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## **A REVIEW OF FOREST FIRE MANAGEMENT IN THE PHILIPPINES**

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## **Executive Summary**

1. This review was undertaken in December 2003 with funding provided by the International Tropical Timber Organization. The review was recommended by the ITTO Diagnostic Mission on Sustainable Forestry Management in The Philippines undertaken in July 2003<sup>1</sup>.
2. The purpose of the study was to review forest fire management in The Philippines and to make recommendations for improvement where this was appropriate. The review was to give attention to Community Based Forestry Management as a possible vehicle for improving fire management in rural areas. It was also to give attention to recent FAO proposals for projects in forest fire management.
3. The review found that the core problem was as follows:  
**“Unwanted forest and grassland fires go unchecked and destroy forests, grasslands, plantations, agricultural areas and other assets”.**
4. Four main constraints were identified that are preventing the core problem being overcome. These are:
  1. There is **limited organizational capability** within the Department of Environment and Natural Resources (DENR), Bureau of Fire Protection (BFP) and other government agencies, non-governmental organizations (NGOs), Peoples’ Organizations (PO) and the community to manage the problem of forest and grassland fires;
  2. There is **limited operational preparedness** at all levels, with the possible exception of a few plantation enterprises;
  3. There is **inadequate fire prevention capability** at all levels, with the possible exception of a few plantation enterprises; and
  4. **Controlled use of fire is not well managed.**
5. The fundamental constraint that is contributing to the core problem is that the Forestry Management Bureau within DENR does not exercise sufficient responsibility for the suppression of forest fires. As a result of a change in the law, responsibility for forest fires was given to the Bureau of Fire Protection within the Department of Industry and Local Government (DILG). As a result, while DENR has responsibility as land manager for forest protection, it has reduced its emphasis on forest fire management because of other competing demands on its resources. As a result, DENR has progressively lost its professional capabilities in fire management and has focused on other areas of activity. The rectification of this organizational arrangement is seen by the review team as being a precondition for any effective progress in forest fire management in The Philippines.
6. A possible short-term solution to this situation is for DENR and BFP (through the DILG) to come to a mutual agreement that DENR should be the lead agency for forest fire suppression. Such an agreement could be added to the Memorandum of Agreement (MOA) that currently exists between the two Departments.
7. This report also suggests a five-year plan over which the recommendations might be implemented as well as some suggestions for possible intervention projects.

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<sup>1</sup> See “Achieving the ITTO Objective 2000 and Sustainable Forest Management in the Philippines” ITTC (XXXV)/16, November 2003.

## **Acronyms**

A & D	Alien and Disposable Land
ASB	Alternatives to Slash and Burn
ASMC	ASEAN Specialised Meteorological Center
BFI	Bukidnon Forests Incorporated
BFP	Bureau of Fire Protection
CAR	Cordillera Autonomous Region
CBFM	Community Based Forestry Management
CBFiM	Community Based Fire Management
CECAP	Central Cordilleras Agricultural Program
CENRO	Community Environment and Natural Resources Officer
CFP-Q	Community Forestry Project in Quirino
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DILG	Department of Industry and Local Government
EU	European Union
FAO	UN Food and Agriculture Organization
FFMC	Forest Fire Management Committee
FMB	Forest management Bureau
GTZ	German Agency for Technical Cooperation
ICS	Incident Command System
IFMA	Integrated Forestry Management Agreement
ITTO	International Tropical Timber Organization
JICA	Japanese International Cooperation Agency
KPIs	Key Performance Indicators
LGU	Local Government Unit
LOP	Local Operational Plan
MIRDC	Metal Industries Research and Development Center
MOA	Memorandum of Agreement
MPFD	Master Plan for Forest Development
NCIP	National Commission for Indigenous People
NDCC	National Disaster Coordinating Council
OGAs	Other Government Agencies
PDCC	Provincial Disaster Coordinating Council
PENRO	Provincial Environment and Natural Resources Officer
PO	People's Organization
RDCC	Regional Disaster Coordinating Council
SOPs	Standard Operating Procedures

## **Background to the Review**

In July 2003, the Government of The Philippines, through its International Tropical Timber Organization (ITTO) Focal Point, sought ITTO funding under ITTC Decision 6 (XXXIII) for a review of forest fire management in The Philippines. This action was taken because of the view that forests in The Philippines are under threat from fires, especially during El Niño periods.

In July, an ITTO-supported diagnostic mission was conducted in the Philippines to assist the country in identifying the main constraints for achieving ITTO's Objective 2000, in which member countries committed themselves to promoting trade of tropical timber from sustainably managed forests. The diagnostic mission also developed recommendations on how to overcome these constraints. One of the priority areas identified during the mission was the prevention and management of forest fires in the Philippines. Based on

these findings and under the provisions of ITTC Decision 6(XXXII), the Executive Director of the ITTO authorized a review of forest fire management in the Philippines with a special emphasis on Community Based Fire Management.

In addition, in October 2003, FAO undertook a critical review of the implementation of The Philippines Forestry Master Plan<sup>2</sup>. The FAO also developed a first draft of a project proposal on forest fire management in The Philippines. Both these FAO documents were made available to the review team and have been included in the information on which the recommendations have been developed.

### **Terms of Reference of the Review**

The international consultants' responsibilities included, *inter alia*, the following:

1. Review background information related to the country's policies and legislation on forest fire, including the Master Plan and National Haze Committee;
2. Review past and current activities by The Philippines Government, other stakeholders including local communities and bilateral and multilateral organizations in forest fire prevention and management; special emphasis should be given to FAO's planned technical cooperation project on community fire management;
3. Review existing forest fire management practices and available equipment and infrastructure;
4. Consult with all relevant stakeholders on forest fire management problems and possible solutions;
5. Develop jointly with all relevant stakeholders a strategy for the prevention and management of forest fire in The Philippines;
6. If appropriate, develop a project proposal to strengthen the implementation of the national forest fire management strategy;
7. Depending on the outcome of the consultancy, submit to ITTO either a draft project or pre-project proposal or a mission report outlining the forest fire strategy developed through the consultancy; and
8. Engage two local consultants for up to one month to assist in the document review, preparation and implementation of the mission to The Philippines, particularly concerning logistical aspects.

The international agency engaged to undertake the review was NSW Rural Fire Service of Australia, represented by Duncan Sutherland, Director, Business Development and Superintendent Bruce Arthur, OAM, Fire Control Officer, Yarrowlumla Rural Fire District.

The national experts from The Philippines were Mr Rosalio Goze, retired Director of DENR and Mr Sabado Batcagan, retired Assistant Secretary for DENR.

### **Methodology**

Following a briefing and planning meeting in DENR head office in Manila, the review team undertook a series of site visits in the Cordillera Autonomous Region (CAR) and several other provinces in the northern Philippines region of Luzon followed by a tour of Bukidnon Province in Mindanao Island.

Meetings were held with a wide variety of groups and individuals including:

- Head Office staff of DENR, including the Undersecretary for Field Operations;

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<sup>2</sup> *Sustainable Forest Management, Poverty Alleviation and Food Security in Upland Communities in the Philippines* (Project PHI/01/010). FAO, October 2003.

- Indigenous People and officers from the National Commission for Indigenous People (NCIP);
- People's Organizations and NGOs;
- Upland farmers;
- Barangay Captains and Tribal Elders;
- Mayors, Provincial Governors, Provincial Board Members, Local Government Units;
- DENR Forest Management Bureau staff from the regional, provincial and community levels;
- DENR Training Academy staff;
- Project staff from DENR-ITTO Community Based Forestry Management (CBFM) project and the Community Forestry Project in Quirino Province (CFP-Q);
- Provincial Disaster Coordinating Council (PDCC) and National Disaster Coordinating Council (NDCC) representatives;
- Staff from the Bureau of Meteorology in Manila;
- Bureau of Fire Protection (BFP) staff at both Headquarters and in the regions; and
- Miners, farmers, Agroforestry farmers and IFMA holders. Following the field visits, a series of consultations were held with DENR and BFP officers in Manila prior to a presentation to the DENR Undersecretary.

### ***Current Context***

Following is an extract from the Master Plan for Forestry Development (The Forestry Master Plan<sup>3</sup>).

The Philippines' forestry sector is continuously declining in terms of its biophysical, economic and environmental aspects. Such decline is largely attributed to a number of inadequate and poorly implemented forestry policies that led to the rapid exploitation of timber from virgin forests at prices far below real market values. The proliferation of only short duration timber licenses in the past discouraged long term investments in forest development and dampened private sector initiatives. Forest destruction rose to very alarming levels while forest recovery through natural and artificial means never coped with the forest destruction rate. Furthermore, the institutions mandated to implement forest policies to address all these problems had not been equipped to fully address the situation. Meanwhile, the social settings in the uplands and forest adjacent communities continue to exert pressure on natural resources and made the tasks of conserving the forests more difficult. The very high incidence of poverty in the uplands continues to exacerbate environmental degradation problems and the country's once rich forests continue to lose their vital functions.

Since the MPFD was formulated, several new developments and concerns have emerged in forestry, both in the local and international fronts. These issues now affecting forestry in the country were unforeseen at the time MPFD was formulated. Among these are the forestry and land-use implications related to climate change, adoption of criteria and indicators for sustainable forest management, and the increasing recognition of the role of forests and forestry in poverty eradication and support of sustainable livelihood, among others. The review of MPFD implementation conducted by UNDP mission (October 2003) also noted several weaknesses and aspects of the Plan that had become less relevant in guiding the country's forestry activities. The mission recommended the review and revision of MPFD taking into consideration the changed environment and priorities in The Philippines and other emerging trends in local and international forestry.

The forestry sector is the major centerpiece of the country's natural resource base and ecosystems. Although the sector's contribution to the national economy has been declining,

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<sup>3</sup> The Philippines Forestry Master Plan Executive Summary 2003, Unpublished.

its continued development and that of the environmental sector is a pre-requisite to a sustained growth in agriculture and other industries. Besides, forest lands are the main watersheds of rivers which provide water for various uses. Soil erosion and hydrological deterioration of these watersheds caused losses in productivity and utility of infrastructures. The total off-site and on-site costs of forest degradation was estimated at P11.6 billion annually (MPFD, 1990). The contribution of the sector to the economy in terms of gross value added, export revenues, full-time job creations, and the provision of biomass fuels, are still significant. However, the sector continue to reel from many threats to forest resources, among which are: the tremendous pressure from an increasing population in search of land to till and forest resources to use, the loss of vital watershed function and loss of biodiversity and inadequate forest development, management, and conservation efforts.

