FOREST FIRE PREVENTION FOR COMMUNITY

SUMMARY OF TRAINING MODULE

ITTO PROJECT PD 89/90 (F) PHASE III
HUMAN RESOURCES DEVELOPMENT

DEPARTEMEN KEHUTANAN
CENTER FOR FORESTRY EDUCATION AND TRAINING
MINISTRY OF FORESTRY, REPUBLIC OF INDONESIA
INTERNATIONAL TROPICAL TIMBER ORGANIZATION
FOREST FIRE PREVENTION
FOR COMMUNITY

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Forest Fire Prevention for Community

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    International Tropical Timber Organization (ITTO)
ITTO PROJECT PD 89/90 (F) HUMAN RESOURCES DEVELOPMENT
Training Module
Forest Fire Prevention for Community

Summary

This document is the summarized version of Forest Fire Prevention Training Module for Community. The original version is published in Indonesian as one of the results of the cooperation between the Center for Forestry Education and Training (CFET), Ministry of Forestry, Republic of Indonesia and the International Tropical Timber Organization (ITTO) through ITTO Project PD 89/90 (F).

The first chapter introduces the background, objectives, target groups, methods teaching equipments and materials, and curriculum.

The objectives of this training are: (1) To build common perception on the importance of Forest Fire Prevention, and (2) To raise motivation and participation of local community on Forest Fire Prevention.

The target groups of this training are community members from forest-surrounding villages, especially the forest fire sensitive areas consisting of farmers, community leaders, youth leaders and village formal leaders. The methods used are mostly active learning and sharing experiences.

Chapter two explains theoretical subjects delivered in the training course:
(1) Introduction to the Course/Climate Setting.
(3) Basic Principle of Forest Fire.
(4) Identification and Mapping of Forest Fire sensitive Areas.
(5) Efforts in Forest Fire Prevention.

Chapter three covers the following subjects related to exercise or fieldwork activities:
(1) Identification and Mapping of Forest Fire sensitive Areas.
(2) Efforts in Forest Fire Prevention.
(3) Forest Fire Prevention Action Plan
(4) Seminar.

This module needs to be further elaborated and modified to meet recent development or local specific environment.
# FOREST FIRE PREVENTION FOR COMMUNITY

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CHAPTER I. INTRODUCTION

1.1. Background

Forest fire in Indonesia, because of their frequency and severity during the last two decades; have emerged on the global agenda as a major problem needing urgent and continuous attention.

Most forests in Indonesia are categorized as tropical rain forests, since the country is located in the tropics where there is plentiful rainfall. This provides conditions, which are favorable for many organisms to live, all of which have contributed to making Indonesia as the mega diversity country. The majority of many elements of this biodiversity are found in the natural rain forests of Borneo (Kalimantan), Sumatra and Papua.

Large areas of land and forest in Indonesia burned in 1982 and 1983. In Kalimantan alone, the fires burned from 2.4 to 3.6 million ha of forest. Land and forest also burned in Indonesia during extended dry periods in 1987, 1991, and 1994 and most recently in 1997-1998. Various estimates of total area burned during the most recent fires range from hundreds of thousands to millions of hectares.

In the late 1997 and early 1998, devastating forest fires in several locations in Indonesia alerted the Southeast Asian region to the urgency of the need to find effective solutions to a recurring social and environmental problem with local, regional and global consequences. Human health was disturbed due to very thick haze spreading to the neighboring countries, causing in some instances to panic because it has gone the tolerable limit. Major modes of transportation were hampered-many flights were grounded, sea and river transport bore the high risk of accidents, and so were the many means of land transportation. Of no less importance was the loss of
valuable timber from the lush tropical forests, the lowering quality of animal and plant habitat and the loss of gene pool and biodiversity.

The causes of forest fires can be grouped into two categories—predisoping (creating conditions favorable for fires) and immediate (leading to ignition). Both these can be natural or man-made; and they reinforce each other. El Nino Southern Oscillation (ENSO) phenomenon is a natural predisoping factor, whereas man-made factors are: wasteful logging, forest clearance for agricultural crops, estate crops and forest plantations leading to build up of combustible materials; in adequate fire protection measures etc.

Looking to the future, ENSO will continue to occur. Also land use patterns will continue to fragment Indonesia’s forested landscape, producing more and varied fuels for fire. As such, forest fire prevention should be undertaken as a joint effort of all concerned. It is widely realized that prevention is one of the most effective ways to tackle forests and land fires. If we can lessen the possibilities of fire incidents, it would reduce efforts of suppression and rehabilitation. However, forest fire is a weak area in Indonesia. Efforts to prevent forest fires call for stakeholder actions to control the causes of fire. Knowledge about, and analysis of, causes, both predisoping and immediate, of forest fires is important to design and implement measures of fire protection.

To enhance both theory and practical skill of all related parties on forest fire prevention, Center for Forestry Education and Training (CFET1)—Ministry of Forestry of the Republic of Indonesia in cooperation with the International Tropical Timber Organization

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1 CFET has the duties to carry out education and training for forestry officials within the Indonesian Ministry of Forestry and other institutions related to forestry development. In implementing its duties CFET carries out the following fuctions: (1) To carry out the policies of the Ministry in education and training (2) To formulate the plan, programs, evaluation and reports (3) To study and develop education and training (4) To serve, supervise and coordinate educational amd training activities (5) To manage the Center’s administration.
[ITTO Project PD 89/90 (F)] have identified, developed and successfully tried-out\(^2\) of seven training modules for seven target groups; (1) extension workers (2) trainers (3) middle-managers of forest concession holders (4) middle-managers of government officials on district level (5) local community (6) forest guards and (7) non-government organizations. All those seven training modules were written in Indonesian.

In order to reach the wider readers and to enable to support similar activities in South East Asia, three [(1), (5) and (7)] of those seven training modules were summarized and translated in English.

This document is the summarized version of *Forest Fire Prevention Training Module for Community*. On the original version of the module, each module is composed of four chapters; (1) Introduction (2) Guide for Module's User (3) Curriculum and Syllabus (4) Training Manual. Chapter One to Chapter Three acts as introductory chapters, while the core of the module lies on Chapter Four. The latter chapter gives a comprehensive guidance to the trainers/tutors/ facilitators on both *Theory* (class-room session) and *Fieldwork* (practical exercises). The level of guidance is given on a training subject basis, which are composed of *Tutor Note* (rough session scenario) and several handouts for participants. As such, tutors have to prepare *Trainer's Agenda/Session Planning* by themselves.

It must be kept in mind that this module only contains minimum set of training material, thereby further elaboration, modification are required to meet recent development or local specific environment.

