NATIONAL GUIDELINES ON THE PROTECTION OF TROPICAL FORESTS AGAINST FIRE

ITTO PROJECT [PD 12/93 REV.3 (F)] INTEGRATED FOREST FIRE MANAGEMENT IN INDONESIA: PHASE 1

ITTO

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REFERENCES

1. Local Planning and Development Board (*BAPPEDA*)
2. Regional Regency of Forestry Service (*KANWIL KEHUTANAN*)
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4. Other institutions

PREFACE

We are aware that forest fires may cause serious environmental degradation whether due to natural causes or human'negligence and poor management. Since sixteen years ago, a prolonged drought affected by El-Nino phenomenon had built a such condition that tropical forest became easy to burn. The first largest fire devastated about 3.7 million hectares of forest areas in East Kalimantan in 1982/1983. The Government of Indonesia noticed that forest and land fires occur every year although they differ in intensity. Within the past 16 years, the 1997 fires were recognized as the worst fires and the President of Republic of Indonesia declared them as a national disaster.

Since 1981, Indonesia has worked out cooperation with various countries concerning forest fire. Until 1997, numerous cooperations have been organized with different international organizations or countries in form of seminars, workshops, educations, researches and experts assistances from Canada, Germany, Japan, Australia, America, Finland and etc. Among the organizations that have contributed assistance on matter concerning forest fire are The European Communities (EC), United Nation Development Program (UNDP/FAO), Deutsch Gessellschaft für Technische Zusammernarbeit (GTZ), International Tropical Timber Organization (ITTO), Japan Forest Technical Association (JAFTA), Japan International Cooperation Agency (JICA), United States Agency for International Development (USAID), and other related institutions.

Local organizations and institutions have also initiated numerous inputs in various researches and education programs. For instance, institutions from Local Governments (East Kalimantan, Lampung, Palembang, North Sumatera and etc.), Faculty of Forestry from several universities (Mulawarman University, Bogor Agricultural University ans etc.), Environmental Impact Control Board (Bappedal), and other parties.

The effort in forest fire protection so far has been minimal due to lack of institutional capacity, personnel and lack of guidelines both at the national and regional level. Due to condition as mentioned above, Indonesia should develop its own guidelines pertaining to forest fire management. The International Tropical Timber Organization (ITTO) and its sister organization, the Common Fund for Commodities (CFC) have sponsored this very important project entitled: **"Integrated Forest Fire Management in Indonesia, Phase I: National Guidelines on the Protection of Forests Against Fire"**. As we know, Indonesia has not owned its National Guidelines on Forest Fire Management until the end of this project.

During the process in developing these guidelines, we had established five drafts. The improvement of each draft was conducted by inviting suggestions from forest fire

experts/ scientist /academicians, forest managers/executives and other related institutions. The sixth draft will be the final report. This successfully developed National Guidelines is an output of assistances and cooperations with various foreign and local institutions.

Bogor, 1998

TABLE OF CONTENTS

LIST OF APPENDICES

I. INTRODUCTION

Forest and land fires in Indonesia have caused enormous economical, ecological and political losses to the country. Fire losses often make it impossible to reach the sustainable forest management or comply with ecolabling regulations. Economically, forest and land 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 and land fires can reduce the quality ecosystem which functions as a life-support system. They also decrease the biodiversity of flora, fauna, and germ plasma 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 occurred in Indonesia 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 converting the natural forests for agricultural purposes and new settlements to accommodate the population increase. Ironically, 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 plantation areas.

These situations, conditions and phenomena have not only attracted the attention of the nation, but also the international community. Therefore, ITTO/CFC is 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 level to develop policies, programs, projects, activities and forest fire management actions* including communities in and around forests. *Further, this 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 research; institutional framework and its development capacity; socio-economic consideration; the relationship between the forest fire management and utilization; and training and education. These guidelines are made based on the present and expected future conditions and situations in Indonesia. The guidelines are applicable for forest areas, which include Production Forests, Protection Forests, and Conservation Forests. The discussion on fire uses outside the forest area is due to the fact that the fires within the forest are often a result of a fire source from outside the forest.

These guidelines are still in general but comprehensive and clear as they are directed for all types of forests ecosystems in Indonesia. To be more practical, operational and suitable for their situation and conditions, these guidelines need to be clarified in detail to the respective province and even if required to forest management units.

II. NATIONAL POLICY AND LEGISLATION
(Philosophic Basis)

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 sustainable 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 and equalize the perception between all sectors of government and private institution in utilizing forests and land in sustainable and continual manner so that the integrity and 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 participate in maintaining 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 in forest utilization that is oriented to the prosperity of the community.

Principle No. 2: Forest Protection

A. State guidelines (GBHN) entrust that forestry development continue to be upgraded and directed to secure the continuity of supplying forest products for the development of industries, multiple work sectors, business opportunities, national income sources and regional development. Forestry development is to maintain its function in the ecosystem benefits for hydrology, germ plasma, soil fertility and climate. In order to maintain the continuity of forestry development, forest protection is meant to secure the sustainability of forest so that it can fulfill its functions.

B. Forest protection includes all efforts, initiative, activities and measures to prevent and limit the damages to forests and forest products. Humans, livestock, fire, natural disaster, pests 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. Widely disseminate the protection efforts to maintain forest conservation so 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. Encourage the creation of a functional stand-alone security system that is supported by facilities and infrastructure, funding and standard operation procedure as well as adequate human resources in term of quality and quantity. 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 from fire for each conservation area.

B. Require 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

Besides 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 wood and non-wood forest products. This short-term economic goal has let to the

drastic damage and deforestation of the forests to the point that the existence and quality of the forest resources have declined greatly.

B. Encourage stand-alone forestry extension efforts under the existing national and provincial forestry organizations. Forestry extensions will include rural development and the military participation in rural development. This forestry extension activity should include appropriate legal requirements.

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 toward forests through their participation in regular activities and exchanges of information.

D. Consider 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. The already existing forest fire management legislation and technical provisions are deemed adequate if implemented and enforced.

The government and the community have prepared protection regulations. In order to implement these regulations, several steps aiming at a more concrete intersectorial coordination include:

1) The "Bandung Conference" in 1992 concerning producing "Long Term Integrated Forest 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 Department of Economic and Finance, National Board for Development Planning (*Bappenas*), Department of Industry and Department for 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 on forest and land fires.

7) *Decree of the President of Republic of Indonesia, 1998 on Cabinet Ministers of Development VII, which combined the Ministry of Estate Crops in the Ministry of Forestry that later became Ministry of Forestry and Estate Crops or 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. Gain understanding of forest protection policy on fire with other government agencies through intensive communications including formal correspondence, meetings, seminars and workshops.

B. Formulate an integral forest and land control policy including forest and land fire aspects. The fire elements must be balanced with other elements and must be acceptable to the involved parties, government, private and the communities in general. The formulated policy should be easily understood, accepted by all parties and is implementable.

C. Implement the policy of forest protection from fire by requiring 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 state actions 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 and land fire rules and regulations.

C. In order to get a comprehensive forest protection system that includes items of various importance, 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. 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 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, non-formal and informal education processes and disseminate information through various mass media, communication forums, correspondence, seminars, workshops, etc.

D. Enhance law enforcement efforts through cooperation and coordination between enforcement personnel and related institutions. To support these efforts, the Department of Forestry plans to increase Forest Protection Personnel (Jagawana) to 15,000 persons and Perum Perhutani to 5,000. In addition, to assist in law enforcement, one-third of the Jagawana force will be granted the authority and power of a Government Investigating Officer (PPNS).

E. Each functioning unit of forest area, national park and other conservation areas should establish, train and equip at least one team that consists of 3 forest fire suppression teams. These teams will consist of 30 or 10 persons in one team that work in shift. Each of this team consists of Jagawana or control unit who may work not only to suppress fire but also to guard the forest and enforce related laws.

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 and land fire management, as a part of the management activities should be carried out based on proper planning. A forest fire management plan is an integral part of forest and land control plan. The plan is developed at national, provincial, regional 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.

B. Identify all factors affecting forest fire management including:
   1) Forest fire history
   2) National Land Use Plan(RTRWN), Provincial Spatial Plan (RTRWP) and Regency Spatial Plan (RTRWK)
   3) Ecosystem type (relates to fuel type)
   4) Climate and weather conditions
   5) Software
   6) Socio-economic condition of the communities
   7) Structural and non-structural organizations

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

Develop annual and five-year forest fire management plans that include:

1) Fire Management Objective
2) Fire Prevention Programs
3) Fire Suppression Programs
4) Five-year Projection of Manpower, Facilities and Infrastructure

The annual plan will include a display of targets and general activities, prevention, actions, suppression, scheduling and source funding and amount, and manpower required.

