Annex E

ITTO GUIDELINES ON FIRE MANAGEMENT IN TROPICAL FORESTS

Pursuant to Decision 1 (XI) of the International Tropical Timber Council (ITTC), an Expert Panel was established to develop Guidelines for the Protection of Tropical Forests Against Fire. An Expert Panel met in Jakarta from 6-10 March 1995 to prepare the draft guidelines on the base of a document prepared by J. Goldammer (Germany) and S. Manan (Indonesia). After revision of the guidelines the document was approved by the ITTC at its 21st Session held in Yokohama, November 1996.

The ITTO guidelines are considered a major cross-reference and source document which addresses the fire and smoke problems at the source. The original guidelines document which contains several Annexes is published by the ITTO:

> International Tropical Timber Organization (ITTO) 1997. ITTO Guidelines on Fire Management in Tropical Forests. ITTO Policy Development Series No.6. ITTO, Yokohama, 40 p.

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1. INTRODUCTION

The vast majority of today's global vegetation fires are human-caused, and take place in the tropics and subtropics. They are the result of the increasing human population pressure on these areas where fire is being used extensively as a land treatment tool, e.g., for conversion of forested lands into agricultural lands; for maintaining grazing lands; and for facilitating the utilization of non-wood forest products of the seasonal forests and savannas.

In the evolutionary history of the seasonal tròpics, lightning fires have significantly contributed to shape savanna and forest ecosystems. In addition, fire influence through traditional burning practices over millennia has strongly favored and selected plant communities that are considered to be sustainable and long-term stable fire ecosystems. However, the contemporarily changing fire regimes, and the alteration of sustainable time-space-fire relationships in the wake of changing land-use practices are often associated with forest and site degradation.

Tropical rain forests can be severely affected by fire. Shortening of shifting cultivation cycles and the increasing occurrence of escaping land-use fires into tropical rain forests cause high ecological damage by reducing biodiversity. Fire-induced loss of soil cover negatively affects hydrological regimes and soil properties, leading to severe erosion and loss of productive topsoil. High economic losses are caused by damaging valuable timber and non-timber resources, natural regeneration, and planted forests.

In addition, burning of forests and other vegetation of the tropics may exert impacts at different levels on local, regional, and global environments. Smoke from large scale tropical fires also reduces safety of air, land and coastal marine traffic; and may cause problems to human health. Fires in the interface of wildlands and residential areas often cause the loss of human lives, property, and other values at risk, e.g., forestry enterprises, sawmills, power lines, other infrastructures, and livelihoods.

On the other hand, fires play a central role in the maintenance of many natural ecosystems, as well as in the practice of agriculture and pastoralism. Tropical moist savannas in many regions are maintained by fire and would return to seasonal tropical forests if fire could be excluded. Some seasonal tropical forests regularly affected by fire produce valuable timber and non-wood forest products.

These ***ITTO Guidelines on Fire Management in Tropical Forests*** build on the previously published *ITTO Guidelines on Sustainable Management of Natural Tropical Forests, the Establishment and Sustainable Management of Planted Tropical Forests, and the Conservation of Biological Diversity in Tropical Production Forests.*

These fire management guidelines are designed to provide a base for policy makers and managers at various levels to develop programs and projects in which the specific national, socio-economic, and natural problems related to fire in tropical natural and planted forests will be addressed. The scope of the guidelines is to assist the ITTO producer and consumer countries to develop programs for reducing damage caused by fire; and to help tropical forest managers and rural residents to safely use and take advantage of the beneficial effects of fire in land-use systems. The Guidelines are in accordance with the UN Resolution 44/236 in which the 1990's were designated as the International Decade on Natural Disaster Reduction

(IDNDR). One objective of IDNDR is to reduce damage, economic disruption, and loss of life caused by wildfires through concerted international action, especially in developing countries.

The Guidelines recognize that many forest fires originate in the agricultural and pastoral systems; and in degraded vegetation which is outside of forests. Therefore, fire management on former and degraded forest lands may help to re-establish productive forests and to safeguard the success of reforestation programs.