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\(^2\) The main idea of training try-outs is to evaluate or test the initial draft of the newly developed module in the field. By testing the modules, it could be found several inconsistencies, irrelevant material, impractical exercises, insufficient time allocation etc. Those things will be bases to improve the modules.
1.2. Overall Objectives of the Training Course

1.2.1. General Objectives

(1) To build common perception on the importance of forest fire prevention.

(2) To raise motivation and participation of local community on forest fire prevention.

1.2.2. Immediate Objectives

(1) After completing the training course the participants are expected to obtain basic knowledge and skill on forest fire prevention.

(2) The participants are expected to have awareness to develop a community group to conduct participative efforts on forest fire prevention in their area.

1.3. Target Groups

(1) Community members from forest-surrounding villages, especially the forest fire-sensitive areas.

(2) The participants are expected from farmers, community leaders, youth leaders, and village formal leaders.

(3) The participants should be literate and in good health.

1.4. Methods

The training module is not designed like a medicine or a cookbook; it is open for creativity of trainers/facilitators/training organizers. As such, further elaboration, modification or adaptation is required to meet recent development, level of participants (experience, education) or local specific environments.

Training implementation, as much as possible, built upon the experiences of the participants. Training session give facilitation of
the learning and sharing from participant to participant (cross-fertilization), rather than just one-way communication from facilitator to participants. Participants should be actively involved in all phases of the learning process through group activities (discussion, self-learning, group work, presentation, seminar, exercise, etc.). In this context, role of training facilitators are central, they should have capability: (1) to give opportunity to participants to take part in all activities (2) to encourage the participants to be active, "force" them if needed (3) to improve the capability of the participants to be active through examples, stimulation, etc.

1.5. Teaching Equipment and Material

(1) White board, OHP and slide, chart, poster, leaflet, board marker
(2) Hand out, pen/pencil, notebook
(3) Field work manual, compass, measuring tape, spade, pen/pencil, paper

1.6. Curriculum

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CHAPTER II. THEORY

2.1. Climate Setting

**Objective:** To create a favorable situation (climate setting) for the participants and the facilitator to start the training

**Methods:**
- Introduction among the participants and the facilitator
- Group dynamic games

**Allocated Time:** 4 x 45 minute divided into two sessions
  - Ice Breaking
  - Introduction to the course

2.1.1. Ice Breaking

This session aims to set up a relaxing and helpful situation in knowing each others (among the course mate) by using games. There are a lot of games available especially used for this session.

2.1.2. Introduction to the Training Course

This session give an overview on the background and objectives of the course, schedule and other related matters.

2.2. Policy on Forest Management and Forest Fire Prevention

**Objective:** To introduce participants to policy on forest management and forest fire prevention.

**Methods:**
- Lecture
- Discussion

**Allocated time:** 4 x 45 minute divided into two sessions
  - Policy on Forest Management
  - Policy on Forest Fire Prevention


2.2.1. Policy on Forest Management

This session aims to strengthen the idea of functions of forest, objective of forest utilization and policy on forest management. This will include; government policies on forest management and forest fire prevention, especially related to forest management policy in participant’s area, for examples Protection Forest, Production Forest, Nature Conservation, etc. Therefore, forestry official responsible for forestry policy better delivers this subject.

The steps of subject delivery are as follow:

(1) Facilitator starts the session by delivering subject on function and benefit of forest for human life. Use a chart or poster or cartoon showing the multi-use of forest.

(2) Discuss the subject with the participants.

(3) Review the discussion by delivering in-depth explanation on function and benefit of forest for human life:

- Conservation and protection: land conservation, hydrology, preservation of gene-resources
- Production/economic: forest products (timber, firewood, rattan, medicinal plants, etc.)
- Social: recreation, places for indigenous people,
- Ecological: supply of water, prevention of landslides and erosion, and biodiversity

(4) Discuss also the division of function of forest based on the Government Laws and Regulations (Government Policies), e.g. Conservation Forest, Protection Forest and Production Forest.

2.2.2. Policy on Forest Fire Prevention

The purpose of this session is to discuss the importance of forest
protection and forest fire prevention (FFP), principles of FFP and policy on FFP.

(1) The essence of forest fire prevention

a. Overcoming forest fire is obligation of all stakeholders related to forestry activities.

b. The activities are emphasized in pre-fire activities: prevention, monitoring, awareness and readiness to decrease or lessen the impact caused by forest fire.

(2) Principles of FFP

a. Principle of togetherness and voluntary

b. Principle of coordination, synchronization, and integration

c. Principle of autonomy/self-funding

d. Principle of promptness and accuracy

e. Principle of prevention and preparedness

f. Principle of totality

g. Principle of global

(3) The direction of policies

Often forest fire becomes large and difficult to handle although in-conventional equipment are available. In order to implement forest fire prevention in line with sustainable forest management, the activities are directed:

a. To prevent impact and losses caused by larger fires.

b. To safe human life, government assets.

c. To manage impacts after fires.
(4) Vision and Mission

a. Vision
   To control forest fire and to protect people from damages caused by forest fire.

b. Mission
   - To optimize the aspect of forest fire prevention
   - To improve monitoring, alertness and readiness
   - To improve aspect of rehabilitation of forest after fire
   - To enhance judicial aspect

(5) Targets of forest fire prevention

a. To master technology of prevention, monitoring, alertness, readiness, early warning system, early detection, early fire extinguishing, and post-fire handling.

b. To utilize all potential resources to overcome forest fire nationally supported by appropriate software and hardware.

c. To improve coordination and cooperation nationally, regionally and internationally.

(6) Normative steps of FFP

Steps of forest fire include: prevention, monitoring, preparedness, early warning, early detection, respond, and post fire management.

The chart below shows the steps/cycle of forest fire prevention.
Explanation:

(1). Prevention:

a. Social, cultural and economic approaches
   The purpose is to enhance people awareness on forest fire danger. The activities include campaigns through TV shows, TV and radio talks, newspaper, demonstrations, etc., and community-based forest fire management.

b. Fire prevention techniques approaches
   These include man-made green belt, natural break, fuels break, firebreak, controlled burning.

c. Forestry techniques approach
   - Discipline in forestry knowledge implementation
- Development of fire-resistant infrastructures such as roads and water supply system.
- Selection of species in plantation and silvicultural techniques in natural forest.

d. Implementation
   All stakeholders have obligation to participate in management of forest fires.

(2) Monitoring, Alertness and Preparedness

In dry season, monitoring of all aspects related to danger rating prediction and forest fire management should be done. Alertness is created by posting guard in fire tower and intensifying patrolling.