It is difficult to gain an accurate picture of the annual extent of forest fires in The Philippines because of the inadequacy of reporting, as well as ambiguity over what constitutes a forest fire. If destruction of forest areas (either plantation or natural forest) is the definition, then all forms of forest fires, both wild fires and intentionally lit fires must be recorded. This would include shifting cultivation. The FAO Forest Resource Assessment (FRA) 2005 is now informing countries that all wildland fires should be recorded as well as all prescribed fires. That is to say that all fires inside forests should be defined as forest fires. In the Philippines, FAO<sup>4</sup> estimates that two million families derive their living from living from shifting cultivation. If each family burns an area of 1.5 ha the annual loss of forest will exceed 3 million ha/year. This area of burning represents loss of forest, but it is not reported or included in statistics. If full and accurate figures for forest fire damage are available, and these can be translated into the value of resource lost, it allows the problem to take on much more political significance.

In 2002, Pogeyed<sup>5</sup> described the forest fire situation in The Philippines as follows:

“about 5.49 million ha or roughly 18 percent of the total land area [is] still covered with forests. The remaining old growth, or primary dipterocarp forests, comprises only about 0.804 million ha, far from the 12 million ha of old-growth forest that existed 55 years ago. A close look at the causes of this reduction indicates that the major factors of denudation are *kaingin*, or shifting cultivation, forest fires, illegal occupancy, conversion to other uses, clearing in the process of logging, pests and diseases. Fire is obviously a very serious problem that threatens the few remaining forests of the country. Humans have caused most of the reported forest fires, either intentionally for economic gains such a *kaingin*, charcoal production, etc., or unintentionally through negligence or carelessness.

The Filipino Constitution categorizes public land into four parts:

1. Agricultural;
2. Forest or Timber;
3. Mineral; and
4. National Parks.

Except for agricultural lands, the other three (3) classes are administered by the DENR. The Forest Management Bureau (FMB) as a staff bureau is principally responsible for the Forest or Timber category. The Parks and Wildlife Bureau of DENR is responsible for the administration of National Parks.

Agricultural lands, also known as Alienable and Disposable (A & D) lands, are released from the public domain with the overall consideration that they are not needed for "forest

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<sup>4</sup> From discussion with Mike Jurvélius, FAO, 2004.

<sup>5</sup> Pogeyed, M. L. 2002 *Fire Situation in the Philippines* IFFN No. 26

purposes". Non-forest purposes include agriculture, town sites, settlements, industrial areas and similar purposes. A & D lands are only those that can be tilled and privately-owned. The Department of Agriculture's (DA) responsibility is the delivery of services to those A & D lands actually engaged in agricultural production.

There are isolated areas in A & D lands still with natural forest cover. Since A & D lands are not needed for "natural" forest purposes, the still existing natural forest cover is therefore temporary. The DENR as a matter of policy does not discourage the maintenance of these isolated areas with forest cover. Tree farming is actually practiced in some privately-owned lands and is not being discouraged by the DENR.

The DA is not mandated to manage or regulate the use of fire in A & D lands engaged in actual agriculture (including those areas still with natural forest cover or artificially forested areas).

In relation to forest fire management in 2003, several factors have combined to create a situation where fires go unchecked, fire prevention is poorly implemented and controlled use of fire is poorly managed. The key to this situation is that the Department of Environment and Natural Resources (DENR), through FMB does not take sufficient responsibility for forest fire suppression. Following the restructuring of the Directorate of Forestry in 1990, responsibility for forest fires became the lawful responsibility of the Bureau of Fire Protection (BFP) and as a result, FMB has given forest fire management a very low priority.

As noted by Igsoc (1999)<sup>6</sup>

“the full implementation of the DENR's reorganization in 1988 provided the abolition of the Forest Protection and Law Enforcement Division and transform the defunct Bureau of Forest Development (BFD) as staff bureau which is now called Forest Management Bureau (FMB). In other words there is no longer a definite Office or Division in the Central Office that will oversee, coordinate, monitor and evaluate the nationwide implementation of forest fire control and management program. ... FMB ... [should] be given the task, among others, to see to it that field offices have adequate manpower and trained forest protection personnel; recommend appropriate fire fighting tools and communications facilities to be procured and distributed to CENROs; should take the lead in the training of forest protection personnel and fire fighting crews in coordination with the DENR Human Resources Development Office.”

As a result of the reorganization in 1988, DENR has undergone a progressive decline in the number of officers with forest fire management skills and experience. Although DENR has responsibility for forest protection, this role is focused on encroachment and illegal logging rather than fire management. Because BFP has the legal mandate for forest fire prevention and suppression, DENR it has experienced difficulties securing budget allocations for forest fire management initiatives. DENR will need to give top priority and the corresponding budget to forest fire management for current losses from forest fires to be reversed.

In 2004, Presidential elections will take place in The Philippines. Until the new President is sworn in and his/her cabinet is appointed in July/August, there is little likelihood of substantial change to the current institutional arrangements for forest fire protection.

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<sup>6</sup> Igsoc, R. O. 1999. *Appropriate Mission and Structural Organization concerning Forest Fire Management, The Philippines*. Paper presented during the 2<sup>nd</sup> International Workshop on Forest Fire Control and Suppression Aspects, Bogor, Indonesia, 1999.

At the international level, in June 2002, The Philippines signed the ASEAN Agreement on Transboundary Haze Pollution<sup>7</sup> that places certain constraints on it producing smoke from wildfires and agricultural burning. This agreement has been ratified by the requisite number of six ASEAN countries and thereby came into effect on 25<sup>th</sup> November 2003. The Philippines has yet to ratify the agreement and is under some international political pressure to do so.

### **International Assistance in Forest Fire Management**

Past and current assistance from bi- or multilateral organizations in sustainable forest management and community based forest management is quite extensive. Although most, if not all of these projects have forest protection as a key focus area, few have given a particularly strong emphasis to forest fire management.

The ITTO-funded CBFM project in Nueva Viscaya has given some attention to the issue of forest fires within the wider issue of forest protection, with the training and equipping of some forest fire suppression teams and with the use of fire fuel breaks and static water storages. It is, however, of limited effectiveness because it is designed for infrequent application to low intensity fires. The ITTO site at Nueva Viscaya has already experienced one wild fire but it was readily contained using the arrangements that have been put into place. If the location is impacted upon by a high intensity fire, these local arrangements will be quickly overwhelmed. Nevertheless, as a first response arrangement, they are very worthwhile, especially if a fire can be detected and attacked very quickly. The arrangements also serve to draw local people's attention to the issue of forest fires.

The European Union (EU) funded CECAP program has focused on environmental development in the uplands of the northern Philippines. This project, Central Cordilleras Agricultural Program, conducts environmental education through awareness campaigns, agro-forestry, reforestation, upland farm intensification and pasture management. Forest protection is a part of this program, but fire management is, to a degree, incidental to the overall initiative. The EU also funded the Caraballo & Southern Cordillera Agricultural Development Program, which gave rise to the Tree for Legacy project. This project encourages tree planting by the community, with an emphasis on forest protection, but little specific provision is made for forest fires.

The Asia Development Bank funded Cordillera Highland Agricultural Resources Management project has a component on reforestation and forest protection through the mobilization of local communities. Incidental to its central objectives is the matter of forest fire protection, but the project has no specific initiatives to address training, coordination, equipment, community education or other essentials.

The Japanese International Cooperation Agency, JICA, is developing a Master Plan Study for Watershed Management in Upper Magat and Cagayan River Basin, part of which is forest protection. Again, fire management is incidental to, rather than central to this endeavor.

The FAO has been a key participant in fire management in The Philippines for many years. In the 1980s FAO was involved in a series of Technical Cooperation Projects addressing the issue of forest fire management. FAO is currently considering a project proposal that specifically addresses forest fire management. This current proposal would see the development of an Integrated Community Based Fire Management concept along with preparation of pilot sites and implementation of training and equipment programs. A

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<sup>7</sup> See <http://www.haze-online.or.id/docs> for an electronic copy of the ASEAN Haze Agreement.

key feature of this proposal is the development of a fire danger rating system and procedures for controlled burning. While the proposal has merit, without appropriate long-term institutional support from the DENR it is unlikely to have a sustainable impact.

The Bukidnon Forest Incorporated (BFI) plantation site in Mindanao Province, supported by New Zealand, is by far the best example of arrangements for forest fire prevention and suppression, with an integrated system of fire weather warnings, lookout towers, crew patrols and a comprehensive equipment cache. A key feature of this project is the close cooperation between the plantation managers and the local community in the matter of forest fires. This cooperation included the provision of assistance in controlled burning to neighboring farmers by plantation employees, payment of bounties to neighbors who report wildfires and support for volunteerism within the community by the plantation managers and the local radio station. There is much that can be learnt and applied nationwide from the BFI project's approach to forest fire management.

### ***Situation Analysis***

The review team determined a *core problem* and a range of *impacts*. Further analysis determined four *major constraints* and a series of *underlying causes* that have contributed to these constraints.

### ***The Core Problem***

“Unwanted forest and grassland fires go unchecked and destroy forests, grasslands, plantations, agricultural areas and other assets”.

### ***Impacts***

Seven major impacts caused by this core problem were recognized as follows:

1. Increased rural poverty through decrease in forest cover, loss of soil fertility and increased erosion;
2. Loss of biodiversity especially in mossy forests and dipterocarp forests;
3. Impaired water quality and quantity in watersheds, especially due to erosion and siltation;
4. Reduced commitment to CBFM by the community due to loss of forests by fire;
5. Damage to agroforestry and agriculture including financial losses;
6. Threat to life and property; and
7. People see fires as uncontrollable and become indifferent to them.

### ***Main Constraints Summary***

Four constraints to the rectification of the core problem were identified:

1. There is ***limited organizational capability*** within the DENR, BFP and other government agencies, NGOs, PO and the community to manage the problem of forest and grassland fires;
2. There is ***limited operational preparedness*** at all levels, with the possible exception of a few plantation enterprises;
3. There is ***inadequate fire prevention capability*** at all levels, with the possible exception of a few plantation enterprises; and
4. ***Controlled use of fire is not well managed.***

## ***Main Constraint # 1: Limited Organizational Capability***

### **1. Legal Mandate**

With the advent of Republic Act 6975, otherwise known as the Department of the Interior and Local Government (DILG) Act of 1991, the Bureau of Fire Protection (BFP) was mandated to undertake the prevention and suppression of all fires in buildings, ships, docked at piers, forests, etc. In response to this mandate for forest fires the Office of Forest Fire Protection was established to perform functions as follows:

- Formulate policies and guidelines relative to forest fire prevention and suppression;
- Coordinate with other government agencies with functions relative to forest fire protection

Because BFP was previously responsible for prevention and suppression of buildings and structural fires, BFP entered into a Memorandum of Agreement with the DENR for the training of BFP personnel in forest fire protection and management.