D. Monitor and evaluate annually the implementation of fire management plan. Revise the plan as required.

2. Fire Management Options

Principle No. 8: Selection 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 emphasizes the socio-economic and culture aspects of local communities.*

3. Fire Prevention

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

Principle No. 9: Fire Prevention Plan

A. The development of fire prevention plan follows these steps:
   1) compilation of basic information
   2) analysis of needs based on risks and hazard and related resources
   3) identification of the major fire causes and concentrate efforts toward them
   4) division of duties and responsibilities of related agencies
   5) compilation and analysis of feed-back information

B. Reducing wood and organic waste during logging and land clearing operations are a strategic step in fire prevention.

C. Using prescribed burning in fuel management as one strategic step in fire prevention.

Activities No. 9

A. Develop general forest fire prevention plan according to the following outline:
   1) Develop basic plan
      a. Fire occurrence map with numbers and locations of past fires
      b. Fire statistics showing dates and times of fires, fire cause, size, etc.
      c. Fire risk map showing locations where activities and improvements might increase the chance of a fire start
      d. Hazard map showing fuel types according to their flammability
      e. Other required maps

   2) Determine prevention objectives

3) Summarize problems and further actions

4) Develop prevention activities plan and strategy/method and scheduling:
   a. Establishment
   b. Campaign/dissemination of information
   c. Extension
   d. Education
   e. Fuel management/fuel treatment
   f. Role of communities

5) Develop monitoring and evaluation plan

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

B. Prioritize prevention activities firstly for conservation areas and protection forests, and secondly for fire-endangered remote areas.

Principle No. 10: Implementation of Forest Fire Prevention

The success of the forest fire prevention is determined by:

1) Appropriate selection of activities program that meet the target
2) Appropriate selection of method and scheduling
3) Adequate facilities, infrastructure and funding
4) Number and quality of human resources as executors
5) Other related resources.

Activities No. 10

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

B. Implement the prevention activities by using the following methods:
   1) Education and extension
      a. Personal contact

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

c. Printed and electronic media

d. Schools – especially primary and secondary schools

e. Exhibitions, festivals and parades

f. Regreening week, National Nature Conservation, *"Apel Siaga"*, National Forest Fire Prevention, Living Environment Day and other national holidays

g. "Si Pongi" mascot program

h. Sign and warning notice board especially at fire risk areas

2) Technical action and regulation

a. Patrol and control/guard of fire risk areas

b. Fuel behaviors (logging waste and other organic) among others by reducing fuel including prescribed burning, fuel modification and fuel isolation

c. Develop and maintain fuel and fuel break

d. Disseminate fire weather forecasting

e. Socialize and enforce laws including custom and tradition laws

C. 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.

D. Develop a solid prescribed burning plan which is approved by authorized institutions. Prescribed burning must be conducted under the permission of the local authority and carried out by the skilled personnel, *during the permitted period and obey the enforcing regulation.*

E. Carry-out fire danger evaluation at every province by using system or method suitable for each province, at time required and disseminate this outputs to communities.

F. *Issue regulation on prohibition of prescribed burning to all concession holders and other related parties when the level of fire danger is high, and monitor the implementation of this regulation.*

G. *Make use of data and information on El Nino oscillation from Meteorological and Geophysical Agency in an effort to forest fire prevention.*

H. *Construct and maintain fire break around the area which is known before as forest fire source area.*

I. *Promote national campaign on wildfire prevention using "Si Pongi" mascot.*

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 the area forest fire manager and forest 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 respective 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 self-motivated communities as volunteer 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 staffing, organizing, 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. Develop detection and early warning systems and procure and arrange for maintenance of equipment.

Activities No. 12

A. Preparation

1) Prepare data and information needed in suppression operation. Included are topography map, risk area map, accessibility (road) map, and supporting location map with items such as weather station, guard post, fire lookout, water supplies, fire breaks, etc. Include annual statistical data on forest and land fire on list and note of the available resources.

2) Make an inventory of the available fire equipment, infrastructure and manpower in an area to determine potential resource and mobilization needs.

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) Prepare and formalize cooperative agreements for aid resources between and among related institutions. These include military, Public Work Department, Social Department, Health Department, Agricultural Department, Transmigration, Forest Encroached Settlement (*PPH*), Home Affair Department, Search and Rescue Agency and National Coordination Agency for Disaster Prevention (*BAKORNAS PB*). The complete staff members of the departments and their working partners at regional and local levels are to be included in these agreements.

C. Strengthen Standard Procedures

1) *Identify criteria as to when the caution level has been reached.*

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) 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 equipment, including fire lookout, satellite image receiving station and telecommunication facilities are fully functioning and usable.

2) Check, maintain and ensure equipment at the fire control centers and guard posts at all levels are ready for use.

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

4) Identify and ensure readiness of any needed supporting equipment for suppression operation *based on conditions of existing equipment (type and number) and constant regulation.*

5) *Build warehouse (cache) for forest fire suppression equipment at national and province level to face emergency situation. National warehouse will equip with equipment for 500 fire crews while at province level support minimum 200 fire crews.*

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 Second and First Alert areas and disseminate information of these areas.

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

E. Manpower Preparation (recruitment and training)

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

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

3) Organize basic forest fire suppression training course at the beginning and advance level for existing fire crews. Conduct this training prior to fire danger indices reaching the high level.

4) Encourage the forming of volunteer fire crews from local communities and forest users (rattan or rubber collectors, etc.).

5) Establish local fire crews equipped with fire suppression tools and equipment.

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.

B. When initial attack forces cannot control the fire, then further steps are taken by mobilizing either more resources or larger amounts of supporting resources (extended attack).

Activities No. 13

A. Fire Detection

1) Fire detection is an important factor and key to early suppression activity. In order to achieve this, 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 on 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:
   a. Establish a suppression plan that answers the 5 W and 1 H questions.
   b. Suppression action using appropriate suppression methods; direct, parallel or indirect attack depending upon the topography, fuel and weather.
   c. Carry out early control actions, rapid initial attack to contain and prevent fire from spreading.
   d. Analyze the fire situation and develop alternative control strategies based upon the expected fire spread and intensity.

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.

a. 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.

b. To implement those activities, there is a need to create a comprehensive Incident Command System (*SKK*) that can answer all the 5 W and 1 H questions.

C. *Logistic Preparation*

Prepare sufficient logistic in case of continued suppression operation. The logistic includes back-up team, equipment, water for any needs, food and first aid. Also 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 became dangerous, every member involved in suppression operation needs to clearly understand this plan and route. Determine also plan and 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 and land fire statistics that include the number of fire occurrences, burnt over areas, fire sources, fire behavior and fire location.

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

C. Estimate the economical and ecological damages and losses caused by the fire, both inside and outside the forested areas.

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

E. Evaluate the fire suppression plan and its implementation.

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

Principle No. 15: Rehabilitation of Burnt Over Area

To rehabilitate the burnt over area in order to re-establish the forest and its function, there is a need to initiate reforestation action, *enrichment planting, or to keep the burnt over area from burning again so that natural regeneration could take place.*

Activities No. 15

A. Evaluate the feasibility of the burnt over area for rehabilitation and identify appropriate rehabilitation efforts.

B. Develop a rehabilitation plan for the burnt over area. If the area is to be maintained according to its original function, the area should be replanted with the fast growing species that are fire resistant or fire tolerant. This will tend to reduce the fire risk and hazard in the future.

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

Principle No. 16: Requirement Plan

The success of forest fire prevention and suppression depend 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 these equipment and facilities are functioning well for effective and efficient fire prevention and suppression.*

Activities No. 16

Conduct an inventory of tools, equipment and other supporting facilities that already exist. A suggested grouping of equipment by facility follows.