Preparedness is a step to prepare all resources by all stakeholders in managing forest fire before fire season.

The chart below explains steps of monitoring, alertness and preparedness.
Early warning and detection systems

Early warning is a determination of condition from an analysis of factors influencing an area fire danger status. This consists of early warning and early detection.

Early warning consists of daily examination of map of forest fire-sensitive areas, analysis of weather, fuels and community dynamic, analysis of dryness index, warning signs, and coordination among stakeholders.

Early detection is an effort to obtain information of forest fire as early as possible through a simple to sophisticated technology.
This comprises of terrestrial detection and aerial or remote sensing. Terrestrial detection is done through patrolling in sensitive areas; tower examination while aerial sensing is done through the use of helicopter, aircraft and satellite.

Mechanism:

(4) Fire Attack

Fire attack is an activity to extinguish fire starting from planning to mop-up and patrolling.
Mechanism:

1. Early Detection and Reporting
2. Early Attack by Forest Management
3. Assistance
4. Mop-up and Patrolling
5. Resource Mobilization in Sub District
6. Assistance
7. Resource Mobilization in District
8. Assistance
9. Resource Mobilization in Province
10. Assistance
11. Disaster Resource Mobilization (National, Regional, International)
12. Disaster
13. Fire Attack Respond
(5) Post-fire management

Post-fire management consists of activities conducted during the fires, after fires inactive and during the former fire sites still recognizable.

The activities included are fire cause investigation, fire impact management, law enforcement, and rehabilitation.

Mechanism:
2.3. Basic Principle of Forest Fire

**Objective:** To introduce the participants to the Basic Principle of Forest Fire (factors affecting forest fires, causes and impacts of forest fires)

**Methods:**
- Lecture
- Discussion

**Allocated time:** 6 x 45 minute divided into three sessions:
  b. Cases of Forest and Land Fires
  c. Concept of Fire Triangle
  d. Causes and Impacts of Forest Fires
  e. Intensity of fire spread and types of forest fires

2.3.1. Cases of Forest and Land Fires

In this session the participants are divided into small groups (@ 5 persons) and asked to discuss causes and impacts of forest and land fires. Topics to discuss can be:

**Group 1:**

a. The causes of forest fires.

b. How to open and clear lands (Give an example on a careless way to clear land).

c. Compare the example with the practice in participant area’s common practices.

**Group 2:**

a. The impacts of forest fires.

b. Who are affected by the fires and who should be responsible?

c. How if forest fire occurs in your area? What should community in your area do?
2.3.2. Concept of Fire Triangle

Three main causes of forest fires:

a. Fuels  
b. Heat  
c. Oxygen (O₂)

Interrelation among these three factors is often called “Fire Triangle”. Without one of them fire will not occur. Fire needs dry fuels, enough heat, and enough oxygen to start combustion.

This concept also guides ways to stop fires. By separating or minimizing one of them fires will not start. Minimizing fuels is done by making ‘fire breaker’ to separate from heat sources. Heat is minimized by maintaining humidity (e.g. by watering). Oxygen is minimized by covering fire with soil.Textbox below provide a simple demonstration of fire triangle.

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<th>Demonstration of Fire Triangle</th>
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<tr>
<td>Provide a candle and matches. We have all three factors to start fire: fuel (candle), heat source (matches) and Oxygen (available freely in atmosphere). Provide a glass taller than the candle. Lit the candle and cover it with the glass. After sometime the fire will turn off. This is caused by disappearance of Oxygen in a limited space covered by glass. This shows that unavailability of one of the factors of fire triangle will make easier to stop fires.</td>
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2.3.3. Causes and Impacts of Forest Fires

Start the session by digging participants' knowledge and experiences and jogging their memories on causes and impacts of forest fires. Proceed with discussion in the classroom.

Ask the participants to write down history of forest fires in their areas in recent years.
2.3.3.1. Causes of Forest Fires

Because Oxygen is freely available, we only focus discussion on fuels and heat.

(1) Fuels

Fuels are the most dominant factor in starting fires. Fuels availability in forest and its relation to forest fires should be considered. Below are classifications of fuels in several types of forest.

a. Primary forest

In this type of forest, litter is thin, humidity is high and the temperature is low because crown cover is almost 100%. Sunrays on forest floor are almost 0%.

b. Logged over areas

In logged over areas, litter is thick. This is caused by leftover of logging activities. This thick litter is under open crown. In dry season the humidity is low while the temperature is high, so that litter is easily burnt. In a long dry season fires are difficult to stop.

c. Plantation forest

In young plantation forests with crown cover less than 100%, fuels are available in term of grasses and shrubs. As in logged over areas in dry season temperature in forest floor is high. Risk of fire is also high.

d. Peat forest

In peat forest the fuels are the peat itself located under the ground surface. In rainy season, peat land are usually immersed in water. In a normal dry season, only upper layer is dry. Fire is not easily happened. However, in long dry seasons, deep layers
of peat (can reach tens of cm) are dry and are easily burnt. If this happens, although slow, peat fires are difficult to stop.

e. Grassland and shrub

Litter in grassland and shrubs are sensitive to fires even in normal dry seasons. Because fuels are not abundant, usually fire is not as big as in peat forest and logged over areas.

(2) Heat

Heat is closely related to fire or flame sources. Generally it is estimated that around 90% of fire sources come from human activities. The rests is brought about by natural causes.

a. Human factor

Human can be a factor of fire because of their carelessness or their deliberateness.

Examples of carelessness:
- Farmers prepare their farmlands through burning or slash and burn;
- Hunter, grasser, fire wood collectors go to forest using fire for illumination or to gather honey;
- Cigarette or fire remnants;
- Uncontrolled burning in plantation.

Examples of deliberateness:
- Process of forest conversion into farm land and settlement using fire as cheap ways to clear land;
- Process of forest conversion into plantation and land clearing using fires;
- Disappointment of community on plantation projects.
b. Natural factor
   - Climate (long dry seasons, El-Nino phenomenon)
   - Thunderstorm, volcanic activities and other natural causes.

2.3.3.2. Forest Fires Impact

(1) Smoke
Smoke causes illness in human respiratory system, and transportation disruption. It also becomes regional problem since smoke can travel to neighboring countries.

(2) Impacts on forest and environment
- Fires affect forest ecosystem and biodiversity. Fires disturb five ecological processes in forest such as natural succession, organic material production and decomposition, nutrient cycle, hydrology cycle, and land formation.
- Burnt trees will decrease Carbon dioxide absorption. This will increase green house effect and decrease microclimate function of the forest.
- Fires decrease biodiversity. Fires also affect reproduction activities of some primates, amphibian and reptilian.