BFP has a total number of 18,000 personnel from the national level down to regional, provincial, city and municipal levels but their activities are restricted to urban fire protection. As a result of the implementation of its 24-hour roster system, the number of BFP fire fighters on duty at any one time is around 6,000 nationwide. At the barangay level, BFP has organized barangay fire brigades in some locations to augment its personnel assigned to city/municipal level in fire prevention and suppression activities. (A barangay is a local government unit at the community level. Each is managed by a Barangay Captain and a council and they are responsible for local security, dispute resolution, waste management and other local issues). These barangay brigades have been provided with some advice and guidance on fire suppression both for structures and for forest fires. Nevertheless, on the ground there was little evidence of the effectiveness of this training in the barangays visited by the review team.

While there have been a number of BFP personnel trained in forest fire suppression, the agency has not been able to provide fire fighting tools and equipment due to higher priorities within its budget. BFP currently has 700 municipal fire stations without fire engines. In such circumstances it is very unlikely that resources can be made available for anything more than a token response to forest fires.

While DENR has responsibility as land manager for forest protection, FMB does not take sufficient responsibility for forest fire suppression. Following the restructuring of the Directorate of Forestry in 1990, responsibility for forest fires became the lawful responsibility of the Bureau of Fire Protection (BFP) and as a result, FMB has given forest fire management a very low priority. As a result, DENR has progressively lost its professional capabilities in fire management and has focused on other areas of activity.

A cornerstone of recent DENR activity in forest management has been the Community Based Forest Management (CBFM) initiative. This initiative has seen local communities take responsibility for the management of their forests in return for a variety of incentives including access to tenure and to forest products. A key element of the social contract that has been developed between the DENR and the communities involved in the CBFM initiative is protection of the forests and watershed from encroachment, illegal logging and poaching. Local communities have also taken it upon themselves to attempt to address the issue of forest fires, although they have expressed concerns over the lack of training, equipment, coordination and support.

Within Local Government Units (LGUs), several forest protection initiatives were observed. The most outstanding of these were the Trees for Legacy initiative in Nueva Viscaya Province<sup>8</sup> and the mobilization of volunteers during fires in Bukidnon province. In both these initiatives, DENR officers played key roles in support of the LGU efforts.

Civil society has also taken a role in forest protection in several provinces. Examples were observed of People's Organizations establishing reforestation projects such as the Baguio Regreening Movement. While these have focused primarily on establishment of watershed protection and planting of trees, significant concern is also held for the need for fire management. In discussion, all of those interviewed acknowledged that DENR is the appropriate government agency to provide policy, training equipment and coordination in forest fire management. In all cases, respondents suggested that the BFP was fully extended providing fire protection to urban areas and did not have the capacity to provide forest fire protection.

Considerable uncertainty exists in the community's mind about which agency is responsible for forest fire management. This uncertainty is also apparent within DENR, especially at the level of Community Environment and Natural Resources Officers (CENRO). DENR has established an excellent vehicle for community based fire management through its CBFM initiative and this program should be the context in which community based fire management is developed. As the manager of this program, and as the manager of forest lands in the Philippines, DENR is the logical government agency to lead and coordinate all aspects of forest fire management in the country.

To add weight to this argument, all effective international models have land managers being responsible for fire management on the lands that they manage.

BFP and DENR have both expressed interest in clarification of the current untenable situation. One suggestion is that DENR should be the agency responsible for fire prevention and suppression in relation to forest fires on lands for which it is responsible with BFP responding in the event that the fire situation escalates beyond DENR's resources and if BFP resources are available. The BFP would retain responsibility for forest fires on land within towns and cities. DENR would be responsible for the coordination of other agencies in the suppression and prevention of fires on DENR lands (forests and national parks). DENR and BFP would work together to develop policies and procedures for the prevention and suppression of forest fires on all classes of land. DENR would also be responsible for controlled use of fire for forest management purposes. Initially, this arrangement could be included in the existing Memorandum of Agreement (MOA) between DENR and BFP. The MOA would then give DENR some legitimate claim to financial resources for forest fire management programs, especially training programs at the community level.

In the longer term it may be possible to make changes to the Sustainable Forest Management Act of 2002<sup>9</sup> (which is awaiting passage through the twelfth Congress of the Republic of The Philippines) to give DENR the necessary legal mandate for forest fire suppression on land under its management control.

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<sup>8</sup> See "Tree for Legacy" A DENR-LGU Partnership jointly published by the Province of Nueva Viscaya and the DENR, 2002 (?)

<sup>9</sup> See a Bill for "An Act Providing for Sustainable Forest Management and for Other Purposes" Twelfth Congress, Republic of the Philippines 2002 (not yet enacted)

### **Recommendation #1**

*Mandate responsibility for forest fire management with the primary manager of forest land (DENR) recommended as being the lead fire management agency.*

## **2. Jurisdictional Boundaries and Legal Status**

Under the MOA it is necessary to define boundaries of responsibility for both BFP and DENR. To reflect the reality of the current situation BFP should be responsible for all fires in urban areas and DENR should be responsible for fires on land under its management responsibility. Other classes of land such as privately owned agricultural land and plantations would be the initial responsibility of the landowner. These arrangements should be included in the MOA between BFP and DENR.

### **Recommendation #2**

*Mandate the jurisdictional territories for which DENR and BFP are responsible in relation to forest fire management.*

When DENR is given legal responsibility for forest fire management its officers will require certain provisions under law. These provisions should include a legal mandate to manage suppression, prevention and controlled use of fires, protection from prosecution to allow officers to take necessary actions, and powers to take necessary action to suppress and prevent fires.

### **Recommendation #3**

*Develop appropriate legislation to give DENR the necessary responsibilities, protections and powers to manage fires.*

## **3. Institutional Coordination and Leadership**

A number of agencies and organizations are stakeholders and players in forest fire management in the Philippines. These include other government agencies (OGAs) such as the Department of Agriculture, Department of Interior and Local Government, Local Government Units, People's Organizations and Provincial Disaster Coordinating Councils (PDCCs). As a consequence, the situation is somewhat confused and lacks coordinated effort. In the interests of community safety and the effective channeling of the efforts of all these participants, one agency should take responsibility for coordination.

### **Recommendation #4**

*DENR to coordinate the work of OGAs, POs and LGUs in forest fire management*

Forest fire management must be given renewed focus within DENR as well as across all appropriate government agencies and the wider community. Under current arrangements, the fire management effort is dissipated across many players and leadership and accountability need to be strengthened. During fire events, especially those that escalate rapidly, a chain of command is required to ensure that operations are effectively managed and the community and the environment are protected.

In order for DENR to be accountable for its responsibilities, the development of a professional fire management capacity is required within the organization and up to senior officer level. The appointment of a Chief Fire Officer for forest fire management would provide an appropriate focus and give the DENR a level of community confidence that is not clear under the current arrangements. The appointment of a Chief Fire Officer should not add to the existing organizational structure, but should be achieved by re-directing priorities within the DENR.

## **Recommendation #5**

*Strengthen line management for fire within DENR (including the establishment of a fire management line unit and appointment of a Chief Fire Officer located in Head Office)*

### **4. Focus on the CBFM Program**

DENR has moved its focus away from fire management in the past decade due to changes in its mandate. This has led to a reduction in action on forest fire management initiatives. DENR's key community forestry program has been CBFM, a program that includes components on forest protection<sup>10</sup>. In order for DENR to adequately support and coordinate the CBFM program it is essential that fire management be included. Some respondents suggested that DENR's priority in relation to the CBFM initiative has been on securing tenurial instruments and encouraging tree planting. While these are worthy objectives, they fall short of the need to ensure that communities enjoy as much success as possible through their stewardship of community forests. There is a demonstrable need for assistance to be given in fire prevention, silvicultural practices and marketing so that communities do not eventually become discouraged as a result of plantation failures, forest fires and poor returns in the market. It has been suggested that DENR should now renew its efforts to support CBFM to ensure successful long-term outcomes for the participating communities.

There are a number of international studies that demonstrate the effectiveness of community based forest management as a vehicle for the development of forest fire management at the community level<sup>11</sup>. The review team strongly advocates a Community Based Fire Management (CBFiM) approach be taken in The Philippines. Under such an approach, the frontline responsibility for fire detection, prevention and suppression rests with villages (barangays). Barangays would also issue permits and manage the controlled use of fire within their area. The role of DENR would be to initiate, support and guide this process through training, provision of legislative and regulatory instruments and providing coordination and backup in the event that a fire threatens to involve more than one barangay area.

## **Recommendation #6**

*Refocus DENR on long-term CBFM outcomes for success including fire management and better support for farm silviculture and marketing.*

### **5. Roles of the CENRO and PENRO**

There is considerable evidence that provincial and community officers from DENR are uncertain about their roles in fire management. An effective fire management system would support rapid response at the local level with provision to expand the fire management resources and capability if the fire situation should escalate. The nurturing and support of a fire prevention and suppression capability at the community level should rest at the level of Community Environment and Natural Resources Officers (CENROs). CENROs are the most decentralized elements of DENR and have a key role in coordinating community needs and expectations. They should be integral to the development of barangay forest fire management capabilities as well as providing management procedures for permits to use fire as a tool for agricultural and forest management.

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<sup>10</sup> See DENR Administrative Order No 96-29, "Rules and Regulations for the Implementation of Executive Order 263, Otherwise Known as The Community-Based Forest Management Strategy" October 1996.

<sup>11</sup> See Ganz D, Moore P and Reeb D, "Community-based fire management case studies from China, The Gambia, Honduras, India, Lao People's Democratic Republic and Turkey" at <http://www.fao.org/docrep/006/ad352t/ad352t02.htm>.

The role of Provincial Environment and Natural Resources Officers (PENROs) should be to monitor and evaluate the implementation of community based forest initiatives and to provide interventions when these are indicated.

### ***Recommendation #7***

*Clarify and strengthen role of CENRO and PENRO in fire management.*

## **6. Public Image of DENR**

Many community members advised the review that DENR is perceived as a regulatory agency with something of a policing role. While such a role is essential, especially for the management of illegal logging, DENR's effectiveness is also dependent on it being perceived as being supportive and encouraging as well as being an enforcer of government policy. Further, its regulatory role is encumbered by procedures that are cumbersome and perceived as being slow and an impediment to effective working relationships. One example of this is the time that is required to resolve illegal logging seizures. Another example is the lengthy procedure needed to deputize community members as DENR rangers.