A. *Equipment needs based on sections in the fire suppression organization.*

1) *Mobile fire fighting team: one team responsible for 30,000 ha. of forest area.*

2) *Mobile forest fire detection team: two teams, each consists of 2 persons for the same area.*

3) *Fire look-out team: number of tower depends on visibility range (with and without tools), and land configuration. Visibility range between towers must overlap 20%. This team consists of 3 persons with 3 work shift.*

4) *Supervisor for 6,000 liter water tank capacity: one team.*

5) *Supervisor for portable water tank: two teams for 400 liter and 200 liter tank capacity respectively.*

6) *One team in-charge of 100 watt radio transmitter (VHF/FM).*

B. *Mobile forest fire suppression team*

1) *Mobile forest fire suppression team consists of 34 persons: one Team Leader (KATIM), two drivers, one person responsible for logistic team, and 30 fire fighters. This fire fighting team consists of three teams with 10 members for each team that is 1 leader (KARU) and 9 members.*

2) *One pick-up truck 4-WD with one ton capacity. This truck serve to transport 10-12 persons and one set of hand tools. Also use to transport logistic and other needs for the team. Three trips are required to transport this mobile team or as arranged by KATIM. Two drivers are provided for alternate driving as safety precaution.*

3) *Four sets of 5 watt handy talkie (VHF/FM) for KATIM and KARU.*

4) *One unit of radio transmitter or car radio (VHF/FM) installed in the team's vehicle.*

5) *Fire suppression hand tools that consists of 2 sets. Each set is alternately used or the use is arranged by KATIM. When the fire suppression operation is predicted to be long, work shift of every 3 hours is necessary. This is to enable the team members to refresh in order to work optimally. But, when the operation is short, only maximum of two teams (2 x 10 members) may work together and 10 other members as reserve.*

When shifting the team, used equipment also need to be changed for maintenance so that it will be ready for the next shift.

6) *Each set of hand tools consists of (double the number by number of team):*

a.	*Fire swatter*	*8 units*
b.	*Rake hoe*	*8 units*
c.	*Oval blade hoe*	*8 units*
d.	*Ax*	*4 units*
e.	*Grass cutting bolo*	*5 units*
f.	*Forester's bolo*	*10 units*
g.	*Hoe / spade*	*8 units*
h.	*Drip torch*	*1 unit*
i.	*Sprayer / Backpack pump*	*8 units*
j.	*Portable pump and its accessories*	*1 unit*

7) *All team members are equipped with fire protective clothes (33 sets). Each set consists of clothes, boots, helmet with head torch, gloves, "kepis" and water canteen.*

8) *Supporting equipment that consists of logistics, tent, first aid and rescue aid, location map and operation plan map. Logistic team leader may be assisted by driver in carrying out his duties.*

C. *Mobile forest fire detection team equipped with early suppression equipment.*

1) *Two persons in each team: one motorbike driver and passenger.*
2) *One unit of trail-typed motorbike for each team.*
3) *One unit of binocular for each team.*
4) *One unit of 5 watt handy talkie (VHF/FM).*
5) *Two units of forester's bolo for each team member.*
6) *One unit of backpack pump.*
7) *Location map.*
8) *Hot spot information from satellite image.*

D. Fire look-out tower equipped with early suppression tools.

1) Each tower has one team of 3 persons with 3 work shifts in 24 hours.

2) One map of its control area.

3) Fire finder.

4) One binocular for each tower.

5) One 5 watt handy talkie (VHF/FM) for each tower.

6) Three units of forester's bolo for each member of the tower team.

7) One unit of back pack pump/jet shooter.

8) Three units of fire swatters

9) Simple logistic (food and drink) and first aid.

E. Early warning system:

Weather forecasting station equipped with 1) rain gauge, 2) thermometer, 3) anemometer, 4) hygrometer, and heliometer to measure fire dangêr index, and communication devices.

F. Water pump team

1) This team is given duties and responsibilities to support suppression operation by using water. The team led by Team Leader (KATIM) and number of members is adjusted according to the need level for optimal operation.

2) One unit of 5 watt handy talkie for KATIM

3) Semaphore flag and whistle as mean of communication between members.

4) Pump, water tank and its accessories

G. Team for mechanical/ heavy equipment

1) When the suppression operation requires mechanical/heavy equipment support, a team will be formed. Team will be led by Team Leader with members adjusted to the need for optimal operation.

2) Team is equipped with appropriate supporting tools for optimal implementation of the operation.

H. Communication Equipment

1) Main office

a. AceS satellite terminal service

b. GPS unit

c. PT Telkom telephone network

d. Radio network

e. Handy talkie (VHF/FM) 2 m - band (15 MHz)

f. Radio 2 m band (VHF) with 150 MHz placed in the helicopter

g. AceS terminal and portable terminal

2) Field device

a. Pre and Post Fire

- *Handy communication device to communication with the main office via satellite*
- *Inter-office communication device including data transmission, processing and warning receiving*
- *Global Positioning System navigation tool*

b. Fire Suppression

- *Handy talkie for communication at fire location (VHF and 150 MHz)*
- *2 m band communication device(VHF) for communication with helicopter and satellite terminal.*
- *Mobile communication device in vehicle.*

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 principle 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 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 system at central, inter-regency, inter- and inner-province.

IV. MONITORING AND EVALUATION

Scope

Monitoring includes 1) reviewing forest fire statistical data; 2) monitoring potential forest fire areas as to their "fire readiness" (extent of drought); 3) 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 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, length of time the fire burned, and size of burnt over area, cause and damages as well as suppression efforts. 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 hand tools, cutting devices, rakes, sprayer, 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 hardware and software for statistical data processing.

E. Prepare standard reporting form whereby fire information collected can be processed, displayed and analyzed. Information in the reporting form must be organized so that it is readily useable by automatic data processing systems.

F. Staff and train personnel to carry out the above duties.

G. Develop a hierarchical reporting system.

H. Evaluate the activities of the Regional Forest and Land Fire Management Center.

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

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 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 and to disseminate this to Regency government level. This allows the local levels to anticipate the coming fire season and make any necessary preparations. Steps should be taken to strengthen the coordination between the MOF and the Meteorology and Geophysical Agency. Information on weather conditions and forecasts must be readily shared between the Meteorology and Geophysical Agency 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 drought index so that daily forest fire danger is known. This can be done by utilizing the Fire Danger Rating system developed by the IFFM/GTZ project in the East Kalimantan province. This Fire

Danger Rating system can be easily adapted to other provinces and adopted as the national system.

C. Develop the National Fire Danger Index. 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 and Its Response

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 and by alerting villagers by use of wooden drums (*kentongan*) and *"gethok tular"*. In addition, optimal use of existing means such as ground patrolling and guards 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 and Ministry of Defense and Security. The central level of the MOF should initiate construction of satellite receiving stations, such as NOAA, that can cover all the provinces of Indonesia. The use of other satellite receiving stations may thereby be discontinued and the related difficulty in financing these stations by the provinces abated.

Activities No. 20

A. Encourage all forest management units in the field level [HPH/HPHTI, Technical Executor 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 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 *"gethok 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.

E. Determine the best location for one NOAA satellite receiving station that will be able to cover all forest areas in Indonesia. Support this station with a network that can disseminate the information on emerging fires to all provinces.

V. RESEARCH AND DEVELOPMENT

Scope

This chapter describes the importance of research and development in the forest fire management arena, including both basic and applied research. 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 develops the basic information required in forest fire management. The required research includes the impact of fire on Indonesian ecosystems, biogeochemical cycles, atmospheric quality, local and global climate, as well as damage and losses evaluation. It also includes forest fire behavior in all aspects. 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:

1. 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), (c) fire effects, and (d) reforestation of fire-damaged forests.

2. 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.

3. Socio-economic and culture of the communities: (a) socio-economics of fire use, (b) socio-cultural 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. Research will relate how any of these factors relate to the causes of forest fires.

4. 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.

5. Prescribed burning: (a) study the appropriate prescribed burning techniques suitable for the respective ecosystems in Indonesia, (b) develop demonstration areas on non-traditional utilization of secondary forest for agriculture to reduce impact of land clearing using fire.

6. Utilization of wood waste and other organic.

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

8. Research on alternative to shifting cultivation practice.

9. Establish National 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 issuing newsletter, journal, magazines on forest fire periodically.

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

VI. INSTITUIONAL 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

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, 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 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 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 and provincial level. The National Forest Fire Control Center (PUSDALKARHUTNAS) and its parallel regional provincial level group (SATLAK) and the field fire brigades need additional authority and stronger administrative positions. Develop Forest Fire Control Center (PUSDALKARHUT) at the Ministry of Forestry and constantly improve the structure, duties, functions, responsibilities and authority of the organization.