(3) Economic losses in term of destruction of stands, non-wood forest products, fruits.
- Agriculture sector losses
  Productivity of some agriculture commodities is affected by smoke generated from forest fires. Productivity of oil palm tree in Jambi, Sumatra, Indonesia, for example, in three years decreases about 55% after forest fire.
- Social impact
  Forest and land fires affect local community social and
economic activities. When these activities are disturbed, they will try to find easy alternatives that will cause other negative impacts.

2.3.4. Intensity of Fire Spread and Types of Forest Fires

2.3.4.1. Intensity of Fire Spread

Although it is believed that most of forest fires are caused by human activities, intensity of fire spread is intensified by natural condition such as characteristics of fuels, weather condition and topography.

(1) Characteristics of fuels

Knowledge on fuels is important in answering question: "How can we prevent fires?"

a. Fuels and their availability
   - What kind of plants is sensitive to fires? Trees, shrubs or grass? Trees and timber are not as easily burnt as grass.
   - Death plants are easier to be burnt than the live ones.
   - How much are the fuels?
   - Types of land-covering plants.

b. Fuel humidity

   Rather dry living trees/plants will be easily burnt and humid death plants will not be easily burnt.

c. Fuel composition and structure

   - Standing fuels are easier to burn than the laying ones because of more Oxygen supply.
   - Dispersed fuels decrease the spread of fires.
   - Small and dry fuels speed up combustion. Solid fuels slow down combustion
(2) Weather condition
Weather condition before and during fires will determine how the fires start and behave.

a. Temperature
Hot weather before and during fires facilitate fires and make it difficult to stop.

b. Wind
The stronger the wind the more difficult to manage the fires. Wind pushes flame to touch fuels in the front and make it jumps. Wind also supplies more Oxygen and helps to dry fuels.

c. Humidity
Rain and high humidity make fuels wetter and slow down fires.

(3) Topography

a. In steep slopes flame become closer to fuels in the front so that fire spread easily that on the flat surface.

b. Generally in South East Asia, east-facing slopes receive more heat in the morning. When fire occurs in this slope it is difficult to manage in the morning. In west-facing slopes, on the other hand, receive more heat in the afternoon. Fire in this slope is more difficult to handle in the afternoon.

Rule of thumbs: slope vs. fire spread
*The steeper the slope the quicker is the speed of fire spread.*

2.3.4.2. Types of Forest Fires

Based on the source of fires, forest fire can be divided into two:

(1) Ground fire
This kind of fire is caused by coal (e.g. in east Kalimantan,
Indonesia), bauxite and peat. Although this type of fire is slowly spread, it is difficult to stop.

(2) Surface fire

This fire occurs because of shrubs, grass, logging waste burning. Normally the speed of fire spread is about 4 - 7 km per hour, but if strong wind blows on steep slope, it can reach 10 km per hour.

2.4. Identification and Mapping of Forest Fire-sensitive Areas

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<th>Objective:</th>
<th>To discuss identification techniques and mapping of forest fire-sensitive areas</th>
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<td>Methods:</td>
<td>- Lecture</td>
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<td></td>
<td>- Discussion</td>
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<tr>
<td>Allocated time:</td>
<td>6 x 45 minute divided into two sessions:</td>
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<tr>
<td></td>
<td>a. Identification techniques if forest fire-sensitive areas</td>
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<td></td>
<td>b. Techniques of sketch making of forest fire-sensitive areas</td>
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</table>

2.4.1. Identification Techniques of Forest Fire-Sensitive Areas

(1) Definition:

Forest fire-sensitive areas are areas where elements and factors causing fires are available in a sufficient amount to start fire.

Characteristics of these areas are:

- Availability of potential fuel (e.g. grassland and cleared area for farm)
- Human activities using fires (e.g. camping, hunting, farming)
- Long drought
(2) Identification

Forest fire prevention program should be started with identification of forest fire-sensitive areas and the results are drawn in a sketch or a simple map. The sketch is used as a base in forest fire prevention plan. The checklist below is useful for identification:

<table>
<thead>
<tr>
<th>Checklist for fire-sensitive areas:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Why do fires frequently occur?</td>
</tr>
<tr>
<td>b. Where do the fires happen?</td>
</tr>
<tr>
<td>c. What activities are done?</td>
</tr>
<tr>
<td>d. Where the activities are done?</td>
</tr>
<tr>
<td>e. How often the activities are done?</td>
</tr>
<tr>
<td>f. What natural factors caused the fires?</td>
</tr>
<tr>
<td>g. When do the fires usually happen?</td>
</tr>
<tr>
<td>h. What months do dry season usually take place?</td>
</tr>
</tbody>
</table>

To answer these questions, the participants need to be facilitated to identify fire-sensitive areas using Participatory Rural Appraisal (PRA). Some PRA techniques are described below:

a. History of Fires

History of forest fire occurrences in and around the village is a good means to illustrate and facilitate rural people in discussion of incidents that happened in the area indicated the sensitivity to fires.

Information that can be dig from this history is:
- Chronology of forest fires in recent years
- Story based on facts on causes of fires
- Story based on facts on impacts or losses of forest fires
- Story based on facts on community participation in fire prevention
Steps in discussion:
- Explain about objectives of the process of history making
- Discuss with the participants about forest fires that occurred in their village (in practice/field work interview village elderly)
- Complete the information by asking the causes, the impacts, and how people cope with it during and after the fires
- Ask them to start writing the history in a flip chart
- Write the history chronologically
- Discuss further to dig participants' responds and perceptions

b. Village Transect

Transect is done by walking through the village following a certain pattern to get information as complete as possible. The results of observation are presented in a chart for further discussion.

Output of information:
- Land use pattern
- Land ownership status
- Vegetation
- People activities
- Fires potential

Steps:
- Prepare team to conduct village transect.
- Prepare material and tools.
- Determine transect lines.
- Travel and observe condition along the lines. Interview the local people met during observation.
- Take notes on observation in each location.
- Draw the results.
c. People Mobility map

This map shows location of people activities and frequency of mobility in their daily life that could influence the emergence of fires. This is done by collecting information (direct information or interview) on local people and outsiders’ daily activities to estimate the fire sensitivity.

Output of information
- Where do people go to do their activities?
- What kind of activities do people have and how often?

Steps:
- Explain about local people and outsiders’ mobility to know where they go.
- In a flip chart, draw position showing where people live.
- People mobility can be drawn with the help from local people.
- Put arrow to show people activity.
- The number of arrow shows frequency of mobility in a certain activity.

d. Season calendar

Season calendar for the purpose of identification of fire-sensitive areas is a tool to identify critical periods that facilitate forest fires. This calendar can be used to reveal relation between dry seasons and people activities that can trigger danger of fires.

