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30-Nov-00*

Final Report



- **Executive Summary**
- **North American Fire Management Team Report**
- **Fire Preparedness and Burned Area Recovery Training Plan**
- **Chiapas & Oaxaca Trip Report**



United States
Department of Agriculture



United States
Agency for International Development



Secretaria de Medio Ambiente,
Recursos Naturales y Pesca

Executive Summary

This report contains the following documents:

- ◆ Exhibit #1 - North American Fire Management Team Final Report
- ◆ Exhibit #2 - Fire Preparedness and Burned Area Recovery Plan
- ◆ Exhibit #3 - Chiapas and Oaxaca Trip Report

The world witnessed a 1998 wildland fire season in Mexico of catastrophic proportions. This event had neither precedent nor antecedent, it was truly historic and unique. Smoke from thousands of uncontrolled wildland fires, burning simultaneously throughout Latin America, drifted over portions of the United States, creating health alerts and health hazards. Through the U. S. Agency for International Development, more than \$7.5 million dollars of aid and technical assistance was provided to Mexico.

These documents summarize the findings of the North American Fire Management Team, explaining the strengths and weaknesses of Mexico's current capacity to mobilize for wildland fire emergencies. It also identifies specific institutional strengthening, training, and equipment needs within SEMARNAP to improve future wildland fire emergency response efforts.

A program for restoration and conservation of the areas affected by the 1998 wildland fires is also recommended.

These reports rely on the findings of the Assessment Team charged with evaluating the wildland fire situation in the Chimilapas Area, during May and June which is also included.

North American Fire Management Team

FINAL REPORT



Pablo Munich conducts briefing at Cintalapa for Mexican and American Delegations involved in the wildland fire emergency response to Mexico.

Unloading and storing the fire fighting tools provided by USAID, at the SEMARNAP warehouse in Tuxtla Gutierrez.



United States
Department of Agriculture



United States
Agency for International Development



Secretaria de Medio Ambiente,
Recursos Naturales y Pesca

North American Fire Management Team Final Report

Analysis of SEMARNAP's 1998 Fire Suppression Activities

May 1999

Executive Summary

Although many suggestions and recommendations are being made and several areas that need improvement are noted, no one should interpret this report as finding fault or criticizing Mexico's 1998-fire suppression effort. Nor should they criticize or find fault with Mexico's overall organizational effectiveness. A post-emergency in-depth review is routinely conducted in the United States after catastrophic wildland fire years. Without exception, these reviews indicate policies to change; new programs to implement; additional cooperative agreements to develop; new technologies to evaluate; and additional training that is needed in order to increase the effectiveness of fire suppression operations.

In addition to reviewing fire suppression operations, teams of natural resource management professionals review and identify measures to restore and rehabilitate burned areas. Restoration and rehabilitation measures actually begin during fire activity or and may continue for months and sometimes even years after the fires are extinguished.

This report of Mexico's 1998 wildland fire response and current organizational strength is offered with these same positive results and objectives in mind.

North American Fire Management Team Members

Members of the North American Fire Management Team were:

Oscar Cedeno, Director de Proteccion, Direccion General Forestal, Subsecretaria de Recursos Naturales, Secretaria de Medio Ambiente, Recursos Naturales y Pesca, Mexico.

Roberto Martinez, Sub-director de Incendios Forestales, Direccion de Proteccion Forestal, Direccion General Forestal, Subsecretaria de Recursos Naturales, Secretaria de Medio Ambiente, Recursos Naturales y Pesca, Mexico.

Paul Weeden, Deputy Forest Supervisor, San Bernardino National Forest, Forest Service, US Department of Agriculture.

Mike Conrad, Deputy Forest Fire Management Officer, San Bernardino National Forest, Forest Service, US Department of Agriculture.

Background

During the Bi-National Commission meeting held in Washington, DC, Julia Carabias, Secretary of the Ministry of Environment Natural Resources and Fisheries (SEMARNAP) and J. Brian Atwood, Administrator of the US Agency for International Development (USAID) signed a Memorandum of Understanding (MOU) which implemented the "Mexico National Fires Prevention and Restoration Program."

Under this MOU, SEMARNAP and USAID agreed to develop a program of cooperation focused on two areas:

1. Evaluation of Mexico's wildland fire preparedness capabilities, and
2. Restoration and conservation of the areas affected by the 1998 wildland fires.

The MOU specified that the majority of the program funding for this increased level of cooperation would be directed through the Fondo Mexicano para la Conservacion de la Naturaleza (FMCN, also known as the "Fondo").