   There are two institutions at the national level, which have similar duties. They are PUSDALKARHUTNAS, established based on the Decree of the Minister of Forestry No. 188/Kpts-II/1995 and the National Coordination Team on Land Fire established by the Decree of Minister of Environment No. Kep-18/MENLH/3/1995. Based on the directives described in the Decree of the Minister of Forestry, a Forest and Land Fire Control Center was to be formed at the regional level. In order to be effective and efficient, especially in the financial aspect, there should be only one Forest and Land Fire Management Institution at the national level. This institution should be established by the decree of the President, to supervise several related ministries and to appoint

one minister as the responsible person. Fires that occur outside forests, which are called "land fires", are indicated as one of the sources of forest fires. Therefore, the appointed minister should be the Minister of Forestry.

C. Formulate regulations clearly defining the tasks and responsibilities of related institutions in forest and land fire protection.

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

E. Develop and strengthen an appropriate mechanism and structure for organizations at national, provincial and regency levels so that forest and land fire organizations at sub-district or work units, including the volunteer fire brigade, can be established and effectively carry out their tasks of fire protection.

F. Develop operation plans that establish the role of the volunteer organization, especially NGO and women's groups. Prepare and execute training plans for upgrading their capabilities and readiness.

G. Forest and land fire management institutions, from provincial to field levels, should develop formal cooperative agreements with the rural communities, NGOs, timber industries and other related institutions.

H. Develop cooperative agreements with national and international institutions, which have expertise in fire management and can provide their suggestions and ideas to enhance institutional capacity within Indonesia. These international institutions can assist by providing technology, materials and development of infrastructure.

I. Widely disseminate information concerning forest and land fire management institutions 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 land and forest fire prevention and suppression efforts. Dissemination of information to international communities will be further evidence that Indonesia is realistically and seriously dealing with the fire problem.

Principle No. 24: Institutional Framework

Land and forest fire management involves all parties concerned with the general land use, e.g., national forest, private forest, land under traditional right (*hak ulayat*), concession holders, contractors, 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. Duties of the National Forest Fire Organization are particularly:

1) *Develop a master plan for integrated forest fire management.*
2) *Regulation on permission to use fire or other regulation on forest fire.*
3) *Monitor various problems related to forest fire using supplementary data from Bappedal (planning), BMG (climate), LAPAN and etc.*
4) *Research.*
5) *Provision of fund.*
6) *International cooperation*
7) *Assign duties/orders to implementing institutions at province level.*

B. Duties at province level to executing unit (SATLAK) are:

1) *Prevention*
2) *Pre-suppression*
3) *Suppression*
4) *Prescribed burning*
5) *Post-fire (evaluation and rehabilitation)*
6) *Establish and coordinate local communities*
7) *Extension and education*

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

C. Establish an inter-ministerial National Coordination Committee on Forest and Land Fire determined by the President's Decree. The Minister who is responsible for the protection of the forest from fire coordinates this committee. Because forest fire is the focus and land fire is viewed as one source for forest fire occurrence, the appropriate minister is the Minister of Forestry. Every ministry/agency involved in the coordination committee 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 committee. 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. Provide organization resources in the form of staff (human resources), hardware (tools) and software (plan, work program) for the coordination committees at every level.

F. Develop cooperation with communities through social organizations, NGOs, youth organizations, Boy Scout, girl guides, 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.

G. Initiate cooperation and consultation with developed countries and international agencies employing experts in managing land and forest fires. Request highly required assistance, technical assistance, training and/or tools and equipment.

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, as well as in waste processing.

B. Increase information exchange and knowledge concerning forest fire management between governments of ASEAN and their neighboring countries. *The existing bilateral cooperation between the ASEAN countries through BIMP-EAGA, ASOEN Haze Technical Task Force, and ASOF (ASEAN Senior Officials on Forestry) should be increased in various ways.*

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

D. *Support cooperation in forest and land fire prevention 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 handling forest fire. This can be done by (1) sending Indonesian personnel to attend education or training to 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 by 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 fore fire. This includes organizations such as Climate Change Convention, World Meteorological Organization (WMO), South East Asia Ministry of Education Organization (SEAMEO, Biotrop-impact). *This allows early preparation to anticipate change of severe weather or climate that will endanger 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.

2. 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. Besides the enormous economic losses, valued at several million Rupiah, the forest fires have also caused losses in environmental quality and ecosystem degradation. Considering these factors, the required monies needed for fire management would be less than the value of the losses caused by forest fires.

B. Funding for forest fire management may be obtained from *non-bidding 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. This is an emergency fire fund that can only be used upon declaration of a fire emergency.

B. Provide a special fund for preventing forest fires annually at every unit of forest management, mainly at the field level. Forestry entrepreneur companies will provide this special fund for preventing forest fires to cover their managed forest and surrounding areas.

C. Provide *and use effectively and efficiently* a special fund for suppression of forest fire at every forest management unit, especially at field level. Forestry entrepreneur 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 fund for emergency.*

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 expert advise, 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. UN aid in research and fire management includes the world vegetation fire information system and its capability for assisting forest fire management. Donor countries and institution that may provide funding need to get 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-ECONMIC 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 estimation is required to convince people that the programmed fire management cost is less than the losses suffered when fire occurs.

The required steps for this estimation are: 1) study and inventory the impacts, both direct and indirect; 2) formulate methodology for estimating financial losses; 3) determine standard 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. A reason is the use of fire in land clearing without sufficient control, followed by an inadequate knowledge of the importance and function of the forest.

Activities No. 29

A. Introduce and develop permanent agricultural systems, agroforestry and agrosilvopastoral as alternative solutions to shifting cultivation. Establish demonstration plots to show one of the above with emphasis in fire management.

B. Develop an incentive system to reward communities or individuals that apply appropriate land-use practices that can prevent or reduce fire-damaged forests. 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 community awareness on the environment. The program musts be appropriate to the social, economic and cultural background of the community and emphasize the function in the environment and the negative impacts cause 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 agricultural systems by introducing nutrient cycling 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 land preparation. Implement good 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 between rural inhabitants 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 keep those forest resources protected. Local communities use fire for economic, agricultural and cultural interest; and they will continue to do so in the future. The traditional experience on fire control in one particular place may be useful for wider area (national context). There are many experiences in fire protection with different success levels. Lessons from these experiences may be used in national fire management.

Activities No. 30

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

B. Involve local government and communities in determining method for controlling fire in their areas. The communities may also need financial assistance to control wildfires. Organizing them in training should be conducted by participatory approach in order to be effective and sustainable.

C. Develop exchange of information and experience concerning fire management involving local communities. This exchange can be assisted by international organizations if needed.

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

Communities living around forests, community and spiritual leaders, NGOs and women's groups play an important role in fire management. Women's groups often play a big role in agriculture, raising livestock, fuel wood and gathering of non-timber forest producing. They are often more appreciative and caring for the natural environment, although it is often difficult to involve them in the education and extension programs due to their culture. Their active participation in forest fire management programs is very important in protecting the forest from wildfires. Other family members and community leaders, spiritual leaders, NGOs and the public can be involved in the fire management activities and eventually become supporters for fire protection within their communities.

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 forest management in relationship to fire 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

Forest fire management as an integral part of sustainable forest management *should be based* on precise land-use planning *and consider 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, twigs, branches, manure, etc.) used to estimate fire hazard. Another example is the construction of forest road network, which will serve both the purposes of access for forest cultural treatments and may serve as access for fire suppression. Roads may also serve as fire breaks if conditions are suitable.

B. Include forest protection from fire into forest concession agreements.

C. Include forest protection from fire into 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 reduce potential of insect and disease attacks.

Activities No. 33

A. Consider the possibility of underplanting or intermixing the main species with suitable local species with low flammability.

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

C. *Reduce accumulation of biomass waste through logging waste utilization.*

D. *Utilize forest road as fire break.*

E. *Use buffer zone to prevent fire from outside to spread into the forest.*

F. *Develop technical guidelines for special activities practices such as land preparation for concessions, palm plantation and agriculture.*

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

Savanna and grassland are an important ecosystem in tropical area of 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.

Monsoon forest is a forest ecosystem that is fire prone and the 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 training in proper fire-use techniques periodically 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 cloud ventilation values to insure that smoke will not spread parallel to the surface of the earth; and 6) calculate the dryness index prior to initiating the burn.

Activities No. 35

A. Study and analyze all ecosystem types 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 communities (not the immigrants) that use fire in land preparation.

C. Study *successful* prescribed burning systems that are used by more developed countries *for its application in Indonesia*.

D. Prescribed burns must have a burn plan approved by a forest officer prior to initiating the burn. Each plan must contain all provision, including those smoke containment provisions, as designated by the provincial government.