Output of information: people activities from January to December.

Steps:
- Explain the purpose of this activity.
- Discuss with the participants about dry seasons and fire danger.
- Identify people activities in the dry seasons.
- Ask the participants to draw a season calendar in a flip chart.
- Analyze the calendar (What causes fires? Is there any relation between season and fires? What is possible solution?)
- Write down all problems, potential and information related to fires causes.

2.5. Efforts on Forest Fire Prevention

| Objective: | After taking this subject the participants are expected to be familiar with efforts in forest fire prevention and are able to implement them in their areas |
| Methods: | - Lecture  
- Discussion  |
| Allocated time: | 6 x 45 minute divided into four seasons:  
- Can we prevent forest fires?  
- Techniques of Forest Fire Prevention  
- Prevention of Grassland Fires  
- Local Wisdom in Forest Fire Prevention |

2.5.1. Can we prevent forest fires?

Start the session with brainstorming on forest fire problem and prevention activities. Because this session is only an introductory, use allocated time wisely. Guide the discussion on:
- Steps taken by community to prevent forest fires.
- Individual steps to prevent forest fires.
- What can people do to control forest fires?
- What can individual do to decrease forest fires?
2.5.2. Techniques of Forest Fire Prevention

Start this session with an exercise to refresh participants' memories and dig up their knowledge on forest fire prevention. Follow with a discussion. To facilitate them use the following questions:

<table>
<thead>
<tr>
<th>Checklist: efforts in forest fire prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are people familiar with means of forest and fires prevention?</td>
</tr>
<tr>
<td>2. Is there any forest and land fires extension activities/campaigns?</td>
</tr>
<tr>
<td>3. Do people involve in forest management with government officials or forest concession?</td>
</tr>
<tr>
<td>4. Do people know how to conduct controller burning? What people's activities that caused fires?</td>
</tr>
<tr>
<td>5. Do people know how to make fire break?</td>
</tr>
<tr>
<td>6. Do people know how to make green belt to prevent fires?</td>
</tr>
<tr>
<td>7. What efforts that people usually do to prevent forest and land fires?</td>
</tr>
</tbody>
</table>

(1) Definition and scope

a. Forest fire prevention is all efforts, actions or other activities in order to prevent or reduce possibility of forest fires.

b. Fire anticipation is an early step in system of forest fire prevention.

c. Prevention to reduce fire risk, including: education and other activities
   - Pre-attack by reducing fuel spread and creating fuel break
   - Fire attack

d. Forest fire prevention activities are directed to community and the impact areas.

(2) Efforts in forest fire prevention

a. Social, cultural and economics approaches

   To motivate and to encourage people involvement are the best way out in forest fire prevention. These approaches
emphasize effort in enhancing people awareness on the danger of forest fires. These can be done through:
- Campaigns, extension activities, socialization
- Community-based forest fire management

b. Technical approaches

In fire terminology, technical approaches are all efforts either facilities or activities directly useful in reducing fire risks. These include:
- Development of man-made green-belt
- Maintenance of natural fire break
- Development of fuel break
- Development of fire break
- Fuel management
- Plant management

c. Forest management approaches

The success of forest management (including forest fire management) is interrelated to the discipline in application of forestry science in general. Clear regulation and law enforcement are fundamental in forest fire prevention. Development of fire-resistant infrastructure and selection of tree species are also essential in managing fires.

2.5.3. Controlled Burning

One of the most effective ways of forest fire prevention is zero burning. This, however, is still impossible to implement where people are used to using fire to clear their lands. To anticipate uncontrolled spread of fire and to reduce its danger, timing for burning should be considered.
<table>
<thead>
<tr>
<th>PERIOD</th>
<th>FIRE BEHAVIOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Fire is intensive and difficult to manage</td>
</tr>
<tr>
<td>B</td>
<td>Fire is slowly reducing and is easy to handle</td>
</tr>
<tr>
<td>C</td>
<td>Fire is in its lowest level and is easy to manage</td>
</tr>
<tr>
<td>D</td>
<td>Fire is increasing and rather difficult to manage</td>
</tr>
</tbody>
</table>

2.5.4. Prevention of Grassland Fires

*Imperata cylindrica* is a kind of fuel that is easily burnt in dry seasons. Fires in a relatively short time can destroy an extensive area. These fires can also stimulate another domination of *Imperata cylindrica*. Green breaks and green strips can help preventing fire spread.

Fires prevention in this kind of grass needs a lot of resources, however this is more effective and efficient than suppression. Some techniques of prevention of grassland fires are discussed below:

(1) Grass cutting

Grass cutting and removing can decrease fire danger effectively. In a day one man can cut about 200 - 400 m² of grassland.

Flame height in grassland fires can reach twice of the grass height. Cutting should be done so that the height of the remaining grass is less than the height of the main tree species. This is done to facilitate fire suppression.

Because *Imperata cylindrica* re-grows immediately after cutting, it needs frequent cutting.

(2) Grass Crushing

Grass crushing is usually done by pressing it with heavy cylinder (made of timber or metal). The crushed grasses press and kill the
lower layers. Although this practice is useful in reducing fire danger, fires will still occur. However, the fires will start slowly. If the grasses height is kept at 25 cm, the flame is estimated to be around 50 cm. At this height fires are easy to manage.

Advantages of grass crushing:

a. Grass crushing can decrease fire spread substantially because of the decreasing air circulation.

b. Grass re-growth after crushing is only 20% -60% of re-growth after cutting. Re-crushing is less often than re-cutting.

c. Grass crushing is easier than cutting.

d. Crushing can reduce shading on main tree species.

e. Crushed grasses could be mulches for soil.

When to crush?

a. When the height is around 1 m. Crushing too young and less-than 1 m grass is not effective because they will easily re-grow.

b. Crushing is done in early rainy and dry seasons. In rainy seasons, crushing is better done after raining. In dry seasons, crushing is done to prevent fires.

How to crush?

a. Crushing is done at the same direction.

b. In slopes crushing is done from higher places to lower ones.

(3) Firebreaks

Firebreaks in grassland are necessary to prevent fire spread. When reaching firebreaks, the spread will decelerate to give opportunity to attack fires.

Although it is difficult to determine exact width of firebreaks, six meters to 30 meters are suitable to prevent fire spread. The use
of natural vegetation is suggested, and if possible green belt by planting productive and multi-purpose plants. In hilly areas, horizontal fire breaks (cutting slopes) should be made wider than the vertical ones because fires are easier to jump to higher places.