Under the authority of the Memorandum of Understanding, a **Grant Agreement** was developed to describe the overall program of cooperation between USAID and the Government of Mexico (GOM). A copy of the Grant Agreement is attached as part of this report. This Grant Agreement contains three very detailed and broad ranging objectives. However, this North American Fire Management Team Final Report will only address Objective #1 of the Grant Agreement.

Objective # 1 directs that an assessment of Mexico's current capacity to respond to wildland fire emergencies be made. It also directs that an evaluation of the damages caused by the 1998 fires be made. Objective #1 is further sub-divided three sub-parts, 1(a), 1(b), and 1(c).

Objective #1(a) establishes a North American Fire Management Team (NAFMT) and directs them to evaluate the strengths and weaknesses of Mexico's current capacity to mobilize for wildland fire emergencies. This objective directs the NAFMT to make recommendations to improve future emergency response efforts.

Objective #1(b) is actually a sub-component of the Wildland Fire Assessment mandated by objective #1(a). The purpose of this objective is to identify specific institutional strengthening, training, and equipment needs within SEMARNAP.

Objective #1(c) directs the Comision Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) to make a resource assessment of the areas damaged by the 1998 wildland fires.

Objective #1(a) – Assessment of Fire Suppression Experience

The NAFMT used as the basis of its evaluation the Final Report, Mexico Wildland Fire Assessment, States of Oaxaca and Chiapas, May – June 1998. A copy of that report is included. Additionally, the NAFMT utilized the SEMARNAP fire season information prepared by Roberto Martinez, Sub-director de Incendios Forestales. However, a copy of his report is not attached.

STRENGTHS OF MEXICO'S CAPABILITY TO RESPOND TO WILDLAND FIRE EMERGENCIES

1. Without doubt, Mexico faced its worse fire season of this century. No country in the world has sufficient suppression resources to combat all of the fires that Mexico faced during the height of their wildland fire emergency. The magnitude and severity of Mexico's current wildland fire situation was never overstated.
2. The 1998 wildland fire season was an historic and unique event; similar to what the United States has experienced 3 times within the previous 12 years. (1987, 1988,

1994) During 1998 SEMARNAP controlled more than 14,290 wildland fires. All but a few of these fires were attacked, suppressed, and controlled with fire suppression resources available in Mexico.

3. SEMARNAP's suppression capability was overwhelmed by a massive number of ignitions, numbering in the several hundreds, perhaps even thousands, that occurred within a period of three or four days (May 12 - 16, 1998).
4. No country in the world has at its disposal sufficient suppression resources to mount a successful initial attack for an unprecedented "ignition event" such as this one.
5. At no time in Mexico's history has it had to initial attack and take suppression action on so many large fires, burning simultaneously, over such a widespread geographical area, in ecosystems that had not been burned for decades or hundreds of years, in such remote and inaccessible terrain.
6. This suppression challenge was made even worse because of Mexico's worst drought in 70 years. Moreover a continual succession of storm fronts continually brought very strong winds but absolutely no moisture.
7. A professionalism and commitment exists within the SEMARNAP wildland fire suppression program, which is greater now than it has ever been. This level of professionalism, as evidenced in the knowledge, skills, abilities, education, training, and dedication of the SEMARNAP employees continues to expand.
8. There is a significant concern for and a commitment to fire fighter safety which is equal to that which the natural resource management agencies have in the United States.
9. The fire suppression knowledge and skills of SEMARNAP personnel at both the National and State levels have increased dramatically over the last 15 years. Many personnel have received advanced fire training and have acquired the necessary skills and abilities to manage the worst wildland fire emergency of the century.
10. The military plays an important and much needed role in responding to wildland fires. Their response to and support of the 1998 Mexico wildland fire emergency was outstanding. They mobilize quickly and are highly effective in suppression efforts. They were highly effective during the 1998 fire suppression operations and will continue to be a vitally important component of future suppression operations.
11. The training and technical exchanges between Mexico and the United States and between Mexico and Canada has been highly successful. This training has advanced SEMARNAP's ability to respond to and deal with very complex wildland fires.
12. The National and Regional Level Training Courses are highly effective in training SEMARNAP personnel at the Regional, State and local levels on understanding fire behavior and organizing for a wide range of fire suppression operations.

13. The local courses, which are taught in the “ejidos” (local, rural communities) have increased the numbers of, volunteer fire fighters available for wildland fire suppression operations. We believe that it has increased their knowledge, awareness, and skills in fire suppression operations. However, in light of the numerous fatalities during 1998, an important recommendation to jointly review this program will be made.