E. Encourage all provinces to develop a general plan on prescribed burning and smoke management, including scheduling for burning so that smoke emission does not pollute the air. To facilitate this, the Ministry of Forestry should develop guidelines for preparing a prescribed burning plan.

F. *Encourage related agencies such as* the Meteorology and Geophysical Agency for obtaining their assistance in preparing signs (warning boards) as to where and under what weather conditions prescribe burns can be safely carried out.

G. Encourage the Agency for Forestry Research and Development and other research agency and institutions *who have interest to develop all related aspects concerning strategies, methodology and technique of prescribed burning for various ecosystems. This is to minimize the negative impacts to those ecosystems and environment at large.*

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, soil-moving equipment, skidders, *chain saw*, 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 with clear instructions. A responsible officer should be appointed to oversee these aspect 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 tend to promote awareness and develop responsiveness in carrying out their daily activities such as 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 contents of the forest concession agreement on 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 will be 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 desiccate 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 floor, and the invasion of fire sensitive pioneer species.

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

C. *Socialize* and enforce laws, regulations or guidelines for forest operators/workers. If necessary, modify agreement to promote responsibilities by concession holders and contractors in fire prevention.

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

3. 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 and collecting food from medicinal plants and other forest products. Conversion of forest lands to other land uses and population pressure have increased the intensity of forest uses by the 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, encouraging their active participation in forest fire prevention programs.

B. Control 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 the local community 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 must be pre-arranged and 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 company*, should acquire knowledge and skill in forest fire management. This includes employees in state-owned forest companies, forest concessionaires and particularly those who are assigned duties in forest protection.

C. Every official, manager, worker and staff member in forestry who is given duties and authorities specifically 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 given in form of dissemination of library materials, seminars, workshops, 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 plan 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 Unit, Forestry School and faculty of forestry of university.*

G. *Disseminate law and regulation including the guidelines on forest fire management.*

Principle No. 40: Training for Communities Adjacent to Forests

Governmental and non-governmental institutions and the forestry related private sector are responsible for providing education in forest fire management both non-formal and formal, 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. *Socialize knowledge and regulation on* fire prevention to 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. *Make 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 could start from camp fires, hunting and 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 from forest fire in the form of property loss, income loss, personnel safety and sustainability of the forest ecosystem. The Government, together with non-governmental institutions and entrepreneurs, are responsible in organizing 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 NGO 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 with basic ecology and economic situation of Indonesia.*

F. *Develop programs to enhance public awareness towards forest fire particularly on its prevention.*

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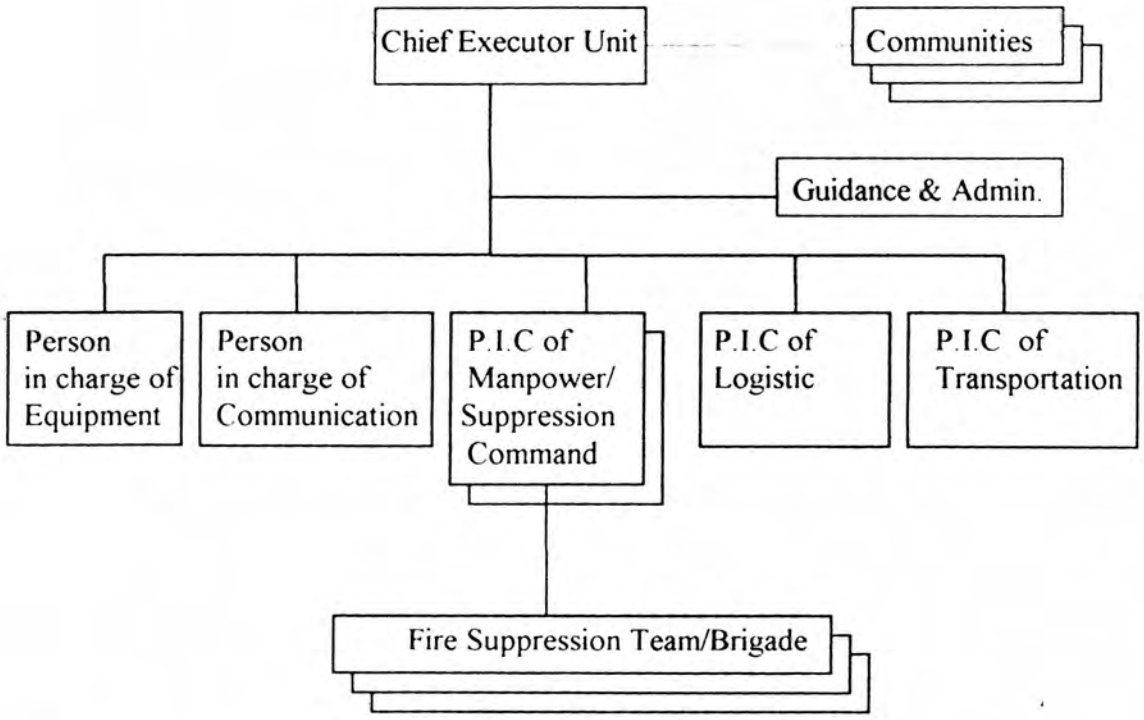
APPENDIX 1: ORGANIZATION CHART OF FOREST FIRE MANAGEMENT

Organization chart of forest fire management is included in the Decree of Minister No. 188/Kpts-II/1995 and the Decree of Directorate General of Forest Protection and Nature Conservation (PHPA) No. 244/Kpts/DJ-VI/1994 concerning Technical Guidelines for Forest Fire Suppression.

1. The Smallest unit of Forest Management



Note :

1) Executing unit formed based on Decree of Mayor Head of Regency.
2) Implement forest and land fire prevention & suppression.
3) Chief of the Executing Unit as Suppression Brigade Commandant.

3. **Organization of National Coordinating Committee on Land Fire**. Based on the Decree of Minister of Environment No. KEP-18/MENLH/3/1995 on the Establishment of National Coordination Board on Land Fire.

The structure of the board is as follows:

1) Implementation Chief : Director General of Forest Protection and Nature Conservation

2) Assistant : Deputy of Environmental Impact Control Board (Bapedal)

3) Members :
   1. Director General PUOD, Ministry of Home Affairs
   2. Director General of General Mining, Ministry of Mining and Energy
   3. Director General of Settlement and Environment, Ministry of Transmigration and Forest Encroached Settlement
   4. Director General of Crop Plantation, Ministry of Agriculture
   5. Director General of Social Support Management, Ministry of Social
   6. Assistant V for the Coordination Minister of Industry and Trade
   7. Assistant III on Coordination of Implementation, State Minister of Environment
   8. Deputy of Aeronautic and Aerospace Institute (LAPAN)
   9. Deputy of Regional and District, National Board for Development Planning (Bappenas)
   10. Deputy of Technological Development, Board for Technological Development and Application
   11. Head of Meteorology and Geophysical Board, Ministry of Transportation

12. Head of National Board for Search and Rescue.

4) Sec./member : Director of Environmental Damage Control, Environmental Impact Control Board (Bapedal)

Note:

a) The National Coordinating Committee on Land Fire Board is a non-structural organization which coordinates related institutions at central level and as facilitator at regional level.

b) Provide assistance and is responsible to the State Minister of Environment as Director General.

c) The Board is working on a) formulating national policies on land fire prevention and mitigation, b) operational coordination at central and regional level, c) formulating human resource management systems, monitoring mechanism, reporting/information systems, and development of incentive systems.

4) Based on Decree of Minister of Forestry No. 188/Kpts-11/95 on the establishment of National Forest Fire Control Center (*PUSDALKARHUTNAS*), with the following structure:

1. Responsible Minister : Minister of Forestry
2. General Chief : Directorate General of Forest Protection and Nature Conservation
2. Daily Executor : Director of Forest Protection
3. Secretary : Head of Sub-Directorate Forest Fire
4. Members, representative :
   a. Secretarial General of Forest Department
   b. Directorate General of Forest Protection and Nature Conservation
   c. Directorate General of Regreening and Land Reforestation
   d. Forest Entrepreneur Service
   e. PT. Inhutani I – IV Service
   f. Indonesia Forest Entrepreneur Association (*APHI*)

Note:

1) Monitor the operation of the forest fire management , 2) Provide direction and operational technical guidance, 3) Utilize and mobilize all facilities and infrastructure, 4) Coordinate aid uses, 5) Report to the General Chief and Daily Chief Executor.

5) Head of Regency will establish Regency Forest Fire Control Center at the Regional Office of Provincial Department of Forestry.