The land use and forest biodiversity management plan developed by DENR under an ITTO project in Nueva Viscaya clearly delineates a role for DENR in supporting communities in fire prevention and suppression<sup>12</sup>.

### ***Recommendation # 8***

*Reposition DENR from being seen as a regulator to being perceived as a supporter of communities.*

## **7. National Disaster Coordinating Council**

It must be anticipated that a future fire event will occur that is of such proportions that a disaster situation needs to be declared. As global warming continues to have an impact, El Niño events appear to be more frequent and perhaps more intense. Under these conditions it is a matter of when, not if, a disastrous fire event occurs in The Philippines. In anticipation of such an event, the National Disaster Coordinating Council (NDCC) should make the necessary preparations. Because access to emergency funding is involved in a declared disaster, the NDCC must develop criteria under which a state of disaster is declared in relation to a forest fire. These criteria must not only include existing damage, but must also take into consideration potential damage and forecast weather conditions. This would allow funding to flow even if a disastrous fire event was likely but had yet to eventuate. Such preemptive action is vital in avoiding heavy losses, both of lives and property.

A further role of the NDCC is for participating agencies to coordinate their actions in the event of a disastrous fire. Like all other forms of disaster, forest fire conditions can deteriorate rapidly and allow little time for ad hoc decision-making. Further, it is essential that one agency is empowered to take charge of the operation. In relation to forest fires, this agency should be DENR, with other agencies and organizations providing support as required. A disaster plan should be developed, giving consideration to operational matters, logistics and planning. It is likely that resource re-deployment and evacuations will be key elements of such a plan. It is vital that each agency is clear about its role in the plan and which organization is the lead agency.

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<sup>12</sup> See "Land-Use and Forest/Biodiversity Management Plan" as part of "Developing Tropical Forest Resources through Community-Based Forest Management" [ITTO Project PD21/97 Rev. 2(F)]

It may be appropriate for the NDCC to establish a committee from within its membership with a specific focus on forest fires. This would allow the issues to be given detailed consideration by the agencies most effected by a disastrous forest fire.

### **Recommendation #9**

*Establish a National Committee within NDCC to coordinate agency policies, develop a plan for disastrous forest fires, access budget and develop criteria for declaration of fires as disasters.*

## **8 Training and Equipment**

A consistent request from all community groups has been the call for the provision of training and equipment for forest fire suppression. The key government agencies have also identified this as a significant deficiency. Under current provisions, most fire fighters are forced to use tree branches to swat fires. This is both exhausting and inefficient. Under slightly higher fire intensity it is also dangerous because of the threat of burns and heat exhaustion.

Both DENR and BFP allocate over 80% of their budget to salaries and personnel expenses<sup>13</sup>. In the case of forest protection the allocation exceeds 90%. Such a situation means that the organization lacks the flexibility to respond to emerging high priority resource demands such as the provision of training and equipment. Fire fighting equipment need not be expensive but must be readily available if communities are to be supported in their willingness to address the fire threat.

Training and equipment for communities represent the most cost-effective means of addressing the threat of forest fires. Not only does it demonstrate the government's commitment to support the communities but it also greatly assists them to respond to fire events in the most timely fashion.

### **Recommendation #10**

*Redirect DENR budget towards training and equipment.*

## **9. Inventory of Personnel**

An essential component of any fire response plan is a full knowledge of the skilled and experienced personnel that are available to the fire manager to address a potential fire threat. To this end a full inventory of fire personnel should be prepared and made available to the PENRO for use in preparation of provincial contingency plans. Using this information the PENRO and CENROs can efficiently coordinate training programs, identify skill gaps and mobilize key personnel during emergency situations.

The inventory of available personnel should include the names and contact details of people from any government agency as well as LGUs and community organizations. The key consideration is the person's skill level and availability. Using this information, management teams should be prepared and desktop exercises practiced in order to refine coordination and mobilization of fire suppression resources.

### **Recommendation #11**

*Prepare an inventory of personnel who have undergone trainings in forest fire management.*

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<sup>13</sup> Figures provided by DENR and BFP officers for the current financial year, 2003.

## **10. Research**

The review was provided with a range of examples of fire management research that had been conducted over past years<sup>14</sup>. It is important that this research is continued and directed to priority areas. Such research not only builds credibility in policies that use it, but also allows the development of a professional forest fire management stream within academic institutions. It was noted with some regret that forest fire management does not have a prominent place in the curriculum in forestry training colleges. Research would assist in redressing this situation.

### ***Recommendation #12***

*Encourage increased research on fire behavior and management.*

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<sup>14</sup> See, for example, Florence LM and Methven IR 1992. "Fire Behaviour, Fire Effects and Survival responses in Trees" Sylvatrop Tech. J. of Philipp. Ecosystems and Nat. Res. 4 (2): 41-63.

## **Main Constraint # 2: Limited Operational Preparedness**

### **11. National Strategy and Operational Doctrine**

The review recommends a national strategy for forest fire management as follows:

1. Prevent all unwanted fires;
2. Effectively control and manage all intended fires; and
3. Initiate rapid local community response to all unwanted fires.

This national strategy is based on effective prevention, especially through community education, as well as the development of an effective village and community capability to suppress unwanted fires. Where fire is to be used as a tool it must be safely and effectively used under the local management of a workable permit system.

A national operational doctrine is required based on this strategy, which determines operational responsibilities, strategies, organizational structures, standard operating procedures (SOP) and actions with regard to forest fires. No such doctrine currently exists as a single, integrated policy.

A national, homogenous doctrine should be developed across all levels of civil administration having any responsibility for forest fire management. Concurrently government should develop and promulgate the necessary administrative instruments required to give effect to the doctrine across all agencies and at all levels from local communities to the national agency..

#### **Recommendation #13**

*Develop fire doctrine for The Philippines based on the suggested National Strategy.*

### **12. Fire Regimes**

Fire behavior and its suppression will vary across The Philippines dependent upon fuel and climatic type and topography. Mossy forests, pines and dipterocarp forests have different fire characteristics, as does *Eucalyptus spp.* Variations to the Standard Operating Procedures (SOPs) must be prepared that take account of these differences.

It is also important that clear fire management objectives are determined for each fuel and climate type, since these will form the basis of the fire doctrine for that situation.<sup>15</sup>

#### **Recommendation #14**

*Develop recommended procedures for suppression operations for various fuel and climatic conditions based on local knowledge and international best practice.*

### **13. Fire Suppression**

The ability to detect unwanted forest fire incidents and to respond with all necessary resources and trained personnel in the earliest possible time frame needs to be developed for all fire prone provinces. Containment and extinguishment of the fire must be achieved with the minimum impact in lives, property and the environment.

No such ability currently exists although some local authorities and organizations have developed a limited ability to assemble and dispatch generally untrained and inadequately equipped resources to nearby incidents.

A key component of an effective suppression capability is an established and recognized line of command. A typical line of command includes a field officer in charge at the fire

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<sup>15</sup> See Anderson et al. 2003. *Fires in Tropical Savannahs*. Springer-Verlag NY.

ground, a superior officer directing fires across the district and a commander at head office level. Such a line command does not exist within DENR for forest fires.

#### **Recommendation #15**

*Develop capacities to suppress fires and mobilize resources including a standard line of command.*

#### **14. Fire Management Training**

A program is required to train and qualify personnel as necessary in all level of forest fire management (fire line suppression operations to overall incident management) to a common national standard.

No such ability currently exists although the DENR, BFP and some local authorities and private companies maintain a limited ability to train personnel for low level fire line suppression operations.

The national program should have the ability to train and qualify personnel as necessary in all levels of forest fire management including:

- fire line suppression operations,
- fire line operational management,
- incident management (to include operations, planning and logistical functions).

#### **Recommendation #16**

*Develop training materials and courses based on the National Strategy and doctrine.*

#### **15. Operational Plans**

There is a need to develop Local Operational Plans (LOPs) that determine operational responsibilities, local strategies, local organizational structures and actions to be taken by key players at the various levels of the DENR, BFP, local government units, NGOs, civil agencies and the community having any responsibility for the suppression of forest fires.

Further, there is a need to develop provincial operational plans that would apply when a fire incident escalates beyond the local community. In most situations this would be when more than one barangay in a province was impacted by fire of such magnitude that provincial coordination and resources must be mobilized.

It should also be anticipated that fire extent or severity may escalate to a scale where coordination is required between provinces and both regional and national resources are mobilized. In this situation a national operational plan is required and should be developed in advance by the NDCC under the leadership of the DENR.

#### **Recommendation #17:**

*Develop operational plans for all levels from national, provincial and community levels*

#### **16. Criteria for Escalation of Fire Events**

The circumstances under which a fire ceases to be the responsibility of the local community and becomes the responsibility of the province need to be determined. It is likely that these criteria will include the area burnt, the assets under threat, the likelihood of the local resources being unable to control the fire and the fire weather forecast.

A possible scale for escalation could be:

- *Level one:* Forest or grassland fires within one barangay area and capable of being controlled by the manpower and tools available within that barangay. The CENRO fire officer receives reports and monitors the situation.
- *Level two:* Forest or grassland fires that include, or have the potential to include, more than one barangay and require coordination of manpower, vehicles and

equipment across the area involved. The CENRO fire officer takes control and coordinates resources.

- *Level three:* Forest or grassland fires that include, or have the potential to include more than one CENRO district and require coordination of manpower, vehicles and agencies across the area involved. The PENRO fire officer takes control and coordinates resources.
- *Level four:* Forest or grassland fires that include, or have the potential to include more than one province and require coordination of resources and agencies across the area involved. A fire officer appointed by the NDCC takes control and coordinates resources.

The roles of the Provincial Disaster Coordinating Council<sup>16</sup> (PDCC), the Regional Disaster Coordinating Council (RDCC) and the National Disaster Coordinating Council (NDCC) should be clarified in relation to forest and grassland fire incidents. Their roles should include the development of plans for the mobilization and coordination of support agency resources such as emergency feeding and shelter, evacuation, traffic management, hospitalization and other assistance including recovery operations. The task of coordinating the fire suppression operation should be the responsibility of an appropriately qualified and experienced fire suppression expert appointed by the DENR Chief Fire Officer.

### **Recommendation # 18**

*Develop criteria for escalation of fires from small to disaster scale including the roles of the PDCC, RDCC and NDCC.*

## **17. Incident Command System**

The International Wildland Fire Summit in Sydney in 2003 recommended that countries consider the introduction of the Incident Command System (ICS) as a methodology for command and control of fires and other emergencies. The Summit also resolved that ICS should become the international protocol for countries wishing to provide or seek assistance with wildfire suppression at the international level.