STRENGTHS OF MEXICO'S CAPABILITY TO RESTORE AND REHABILITATE BURNED AREAS.

An ambitious and noteworthy National Restoration Program to restore and rehabilitate burned areas and prevent land-use change, as a result of the widespread fire use, has been developed. This national campaign has the potential to establish 100 or more presidentially decreed ecological restoration zones.

These ecological restoration zones will practice intense resource management, including soil conservation, natural regeneration, and reforestation. The Natural Protected Areas that were damaged by the 1998 fires will automatically be considered priority areas for ecological restoration zones.

State-level SEMARNAP delegates, through existing reforestation programs will manage the National Restoration Program. The SEMARNAP delegates, PÓNARE, national and regional Forestry Advisory Councils and many public institutions responsible for resource restoration (CONABIO, PROFEPA, SARAR) will work cooperatively on the National Restoration Program.

Both SEMARNAP and CONABIO are conducting analyses to identify areas for presidential decree of “National Ecological Restoration Zone”. SEMARNAP is conducting field-level analyses and surveys using the following 5 selection criteria:

- | | |
|-------------------------------|----------------------------|
| a) High bio-diversity | d) Risk of land-use change |
| b) Ecosystem function | e) Economic activity |
| c) Amount of biomass affected | |

CONABIO is conducting a broader-based remote sensing activity that uses bio-diversity as the sole criteria. While there is considerable overlap in the recommended areas, there are also differences in the outcomes of the two studies. It is felt that recommendations from both institutions will be included to determine the final National Ecological Restoration Zones.

WEAKNESSES OF MEXICO'S CAPABILITY TO RESPOND TO WILDLAND FIRE EMERGENCIES

- ◆ 1998 is the worst year this century for the number of Mexican citizens killed, while suppressing the wildland fires. Most of these fatalities were “volunteers” or people who live in an “ejido” or rural community close to the fire.
- ◆ The 1999 SEMARNAP budget has not been increased. In fact, the 1999 budget is equal to the initial budget it faced at the beginning of 1998. When the effects of inflation and the devaluation of the peso are considered, the 1999 budget is actually reduced from the 1998 budget. Their budget has not been augmented to implement the training and technical assistance programs identified in the Final Report for Oaxaca and Chiapas, nor has it been increased in order to implement the recommendations contained in this report.

- ◆ The members of the NAFMT are very concerned whether or not SEMARNAP will be able to add this additional workload to their already fully developed schedule of activities for 1999, unless their budget is augmented.
- ◆ Under their current 1999 budget SEMARNAP, may not be able to participate actively and effectively in the Grant Agreement for the Wildfire Prevention and Restoration Fund. In fact the 1999 budget is actually less than the initial 1998 budget when considering the effects of inflation and the devaluation of the Mexican peso.
- ◆ Mexico does not have an Emergency Fire Fighting Fund, similar to what is used in both Canada and the United States. This emergency fund provides rapid budget augmentations that respond quickly to an escalating wildland fire emergency. The current appropriation used by Mexico is too slow to respond to a rapidly evolving wildland fire emergency. This unnecessarily delays purchasing additional fire fighting supplies, contracting for additional resources, and paying other expenses associated with wildland fire suppression.
- ◆ When the military is mobilized for fire suppression assignments, the military assumes full control for their logistical support. (Food, shelters, care, etc.) Unfortunately, there is no agreement or procedure in place for the military to feed and care for the volunteer fire fighters or SEMARNAP personnel assigned to the suppression effort.
- ◆ Presently the military cannot mobilize outside of its assigned military zone, without approval from the Secretary of SEDENA. It is strongly recommended that the military decision-making process be evaluated to determine if a better and quicker decision making process can be implemented allowing them to mobilize outside of their assigned military zones.
- ◆ SEMARNAP has a very limited supply of appropriate fire suppression tools and equipment for the military personnel and volunteers because of their limited and decreasing budget.
- ◆ SEMARNAP has a very limited supply of appropriate protective clothing for the volunteer and military fire fighters because of their limited and decreasing budget.
- ◆ Until the 3 radio kits were shipped by USAID, SEMARNAP did not have any 2 way radio systems. There is a significant diversity of frequencies already used in Mexico. There is also a lack of a dedicated frequency for emergencies. All of these make radio communications very difficult.
- ◆ Currently SEMARNAP does not have the capability to set up and install the 3 radio communication systems provided by USAID.