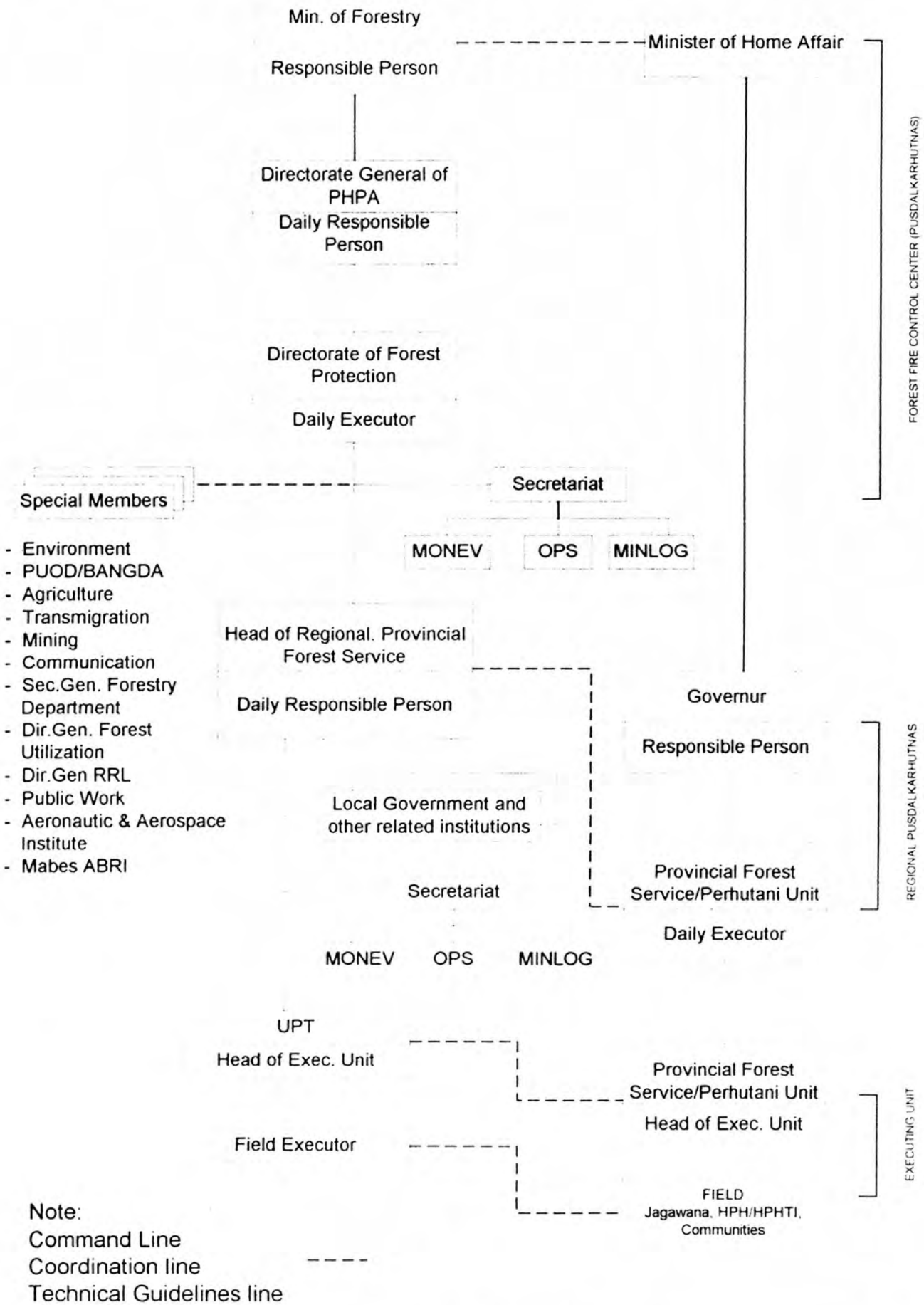
The structure of the Center is as follows:

1. Responsible Person : Governor Head of Regency
2. General Chief : Head of Regional office of Department of Forestry
3. Daily Executor : Head of Provincial Forest Service
4. Secretary : Head of Regional KSDA/PHKA Office
5. Members : a. Regency government
   b. Regional Regency Department of Transmigration and
   c. Forest Encroached Settlement
   d. Agricultural Service
   e. Regional Public Work Service
   f. Regional Head of Fire Service
   g. Regional Crop Plantation Service
   h. Regional Health Service
   i. Regency Office for National Board for Search and Rescue
   j. Forest concession holders

Note:

1) Land and Forest Fire Management Executor, 2) Guiding in implementation activities, 3) Coordinates all implementation activities, 4) Reporting the implementation activities to *PUSDALKARHUTNAS*.

2. Organization Structure of Forest Fire Control Center is as follow:



Note:
Command Line
Coordination line ----
Technical Guidelines line

APPENDIX 2: FIRE MANAGEMENT OPTIONS

Fire management includes all activities required for the protection of forest and human values from fires, and the use of fire to meet land management goals and objectives.

There are three fire management options for application within the forest which includes:

1. **Fire Exclusion** : is applied in those forest types where any fire effect would bring undesirable loss and damage to the resource management and conservation objectives (e.g. tropical moist forest, fire intolerant plantation-type forest).

2. **No Fire Management Measures Applied** : applicable where occurrence of uncontrolled fire may be tolerated as long as no considerable degradation and recoverable environment occurred for example grazing area. Also applicable when there is no other alternatives due to lack of fire control capabilities.

   No fire management measures should only be considered when it is known that forest fire will not become and result an extreme wildfire behavior and damage the human properties and forest ecosystem.

3. **Integrated Fire Management** : is applied when there is a good understanding on theeffect of fire on the specific forest types involved; where there is capability to manage all fire situations (e.g., prevent and suppress all undesirable fire). The use of prescribed burning to achieve the objectives of resource management and other conservation areas.

   The application of the Integrated Fire Management option should be prioritized when wildfires have high potential to threaten human life or property and other assets identified in management plans for protection.

   Integrated fire management measures include the following aspects:

   (i) Fire Prevention
   (ii) Pre-fire activities
   (iii) Fire Suppression
   (iv) Training and Education
   (v) Law Enforcement and the Use of Incentives
   (vi) The use of fire for Specific Purpose

APPENDIX 3: ACTIVITIES BEFORE FIRE

Based on several references (e.g. Fire in Forestry, Volume I: Forest Fire Management and Organization, 1983. By: C. Chandler, P. Cheney, P. Thomas L. Traband, and D. Williams, fire management may be divided into:

1. Forest fire prevention
2. Pre-suppression activities
3. Forest fire suppression

Based on the Decree of Minister of Forestry No. 260/Kpts-II/1995 on Guidelines of Forest Fire Prevention and Suppression and the Decree of Directorate General of Forest Protection and Nature Conservation (PHPA) No. 243/Kpts/DJ-VI/1994 on Technical Guidelines on Forest Fire Prevention and Suppression at the forest concession areas and other land utilization areas, include **forest fire prevention and pre-suppression** (also known as forest fire prevention and suppression) and **no fire management activities**.

The separation between forest fire prevention and pre-suppression is based on its period of activities. Activities in prevention are done earlier and longer than those in pre-suppression.

Based on the above two decrees, the activities when there is no forest fire are as follows:

1. Forest Fire Management Planning
   a. Forest fire mapping
   b. Statistical data development
   c. Provision of human resource and forest fire suppression equipment
   d. Monitoring on weather, fuel accumulation and fire risk
   e. Establishment of facilities and communication
   f. Software development
   g. Education and training
   h. Coordination with related institutions and communities
   i. Establishment of suppression organization

2. Early Detection of Forest Burning
   a. Build guard fire lookout and communication facilities
   b. Patrolling
   c. Build and utilize guard post
   d. Utilize flight information and satellite data for early detection
3. Extension through posters, signs in schools, NGO and communities
4. Education and Training

   Short courses for Forest Security forces (*Jagawana, PPNS* and concessionaires' guard) at basic, intermediate and advance levels.
5. Enhance Awareness
   a. Establish Control Center (*PUSDAL*) and Executor Unit (*SATLAK*)
   b. Readiness and alertness of fire officials
   c. Readiness of all equipment
6. Reducing the possibility of fire occurrence
   a. Prosperity approach of community living around forest
   b. Shifting cultivation control
   c. Regulation and strict supervision on land clearing implementation
   d. Regulation and supervision on entrance of people into forest during dry season
   e. Establish and maintain fire breaks
   f. Prescribed forest burning
7. Determination of forest fire risk based on climate, types of fuel, community behaviors
8. Building reservoirs
9. Provision of equipment and suppression of forest fire, individual and team tools and central aid.
10. Consolidation of standard procedures in forest fire suppression efforts.