Types of fire break in grassland:

a. Natural fire breaks: rivers, rocks, creeks
b. Artificial fire breaks: roads, streets, water canals, rice fields
c. Green belts: vegetative belts (fire resistant)
d. Clear-land belts

2.5.5. Community Wisdom and Participation

2.5.5.1. Community Wisdom

Many indigenous people have practiced preparing farmland by burning them for a long time. Some traditional communities have customs and practices in implementing local rules effectively for many years. They maintain the balance between farming needs and forest environment.

Rules or custom on fires in communities can be learned from local elderly or leader and the possibility to re-implement them could be explored. The objective is that burning activity can be monitored and controlled effectively by community to prevent fires. The important thing to prevent fire is to implement rules consistently and give sanction for the violation.

Generally local wisdom related to controlled land burning and requirements needed by community are:

(1) Obtain permit from authorized community leaders;
(2) Obtain permit from local government based on local rules or regulation;
(3) Choose the right time, not too hot and not too cold (e.g. late afternoon);
(4) Consider "fire-free period";
(5) Know boundary of landowner;
(6) Gather people, friends, or neighbors to help suppressing fires;
(7) Clean vegetation in and around the place is intended to be burn to prevent fire spread;
(8) In slopes, burning starts from higher places;
(9) Put into effect sanction for violation of the rules and obligation to pay fines for damages caused by fires.

2.5.5.2. Developing Community Participation

Land and forest fires have become national and even global problems. All stakeholders should be responsible to prevent and manage land and forest fires. Community participation is a key factor in land and forest fires prevention.

2.6. Institutions for Forest Fire Prevention

| Objective: | After taking this subject the participants are expected to be familiar are able to explain forms and functions of Institutions for Forest Fire Prevention |
| Methods: | - Lecture  
- Discussion |
| Allocated time: | 4 x 45 minute divided into four seasons:  
- Principles of group formulation  
- Roles of Forest Fire Prevention group  
- Group Activity Plan |
2.6.1. Principles of group formation

(1) Start the session with brainstorming on objectives and goals of group forming, purpose in having group. Ask the constraint in forming the group;

(2) Proceed with brief explanation on principles in grouping, such as common goals, cooperation, equality, fairness, leadership, division of tasks/duties, authorities, and responsibilities;

(3) Explain and discuss about process of group forming.

2.6.2. Roles of Forest Fire Prevention group

(1) Discuss about function/roles of group in forest fire prevention, such as develop member, plan and implement group's activities, coordination and cooperation with other related institutions;

(2) Discuss about rules among approved by the group. Facilitate participants to develop group's rules.

2.6.3. Group Activity Plan

(1) Ask the participants to make a group activity plan. Give an example of activity/work plan matrix;

(2) Explain elements of activities to be planned. Use key words: who, what, where and how.

Discussion:

• It can be concluded that Imugan community had organized themselves to implement forest fire prevention program effectively. Do you think the same approach can be applied in your community?

• If you answer 'yes' and you are assigned as the promoter of forest fire prevention program, what steps will you take?
• Do you need assistance from Village leaders, personnel from related institutions, religious leaders or informal leaders in your village?

• In making green belts, do you need training? Do you need seedlings suitable with your village soil and is it technically suitable to prevent forest fire?
CHAPTER 3. FIELDWORK

In this session participants practice knowledge they had in theory session. Before the session start, the tutor should check and prepare the location. Tutors should have gone to the location to prepare program, budget, transportation, permit to enter location if any, determination of village guides, and procurement of material needed. Tutor should also prepare fieldwork manual.

3.1. Identification of Fire-sensitive Areas

**Objective:** After taking this subject the participants are expected to be able to identify and make sketches of fire-sensitive areas

**Allocated time:** 20 x 45 minute

3.1.1. Method

(1) Preparation

   a. Explanation of objectives of the field work
   b. Explanation of schedule and procedure of the field work
   c. Preparation/checking of material
   d. Explanation of presentation of field work report
   e. Group division

(2) Implementation

   a. To identify fire-sensitive areas PRA approach can be used. These techniques include:
      - Investigation of village history
      - Investigation of village area (village transect)
      - Season calendar
      - People mobility mapping
      - Sketch making
b. Data collection and analysis are done in groups (5 participants per group). Each group will practice all techniques.

c. Each group makes a complete report.

(3) Presentation of fieldwork results

a. After reporting, each group should present its results
b. Discussion is done to evaluate the results
c. The reports are revised and used as material for the next subject.

3.1.2. Investigation of Village History

**Objective:** after completing this session the participants are expected to prepare history of events in village to identify land and forest fire sensitivity.

**Material:** Pencil/pen, Flipchart

**Steps:**

1. Discuss who (village elders and leaders) that can be chosen as respondents to tell history of events related to land and forest fires;
2. After the respondents are chosen, prepare questions to dig information with semi-structured interview and in informal atmosphere;
3. Visit the respondents and interview them;
4. Arrange interview results in a history of village related to fire danger in order of year;
5. Discuss to identify potential problems that cause land and forest fires, and impacts and losses;
6. Final step is to revise the history and use it as useful source of information for community to prevent land and forest fires.
3.1.3. Investigation of Village Areas (Village Transect)

**Objective:** after completing the session the participants are expected to conduct village transect to identify and map fire-sensitive areas

**Material:** Pencil/pen, Flipchart, Markers (some colors), Measuring tape

**Steps:**
1. Discuss important locations to visit related to identifying fire-sensitive areas;
2. Determine starting point and route to go through to cover all agreed locations;
3. Travel along the route and examine anything that can be potential problems for fires and potential to prevent fires. Examine these things and discuss with group members;
4. Take notes on examination results;
5. Draw a transect chart to cover all location on the route;
6. Use clear symbols to complete the chart;
7. Discuss to identify problems and potential available in the area to prevent forest fires and prevention efforts;
8. Revise map and use it as information for community.

3.1.4. Calendar of Seasons

**Objective:** after completing this session the participants are expected to be able to formulate calendar of season to identify and map fire-sensitive areas

**Material:** Pen/pencil, Flipchart, Markers

**Steps:**
1. Ask the participants to interview village people on activities frequently happen in certain months, do these activities always occur from year to year;
2. Instead of people activities, what conditions do occur frequently in those months (e.g. long dry seasons that cause drought, thunderstorm, etc.);

3. When enough data is collected, discuss in a group to agree on main activities to be written in calendar of season;

4. Use simple understandable symbols;

5. Discuss to identify problem and potential in the areas related to fire danger and possible solutions;

6. Analyze the calendar:
   a. What is the cause of problems in management of their activities that can stimulate fire?
   b. What is the cause of critical period in the village, e.g. drought?
   c. Is there any relation between them?
   d. What is the possible solution?