There is a need to develop the capacity, nationally, to coordinate all authorities and agencies with a responsibility for forest fire suppression under a common incident command and control system regardless of jurisdictional or political boundaries. Such an arrangement would achieve a coordinated and efficient response to a fire incident and achieve containment and extinguishment with the least possible impact on lives, property and the environment. This capacity should be developed at all levels from the community to the NDCC, but is most important in situations where an interagency response is mobilized.

One important aspect of an incident management team is that personnel are appointed to the team based on their capacity to undertake the role rather than their seniority.

The NDCC and its regional and provincial counterparts have a role similar in some ways to an incident management team but are generally only activated in the event of a 'disaster'. Forest and grassland fire is not currently recognized as being disasters and no such systems of interagency coordination exist on a practical 'non-disaster' level although some local authorities appear to have informal arrangements. The ability of these arrangements to sustain a long-term operation would appear tenuous at best.

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<sup>16</sup> See "*Disaster Preparedness and Management: Manual for the Province of Ifugao*" published by the Provincial Disaster Coordinating Council of Ifugao Province, 2002 (?)

### **Recommendation #19**

*Consider the nationwide introduction of coordinated fire fighting based on the Incident Command System (ICS).*

### **18. Enhanced Fire Detection**

Fire detection is quite effective at the local community level. National monitoring and management would nevertheless be enhanced if alternative methods of fire detection were also available. Such a backup method would allow monitoring of reporting of existing fire incidents as well as medium range monitoring of increases in the number of incidents. There is a need to strengthen existing procedures for fire reporting and database management, An alternative source of monitoring would be effective in ensuring a level of database accuracy.

While hotspot data is available via satellite, care is needed with its use in operational management because of the possibilities of false recordings and inaccuracies in fire location information. Nevertheless it represents a valuable additional resource for fire managers at the national level.

Hotspot data for The Philippines is currently available from the ASEAN Specialised Meteorological Center (ASMC) in Singapore via Internet<sup>17</sup>.

### **Recommendation # 20**

*Enhance fire detection including access to hotspot analysis from the ASEAN Specialised Meteorological Center in Singapore.*

### **19. Forest and Grassland Fire Risk Maps**

An excellent project was observed in Quirino Province in which Geographic Information Systems (GIS) databases had been prepared for that province. The databases included information on slope, vegetation, land classifications and some other data. These databases and technology provide the basis for the development of a fire risk map for the province. Such a map would use data on slope, aspect, vegetation, temperature, rainfall, land use, population, assets, land title and fire history to identify gradations in risk of wildfires. A fire risk map is a vital tool in the development of plans for resource distribution and for establishment of priorities for prevention programs.

Based on existing fire history data, DENR might gainfully develop fire risk maps for the most fire prone provinces using the expertise and technology that has been developed in Quirino Province.

### **Recommendation # 21**

*Develop fire risk maps using GIS for priority provinces.*

### **20. Forest and Grassland Fire Database**

While some fire data is being collected for forest and grassland fires, there are a number of significant concerns associated with current arrangements. It is apparent that duplication of reports is occurring when the same fires are reported by both DENR and BFP. Nevertheless, BFP only reports fires to which its brigades respond. Since many fires are well beyond BFP's capacity to respond, such fires are not included in BFP reports. Some fires are not being reported because their causes are not investigated and they are mistaken for intentional fires.

There is uncertainty about why the data are being collected and responsibility for maintenance of the database is often shared or is not clearly allocated. The format for reporting varies from jurisdiction to jurisdiction, making consolidation of data very difficult.

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<sup>17</sup> See ASMC Website at <http://app.nea.gov.sg/cms/htdocs/article.asp?pid=1674>.

Fire histories and accurate data are an essential input to planning and formulation of national and provincial strategies, especially when the value of losses can be estimated with some accuracy. Such data are also essential inputs for budget submissions and reporting to the government and the community.

There is an urgent need for DENR, BFP and LGUs to work together to develop a protocol and system for forest fire reporting that improves the accuracy and detail of reported information that can readily be collated into both provincial and national databases.

### ***Recommendation # 22***

*Develop forest and grassland fire database including investigation of causes and value of losses.*

## **21. Local Forest Fire Management Committees**

There is a need to establish local Forest Fire Management Committees (FFMCs) at the barangay, CENRO and provincial levels and involving DENR and the other government agencies with responsibility for land management and fire prevention and suppression and other interested parties (LGUs, forest companies, civil society organizations, community groups, miners, farmers and other land users) to meet on a regular basis to determine and address local issues involving forest fire management.

While some such committees already exist, they vary in structure, purpose and authority. They are subject to local perceptions and needs and could be more effective if they were given appropriate roles and powers.

FFMCs in fire prone areas should be mandated nationally giving them a clearly stated purpose and authority. Their terms of reference should include (but not be limited to):

- development of a local operational plan;
- identification of operational responsibilities within their area;
- hazard identification within their area;
- resource management;
- operational management issues;
- establishment of call out procedures and local strategies;
- local organizational structures; and
- identification of suitably qualified incident controllers within the area.

### ***Recommendation # 23***

*Establish Forest Fire Management Committees at community and provincial levels.*

## **22. Monitoring Capacity of DENR**

It is essential that DENR acquires the human resources expertise to monitor and evaluate local and provincial forest fire management plans. Their analysis should be capable of identifying shortcomings in such plans as well as providing support in plan preparation and development. In this role, DENR can become a crucial player in the iterative process of plan development. Such a role would require DENR to reestablish its expertise and experience in forest fire management at all levels. (See recommendations 4-7)

### ***Recommendation # 24***

*Strengthen DENR's capacity to monitor and evaluate community and provincial fire plans.*

## **23. Inventory of Forest Fire Suppression Resources**

It is unclear what forest fire suppression resources are available within any community. The options available to a fire manager will be greatly enhanced if the quantity, location and performance of all fire fighting resources available to him/her are known.

Any such inventory should commence at the barangay level and extend up to the provincial level. Where available, resources of LGUs, equipment contractors, private landholders and plantation owners should also be included.

A further need for such an inventory is that it allows allocation of resources on a priority needs basis as they become available. Such allocation is best managed at the provincial level, but most of the available resources should be distributed to communities, rather than being held in a provincial equipment cache.

#### ***Recommendation #25***

*Prepare an inventory of fire suppression resources including personnel and equipment.*

### **24. Equipment Codes**

A national policy is needed to provide guidance and standards to determine appropriate and adequate equipment levels relative to local hazard/risk determinations and to facilitate procurement, issue and maintenance of this equipment throughout its service life including planned replacement.

No such ability currently exists although the DENR, BFP and some local authorities and private companies maintain a limited ability to procure and issue equipment in some areas. The adequacy and serviceability of much of that equipment observed in the field was questionable.

#### ***Recommendation # 26***

*Develop national codes for forest fire suppression equipment.*

### **25. Local Manufacture of Equipment**

Forest fire suppression equipment should, as far as practicable, be manufactured in The Philippines rather than being imported. Such an arrangement will encourage local industry, assist with development of designs suitable to the local circumstances, assist with availability of supply and keep costs low. Care is needed, however, to ensure that any locally manufactured equipment is of such a standard that it meets pre-determined performance criteria or specifications. These performance specifications would be included in the equipment code.

Previous international projects have given consideration to this issue. It has been suggested that all necessary skills and knowledge on tools and their manufacturing with Metal Industries Research and Development Center (MIRDC) in Taguig, Rizal. This information needs to be followed up and verified.

#### ***Recommendation # 27***

*Encourage local manufacture of code equipment.*

### **26. Operational Communications**

No nationwide forest fire communications network currently exists. Although some government and private two-way radio systems are in place in various locations, these are non-integrated, non-designed systems, marginal at best and generally considered as less than effective for operational fire fighting. Much of the basic communication function is currently provided by mobile telephones. This system is quite useful given the extensive coverage, but cannot be relied upon in times of emergency or when the network fails.

There is a need to develop a comprehensive and integrated communications system for forest fire suppression. The DENR should therefore prepare policy and standards for appropriate and adequate communication systems relative to local operational requirements. The policy should address equipment procurement, distribution and maintenance including planned replacement.

### **Recommendation # 28**

*Strengthen fire suppression communications.*

### **27. Forest Fire Intelligence and Planning**

Effective fire suppression relies on accurate fire intelligence. Such intelligence will include accurate maps of the fire ground showing topography, access roads and tracks, structures, water sources and fire suppression resources. It will also include information about the fire's current status and burnt area as well a past fire history and typical burn patterns. In addition, current and forecast information about weather on the fire ground forms part of essential fire intelligence. This intelligence must be available in a timely and accessible format for fireground managers who will use it to develop and update the plan to suppress the fire by the most efficient and safest means. In ideal circumstances, fire intelligence data and GIS databases would be integrated enabling risk maps, current fire activity and predicted fire behavior to be plotted on the same maps.

Generally no such national common systems exist, although some very limited capability does exist in some selected private ventures and local government areas. These examples can be used as case studies for the development of a wider system.

### **Recommendation # 29**

*Improve fire intelligence capabilities at national level, especially in relation to weather forecasting and mapping of the fire ground.*

### **28. Barangay Volunteers**

During the fire season it is within DENR's power to deputize barangay volunteers to become honorary forest rangers. This gives these volunteers certain powers in relation to illegal logging, fire prevention and other forest protection activities. It is an arrangement that is very beneficial from the perspective of encouraging local community participation in forest protection as well as helping to build a closer relation ship between the DENR and the community. Nevertheless it is a process that has some problems. The approval process is seen as being unwieldy and slow. The powers and protections provided to the volunteers are uncertain. Citizens older than 60 years cannot participate in the program. All these problems are worth overcoming, especially in circumstances where volunteers can be so helpful in providing local protection. Older citizens are an ideal inclusion in any such volunteer program because of their status as elders within the community and because they may have the experience and time to give to the role.

Other issues to be addressed are insurance protection for the volunteers as well as legal status for their role and suitable arrangements for their feeding while on duty. The approval process should be streamlined and delegated to CENROs to administer at the local level.

### **Recommendation # 30**

*Streamline the deputizing of barangay volunteers and ensure their welfare during operations (food and emergency medical support).*

### **29. Role of Women in Fire Suppression Management**

Women are essential to fire management activities as well as to fire suppression operations. In rural communities it is often women who undertake much of the farm work, including the burning of farm wastes. During suppression operations, women often carry water for the fire fighters as well as providing feeding and welfare support. Women therefore represent an ideal audience for community education programs, especially in relation to safe use of fire. Their role in suppression operations needs to be acknowledged and supported where possible.