WEAKNESSES IN MEXICO'S CAPABILITY TO RESTORE AND REHABILITATE BURNED AREAS

State level SEMARNAP programs have an uneven history in their ability to coordinate, fund and implement restoration efforts following wildfires. The national campaign underway is the first-ever effort to provide a legal framework and program for accomplishing short and long-term restoration goals.

Recommendations to Improve Future Emergency Response Efforts

1. It is vitally important that the level of authority and the autonomy of the Mexico City office of SEMARNAP be elevated to ensure a rapid response to an emerging wildland fire emergency. They must have the authority, autonomy and ability to expeditiously move personnel, aircraft, tools, and equipment across state lines and to coordinate the emergency response of the other agencies.
2. The Mexico City Office of SEMARNAP must also have the authority to negotiate agreements, interact with their counterparts in the State SEMARNAP offices, the military and other Mexican government organizations. They also must have the ability to enforce the agreements that are made.
3. It is equally important that the number of employees dedicated to wildland fire suppression and management in the SEMARNAP Mexico City Office and State delegations be increased. This will enable them to administer their current large and complex fire management program. It will enable the SEMARNAP employees to provide additional training and technical assistance recommended by this report, and it will also enable them to provide technical support to the State delegations.
4. Agreements and memorandums of understanding must be developed between SEMARNAP; the military and other agencies involved in fire suppression operations. The agreement must enable each of them to logistically support each other during a wildfire emergency and mobilization.
5. It is strongly recommended that Mexico develop an Emergency Fire Fighting Fund, similar to what is used in both Canada and the United States, to provide rapid budget augmentations to respond to an escalating wildland fire emergency.
6. The Fire Management Study Group of the North American Forestry Commission should be actively involved in the overall funding, coordination, implementation, and direction for the revitalized program of mutual cooperation between Mexico, the United States, and Canada. It is vitally important that all three countries be actively involved in assisting each other during wildland fire emergencies as well as funding the implementation of the training and technical exchanges described in this report.
7. As already noted the military plays an important and much needed role in responding to wildland fires. They mobilize quickly and are highly effective in suppression efforts. However, current policy prevents them from crossing certain pre-defined areas of responsibility without national level approval. It is highly recommended that the necessary authority to mobilize fire suppression forces across pre-defined areas be delegated to the field commanders.
8. SEMARNAP must develop both "Intra" and Inter" agency agreements, including state and local level partners to establish methodologies for assessing, prioritizing and restoring burned areas. An interdisciplinary resource team approach is an

important component of developing short and long-range restoration measures to protect the productivity of the land and the health and sustainability of the ecosystems.

9. The national campaign underway should consider using selected ecological restoration zones as demonstration areas where restoration concepts, techniques, training, and research can be shared among states and local-level partners.
10. SEMARNAP, in cooperation with the other appropriate Government of Mexico (GOM) agencies and the USDA Forest Service, begin development of a Fire Danger Rating System, utilizing fuel modeling data from Mexican ecosystems.
11. SEMARNAP, in cooperation with the other appropriate GOM agencies and the appropriate agencies from other countries, develop a remote sensing program utilizing satellite imagery, Geographic Information Systems (GIS), and digital photo interpretation.

OBJECTIVE #1(B) - SPECIFIC SEMARNAP STRENGTHENING, TRAINING, AND EQUIPMENT NEEDS

After a careful review of the Final Report, Mexico Wildland Fire Assessment, States of Oaxaca and Chiapas, and working in close cooperation with Roberto Martinez and Oscar Cedeno, the North American Fire Management Team conducted a broad-based Institutional Strengthening Needs Assessment (ISNA). Based on this assessment, a comprehensive and ambitious "Program of Training Courses and Technical Assistance" (PTCTA) was developed. The PTCTA is divided into the six following categories:

Administration	Safety
Fire Suppression	Fire Prevention/Protection
Aviation	Restoration and Rehabilitation

The PTCTA is divided into these categories to coincide with the proposed re-organization of the Fire Management branch of SEMARNAP. The training identified in the PTCTA matrix will be delivered to both State and Federal SEMARNAP employees. The objective and expectation of each course is that each participant will graduate from the course as a qualified instructor who will return to his or her home State and provide training courses at the local or "ejido" level.