7. Revise the calendar based on the results of discussion.

3.1.5. Mapping of People Mobility

**Objective:** after completing this session, the participants are expected to be able to make map of people mobility

**Material:** Pen/pencil, Flipchart, Markers

**Steps:**
1. Discuss people mobility in the village to identify where they come from, what is the purpose and where they go;
2. On a flipchart draw circles to show location in the village where people live;
3. People mobility from their residence to certain location/area can be drawn in symbols. Their purposes can be described in symbols or written text.
4. When collecting information, concentrate on a topic at a time. Proceed with other topic when ready;
5. Discuss to get input and suggestion.
3.1.6. Formulation of Village Map/Sketch

**Objective:** after completing the session the participants are expected to be formulate village sketch to identify and map fire-sensitive areas

**Material:** Pen/pencil, Flipchart, Markers, Measuring tape

**Steps:**
1. Discuss village land-use;
2. Discuss symbols to be used in representing object in the map/sketch;
3. Start the process on flipchart and estimate the scale;
4. Locate the main locations that are easily identified in the village as the starting points (river, road, residence);
5. Proceed with other details (hill, garden, forest, etc) and their boundaries;
6. Next step is locate fire-sensitive areas and add explanation on causes of fire, for example: potential fuels, activity centers using fire;
7. Check for completeness;
8. On one corner of the sketch put on symbols and other explanations;
9. Discuss to identify problems and potential solution in the area in relation to land and forest fires;
10. The final step is revision of the sketch. Final version of the sketch can be use as source of information for community.

3.2. Efforts in Forest Fire Prevention

**Objective:** After completing this subject the participants are expected to be able to implement forest fire prevention

**Allocated time:** 30 x 45 minute
3.2.1. Process and method:

(1) Preparation: explain about objective and aims of the subject, schedule and procedure, materials to be used, reporting and group division

(2) Implementation

Some activities to be practiced are:

a. Determination of location for fire breaks and or green belts;

b. Species selection for green belts;

c. Making of fire danger signs;

d. Development of group rules on land and forest fires management;

e. The field work and its reporting is done in a group (@ 4 participants). Each group practice all techniques.

(3) Presentation of report

a. Each group should present its results;

b. Discuss the results to evaluate the field work and to complete data or information;

c. The report is revised and becoming material for the next session.

3.2.2. Determination of location for firebreaks and or green belts

**Objective:** After completing this session the participants are expected to be able to determine location for fire breaks and green belts to prevent land and forest fires

**Material:** Result of field work from previous session, Pen/pencil, Flipchart, Markers
Steps:
1. Re-examine the results of identification and mapping of fire-sensitive areas;
2. Discuss characteristics of fire-sensitive areas, especially the ones that have potential for stimulating fires in dry seasons, based on collected data and information;
3. Determine locations for fire breaks and green belts to prevent possibility of land and forest fires;
4. Draw those locations on map of fire-sensitive areas;
5. Prepare physical plan of fire breaks and or green belts;
6. Discuss the proposed locations;
7. Use the results as information for forest fire prevention.

3.2.3. Species selection for green belts

Objective: After completing this session the participants are expected to be able to prepare people interest on plant species for green belts to prevent land and forest fires.

Material: Result of identification and mapping of fire-sensitive areas field work, Pen/pencil, Flipchart, Markers

Steps:
1. The purpose of species selection is to determine rank of people selection on plant species for green belts;
2. Discuss:
   a. Criteria for assessment: benefit, potential and constraints of the selected species;
   b. Symbols to be used;
   c. Assessment procedure and scoring.
3. Put the species to be selected in a rank matrix;
4. Discuss to get suggestion to revise the matrix.
3.2.4. Development of Fire Danger Signs

**Objective:** After completing this session the participants are expected to be able to make signs of fire danger to prevent land and forest fire

**Material:** Wood plank or metal sheet, Wood/metal poles, Paint, Paint brush, Saw, nails, etc.

**Steps:**
1. Plan short sentence/title to be used as warning signs;
2. Discuss the title/sentence. Use simple and effective wording.
3. Write the sign on the wood plank or metal sheet;
4. Put the signs on strategic places.

3.2.5. Development of group rules on land and forest fires management

**Objective:** After completing this session the participants are expected to be able to develop group rules to prevent land and forest fires

**Material:** Pen/pencil, Flipchart, Markers

**Steps**
1. Discuss model of institution for land and forest fire prevention;
2. Brainstorm on causes of land and forest fires;
3. Brainstorm on social and cultural activities of people in relation to land and forest management based on local wisdom;
4. Brainstorm on development of outsider intervention in land and forest management around the village;
5. Develop rules on land and forest management based on the result of 2, 3 and 4 above;
6. Discuss the sanction to be applied on violation of the rules;
7. Discuss the substance, format and wording of the rules;
8. Finish the rules by accommodating discussion results.
3.3. Forest Fire Prevention Action Plan (Exercise)

**Objective:** After completing this subject the participants are expected to be able to develop action plan for forest fire prevention

**Allocated time:** 20 x 45 minute

3.3.1. Process and method

**Preparation:** Explain about objective and aims of the subject, schedule and procedure, materials to be used, reporting and group division

**Implementation:** Some activities to be practiced are,

a. Develop a matrix of activities;

b. Develop schedule of activities.

The exercise and its reporting is done in a group (@ 5 participants). Each group practice all techniques.

**Presentation of report:**

a. Each group should present its results;

b. Discuss the results to evaluate the field work and to complete data or information;

c. The report is revised and becoming material for the next session

3.3.2. Development of Matrix of Activities for Forest Fire Prevention

**Objective:** After completing this exercise the participants are expected to be able to develop a matrix of priorities of land and forest fires prevention activities

**Expected Results:** Matrix of activities showing strategy, indicator of success, participants, time, location, cost and the responsible person/parties.
**Required Material:** Results of identification and mapping of fire-sensitive areas and analysis of alternatives of forest fire prevention activities.

**Steps:**
1. Ask the participants to recheck the results of identification and mapping of fire-sensitive areas and analysis of alternatives of forest fire prevention activities. This is the base for matrix development;
2. Explain briefly about what matrix is! Explain about what to do, who should do it, what resource are needed, etc.
3. Explain about hierarchical relationship of program strategy: activities,
4. Result and objective
   
   ![Diagram](Activities done → Results obtained → Objective achieved)

   If
   
   If

5. Ask the participants to place objectives, results and activities on their columns. Re-examine the relationship among them and the lower ones.
6. Formulate indicators of success at each level of program strategy, indicators of success, related parties involved, location, cost, and the responsible person.
7. Ask the participants to formulate activities to be done.

