protection:** That branch of forestry concerned with the prevention and control of damage to forests arising mainly from human action (particularly unauthorized: grazing and browsing, felling, fire, land utilization), and pests and pathogens but also from climatic and soil agencies.

21. **Fuel break:** Generally wide (20 to 300 m) strips of land of which the native vegetation has been permanently modified so that fires burning into them can be more readily controlled.

22. **Fuel isolation:** A technique through which large expance of fuels (forests) are broken up with firebreaks, fuel-breaks or green belts.

23. **Fuel management:** The act or practice of controlling the flammability and reducing the resistance to control of forest fuels through mechanical, chemical, or biological means, or by fire. It includes fuel isolation, fuel modification and fuel reduction.

24. **Fuel modification:** The act of changing one or more forest fuel characteristics, such as fuel type, fuel compactness, arrangement and fuel size and continuity.

25. **Fuel reduction:** A generic term which describes program that seek to reduce fire hazard through the diminution of available forest fuels.

26. **Green belt:** A strip that has been converted to a nonflammable cover type and is maintained in that state by irrigation and mechanical treatment.

27. **Ground fire:** A fire that burn organic material in soil layer (e.g. peat fire) and often also the surface litter and small vegetation.

28. **Jagawana (forestry special police):** Certain government officer in forestry institutions given authority as Forestry Special Police to safeguard the national forest from disturbance (including fire) as stated in Paragraph 18 Forestry Law No. 5, 1967, Jo. Paragraph 16 Government Regulation No. 28, 1985.

29. **Management Center (PUSDAL):** A forest fire management center at provincial level.

30. **Mop-up**: The act of making a fire safe after it has been controlled, by extinguish or removing burning materials along or near the control line, felling snags, trenching logs or prevent rolling, and the alike.

31. **Penanggulangan kebakaran:** An Indonesian forest fire term to express pre-suppression and suppression activities.

32. **Prescribed burning (prescribed fire):** Controlled application of fire to wild land fuels in either their natural or modified state, under specified environmental conditions that allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to attain planned resource management objectives.

33. **Smoke management:** The application of knowledge of fire behavior and meteorological processes to minimize air quality degradation during prescribed fires.

33. **Surface fire:** A fire that burns only surface litter, other loose debris of the forest floor, logging waste, and small vegetation.

34. **Wildfire:** Any fire occurring on forest and non-forest land except a fire under prescription.

ORIGINAL
ASLI