2. POLICY AND LEGISLATION

POLICY DEVELOPMENT

Principle 1

The successful implementation of a policy to protect tropical forests against fire is highly dependent upon broad-based support from all sectors of society, particularly civic organizations and groups working with the responsible government authorities on a voluntary basis, and must be supported by appropriate legislation which is in harmony with laws concerning related issues.

Recommended Action 1

a. Identify local communities, concession holders, timber companies, contractors, conservation non-governmental organizations (NGOs), women's groups, and other voluntary organizations to assess their interest and capacity to forge partnerships with government authorities in fire management programs. Where necessary, assistance will be provided by government authorities in the development of such organizations.

b. A national fire policy forming an integral part of the national land use policy, and assuring sustainable forest management, should be formulated and accepted by all relevant parties, including government, local communities, and the private sector.

c. Establish, and effectively staff and fund, a decentralized national agency, or strengthen an existing institution responsible for the establishment and implementation of an effective fire policy.

d. Enact and/or revise national and local laws and regulations regarding the proper use of fire to ensure the effective implementation of fire management policies.

e. Create a system of incentives and sanctions which will encourage responsible use of fire at all levels, including timber felling and saw-milling.

Principle 2

National parks, national forests, and equivalent reserves protect important and unique representative samples of tropical forest ecosystems as part of the world's natural heritage. These conservation units can be damaged by wildfires, which are usually caused by the activities of rural populations

Recommended Action 2

a. In a national system for fire management, the protection of conservation areas should be considered a priority.

b. Develop fire protection plans for forest lands with high conservation values.

3. STRATEGIES

FIRE MANAGEMENT PLANNING

Principle 3

A fire management plan is an essential component for the prevention, suppression, and management of fire within forests and adjacent lands. Fire management plans must be part of an overall land-use (e.g. forestry) management plan. Planning should be on a cooperative basis on national, regional, provincial, and local levels as appropriate.

Recommended Action 3

a. Provide adequate resources for fire management planning at different levels of fire activity

b. Develop fire management plans, which include a clear statement of objectives; and incorporate information on land tenure, assets threatened, degree of fire risk, fire history, and fire management measures.

c. Promote the active participation of concession holders, timber companies, contractors, local communities, and all other voluntary organizations, particularly non-governmental and women's groups. Their participation needs to be based on their abilities which could be enhanced through training in fire management; and on providing appropriate equipment and incentives whenever feasible.

FIRE MANAGEMENT OPTIONS

Principle 4

The selection and application of fire management options depend upon the conditions and circumstances found at the national, provincial, and local levels which may include, *inter alia*:

- Forest types and management activities,
- Risk and sources of fire,
- Access and terrain,
- Fire management capabilities,
- Climatic conditions,
- Adjoining land uses, and
- Socio-economic factors

Recommended Action 4

a Select and develop the appropriate fire management option which takes into account local circumstances and conditions.

b. An integrated fire management programme should be developed which may include some or all of the following fire management measures:

- Community participation in fire protection,
- Fire prevention (e.g. fire breaks, fuel breaks, and fuel management),
- Fire pre-suppression (e.g. collection of fire intelligence, weather and fire danger forecasts,
  detection and early warning and reporting systems, fuel assessment, equipment, communications, water supplies, and training of fire fighters, etc.),
- Prescribed burning (e.g. fuel reduction, slash burning, etc.),
- Fire suppression,
- Law enforcement and incentive systems,
- Training, extension and public awareness programs, and
- A compost processing policy for agricultural waste or residues from other operations carried
  out near forest areas.

Principle 5

Fire detection and early warning systems are essential for the rapid and effective control of wildfires. A wide range of fire detection options exists, including look-out towers, surveillance aircraft, ground patrols, satellites, and information provided by the general public.

Recommended Action 5

a. Explore and seek access to all potential sources of information and communication of early fire detection.

b. Develop a system of early and rapid dispatch to fires, including assessment of likely routes of travel to determine impediments.