1. Although not a part of the proposed SEMARNAP reorganization, a section on restoration and rehabilitation has also included in the PTCTA, because it is an important part of the Grant Agreement.
2. A detailed PTCTA matrix is attached as part of this report. It is hoped that this matrix of courses and technical exchanges will be implemented during the next two years.
3. The PTCTA took into consideration SEMARNAP's current fire program capabilities and then identified the training courses that would increase their overall organizational skills and knowledge.
4. Full implementation of the PTCTA will be vitally important to the success of the

Grant Agreement. It will increase the overall organizational skill and knowledge level of SEMARNAP. Accordingly, it is vitally important that two Program Manager positions be created one in the United States and the other in Mexico. They will be responsible to oversee the training accomplishments and the program's budget. An additional funding of money is also needed to cover each Program Manager's travel and per diem expenses.

5. It is also anticipated that the positions will be filled as part time details with the primary work location remaining on the home unit. Other specific details of these positions will be negotiated at the time of selection.

Below listed are the recommendations of the North American Fire Management Team, by the above-identified categories. The detailed training information about each recommendation is contained in the attached matrix.

Recommendations to Improve Administrative Effectiveness

In the United States, there are a number of systems in use that deal with administrative procedures such as contracting for emergencies, managing warehousing, and budgeting. By completing the following recommendations SEMARNAP can develop similar systems in Mexico.

- The US Forest Service or the Bureau of Land Management will provide training and technical assistance exchanges to establish a National Fire Cache system in Mexico. This will include both regional and national fire caches.
- SEMARNAP, working in conjunction with other pertinent Mexican agencies will develop an administrative process to allow for the exigent procurement of tools, services agreements, and other items during wildland fire emergencies.
- The US Forest Service will provide training and technical exchanges so that SEMARNAP can begin development of a National Fire Management Analysis System. This system demonstrates resource loss versus the appropriated funding levels. This is the budgeting process used by the Forest Service and it has applicability for SEMARNAP.

Recommendations to Improve Fire Suppression Effectiveness

Implementation of these recommendations will provide SEMARNAP with the technical assistance and training in order to improve its overall fire suppression effectiveness.

- ♦ It is highly recommended that SEMARNAP adopt the Incident Command System (ICS) as its primary emergency management system.
- ♦ SEMARNAP, working in cooperation with the Forest Service or Bureau of Land Management, must develop skilled technicians to manage, install and maintain portable emergency radio systems.
- ♦ Enhance the emergency management skills of SEMARNAP officials through higher level courses (I-420, I-520, and I-620).

- ◆ Introduce the concept and develop a plan for initiating a National Fire Qualifications System similar to the “Red Card” system used in the United States.

Recommendations to Improve Aviation Effectiveness

Implementation of these recommendations will provide SEMARNAP with the technical assistance and training to improve the safety and the effectiveness of its aviation program.

- SEMARNAP is strongly encouraged to establish cadres of qualified instructors in emergency aviation management for both fixed and rotor wing aircraft.
- SEMARNAP is strongly encouraged to establish qualified crews and individuals skilled at “on scene” helicopter management.
- Working with the Forest Service and the Bureau of Land Management, SEMARNAP is strongly encouraged to provide training in fire fighting techniques and water dropping applications to both military and civilian helicopter pilots.
- SEMARNAP should establish a helicopter rappelling program after they have established heli-tack crews and an excellent safety record.

Recommendations to Improve Prevention Effectiveness

Implementation of these recommendations will improve SEMARNAP’s fire prevention effectiveness.

- SEMARNAP, in conjunction with the Forest Service, is strongly encouraged to review existing and readily available satellite technologies to improve fire detection and vegetation analysis.
- SEMARNAP, in conjunction with the Forest Service is strongly encouraged to develop the concept of vegetation management as an effective land management tool.

Recommendations to Improve Safety Effectiveness

Implementation of these recommendations is designed to provide for an improved safety program within SEMARNAP.

- SEMARNAP, in conjunction with the Forest Service is strongly encouraged to develop a system for reporting, investigating and analyzing wildland fire fatalities.
- SEMARNAP, in conjunction with the Forest Service is strongly encouraged to develop a system for analyzing accidents for common causes and develop a comprehensive fire fighter safety program designed to make their fire fighting operation safer.

Recommendations for Restoration and Rehabilitation Programs

Development and implementation of the recommendations and training in the PTCTA will accomplish Objective #1(c) *Fire Damage Assessment and Restoration Plan* as described in the Grant Agreement.