Mike Jurvélius of FAO<sup>18</sup> suggests that:

gender is one of the key issues in wildland fire management. By concentration on fire suppression, agencies tend to be totally bias towards men's involvement because of the physical demands involved as well as the use of motorized equipment. All fire awareness including home and children's safety programs should be women-bias because they are more concerned than men regarding safety and environmental impacts. They also carry the burden of the upbringing of children.

***Recommendation # 31***

*Promote and support the role of women in fire management and suppression.*

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<sup>18</sup> From discussion with Mike Jurvélius, 2004.

### ***Main Constraint # 3: Inadequate Fire Prevention Capability***

#### **30. Clear Community Education Messages**

The basis of effective community education is clear messages to the key target audience. In the case of forest fire prevention, the messages would be directed at those people most likely to be able to take action to prevent unwanted fires. Priority would also be given to the main causes of unwanted fires. A frequent source of unwanted fires is agricultural waste burning which subsequently escapes. Effective prevention can be achieved by targeting community education messages at those people who light agricultural fires to ensure that they are aware of appropriate means of preventing the fire escaping.

Forest protection and environment conservation are powerful motivators for fire prevention provided that the most susceptible target audiences are identified and media and messages selected to reach them. Research is needed to determine fire causes as well as which media and which messages will be most effective. Given their role in rural activities<sup>19</sup> it is likely that women are an appropriate audience for fire prevention messages and other community education programs.

#### ***Recommendation # 32***

*Develop clear messages for community education especially for women.*

#### **31. School and College Curricula**

A number of anecdotal reports suggested that school children are an ideal target group for education in forest fire protection. There are several reasons for this view. Firstly, children may be a significant cause of unwanted fires (although there is no data to support this proposition for The Philippines). Secondly, children are reported to have an influence on their parents behavior in relation to the use of fires in agricultural areas. Thirdly, children are easier to change in their attitudes and behavior than adults and will carry forward new attitudes to the use of fire into adult life.

There is a wide range of excellent learning scenarios that can be developed using forest protection as the context. In fact, many schools have already established such learning opportunities. A number of school forest plantations were observed as evidence of this approach. There is benefit in extending this learning to forest fire prevention, especially through topics such as fire weather forecasting, fire behavior, fire resistant species, alternatives to the use of fire in agriculture, uses of fire in environmental management and impacts of fire on the environment. These topics can span geography, agriculture, science and mathematics in both primary and secondary schools.

It was reported that forestry training courses at the university and college level do not include any topics on forest fire management. Given the importance of fire in forestry management, both as a tool and as a threat, this would seem to be a significant omission that should be addressed as soon as possible. If the issue is not addressed, the forestry profession, especially within DENR, will progressively become de-skilled in relation to fire management. Given that DENR has primary responsibility for fire management on land that it controls, the loss of fire management capability amongst its officers is a serious long term strategic problem.

#### ***Recommendation # 33***

*Develop curriculum materials in relation to forest fire management for schools and forestry training colleges.*

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<sup>19</sup> ITTO Guidelines on Fire Management in Tropical Forests Principle #18

### **32. Community Support for Forest Fire Prevention**

A number of international models suggest that community support can be generated for forest fire prevention using a community education strategy that includes a mascot and slogans. Examples of such an approach are seen in Malaysia, Indonesia, USA and many other countries. It is important that the messages conveyed by such an approach are correctly balanced to ensure consistency with the national strategy on forest fire management. Under this strategy, unwanted fires are differentiated from those that are used as tools, so a total fire prevention approach would not be viable. The use of a mascot may be especially effective amongst young people.

Of equal importance and effectiveness is the development or encouragement of a forest protection movement within The Philippines, with a special focus on forest fires. There is extensive evidence that civil society in The Philippines is willing to assist in forest protection, provided it is given guidance and support. Such a movement would form an important element in disseminating the fire prevention message.

#### ***Recommendation #34***

*Develop a national mascot and movement to inspire community support for forest fire prevention, especially amongst young people.*

### **33. Encourage Existing Community Groups**

A large number of community groups and organizations already exist within The Philippines and many of these are available to participate in programs to protect the living conditions and environment of the community. Several cases were cited of People's Organizations that have forest protection as a prime objective of part of a wider environmental protection approach. Examples were also cited of the church becoming involved in forest protection and recovery programs. These initiatives are especially important because of the influence that such organizations have within the community. They provide another channel through which to disseminate the message about fire prevention and therefore should be explored further.

#### ***Recommendation #35***

*Invite religious and people's organizations to assist with distribution of forest protection messages.*

### **34. Fire Weather Warning System**

Almost any community forest fire prevention program will include warnings to the community about forthcoming fire danger. Forest fire ignitions and intensity are influenced by prevailing weather conditions and it is possible to forecast fire weather conditions with reasonable accuracy for the forthcoming 24 hour period. If the forecast is for extreme fire weather conditions the community then needs to be warned not to light fires or to take special care if fire ignitions occur. Increased effort can also be put into fire detection under extreme fire weather conditions.

A fire weather warning system has two essential elements. Firstly the weather bureau must recognize indicators of extreme fire weather conditions in its forecasts. These will include factors such as temperature, relative humidity, wind speed and days since rain. The second essential element is that the community is then advised of the forecast in a timely manner to allow changes to behavior such as using fire and watching out for fire incidents.

A fire weather warning system is also essential during fire suppression operations because weather forecasts have a significant bearing on operational planning and activities. Knowledge of fire ground weather is essential for keeping fire fighters safe during suppression operations.

The Philippines does not yet have a fire weather warning system at the national level. If fire suppression, prevention and controlled use of fire are to be effectively managed, such a system is essential.

**Recommendation # 36**

*Develop fire weather warning systems for use in both operations and prevention.*

Some limited use is being made of fire weather warning signs in The Philippines. These signs, based on international models, advise motorists and the community of the level of fire danger on a particular day, across a five point scale varying from low to extreme. It is essential that such devices are based on accurate and informed fire weather forecasts and that they are updated on a daily basis. The community also needs to be educated about the significance of the various readings on the scale, especially in relation to the lighting of fires on extreme fire days. Some research is needed to build up available knowledge within The Philippines about what represents an extreme fire weather forecast, in terms of temperature, relative humidity, fuel dryness and wind speed. Such information would form the basis of a fire weather warning system.

**Recommendation # 37**

*Increase use of roadside fire weather warning signs.*

**35. Total Fire Bans**

An extension of the fire weather warning system is the development of a system of total fire bans for extreme fire weather forecast days. Such a system needs to be backed by legally enforceable sanctions and must be introduced through an intensive and explicit community education program. Under such a system, the lighting of fires in the open would be banned on days where the weather forecast predicted extreme fire danger for a particular weather district, province or region. This information must be made known to the community in a timely manner through the electronic media and backed up by use of roadside signs. Any person detected lighting a fire on a day of total fire ban would be subject to an appropriate legal sanction. Barangay captains could be an important part of the community education and sanction system.

**Recommendation # 38**

*Develop a system to implement Total Fire Bans for extreme fire weather conditions including the necessary supporting legislation.*

**36. Fire Resistant Species**

A number of examples were cited of plant and tree species that are fire resistant and are being used as firebreaks. The use of fire resistant plant species as biological firebreaks is becoming increasingly common throughout the world and is known to be effective, especially for low intensity fires. Research is needed to identify and document the most suitable species for each topographic and climatic type in The Philippines. This information can then be made known to the farming community through the DENR and the Department of Agriculture.

**Recommendation # 39**

*Increased use of fire resistant species.*

**37. Fire Prone Species**

There is an increasing use of *Eucalyptus spp* as a plantation species in The Philippines and other countries. While the timber production qualities of this species may be suitable,

it is also highly dangerous in extreme fire weather conditions where a combination of eucalyptus oil in the leaves and accumulation of leaf litter can create a situation conducive to extreme fire behavior.

Special attention is therefore needed to fire prevention and suppression arrangements where eucalyptus plantations are involved. The Bukidnon Forests Incorporated project provides a case study of a possible approach to this issue<sup>20</sup>.

#### **Recommendation # 40**

*Give attention to fire prone species especially Eucalyptus spp.*

### **38. Alternatives to the Use of Fire in Agriculture**

Many unwanted fires in The Philippines are intentionally lit on agricultural and grazing land and subsequently escape into forest areas. Several measures are available that can help to overcome this situation, principal amongst which is the use of better precautions when fires are lit. A further option is the use of alternatives to fire in agriculture. A number of international studies have identified a range of alternatives that could be considered for the Filipino situation. See the ASB program<sup>21</sup>, ITTO Guidelines on Fire Management in Tropical Forests<sup>22</sup> or the wide range of materials available from The World Agroforestry Centre<sup>23</sup>. Options can include introduction of pasture species that do not require burning, plantation of fruit bearing trees, minimum tillage for crop preparation and conversion of plant waste into compost. Not all these alternatives will suit a given situation and some investigation is needed to identify the most appropriate approach.

#### **Recommendation # 41**

*Develop alternatives to use of fire in agriculture.*

### **39. Incentives for Forest Protection**

A widely stated view, made known on a number of occasions to the review team, is that local communities are willing to protect the forest only if they are able to derive some financial benefit from doing so. A number of approaches have been used to create incentives for local communities to protect the forest from degradation by poaching, illegal logging and unwanted fires. These include access to forest products, “no fire” bonuses and water catchment payments. Another alternative that was also suggested was the recognition of water rights for upstream farmers, with payments being made by downstream irrigators. Such payments could be used to reward watershed protection practices, including fire prevention.

It was also suggested that consideration should be given to sustainable forest management being allowed in protected areas. These areas are currently subject to restrictions over clearing, agriculture and removal of forest products but the reality is that all these practices are going on in protected areas without either controls or incentives for the local community to protect these areas. Management of the current situation rather than attempting to enforce bans may be more realistic and may produce better long-term outcomes for the forest protection and income security for the community.

It has also been suggested that providing a tenurial instrument for land is only the first step in a community realizing income security from forest land. Support also needs to be provided in silvicultural practice, marketing and farm planning.

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<sup>20</sup> See “Sustainable Forestry in the Philippines” published by Bukidnon Forests Incorporated, Bukidnon Province, Mindanao, The Philippines, June 2003. Further information from [bfibuk@mlbly.philcom.com.ph](mailto:bfibuk@mlbly.philcom.com.ph).