FIRE SUPPRESSION

Principle 6

Typical fire situations in many tropical vegetation types can be successfully controlled and managed by experienced ground crews of fire-fighters. The success of ground crews depends upon local fire organization, on the availability of adequately designed hand tools, and the provision of basic training in fire suppression and fire fighter's safety. Fire fighting equipment is available in developed countries and may be adaptable to tropical forest conditions.

Recommended Action 6

a. Encourage the formation of volunteer fire fighting brigades from local communities and forest users.

b. Provide local brigades with well-constructed fire fighting tools and basic equipment.

c. Provide training on fire fighting techniques and tactics to brigade leaders and fire crews; introducing technologies to enable fire organizations to combat forest fires. Such provisions may be possible through support from forest management organizations.

Principle 7

National level emergencies can occur involving numerous large fires due to changing climatic conditions, which exceed local and provincial capabilities. Disasters may be avoided if sufficient action is taken at an early stage.

Recommended Action 7

a. A national fire fighting contingency plan which involves relevant government agencies, other organizations, and local communities should be set up to deal with large scale emergencies. This plan should outline the responsibilities of the various parties involved to prevent duplication of efforts and to optimize human and financial resources. Consideration should be given to the recruitment of international support where appropriate. Arrangements on financial components must be agreed to well before emergencies arise.

Role of Communities in Fire Protection

Principle 8

The majority of tropical forest fires and other wildland fires are caused by the activities of the rural population. An efficient fire prevention strategy therefore requires an initial understanding of the cultural and socio-economic background of the tropical fire scene. The fire prevention programme relies heavily on a positive relationship between the rural community and the forest-fire manager. Mutual confidence and public support can be created by participatory approaches.

Recommended Action 8

a. Employ or encourage participation of rural residents in fire prevention work, such as establishment and maintenance of fire breaks and other fuel treatments.

b. Encourage integration of agriculture and grazing land-use into fuel break systems through incentive mechanisms (e g through cost-free leasing of fuel break lands). Where burning is used as a form of pasture health management, incorporate techniques to minimize risk of escaped fires.

c. Stimulate community cooperation in fire prevention through various incentive measures such as provision of funding popular initiatives for villages which have succeeded in preventing the spread of wildfires into adjoining forest lands. For example, systems to supply potable water are often lacking in some remote areas; and installation priorities are often uncertain. A community which demonstrates major reduction in harmful fires could be rewarded by having its system installed more quickly.

4. MONITORING AND RESEARCH

MONITORING

Principle 9

Assessment, prediction, and monitoring of fire risk, as well as a means of quantification of forest fires and other rural fires are prerequisites for fire management planning purposes. Statistical data sets can also be used to gain the attention of authorities, policy makers, and the general public. In the tropics such information is difficult to gather by ground based-methods. Airborne and spaceborne sensors offer possibilities to monitor less accessible and sparsely populated land areas with inadequate ground-based infrastructures.

Recommended Action 9

a. Seek access to meteorological information from ground stations, and space borne systems; using this information for fire intelligence (fire risk assessment)

b. Use existing orbital remote sensing systems for fire detection and prediction to obtain real-time information on the geographic location of fires.

c. ITTO member countries should join others in supporting the development of international mechanisms, (early warning systems), to predict wildfires. Such a system would not predict occurrence, but rather would report the development of conditions which can be counted on to result in serious fires. It would have to gather and interpret information from a number of sources, including satellites, and land-based stations.

RESEARCH

Principle 10

Basic scientific and applied research are the fundamental sources of information needed for tropical forest fire management. Research on fire behavior and its impact on ecosystems, bio-geochemical cycles, atmospheric quality, and local and global climate, as well as evaluation of damages and losses, will help to establish indicators on how to manage fire in various tropical forest ecosystems.