- Develop a coordinated, interdisciplinary team approach to assessing, prioritizing and developing short and long-range restoration plans.
- Identify pilot sites where restoration research, demonstration and training can be conducted and results shared among states and local level institutions to improve the overall quality of the restoration programs.
- Improve seed sources; nursery practices, and monitoring of reforestation efforts to improve seedling survival of state and local level reforestation efforts.

ATTACHMENT D
Project Description

Grant Agreement

U.S. Agency for International Development (USAID)

and

Fondo Mexicano para la Conservación de la Naturaleza (FMCN)

in coordination with

Secretariat of the Environment, Natural Resources, and Fisheries
(SEMARNAP)

for the

Wildfire Prevention and Restoration Fund (WPRF)

I. Summary

On June 10, 1998, during the Bi-National Commission meetings held in Washington, DC, Julia Carabias the Secretary of the Ministry of Environment Natural Resources and Fisheries (SEMARNAP) of the Government of Mexico and J. Brian Atwood, the Administrator of the US Agency for International Development (USAID) of the Government of the United States signed a Memorandum of Understanding for cooperation in the implementation of the Mexico National Fires Prevention and Restoration Program.

SEMARNAP and USAID agreed to develop a Cooperation Program to focus on Mexican preparedness for fire management and on the restoration and conservation of areas affected by fires, particularly in forest ecosystems. The agreement stated that the majority of the program funding would be channeled through the Mexican Nature Conservation Fund - Fondo Mexicano para la Conservación de la Naturaleza (FMCN), and that the program would take account of other actions being carried out in the framework of the GOM's National Reforestation Program (PRONARE), including the Parks-in-Peril program, other donor projects, and programs of NGOs in both countries.

This Grant Agreement describes the overall Program of Cooperation between the USAID and the GOM and establishes a Wildfire Prevention and Restoration Fund (WPRF), to be managed through the FMCN, in accordance with SEMARNAP-led guidelines established by the Government of Mexico in its National Fire Prevention and Restoration Program. The program described in this Grant Agreement supports, in a complementary manner, SEMARNAP's National Fires Prevention and Restoration Program by providing

financial and technical resources over a three year funding and a five year implementation period to: 1) assess the 1998 wildfire suppression response and the damages caused in Mexico during the 1998 wildfire season; 2) implement an action plan for recovery of severely burned priority areas, as defined by the GOM and 3) strengthen the capacity of government and non-government institutions to plan and implement fire prevention and restoration programs.

All USAID/Mexico resources obligated under this Grant Agreement will be used to develop the WPRF. The Fund will be administered over the next 5 years by the FMCN in accordance with guidelines established by a National Technical Advisory Council composed of representatives from SEMARNAP (Secretariat of the Environment, Natural Resources and Fisheries), the FMCN, and other designated U.S. and Mexican officials and organizations, and agreed upon by USAID. USAID direct funding to the WPRF will be matched by a private sector funding raising effort to be undertaken by FMCN.

The objective of the combined USAID and FMCN Fund is to create a financial mechanism to channel funding to non-governmental, private and community organizations to support activities contributing to improved wildfire preparedness and the restoration of areas severely burned during the 1998 fire season in Mexico. These programs will be conducted in accordance with programmatic technical and policy guidance provided within the National Fire Prevention and Restoration Plan. This support will enable these organizations to more effectively prevent fires as well as manage restoration efforts and protect natural resources with improved technical and organizational capacity.

II. Background

In 1998 Mexico experienced the worst wildfire season in its recorded history. After suffering the hottest and driest spring in the last 90 years, more than 13,400 wildfires consumed over 486,710 hectares of brushland, dry, temperate and tropical forests, many in and around important environmentally protected areas. The damage from this year's forest fires adds to the approximately 6,000,000 hectares that have been lost in Mexico to fires since 1970.

Beginning in May 1998, the U.S. Government provided approximately \$7.2 million in funding to Mexico through USAID/Mexico and USAID's Office of Foreign Disaster Assistance to support a complex coordinated fire suppression operation using helicopters and fixed wing aircraft. The USAID funding supported aircraft, technical assistance (provided primarily by the U.S. Forest Service), and fire fighting equipment. This successful cooperation with Mexico's fire program focused on the suppression of wildfires in the states of Chiapas and Oaxaca, with special assistance provided in the Chimalapas region.

During the June 1998 U.S.-Mexico Bilateral meetings, USAID Administrator, J. Brian Atwood, and the SEMARNAP Secretary, Julia Carabias signed an agreement in which the two parties agreed to

provide funding for a fire prevention and restoration program to be focused on priority protected areas and other critical ecosystems. It was agreed that the USAID funds would be administered by the FMCN, with technical supervision and direction from SEMARNAP.