<sup>21</sup> See [http://www.css.cornell.edu/ecf3/Web/new/AF/ASB\\_01.html](http://www.css.cornell.edu/ecf3/Web/new/AF/ASB_01.html) for information about Alternatives to Slash and Burn (ASB) agriculture.

<sup>22</sup> See “ITTO Guidelines on Fire Management in Tropical Forests” ITTO Policy Development Series No 6, 1997.

<sup>23</sup> See <http://www.worldagroforestrycentre.org/Home.asp> for information about agroforestry options.

**Recommendation # 42**

*Develop appropriate incentives for barangays to protect forests, including tenure, access to production, water rights and “no fire” bonuses (both cash and in-kind).*

**40. Seasonal Forest Rangers**

On a number of occasions a lack of manpower at the CENRO level was cited as a reason why CENRO staff were unable to address forest protection issues, including fire detection and suppression even during the fire season. Other reasons cited were as follows:

- The land is too steep;
- The area to manage is too large;
- No vehicles are available for transport;
- Communications are too poor;
- No budget is available for fuel or feeding;
- CENRO staff lack training or skills in forest fire suppression; and
- No equipment is available for fire suppression.

One possible solution to this problem is the employment of seasonal forest rangers during the fire season. These could be recruited for their skills in fire suppression and disbursed in strategic locations throughout the district. Their work would include fire detection, training of barangay fire teams, coordination of fire suppression operations, management of DENR volunteer forest rangers and preparation of fire reports.

**Recommendation # 43**

*Employ seasonal forest rangers in high fire prone provinces, especially during El Niño years.*

## ***Main Constraint # 4: Controlled Use of Fire is not Well-Managed***

### **41. Fire Burn Permits**

Permitted or controlled use of fire during the fire season is a widespread practice in most countries of the world, and is no less so in The Philippines. Fire is used extensively for agriculture and forestry practice where its use is both legitimate and essential. Nevertheless, fire users must ensure that such fire will not impact on wildfire or get out of control and damage life or property.

The current system of fire burn permits is perceived as being unwieldy and difficult to access. A system is needed that is accessible within the barangay and that sets out the conditions under which the permit is issued. Of particular importance is the specification of the safety measures to be undertaken before a fire is lit, including the provision of constant monitoring of the fire until it is extinguished. A further provision would require the permit to become invalid on days of extreme weather conditions.

Such a system would need to be supported by appropriate community education. Barangay captains and DENR volunteer forest rangers could be trained as permit issuing officers under the management oversight of the CENRO.

Legislative amendments may be necessary to strengthen the sanctions and powers required to make the permit system effective.

### ***Recommendation # 44***

*Strengthen issuance of permits to use fire during fire season via the CENRO and barangay captain, including legislation.*

### **42. Safe Burning**

It is essential to provide the community with guidance about how to undertake permitted fires in a safe manner. Of particular importance is the preparation of a firebreak or cleared area around the material to be burnt. In addition, appropriate hand tools such as hoes, rakes and bucket water should be on hand during the burning operation.

### ***Recommendation # 45***

*Develop community education messages on safe burning.*

### **43. Support for Safe Burning for Farmers**

A practice observed in a number of locations was plantation owners and land management agencies providing assistance to their farmer neighbors when they wished to undertake burning off operations. The support took the form of providing technical advice, placing vehicles on standby and assisting with preparation of firebreaks. The mutual benefit, both short and long term is evident to all participants. This practice should be encouraged and strengthened, with the possibility of DENR providing such a technical advisory service for farmers. The service could readily be linked to the permit system and provided by suitably trained DENR forest rangers.

### ***Recommendation # 46***

*Agencies and organizations to provide support to farmers for safe burning.*

### **44. Codes for Controlled Burning**

Fire is used for a wide variety of legitimate procedures in agriculture and forest management, including weed control, fuel reduction, species management and plantation preparation. Nevertheless these procedures can be technically quite difficult and guidance is needed to ensure that they are undertaken both effectively and safely. Codes should be

developed to apply to each of these procedures, especially where fire intensity can effect the quality of the end result.

It is also possible to vary the timing of fuel reduction burning and have a significant influence on the environmental impact of the fire. Fires late in the season are more damaging to the biota, and lead to a net reduction in soil nutrients such as Nitrogen, while also leading to a net increase in atmospheric CO<sub>2</sub>.<sup>24</sup>

#### **Recommendation # 47**

*Develop codes for use of fire for weed control, fuel reduction, species management and plantation preparation.*

#### **45. Traditional Burning**

It is widely understood that open burning is illegal in The Philippines under the provision of the Clean Air Act. The exception is traditional burning. The difficulty is that a definition of traditional burning is not widely understood.

Traditional burning is said to include:

- Removal of old forage growth to induce new growth that is more palatable to livestock;
- Weed control;
- Fuel hazard reduction;
- Management of desirable plant and animal species; and/or
- Tree plantation preparation and management.

If this is the case, almost any type of burning in rural areas can be claimed as being traditional. The situation can be clarified by preparation of a definition of traditional burning as far as the Clean Air Act is concerned.

#### **Recommendation # 48**

*Define traditional burning in relation to the Clean Air Act.*

#### **46. Indigenous Knowledge on the Use of Fire**

Indigenous people in The Philippines have been successful in retaining many traditional practices in relation to land use and management. Fire is a frequently used tool in traditional practice and knowledge of its use can inform contemporary policy and practice. Of special importance can be knowledge about the long-term impact of fire on vegetation, use of fire in weed control and fire behavior in certain weather and topographic conditions.

#### **Recommendation # 49**

*Use indigenous knowledge to advise policy on management of controlled burning.*

#### **The Way Ahead**

The review team was optimistic about the future of forest fire management in The Philippines, provided that the government of the Republic of The Philippines is willing to take resolute action. It was reassuring to note that DENR Secretary Elisea Gozun announced to the ITTC meeting in Yokohama in November 2003 that her government fully supports the findings of the ITTO Diagnostic Mission on Sustainable Forestry Management.

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<sup>24</sup> See Anderson et al. 2003. *Fires in Tropical Savannas*. Springer-Verlag NY.

Forest fire management must be seen as a wider social problem, not a narrow technical problem. DENR has a central role to play in addressing this issue and can only do so effectively if it is given responsibility for forest fire management for the land that it manages.

It is very reassuring to note that the CBFM initiative in The Philippines has these wider social imperatives at its core. Any initiatives taken by DENR to strengthen the achievement of CBFM's objectives will also result in increased protection of the forest from fire.

There are a number of forest fire management projects that could be contemplated by the ITTO for The Philippines. The long-term effectiveness of any such projects will be strongly influenced by the lead given by the Government of The Philippines to this issue.

### **Priority Areas of Intervention**

In view of the limited resources that are available to the government of The Philippines, and because some activities are essential before others can commence, attention has been given to the matter of priorities for action in implementation of the recommendations.

The recommendations are summarized in the attached table as well as in the suggested five-year strategic plan. Priority has been given to those recommendations that are most urgent, or are precursors for later recommendations. Those that are shown in year one are most urgent, or are precursors to the recommendations that come later. In the five-year plan, ticks ( ) have been used to represent action for a particular recommendation. Where two ticks have been used ( ), this is to signify additional emphasis and effort on this recommendation in the year indicated.

#### **Priority #1**

Recommendations that enable change to commence are the first priority. These include:

- Clarify responsibility for forest fire management, with DENR recommended as lead agency. The MOA between DENR and BFP should be modified to achieve this change.
- Develop forest fire doctrine for The Philippines based on the suggested National Strategy.
- Develop capacities to suppress fires and mobilize resources including line command.
- Committees at community and provincial levels
- Develop fire database including investigation of causes and value of losses.
- Develop equipment codes.
- DENR to coordinate work of OGAs, POs and LGUs in forest fire management.
- Clarify and strengthen role of CENRO and PENRO in fire management.
- Develop fire weather warning systems for use in both operations and prevention.
- Prepare inventories of equipment and resources.
- Streamline the deputizing of barangay volunteers.
- Employ seasonal forest rangers in high fire prone provinces, especially during El Niño years
- Develop clear messages for community education.

- Strengthen issuance of permit to use fire during fire season via the CENRO and barangay captain,

### **Priority #2**

Recommendations that support change over the long term, achieving sustainability.

These include:

- Develop appropriate legislation to give DENR the necessary responsibilities, protections and powers to manage fires.
- Develop a system for the implementation of Total Fire Bans for extreme fire weather conditions including supporting legislation
- Strengthen line management for fire within DENR (including the establishment of a fire management line unit and appointment of a Chief Fire Officer located in Head Office).
- National Committee within NDCC to coordinate agency policies, access budget. and develop criteria for declaration of fires as disasters.
- Develop a plan and criteria for escalation of fires from small to disaster scale including the roles of the PDCC, RDCC and NDCC.
- Refocus DENR on CBFM including fire management and better support for silviculture and marketing.
- Reposition DENR from regulator to supporter of communities.
- Develop procedures (SOPs) for suppression for each fuel and climate type.
- Develop training materials and courses based on doctrine and SOPs.
- Develop curriculum materials for schools and forestry training colleges.
- Develop a plan and criteria for escalation of fires from small to disaster scale including the roles of the PDCC, RDCC and NDCC.
- Strengthen fire suppression communications.
- Improve fire intelligence/mapping.
- Develop fire risk maps using GIS for priority provinces.

### **Priority #3**

Recommendations that will consolidate changes, but are not essential to the achievement of the change. These include:

- Agencies and organizations to provide support to farmers for safe burning.
- Community education on safe burning.
- Develop a national mascot and movement to inspire community support,
- Increase use of roadside fire weather warning signs.
- Develop alternatives to use of fire in agriculture.
- Develop appropriate incentives for barangays to protect forests, including tenure, access to production, water rights and “no fire” bonuses (both cash and in-kind).
- Strengthen DENR’s capacity to monitor and evaluate community and provincial fire plans.

- Encourage local manufacture of code equipment.

#### **Priority #4**

Recommendations that are helpful but incidental to the change or are options subject to funding becoming available.

These include:

- Consider introduction of coordinated fire fighting based on Incident Command System (ICS)
- Invite religious and people's organizations to assist with distribution of forest protection messages.
- Promote and support the role of women during operations.
- Define traditional burning in relation to the Clean Air Act.
- Use indigenous knowledge to advise policy on management of controlled burning.
- Increased use of fire resistant species.
- Give attention to fire prone species especially *eucalyptus spp.*
- Agencies and organizations to provide support to farmers for safe burning.
- Develop codes for use of fire for weed control, fuel reduction, species management and plantation preparation.
- Enhance fire detection including access to hotspot analysis from the ASEAN Fire Monitoring Center in Singapore.