APPENDIX 4: FOREST FIRE PREVENTION ACTIVITIES

Based on the Decree of Minister of Forestry No 260/Kpts-II/1995 concerning Guidelines on Forest Fire Prevention and Suppression, it states the following:

1. Direct and indirect forest fire suppression
2. Finding source of causes to forest fire occurrence
3. Mobilize aid unit

Based on the Decree of the Directorate General of Forest Protection and Nature Conservation No. 244/Kpts/DJ-IV/1994 concerning Technical Guidelines For Forest Fire Suppression which states:

4. Determine the process of forest fire occurrence
5. Types of forest fire (ground, surface and crown fire)
6. Determine fire behaviors
7. Forest fire suppression techniques

   Based on reference, the forest fire suppression techniques may be detailed as follows:

   7.1 Determine the principles and methods of forest fire suppression

   7.2 Determine types of equipment and their uses

   7.3 Determine method of using water or chemical

   7.4 Utilize special equipment such as mechanical fans or special tools

   7.5 Use of aircraft or helicopter

APPENDIX 5: POST FIRE ACTIVITIES

The post fire activities included in the Decree of the Directorate General of Forest Protection and Nature Conservation No. 244/Kpts/DJ-VI/1994 on Technical Guidelines For Forest Fire Suppression are as follows:

1. Inspection of fire-damaged areas
2. Inspection of 30 meter distance from fire break, whenever possible use water
3. Cut burnt trees near the fire and suppress its fire
4. Observe hot spots
5. Mopping-up (clean burnt)
6. Ensure no jump-fire

Based on Decree of Minister of Forestry No. 260/Kpts-II/1995 it is also described:

7. Measure the fire-damaged areas
8. Estimates economical and ecological losses
9. Estimates expenditure
10. Reforestation of fire-damaged areas
11. Evaluation of planning implementation

APPENDIX 6: FOREST FIRE SUPPRESSION EQUIPMENT

Based on Chapter II, the types of equipment as described in the Decree of the Directorate General of Forest Protection and Nature Conservation No. 245/Kpts/DJ-IV/1994 concerning Standard Procedure on Forest Fire Suppression Equipment Use, can be classified as follows:

A. **Hand Tools**

I. Cutters

1. Ax-hoe
2. Double bit ax
3. Rake
4. Foresters' bolo (*golok*)

II. Rakes

1. Fire rake
2. Rake-hoe
3. Fire-fighting shovel

III. Hand tool - Flappers/Swatters

IV. Hand tool - Fire sprayer

B. **Semi-mechanical Equipment**

1. Chain saw
2. Portable water pump
3. Water tank
4. Fire Fighting Kit (FFK) and bumpy bucket

C. **Mechanical Equipment (Fire Apparatus)**

1. Heavy vehicles : Tractor, Bulldozer and Shovel
2. Transportation : Truck / pick-up for mobility of fire-fighting team, water tank, water pump. Hand tools and other equipment

D. **Communication Equipment**

1. Short-distance communication device (HT-2 meter)
2. Moderate distance communication device (RIQ or SSB-16 meter)
3. Long distance communication device (SSB or Philip-80 meter)

E. **Supporting Equipment**

1. Helmets
2. Head-light
3. Protective clothes
4. Water tumbler
5. First-aid kit
6. Other equipment : boots, socks and gloves, knapsack

F. **Air Suppression Equipment**

1. Aircraft with Fire Fighting Kit
2. Helicopter with bumpy bucket

G. **Forest Fire Detection Equipment**

1. Fire lookout
2. Binocular
3. Wooden drum /sound signals (*kenthongan*)
4. Weather satellite (e.g., NOAA)

The diagrams of these equipment can be found in the Book II : Compilation of Laws and Legislation

APPENDIX 7: CURRICULUM FOR FOREST FIRE EDUCATION AND EXTENSION

I. GENERAL CURRICULUM

A. INTRODUCTION

1. Fire problems in Indonesia
2. Forest fire impacts (socio-economic, culture and environment)
3. Government policies in facing forest fire.
4. Laws and legislation on forest fire.
5. Organization and personnel
6. National guidelines on the protection of forest against fire

Note: For training/education for trainer candidate, the following need to be added:-

7. Education/training method
8. Extension method
9. Sociology (economic and culture)

B. BASIC KNOWLEDGE OF FOREST FIRE

1. Fuel
2. Fuel Management
3. Fire weather forecasting
4. Fire sources (wildfire)
5. Forest fire types
6. Forest fire behaviors
7. Extreme fire behaviors

C. FOREST FIRE MANAGEMENT

1. Integrated forest fire management
2. Forest fire management economy
3. Forest fire prevention
4. Pre-fire preparation
5. Pre-fire planning
6. Fire detection
7. Communication (equipment and system)

8. Rapid news transmission (procedure and recording system)
9. Fire hazard reduction activities:
   - 9.1 Mechanical fire breaks (fire break)
   - 9.2 Vegetation fire breaks (fuel break)
   - 9.3 Green belts
   - 9.4 Fuel reduction
   - 9.5 Reducing wildfire
10. Fire suppression equipment, equipment maintenance function
   - 10.1 Hand tools
   - 10.2 Mechanical equipment
   - 10.3 Water bucket/ portable water bags
   - 10.4 Aircraft and helicopter
11. Forest Fire Suppression
   - 11.1 Principles and methods of forest fire suppression
   - 11.2 Forest fire suppression procedures
   - 11.3 Forest fire suppression techniques and strategies
   - 11.4 Coordination of aid of communities and other parties

D. POST-SUPPRESSION ACTIVITIES

1. Recording fire causes and impacts
2. Evaluation of losses and damage
3. Rehabilitation of burnt-over areas and estimation of cost
4. Evaluation plan and implementation of fire prevention

E. FIELD PRACTICE

1. Use of fire hazard index
2. Demonstration of equipment uses
3. Fire Detection
4. Fire suppression techniques and strategies

TYPES OF EDUCATION

1. SEMINAR, TRAINING
2. TRAINING FOR TRAINERS
3. TRAINING FOR FOREST FIRE MANAGEMENT EXECUTORS
4. EXTENSION TO GENERAL PUBLIC OR SPECIFIC PUBLIC GROUP

   4.1 Extension in form of training

   4.2 Extension in schools (primary, junior and senior high schools)

   4.3 Extension through printed and electronic media

   4.4 Extension at other occasions

II. CURRICULUM FOR TRAINING AND EXTENSION

1. TRAINING SEMINAR

a. **Training target** : Training Seminar is training given to decision makers or leaders who have limited time but hold an important position in forest fire management.

b. **Objective**: Provide understanding on forest fire and principles of forest fire in Indonesia

c. **Period**: 1 ~ 2 day (s)

d. **Discussion topics**:

i) Forest fire in Indonesia and its impacts

ii) Government policies, law and legislation

iii) National guidelines on the protection of forest against fire

iv) Early fire detection

v) Forest fire prevention

vi) Fire suppression

vii) Post-fire activities

viii) Utilization (participation) of communities in forest fire prevention and suppression

ix) Supporting topics which includes latest issues that have not been included in the above eight topics.

e. Video and Film Shows

These are substitutes practice to deepen understanding on forest fire which then followed by discussions.