Recommended Action 10

a. Support universities and research institutions, in cooperation with international partners, to undertake research on tropical forest ecosystems including the following main areas of interest:

- Compilation and explanation of the state of the art of fire knowledge on past and present fires (occurrence, and ecological impacts)
- Fuel inventory and modelling,
- Fire behavior models,
- Fire risk indicators,

- Fire risk mapping,
- Fire-weather prediction,
- Environmental impact models,
- Impacts of gaseous and particle emissions of fires on bio-geochemical cycles, atmosphere and climate,
- Socio-economic aspects of forest fire, and
- Rehabilitation of forests damaged by fire.

b. Study the dynamics of swidden lands and secondary forests, as well as timber and non-timber products, which are used by the local communities and are likely to contribute to the cause of fires.

c. Establish demonstration modules for non-traditional harvesting of secondary forests with a view to offsetting the pressure exerted by agricultural burning practices.

d. Establish demonstration practices to offer alternatives for the preparation of agricultural lands other than the burning of felled trees.

Principle 11

Knowledge of forest fires and fire management must be exchanged among forestry and research personnel throughout the world to enhance the coordination and cooperation in forest fire prevention and suppression

Recommended Action 11

a. Select and conduct training courses on information exchange methods, such as Internet and other relevant electronic communication systems.

b. Promote periodical international seminars on forest fire management

5. INSTITUTIONAL FRAMEWORK AND CAPACITY DEVELOPMENT

INSTITUTIONAL DEVELOPMENT

Principle 12

Institutional development and strengthening are highly critical, and attention should be given to human resource development. Fire management must be implemented under the jurisdiction and responsibilities of all land owners involved, i.e. on lands managed by national and provincial governments, local communities, concession holders, timber companies, contractors, and private forestry enterprises. However, an institutional framework must ensure that the national fire policy will be implemented.

Fire management measures affect various sectors of the society, and fall within the responsibilities of a variety of government agencies and land users. Therefore, a national interagency structure must coordinate the various responsible agencies involved in order to maximize efficiency and to share fire management resources. Assistance through bilateral and international programs should be encouraged in order to enable the transfer of existing knowledge and advanced technologies where needed.

Recommended Action 12

a. Establish or strengthen structures at the national level which are responsible for preparing and implementing national fire policies. Additional governmental infrastructure should be established or strengthened to build up fire management capabilities at the provincial and local levels.

b. Develop or strengthen suitable mechanisms and structures at national, provincial, and local levels to provide for the establishment and coordination of rural fire brigade organizations, including volunteer fire brigades.

c Develop operational plans in which the role of voluntary organizations, particularly non-governmental and women's organizations, are defined and exercises conducted at intervals to strengthen procedures, and enhance preparedness.

d. The institutions responsible for fire management should promote cooperative agreements between rural communities, NGO's, forest companies, and the relevant public institutions, as well as political authorities.

e. Nations and organizations with fire management expertise should offer advice in building institutional frameworks and capacities; to provide for technical assistance, materials, and support to countries lacking adequate infrastructure.

Principle 13

Fires may affect resources on the territories of neighboring countries, or may have transboundary effects, e.g , smoke pollution. Cooperative agreements between neighboring countries may help to solve transboundary fire problems; and allow for sharing of resources at regional scale.

Recommended Action 13

a. Establish bilateral and multilateral agreements on cooperation, and mutual assistance in fire management.

b. ITTO member countries should have mobile rural fire brigades in order to provide fire management support in situations that go beyond the capacity of the affected country. These brigades would, at the invitation of the affected country, enter that country and augment its fire fighting forces until the crisis passes.

FUNDING AND IMPLEMENTATION

Principle 14

Large fires in the tropics may adversely affect global economies, environment, and biodiversity. Timber which is destroyed or degraded lowers the supply of available forest resources, and affects prices worldwide. Cost of management of these fires should logically be borne locally, nationally, and when appropriate, internationally. To prevent and combat these fires, appropriate institutional infrastructures and mechanisms should be supported from national resources and, if necessary, international cooperation and assistance could be considered.