#### **International Assistance**

It is very feasible for ITTO and FAO to coordinate their efforts to assist The Philippines with improvements to its forest fire management arrangements. Assistance projects should focus on Priorities #1 and #2. It is not important which priorities are addressed by either agency so long as the projects are coordinated. A more appropriate approach may be to initiate a combined ITTO/FAO project. This would enable overheads to be shared between the two agencies, thereby maximizing impact on the ground. It is essential that DENR is given authority over forest fires as a necessary pre-condition for successful ITTO projects.

Possible themes for forest fire assistance projects could be:

1. **Development of Scope and Enabling Conditions:** Development of an implementation plan that includes in its scope all the areas of this review, modification of Sustainable Forest Management legislation to enable DENR to have responsibility for fire management, Powers and protections for DENR staff, Total Fire Bans and fire permits, fire investigation;
2. **Fire Intelligence and Planning:** Fire database, Fire Weather Warning systems linked to fuel analysis, mapping, fire intelligence, risk mapping and development of operational plans. Development of a fire danger rating system;
3. **Doctrine, Procedures and Training:** Development of national fire doctrine, rebuilding DENR's capacity to manage fires, development of training materials and curriculum for schools and colleges, development of standard operating procedures; and
4. **Safe use of fire:** Procedures for using fires for forest and agricultural management, alternatives to the use of fire in agriculture; techniques and procedures for safe burning.

### **Suggested National Strategy**

1. Prevent unwanted fires
2. Control/manage intended fires
3. Rapid local community response to unwanted fires

### **Situation Analysis Table**

<b>IMPACTS</b>	1. Increased poverty through decrease in forest and soil fertility	2. Loss of biodiversity especially in mossy forests and dipterocarp forests.	3. Impaired water quality and quantity in watersheds	4. Reduced commitment to CBFM	5. Damage to agroforestry and agriculture including financial losses	6. Threat to life and property	7. People see fire as uncontrollable and become indifferent to fires
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<b>CORE PROBLEM</b>	<b>Unwanted forest and grassland fires go unchecked and destroy forests, grasslands, plantations, agricultural areas and other assets.</b>
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<b>MAIN CONSTRAINTS</b>	<b>1. Limited organizational capability</b>	<b>2. Limited operational preparedness</b>	<b>3. Inadequate fire prevention capability</b>	<b>4. Controlled use of fire not well managed</b>
<b>ACTIONS</b>	<ul style="list-style-type: none"> <li>• Clarify responsibility for forest fire management, with DENR recommended as lead agency.</li> <li>• Mandate territory for DENR and BFP.</li> <li>• Develop appropriate legislation to give DENR the necessary responsibilities, protections and powers to manage fires</li> </ul>	<ul style="list-style-type: none"> <li>• Develop fire doctrine for The Philippines based on the suggested National Strategy.</li> <li>• Develop procedures for suppression for each fuel and climate type</li> <li>• Develop capacities to suppress fires and mobilize resources including line command</li> <li>• Develop training materials and</li> </ul>	<ul style="list-style-type: none"> <li>• Develop clear messages for community education especially for women</li> <li>• Develop curriculum materials for schools and forestry training colleges</li> <li>• Develop a national mascot and movement to inspire community support, especially amongst young people.</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen issuance of permit to use fire during fire season via the CENRO and barangay captain, including legislation.</li> <li>• Community education on safe burning</li> </ul>

MAIN CONSTRAINTS	1. Limited organizational capability	2. Limited operational preparedness	3. Inadequate fire prevention capability	4. Controlled use of fire not well managed
	<ul style="list-style-type: none"> <li>• Strengthen line management for fire within DENR (including the establishment of a fire management line unit and appointment of a Chief Fire Officer located in Head Office)</li> <li>• DENR to coordinate work of OGAs, POs and LGUs in forest fire management</li> <li>• Refocus DENR on CBFM including fire management and better support for silviculture and marketing.</li> <li>• Clarify and strengthen role of CENRO and PENRO in fire management</li> <li>• Reposition DENR from regulator to supporter of communities</li> <li>• National Committee within NDCC to coordinate agency policies, access budget. and develop criteria for declaration of fires as disasters.</li> <li>• Need to redirect DENR budget towards training and equipment</li> <li>• Inventory of personnel who have undergone trainings in forest fire management</li> <li>• Encourage increased research on fire behaviour and management</li> </ul>	<ul style="list-style-type: none"> <li>courses based on doctrine and procedures.</li> <li>• Develop operational plans for all levels from national, provincial and community levels</li> <li>• Develop a plan and criteria for escalation of fires from small to disaster scale including the roles of the PDCC, RDCC and NDCC</li> <li>• Consider introduction of coordinated fire fighting based on Incident Command System (ICS)</li> <li>• Enhance fire detection including access to hotspot analysis from the ASEAN Fire Monitoring Center in Singapore</li> <li>• Develop fire risk maps using GIS for priority provinces.</li> <li>• Develop fire database including investigation of causes and value of losses.</li> <li>• Committees at community and provincial levels</li> <li>• Strengthen DENR's capacity to monitor and evaluate community and provincial fire plans.</li> <li>• Prepare inventory of fire</li> </ul>	<ul style="list-style-type: none"> <li>• Increase use of roadside fire weather warning signs.</li> <li>• Invite religious and people's organizations to assist with distribution of forest protection messages.</li> <li>• Develop fire weather warning systems for use in both operations and prevention.</li> <li>• Develop a system for the implementation of Total Fire Bans for extreme fire weather conditions including supporting legislation</li> <li>• Increased use of fire resistant species</li> <li>• Give attention to fire prone species especially <i>eucalyptus spp</i></li> <li>• Develop alternatives to use of fire in agriculture</li> <li>• Develop appropriate incentives for barangays to protect forests, including tenure, access to production, water rights and "no fire" bonuses (both cash and in-kind).</li> <li>• Employ seasonal forest rangers in high fire prone provinces, especially during El Niño years</li> </ul>	<ul style="list-style-type: none"> <li>• Agencies and organizations to provide support to farmers for safe burning.</li> <li>• Develop codes for use of fire for weed control, fuel reduction, species management and plantation preparation.</li> <li>• Define traditional burning in relation to the Clean Air Act.</li> <li>• Use indigenous knowledge to advise policy on management of controlled burning</li> </ul>

<b>MAIN CONSTRAINTS</b>	<b>1. Limited organizational capability</b>	<b>2. Limited operational preparedness</b>	<b>3. Inadequate fire prevention capability</b>	<b>4. Controlled use of fire not well managed</b>
		<p>suppression resources including personnel and equipment</p> <ul style="list-style-type: none"> <li>• Develop equipment codes.</li> <li>• Encourage local manufacture of code equipment.</li> <li>• Strengthen fire suppression communications</li> <li>• Improve fire intelligence/mapping</li> <li>• Streamline the deputizing of barangay volunteers and ensure their welfare during operations (food and emergency medical support)</li> <li>• Promote and support the role of women during operations</li> </ul>		

### ***Five Year Implementation Plan***

	Task	Year One	Year Two	Year Three	Year Four	Year Five
1	Clarify responsibility for forest fire management, with DENR recommended as lead agency.					
2	Mandate territory for DENR and BFP.					
3	Develop appropriate legislation to give DENR the necessary responsibilities, protections and powers to manage fires					
4	Strengthen line management for fire within DENR (including the establishment of a fire management line unit and appointment of a Chief Fire Officer located in Head Office)					
5	DENR to coordinate work of OGAs, POs and LGUs in forest fire management					
6	Refocus DENR on CBFM including fire management and better support for silviculture and marketing					
7	Clarify and strengthen role of CENRO and PENRO in fire management					
8	Reposition DENR from regulator to supporter of communities					
9	National Committee within NDCC to coordinate agency policies, access budget. and develop criteria for declaration of fires as disasters.					
10	Need to redirect DENR budget towards training and equipment					
11	Inventory of personnel who have undergone trainings in forest fire management					
12	Encourage increased research on fire behaviour and management					
13	Develop fire doctrine for The Philippines based on the suggested National Strategy.					
14	Develop procedures for suppression for each fuel and climate type					
15	Develop capacities to suppress fires and mobilize resources including line command					
16	Develop training materials and courses based on doctrine and procedures.					
17	Develop operational plans for all levels from national, provincial and community levels					

18	Develop a plan and criteria for escalation of fires from small to disaster scale including the roles of the PDCC, RDCC and NDCC					
19	Consider introduction of coordinated fire fighting based on Incident Command System (ICS)					
20	Enhance fire detection including access to hotspot analysis from the ASEAN Fire Monitoring Center in Singapore					
21	Develop fire risk maps using GIS for priority provinces					
22	Develop fire database including investigation of causes and value of losses.					
23	Committees at community and provincial levels					
24	Strengthen DENR's capacity to monitor and evaluate community and provincial fire plans.					
25	Prepare inventory of fire suppression resources including personnel and equipment					
26	Develop equipment codes.					
27	Encourage local manufacture of code equipment.					
28	Strengthen fire suppression communications					
29	Improve fire intelligence/mapping					
30	Streamline the deputizing of barangay volunteers and ensure their welfare during operations (food and emergency medical support)					
31	Promote and support the role of women during operations					
32	Develop clear messages for community education especially for women					
33	Develop curriculum materials for schools and forestry training colleges					
34	Develop a national mascot and movement to inspire community support, especially amongst young people.					
35	Increase use of roadside fire weather warning signs.					
36	Invite religious and people's organizations to assist with distribution of forest protection messages.					
37	Develop fire weather warning systems for use					

	in both operations and prevention.					
38	Develop a system for the implementation of Total Fire Bans for extreme fire weather conditions including supporting legislation					
39	Increased use of fire resistant species					
40	Give attention to fire prone species especially <i>eucalyptus spp</i>					
41	Develop alternatives to use of fire in agriculture					
42	Develop appropriate incentives for barangays to protect forests, including tenure, access to production, water rights and “no fire” bonuses (both cash and in-kind).					
43	Employ seasonal forest rangers in high fire prone provinces, especially during El Niño years					
44	Strengthen issuance of permit to use fire during fire season via the CENRO and barangay captain, including legislation.					
45	Community education on safe burning					
46	Agencies and organizations to provide support to farmers for safe burning					
47	Develop codes for use of fire for weed control, fuel reduction, species management and plantation preparation.					
48	Define traditional burning in relation to the Clean Air Act.					
49	Use indigenous knowledge to advise policy on management of controlled burning					

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