USAID/Mexico is responsible for coordinating this US assistance effort in Mexico. The USAID contribution for this program falls under USAID/Mexico's Strategic Objective One: "Conservation and Sustainable Use of Protected Areas and other Critical Ecosystems".

After extensive USAID/Mexico consultations with SEMARNAP, the FMCN, USFS, and U.S. and Mexican NGO partners, a program concept was formulated to finance a five year program of forest fire prevention, fire preparedness and recovery in Mexico. It was agreed that funds requested for this purpose by USAID would be channeled through the FMCN. FMCN, for its part, has agreed to make its best efforts to match the USAID contribution of \$5.75 million on a one-to-one basis through other donor and private sector grants.

This fire management program will seek to build on the significant existing Mexican technical and organizational capacity in this area as well as build on lessons learned during the 1998 fire season.

III. Overview of the National Fire Prevention and Restoration Program

SEMARNAP will set the overall policy framework and provide technical leadership for Mexico's National Fire Prevention and Restoration Program. USAID and matching FMCN resources are intended to complement and strengthen this National Program, especially through local implementation in priority areas through NGOs, community, and other civil society organizations.

Table 1 presents the entire program budget itemized by program objectives. It includes USAID/Mexico support to the FMCN for the WPRF, technical assistance from other USAID offices, SEMARNAP ongoing program support, and the FMCN matching fund activity.

USAID funding will come from several sources. USAID/Mexico funding will be used to finance the establishment of the WPRF. Additional USAID/Mexico funding support will come from ongoing programs, (including but not limited to the Parks-in-Peril Program and the Global Training for Development Program).

USAID Global Programs Bureau's Environment Office (G/ENV) in Washington and USAID Bureau of Humanitarian Response's Office of Foreign Disaster Assistance (OFDA), also in Washington, will also contribute funding directly to the three objectives described below, as indicated in an illustrative way in Table 1. G/ENV and OFDA resources, while constituting part of the overall USAID contribution, do not form part of the obligations under this Grant Agreement. The G/ENV assistance will be technical

assistance obligated in centrally-funded projects. The OFDA funding will be channeled through a centrally-funded grant to the U.S. Forest Service.

This Grant Agreement obligates only those funds that are allocated to the FMCN for the WPRF. The specific role of the WPRF in achieving the objectives of the overall program and the administrative structure of the WPRF are described in sections IV and V of this document.

The USAID/M resources provided in this Grant Agreement, and the FMCN matching resources, are intended to contribute to some of the following objectives, as indicated below, of the overall Government of Mexico Fire Management and Protection Program.

Objective 1: To assess current Mexican capacity to respond to fire emergencies and to evaluate damage caused by the 1998 fires

1a. Assessment of Fire Suppression Experience

An analysis of this year's fire fighting efforts will be conducted to identify strengths and weaknesses of the current Mexican capacity to handle fire emergencies. The North American Fire Management Team (NAFMT), composed of technical experts from the United States, Canada, and Mexico, will be involved in this component and will build on a USFS report prepared after this year's fire disaster.

The final product of activity "1a" will be a report which evaluates the 1998 fire response and makes recommendations to improve future emergency response efforts.

Note: Funds other than the WPRF will be used to meet objective 1a.

1b. Institutional-Strengthening Needs Assessment

This assessment, to be conducted as a sub-component of the above assessment, will identify specific institutional strengthening, training and equipment needs within SEMARNAP. If necessary, workshops and meetings will be held to elaborate this assessment. These meetings will include participants from USAID/Mexico and USAID/OFDA, in addition to the NAFMT.

Note: Funds other than the WPRF will be used to meet objective 1b.

1c. Fire Damage Assessment and Restoration Plan:

This assessment, already in process, is being directed by Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO), a GOM institution charged with the coordination of biodiversity and conservation activities. Input from SEMARNAP's fire management, forestry and soil and water conservation offices is also contemplated.

The assessment results will be used to design an action program

for the WPRF. The element from the assessment to be used in this design will be the designation of areas of highest priority for restoration programs, based on factors such as the amount of damage, ecological importance, likelihood of post-fire problems (landslides, floods etc.) and feasibility of restoration.

Approximately 62 areas will be chosen for restoration. For each of those sites, a more thorough assessment of damage will be conducted with the objective of developing site-specific operational plans. Damage assessments will be coupled with an analysis of existing information about these sites and about nursery stocks of native species to design ecologically sound restoration programs.