Recommended Action 14

a. Implementation of a programme to protect the forest against fires requires forest authorities to establish special units responsible for such a programme at national, provincial, and local levels with adequate, financing, staff, skills, equipment, and operational procedures

b Cooperation and active involvement of local communities, the private sector, non-governmental organizations, and the mass media must be promoted to ensure the implementation of an effective program.

c To ensure preparedness, coordination, adequacy, and effectiveness of operational procedures, workshops, and exercises at various levels, should be organized at regular intervals involving all affected parties, including neighboring countries, as appropriate

d Relevant international and regional organizations should promote cooperative efforts to prevent and combat forest fires.

e. Donor countries should accord high priority in their development assistance programs to help developing tropical countries establish programs to protect forests against fires through financial assistance, provision of expertise, transfer of technology, and assistance in training.

f. Development banks should favorably consider providing assistance to developing tropical countries to protect forests against fires through the provision of grants or loans at concessionaire rates.

g. Multilateral facilities such as the GEF (Global Environmental Facility), UNDP (United Nations Development Program), the Common Fund for Commodities, and other relevant arrangements should create 'windows' to support activities related to the protection of tropical forests against fires.

h. International organizations such as the ITTO, FAO (United Nations Food and Agriculture Organization), UNEP (United Nations Environmental Program), UNDRO (United Nations Disaster Relief Organization), UNESCO (United Nations Educational, Scientific and Cultural Organization) and other relevant organizations, activities (e.g. IDNDR), and international initiatives and conventions should strengthen programs related to protection of the forests against fires. ITTO member countries should join others in supporting the development of international mechanisms to obtain prompt assistance to mitigate the consequences of wildfire disasters, upon request.

i. The CSD (United Nations Commission on Sustainable Development) should ensure that in the implementation of Agenda 21 for forests, due attention is given to forest fires in relation to arrangements that may be developed to harmonize and promote international efforts to protect the world's forests. A UN-sponsored Global Fire Research and Management Facility, which includes a Global Vegetation Fire Information System, and the capabilities to provide support on request to any nation in fire management, should be considered by the CSD

j. Donor countries and lending institutions should ensure that their project appraisal procedures include fire risk assessment; and where appropriate, adequate resources should be included in the project budget for fire protection.

k. Seek the cooperation of NGOs, women's groups, and other voluntary organizations, to raise funds in support of programs to protect tropical forests against fire.

l. Projects and activities related to the protection of tropical forests against fire should merit support from the Bali Partnership Fund to be established under the ITTA (International Tropical Timber Agreement) of 1994.

6. SOCIO-ECONOMIC CONSIDERATIONS

ECONOMIC IMPLICATIONS

Principle 15

Damage to forest cover and the wasteful burning of biomass cause significant loss of productive resources. Forest fires also negatively affect the environment, e.g. soil and water resources, and atmospheric qualities. This has direct and indirect cost implications to the country. At the same time, programs to protect forests from wildfires are complex and costly. Many sectors of the economy, including the forestry, agriculture, fisheries, transportation, and health sectors, stand to benefit from effective fire management; and should be prepared to contribute equitably towards the costs.

Recommended Action 15

a. Estimate the potential direct and indirect costs to the national economy brought about by wildfires. The costs of various options of preventing and controlling wildfires should also be estimated to ensure that fire management policies and programs are viable.

b. The agency responsible for fire protection should undertake a cost/benefit analysis of proposed fire management programs under a variety of scenarios. It should design programs which are cost effective and within its budgetary means. National and provincial governments should be prepared to provide adequate financial support to the forestry agencies should it be necessary for them to meet costs

Principle 16

Preventing wildfires is much more cost-effective than suppressing them and bearing the resulting losses The causes of forest fires, and the underlying reasons for them, need to be determined before effective prevention plans can be made. The general public can be an important cause of wildfire. One reason for this is a lack of understanding on the importance and value of forests. In many tropical countries, uncontrolled shifting cultivation (slash-and-burn, swidden system) is a source of wildfires, as is the use of fire to dispose of crop residue and woody vegetation during land conversion.