**3.4. Development of schedule of activities**

After deciding the activities to be done, determine when the activities to be done. All group members and responsible persons are able to know and have to plan on what to do and when.

Results of the activities are schedule of activities and details of forest fire prevention made by group.
**Objective:** After completing this exercise the participants are expected to be able to develop schedule of activities of land and forest fire prevention.

**Material:** Result of previous exercise, Pen/pencils and notes

**Steps:**
1. Divide the participants into groups (@ 5 participants);
2. Each group is asked to formulate steps to be taken in each activity to become a group schedule;
3. Develop a matrix containing activities and their time allocations;
4. Discuss with the participants;
5. Do revision if needed.

**REFERENCES**


Appendix 1:

Handout: Local Community Empowerment in Forest Fire Management

Community support and participation are key factors in achieving success in land and forest fire management, especially forest fire prevention. Land and forest fire management are suggested to be institutionalized in non-formal community institutions/groups. Special institution should not manage this. More important is that the efforts can be empowered through existing institution. Considering this, community empowerment strategy should be stressed in the discussion.

A. Community Empowerment in Forest Fire Prevention

Community development should be considered as community empowerment and not only ‘a one-time project’ where it ended when there is no more assistance from outside. A good program in forest fire prevention should be directed toward improving community capability and creating self-reliance.

Empowered community is a community with strong mental ability, educated and has a good intrinsic value. These values are important sources of empowerment such as cooperation and teamwork.

B. Roles of Leaders in the Group

The success of community development for forest fire prevention cannot be separated from figure of its leader. The leader is the facilitator, motor, mediator and organizer in program implementation. Roles of the leaders can be described as follow:

1. Facilitator, the leader should ‘know’ and is able to describe program of forest fire prevention, from planning, implementation, and control;
2. Motor, the leader should ‘know’ and is able to initiate cooperation and participation in the community in implementation of forest fire prevention program;

3. Mediator, the leader should ‘know’ and is able to act as ‘hub’ for interest of related elements, especially when a problem arise;

4. Organizer, the leader should ‘know’ and is able to manage community resources in relation to forest fire prevention.

C. Requirements for A Leaders

A good leader should have:

1. A high level of interest to learn. A community leader should always improve his knowledge on background and characters in his community, policies, activity management and other technical capabilities;

2. A leader should have or always try to improve his communication skill horizontally (with his community member) and vertically (with government official, company, NGO, etc.);

3. A leader should have or always to improve his honesty, competence and tolerance.

D. Group Rules in Forest Fire Prevention

An institution or organization will not be effective in achieving its goals if it has no rules. Often traditional community has rules (customary law) related to environment management, for example the utilization of community forest/land. In some community forest fire prevention is clearly regulated and in some other is not clearly stated but mentioned in forest protection. These regulations are usually not written. In the past community members always obey regulation and their values.
However, these days it is difficult to preserve these customary laws among traditional people. The values are changing because there is no more model figure in the community. Other factor is infiltration from outside.

E. Group Activity/Action Plan

Action plan is a framework for the group to achieve its goals in a certain period of time. Activity plan should be comprehensive and easy to implement by utilizing all potential resources inline with community or group aspiration.

Plan is made to solve problem faced by group. Principally, a good plan should contain:
1. Why an activity should be done?
2. What to do?
3. What material and tools need to do the activity?
4. When should it be done?
5. Where to do it?
6. How to do it?
8. Who will do it?

Data and information are needed to answer the questions. These can be obtained from investigation, secondary data and information available in the community.

Action plan can act as tools to:
1. Control activity implementation;
2. Evaluate activity implementation;
3. Calculate cost needed;
4. Maintain understanding among group members.

Some format can be used to present action plan. Below are two examples of simple format to present action plan for forest fire prevention in a community.
Problem Tree

Lack of fertile land

Area of grassland is increasing

Wild fires “eat” young trees

Burning of farmland is not managed properly

Customary laws on farmland burning is weak

Individuality is getting more intense in the community

Quoted from Community of Sanjan, Sungai Mawang Village, Sanggau Kapuas Sub-District, Sanggau District, West Kalimantan Province on 13 Juli 1992.

Example of Group Action Plan Format

<table>
<thead>
<tr>
<th>Activity</th>
<th>Purpose</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Form a group</td>
<td>Form a group to prevent land and forest fires</td>
<td>X</td>
</tr>
<tr>
<td>2. Set up group rulers</td>
<td>Develop and determine group rules to prevent land and forest fires approved by all members</td>
<td>X</td>
</tr>
<tr>
<td>3. Implement forest fire prevention training</td>
<td>Train all group members to increase awareness and willingness to conduct efforts to prevent fires</td>
<td>X</td>
</tr>
<tr>
<td>4. Develop village nursery</td>
<td>Develop nursery to provide the needs to plant green belts along farmland and forest boundaries</td>
<td>X X X X X</td>
</tr>
<tr>
<td>5. etc.</td>
<td>Etc.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2:

Handout: Forest Fire Prevention by Community of Imugan Village, the Philippines

One model of forest fire prevention program originated from community started in 1970 by ‘Kalahan’ Education Foundation in Imugan, Santa Fe, Nueva Vizcaya, the Philippines. Imugan community used all approaches in implementing forest fire prevention program. To reduce the occurrences of fires in protection forests, farmers made and cleaned 10-meter firebreak and planted Kasi (Senna spectabilis). Village fire fighters are responsible to suppress fires, and every community member is able and capable to assist to suppress fire when the alarm is on.

Management of burning activities can prevent fires in traditional farming systems. Farmers should apply for right to burning in their lands. After receiving right the farmer can do burning while always obey the agreed rules. Some requirements are:

- Make two-meter fire breaks surrounding the area intended for burning;
- Burning should be done only in the morning or late in the afternoon when there is no strong winds;
- Tell neighbors about when and where the burning will happen before they will help watching the process.

Every farmer is responsible for damages on trees and his neighbor’s building resulted from his activities. If fire happens the loss should be reported and discussed in village meeting and Foundation’s

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Advisory Team will decide fine payment. Fines are paid in the forms of food or labor (work force) and not in cash.

Forest Fire Prevention program in Imugan was successful. In the first year, damages caused by burning were decreased by 90% (from 400 ha to become 40 ha). 14,000 ha Miscanthus grassland mixed with scattered forests are now secondary natural forests.