2. TRAINING FOR TRAINER

a. **Training target**: candidates for forest fire trainers and leaders from forest fire management executor unit (military cadres, master trainers) such as from several governmental institutions particularly from Department of Forestry, private sectors especially concession holders, community leader with minimum education level of senior high-school.

b. **Objective** : educate master trainer on forest fire management so that they will become skilled and trained trainers and capable to 1) train other trainees, 2) become motivated, 3) become leaders in forest fire management.

c. **Period** : approximately 30 days

d. **Curriculum**:

d.1 Class

d.1.1 Introduction

a) Fire problems in Indonesia

b) Forest fire impacts (socio-economy, culture and environment)

c) Government policies in facing forest fire

d) Laws and Legislation on forest fire

e) Organization and personnel

f) National guidelines on the protection of forest against fire

Note: For training/education for trainers to be, need to add the following:

g) Teaching/ training methods

h) Extension methods

i) Sociology (economy and culture)

d.1.2 Basic knowledge on forest fire

a) Fuel

b) Fuel Management

c) Fire weather forecasting

d) Source of fire (wildfire)

e) Forest fire types

f) Forest fire behaviors

g) Extreme fire behaviors

d.1.3 Forest fire management

a) Integrated forest fire management

b) Forest fire management economy

c) Forest fire prevention

d) Pre-fire preparation

e) Pre-fire planning

f) Fire detection

g) Communication (equipment and system)

h) Rapid news transmission (procedure and recording system)

i) Fire hazard reduction activities:

i.1 Mechanical fire breaks (fire break)

i.2 Vegetation fire break (fuel break)

i.3 Green belts

i.4 Fuel reduction

i.5 Reducing wildfire

j) Fire suppression equipment, equipment maintenance function

j.1 Hand tools

j.2 Mechanical equipment

j.3 Water bucket/ portable water bags

j.4 Aircraft and helicopter

k) Forest Fire Suppression

k.1 Principles and methods of forest fire suppression

k.2 Forest fire suppression procedures

k.3 Forest fire suppression techniques and strategies

k.4 Coordination of aid from communities and other parties

k.5 Mop-up

d.1.4 Post-Suppression Activities

a) Recording fire causes and impacts

b) Evaluation of losses and damage

c) Rehabilitation of burnt-over areas and estimation of cost

d) Evaluation plan and implementation of fire prevention

d.1.5 Field Practice

a) Demonstration on equipment use

b) Prescribed burning

c) Use of fire hazard index

d) Fire detection

e) Fire suppression techniques and strategies

d.2 Presentation and discussion using slides, video and film

d.3 Field Practice :

a) Demonstration on equipment use

b) Prescribed burning

c) Use of fire hazard index

d) Fire detection

e) Fire suppression techniques and strategies

d.4 Discussion

Discussion among participants under supervision of instructors problems in fire management, is organized at the end of the training.

3. TRAINING FOR FOREST FIRE EXECUTORS

a. Training target : core participants or main participants who involved in the implementation of forest fire management at field (SATLAK), forest workers, workers of concession area, community leaders and related institutions.

b. Objective: educate related human resources on the implementation of forest fire management in the field including skill in using equipment, preventing and suppression fire.

c. Period: About 14 days.

d. Curriculum:

d.1 class

a) Impacts of forest fire

b) Laws and legislation and Forest fire organization

c) Equipment use and maintenance

d) Forest fire prevention

e) Fuel management

f) Fire-use management

g) Fire detection

h) Fire suppression (tactics and strategies)

i) Mop-up (clearing up fire residues)

j) Fire behaviors

k) Use of fire hazard index

l) Reporting system

m) Security system

d.2 Overhead, video or film presentation.

d.3 Field Practice

a) Demonstration on equipment use and maintenance

b) Prescribed burning

c) Training on fire detection, communication/hazard sign, mobilization of fire-fighting crews

d) Fire suppression tactics and strategies

4. EXTENSION TO COMMUNITIES AND CIVIC GROUPS

4.1. Training in form of extension

a. Target training : general communities and civic groups especially those living around forest and communities who frequently passed by or living within forest (e.g. tourists, hunters, non-wood forest products collectors and etc.)

b. Objective : to' create communities that understand impacts of fire and involve them in fire prevention and suppression.

c. Period: About 2 to 4 days

d. Curriculum:

d.1. class

a) Forest fire impacts

b) Effects of fire

c) Fire prevention and suppression methods

d) Fuel management

e) Fire-use management

f) Regulations and fire hazard and prohibitions signs

g) Forest fire organization

d.2 Slide, video or film presentation

4.2 Extension at schools (primary school, junior and senior high school)

Class : Impacts of forest fire, causes and prevention and suppression methods

Presentation : Video or film

4.3 Extension through print and electronic media

a. Leaflet, brochures, stickers, comics, and others

b. Aired on radio and printed in magazines and newspapers

4.4. Extension at other occasions

Examples : religious speeches, rural meeting or civic groups.

APPENDIX 8: FOREST FIRE TERMINOLOGY

Selected important forest fire terminologies summarized in this appendix are frequently used terminologies either in Law and Legislation, this National Guidelines on the Protection of Forest against Fire or references.

1. **Backfire**

   Backfire is executed after the construction of fire line. Intentionally setting fire beginning at anchor point formed between the fire line and natural fire belt (road, river and others). A fire is set along the inner edge of fire line facing fire head.

2. **Control Center (PUSDAL)**

   Regional Forest Fire Control Organization

3. **Crown Fire**

   A fire that spread from canopy to canopy of trees or shrubs more or less independently of the surface fire.

4. **Executor Command Post (POSKOLAK)**

   An executor Unit of Forestry Service Branch/Forest Administration (Functionary) Unit

5. **Executor Coordination Unit for Overcoming Natural Disaster (SATKORLAK PBA)**

   Coordination Unit that consists of local government, Arm Forces and other related institutions.

6. **Executor Unit (SATLAK)** Executor Unit for Forest Administration (Functionary) Unit division/Forest Administration Police.

7. **Fire Hazard Index**

A component of a fire management system that integrates the effects of selected fire factors into one or more qualitative or numerical indices of current protection needs.

8. **Fire Intelligence**

All infrastructures, communication, basis data and other hardware and software that provide inputs to decision-support system in form of information and decision making.

9. **Fire Line**

Removing or cutting down grass vegetation (*alang-alang*) and or shrubs toward fire. Fire that burnt fire line will reduce flame and ease the extinguishing work.

10. **Fire Management**

All activities required for the protection of forest against fire; and the use of fire to meet land management goals an objectives.

11. **Fire Prevention**

All measures in fire management, forest management, forest utilization, concerning the land users and the general public which may result in the prevention of outbreak of fires, or the reduction of fire severity and spread.

12. **Forest**

An densely tree vegetated area trees which as a whole is an association of natural flora and fauna with natural environment and creates micro climate. Forest is an area determined by the government as forest area which includes Production Forest, Protected Forest and Conservation Forest.

13. **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 fire spreads to wider areas.

14. **Forest Fire**

Forest burnt with unprescribed fire that caused damage to the forest and forest products that creates economic or environmental losses.

15. **Forest Fire Management**

All efforts executed to prevent and suppress forest fire.

16. **Forest Fire Prevention**

Work executed to avoid forest from fire danger.

17. **Forest Fire Suppression**

All the work of fire extinguishing executed until forest fire is totally suppressed.

18. **Forest Protection**

Knowledge on forest protection against all forest damaging factors such as pest, disease, fire and etc.

19. **Forestry Special Police (*Jagawana*)**

Certain government officers in forestry institutions given authority as Forestry Special Police as stated in Paragraph 18 Law No. 5, 1967 jo Local Regulation No. 28, 1985 Paragraph 16.

20. **Fuel**

All combustible organic materials in forest and other vegetation types, including agricultural residues, usually flammable when the water content is less than 30%.

21. **Fuel Break**

Classified into:

a. **Mechanical fire break**

Any natural or constructed strips of land utilized to segregate or stop and control the spread of fire mechanically; or as control line (road, river, etc).

b. **Vegetation Fuel break**

Strips of vegetated land that can reduce fire risk, segregate and suppress fire.

c. **Forest road as fire break:**

Main road is very effective in preventing the spreading of fire which also called as yellow fire belt.

d. **Yellow fire belt**

Strips of land constructed by scrapping the top soil as wide as 4 m which act as barrier between plants and outside lands such as private land, agricultural land, farm, dry land, rice field, estate or etc.

e. **Green fire belt**

Constructed on left and right side of forest roads, as discontinue connection between natural fire belt, wide 8 m and 4 m at the working road.

f. **Natural fuel belt**

Natural fuel break that exist naturally is able to function as fuel break. For examples: jungle, river, ravine, etc.

22. **Ground Fire**

A fire that burn litter, organic material of soil, e.g. peat, coal etc.

23. **Land**

Top soil space

24. **Mop-up**

The act of making a fire safe after it is controlled, extinguishing fire residues or burning materials that might initiate ignition and cause wildfire again.

25. **Prescribed Fire**

A fire burning with prescription. The fire may result from either planned or unplanned ignitions.

26. **Smoke Management**

The application of knowledge of fire behavior and meteorological processes to minimize air quality degradation during prescribed fires.

27. **Surface Fire**

A fire that burns only surface litter, other loose debris of the forest floor and small vegetation.

28. **Wildfire**

Any fire occurring on forest and non-forest land except a fire under prescription.