Recommended Action 16

a. Promote improved agricultural and agrosilvopastoral systems as alternatives to shifting cultivation.

b Establish model demonstration areas for specific farming and agrosilvopastoral practices, combining them with other components of a fire management system (e.g. integrating farming and grazing activities to modify fuel loads or fuel break systems).

c. Develop suitable incentive programs to reward communities and individuals which use appropriate land-use practices, resulting in reduced fire damage In the case of individuals, it is often effective to simply make formal recognition , in the presence of peers, that the individual has done something special.

d. Develop and promote an environmental awareness programme on the relation between social, economic, and environmental benefits derived from forests, and the negative impacts associated with wildfires.

e. Establish a programme to investigate the causes of wildfires, and the underlying reasons. This should form the basis for formulating a wildfire prevention, education, and extension program.

f Develop and implement programs following the principles of regenerative agriculture to promote nutrient cycling so that biomass is utilized to enhance soil fertility. These programs should consider sustainable agricultural practices promoted and disseminated by organizations such as the IIRR (International Institute for Rural Reconstruction), CATIE (Center for Research and Training in Tropical Agriculture), and grassroots level NGOs.

g. Demonstrate a variety of land treatment and soil preparation practices which apply viable and inexpensive soil and water conservation techniques. Consider establishing demonstration plots where fire is not utilized as a tool in site preparation or land clearing.

COMMUNITY CONSULTATION

Principle 17

There may be competing or conflicting land resource uses between rural inhabitants and other land use classifications such as forest concessions, timber companies, contractors, and conservation units. These conflicts can lead to the setting of wildfires. People need to be able to benefit directly from forest uses in order to value and protect these resources. Local people use fire for economic, religious, agricultural, and cultural reasons; and they will continue to do so in the future. Experiences gained from traditional fire management practices may be of benefit within a wider national context. Some tropical countries have experience with fire management involving local communities, with varying degrees of success Lessons from these experiences may be beneficial to other countries.

Recommended Action 17

a. Provision should be made for consultations with people within communities in an open and transparent way to resolve conflicts on rights of forest land use and the obligation of fire protection.

b. Local people should be trained in techniques to manage and control fire so as to prevent destruction of the forest cover; taking into account their traditions and skills.

c. Local governments and citizens should be involved in decisions on how fire will be managed in areas under their purview. Communities may also need financial assistance to carry out fire prevention measures and respond to wildfires. Community organization and training must be done following participatory methodologies in order for them to be effective and sustainable.

d. Provide opportunities for exchange of information and experiences in fire management involving local communities through forums supported by international organizations such as ITTO, FAO, CIFOR (Center for International Forestry Research), and multi-lateral mechanisms.

Principle 18

In many rural societies, women play an extremely important role in agriculture, raising livestock, collecting fuel wood, and utilizing the forest to produce non-timber goods. Women are therefore more appreciative and caring for the natural environment although it is often difficult to integrate them into educational and extension programs, due to their other roles and responsibilities. Women's active participation in fire management programs can be effective in protecting tropical forest resources from wildfires. The same can be said of the other members of the whole family unit. Adults, children, and elders must all be included in the solution.

Recommended Action 18

a. Include women as active participants in community based fire management activities; capitalizing on their knowledge and experience in the use of fire in agriculture, livestock production, and forest management.

b. Develop an effective fire education component, which is specifically directed towards women at the provincial and local levels. The transfer of fire management technologies, and the sharing of experiences may best be done through participatory programs and extension services in which women can play important roles.

7. LAND RESOURCES MANAGEMENT AND UTILIZATION

FOREST MANAGEMENT

Principle 19

Fire management is an integral part of sustainable forest management, which in turn should be based on appropriate land use planning, taking into account the views of all concerned parties

Recommended Action 19

a. Integrate fire management considerations into forest management planning. For example, when making forest inventories, it is important to include information on the quantities of fuel, (dead tree, branches, litter), with a view to assessing the danger of fire.

b. Incorporate fire protection measures into forest concession contracts.

c. Include provisions for protection of the forest against fire when implementing silvicultural management practices.

Principle 20

Fire risk may be reduced by practicing increased forest diversity, particularly in plantations, in terms of species, age, and structure, as well as through preventative silvicultural techniques. Reducing fire occurrence lowers the forest's vulnerability to degradation from insects and disease.

Recommended Action 20

a. Consider the possibility of under-planting or intermixing the main canopy with suitable species of low flammability which are native to the area and already field tested.

b. Give priority to rehabilitation measures of fire damaged forests

Principle 21

Savannas and grasslands are important tropical ecosystems, often interrelated with forest lands. Fire usually plays an important role in these ecosystems, and must be adequately managed in order to maintain the ecosystems and avoid damage to the nearby forests.

Recommended Action 21

a. Determine the appropriate fire regimes of the savannas and grasslands near forest areas, and develop fire management plans to address the requirements for sustaining those ecosystems.

b. Consider using prescribed fire and/or other techniques to prevent damage from free propagating wildfires in those ecosystems.

c. Instruct residents living within or near those ecosystems, which require periodic fire for their survival, on the proper use of fire, including adequate firing techniques.

FOREST UTILIZATION

Principle 22

Large forest areas are managed for timber production. Logging operations involve various activities including: the construction of infrastructure or facilities such as roads, camps, workshops, fuel storage, etc., the use of heavy equipment such as tractors, earth-moving equipment, skidders, trucks, vehicles, power saws, etc . Workers have frequent access into forest areas, often throughout the year. These factors, combined with careless and poor equipment maintenance, or improper use, can increase fire risks.

Recommended Action 22

a. Logging operations and the use of all equipment and machinery must be strictly controlled, and clearly specified in concession agreements to reduce fire risks Spark arresters should be used to prevent fires starting from chainsaws and other machinery. The handling, use and storage of gasoline must be strictly controlled with clear instructions; and placed under the responsibility of a designated person

b. Concession holders, timber companies, and contractors should be encouraged to conduct special campaigns at regular intervals on fire hazards to promote greater consciousness and more responsible attitudes.

c Specific guidelines must be developed for implementation during periods of extreme dry weather or high fire risk. Such measures may include total or partial restrictions on logging. It may be necessary to restrict access to forest areas to that required for logging operations in accordance with management plans and harvesting activities; including transport of logs to processing plants.

d. Concession agreements should specify the role and responsibility of the concession holder in cases of fire outbreaks, including participation in suppression action, and sharing the costs of rehabilitation of fire-damaged forests.

e Concession holders, timber companies, and contractors should provide appropriate training for their employees, and develop operational procedures in fire prevention and suppression to promptly handle fire outbreaks during logging operations.

f. Concession agreements should require that concessionaires' crews and equipment be available for use in fire control activities.

Principle 23

Logging operations may result in accumulation of biomass, invasion by weed species, and desiccation of organic soil matter, all of which can increase fire risks. The careless use of fire during timber harvesting operations has resulted in large wildfires. These fires cause significant economic losses to governments who are often left with the responsibility for rehabilitating fire damaged forests.

Recommended Action 23

a. Plan logging operations to avoid creating large openings, which result in the drying of the forest floor, and invasion of fire prone pioneer species. Allow for techniques, (such as climber cutting), which minimize damage to surrounding trees.

b. Logging wastes should be minimized through a system of incentives and penalties that apply to concession holders and contractors. Where appropriate, encourage the use of logging residues by local communities, so long as this activity does not increase the risk of fire starts.

c. Laws, regulations, or codes of practice that apply to forest operators should be formulated and enforced; and if necessary, contractual arrangements modified to promote responsible fire protection by concession holders and contractors.

d. Penalties should be levied against concessionaires to recover losses of forest values and recoup costs for rehabilitation of fire damaged forests due to negligence.

OTHER FOREST USES

Principle 24

Communities living in and around forest areas have long-established traditions to hunt, to fish, and to collect food, medicinal plants, and other products from forest areas. Conversion of forests for other land uses, and population pressures, have increased the intensity of such uses by these communities, resulting in greater fire risks. Also, fire risks are greatly increased in forest areas through recreational and sporting activities.

Recommended Action 24

a. Concession holders, timber companies, and contractors should provide assistance to organize and provide support to local communities: encouraging their active participation in forest fire prevention programs.

b. Some forest based activities of local communities involve the use of fire. Such activities should be regulated through measures, which reduce the risk of wildfire starts from these activities.

c. Conflicts and misunderstanding between local communities and forest concession workers must be avoided through regular dialogues, and respect for local traditions and sensitivities. The welfare and well-being of local communities must always be considered by concession holders, timber companies, and contractors for any employment opportunities or facilities which become available.

d. Assist communities in their efforts to enhance respect for traditional values and customs, which have historically preserved natural resources.

e. During periods of extreme fire danger, access to forests for recreational pursuits should be strictly controlled. Camping should be restricted to certain sites where facilities such as stoves should be provided Elsewhere, the use of fires for cooking should be prohibited.

f. Patrols should be undertaken in areas frequented by people to ensure compliance with rules and regulations in force. Such patrols should be more intensive during periods of high fire risks or during holiday seasons.

8. TRAINING AND PUBLIC EDUCATION

TRAINING AND EXTENSION PROGRAMS

Principle 25

Managers at various levels need to acquire and maintain knowledge of all aspects of forest fire management, as well as their responsibilities to maintain the health and sustainability of the forests These managers include officials from forestry and other related ministries, as well as timber companies, contractors, and forest concession operators.

Recommended Action 25

a. Identify the information and training needs for relevant managers, and where necessary disseminate appropriate materials and conduct seminars, workshops, short courses, and field training sessions, dealing with the principles and application of forest fire management, including fire prevention and suppression.

Principle 26

People living near forests are often unaware that their activities may cause forest fires, and in some cases, can result in the destruction of forest ecosystems. Members of these communities, if motivated, properly trained and equipped, can be important sources of assistance in the prevention, control, and management of fires.

Recommended Action 26

a. Prepare and conduct courses for forest authority officers, concession holders, and contractor's staff for the "training of trainers" that can provide extension to local communities.

b. Identify and recruit suitable members of the community to be trained in fire prevention measures and in the use of techniques and equipment, (including traditional tools), to suppress and manage fires.

c. Prepare and conduct basic education programs, and provide extension materials for communities near the forest to increase their awareness on the importance of the forest environment and the role of fire.

d. When required, provide caches of basic fire suppression tools, under strict control of responsible individuals, to be used in emergencies by people identified and trained in "b" above.

Principle 27

Communities living near the forest have traditional values, which affect their attitude toward the forest as a living entity Local people are influenced by community and spiritual leaders who are likely to be effective in extending information on fire protection.

Recommended Action 27

a. Seek the cooperation of the community and spiritual leaders in fire management programs.

Principle 28

Within their areas, the vigilance and influence of NGOs and women's groups can provide effective and prompt assistance in forest fire management programs.

Recommended Action 28

a. Develop and conduct courses as necessary for leaders of NGOs and women's groups on their roles in forest fire management programs, including the dissemination of information to the public on fire dangers to forest ecosystems; and the ways and means to reduce fire risks when enjoying the forest environment.

PUBLIC EDUCATION

Principle 29

Members of the public are affected by wildfires that result in the loss of wealth and livelihood and threaten forest ecosystems. Most people, including recreationalists, are unaware of the causes of fires, and their economic and ecological impacts.

The public's understanding of, and attitudes toward, the role and use of fire and forest management practices can best be improved through the education of children and youth.

Recommended Action 29

a. Establish or enhance cooperation between forest authorities and education departments to allow for the design of suitable curriculums, and the conduct of education programs for elementary and secondary schools on forest and fire management. Explore ways to include non-traditional allies in the education campaign against fire.

b. Use mass communication to provide information to the general public on the causes, impacts, and management of forest fires. The success of such public awareness campaigns will rely upon the selection of appropriate symbols and slogans, which help stimulate the general public to identify themselves with the message. Seek cooperation and involvement of religious organizations, civic groups, and NGOs in public awareness campaign.

c. Provide recreationalists with information (e.g. pamphlets, leaflets), on the benefits that fire steals from them, and on their responsibilities for the prevention of fires starting from campfires and other recreational pursuits.

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