The Bi-National Agreement between SEMARNAP and USAID calls for a special damage assessment of the severely damaged Chimalapas region west of the Oaxaca/Capes border. To carry out this special assessment, additional partners will be involved, including the WWF, SERBO, and the National Inventory of Natural Resources.

Final products of assessment "1c" will include 1) an analytic map of damaged areas and site specific threats to biodiversity/watersheds and 2) a Reforestation Information System to manage relevant information.

Note: WPRF resources will be used to partially meet this objective.

Objective 2: To develop and implement an action plan for restoration and fire prevention

2a. Field Conservation and Restoration Projects in Priority Areas:

This is the largest component of USAID funding assistance and the primary element of the USAID/FMCN Grant Agreement. Resources will be used to establish a sinking trust fund which will fund competitive grant proposals submitted by NGOs, community groups, and other elements of civil society.

Guidelines for the competitive grants program will be developed by the Technical Implementation Committee within the FMCN and will be modeled after the fund management and administration procedures and methodologies established under the "GEF - Mexico Protected Areas Program - Proposed Restructuring".

This Technical Implementing Committee will also coordinate the development of site-specific action plans (operational plans) that will guide the field work to be supported under the WPRF and the grants-giving process. Priority will be given to proposals that are consistent with and supportive of the operational plans developed by the Government of Mexico and that fall under the policy framework and technical directions developed by the National Technical Advisory Council (NTAC) for the implementation of the National Fire Program.

All resources contributed to the WPRF for actions under the Field Conservation and Restoration component will be administered by the FMCN. Accountability structures for monitoring the use of these funds will be established by the FMCN, with the approval of USAID and the NTAC. Activities to be carried out in priority areas include, but are not limited to, reforestation, soil and water conservation, recovery of vegetation and wildlife systems damaged by the fires, protection of land areas against future fire damage, environmental education and other information, education and communication outreach activities.

Note: WPRF resources will be used to meet this objective.

Objective 3: Institutional Support and Development

3a. Technical Assistance

SEMARNAP will be the primary beneficiary of this technical assistance support. Included in this component are: further assessments, action plans, visits by technical experts to improve execution of restoration plans within the 62 priority areas and within other parts of the country, and other similar activities. Support will also be provided for installation of the National Center for Fire Prevention and Control (Centro Nacional de Prevención y Control de Incendios) within SEMARNAP.

Note: WPRF resources will be used to partially meet this objective.

3b. Training and Capacity Building

USAID/Mexico will develop a comprehensive training plan with input from the USFS and the North American Fire Management Team. This plan will build on the recommendations from the above-mentioned assessments.

Training for fire brigades of SEDENA, SEMARNAP, other GOM organizations, and for similar NGO, community and civil society organizations will include fire suppression activities such as basic, intermediate and advanced courses in fire suppression operations and response to fire emergencies. USAID has provided the USFS with financial support to carry out some of these training activities.

Note: WPRF resources will be used to partially meet this objective.

3c. Institutional Strengthening, SEMARNAP

This area will provide tools and equipment for fire suppression. Institutional strengthening of SEMARNAP through the provision of equipment and tools will also be supported. Included in this component are items such as emergency management and information management systems equipment, communications equipment, and personal safety equipment for fire fighters.

It is expected that the USFS will augment funds programmed in this component through the provision of fire suppression excess property to SEMARNAP.

Note: WPRF resources will be used to partially meet this objective.

3d. Strategic Planning

SEMARNAP will be assisted in its efforts to develop strategies for long term planning and policy reform. Included in this component are activities such as: 1) strategies for sustainable use and management of forest areas and 2) strategies for sustainable financing mechanisms for conservation and alternative economic activities in/around protected areas, and alternatives to the use of fire in agriculture.

Activities will include a major international conference on fires and sustainable natural resources management, training to improve service provision in forest management, establishment of technical service organizations, elaboration and distribution of informational materials detailing policies, incentives and credit systems, and other available services related to sustainable development and natural resource management. Some of these items (such as training and technical assistance) may be funded from other budget line items.

Note: WPRF resources will be used to partially meet this objective. USAID/Global and SEMARNAP resources will be used to finance the international fires conference.

IV. Administrative Structure of the Wildfire Prevention and Restoration Fund (WPRF)

FMCN is a conservation endowment designed by USAID and USAID's environmental partners to administer a competitive grants program for NGOs and local development organizations in Mexico. Since its inception three years ago, FMCN's administrative structure has expanded to encompass other types of programs, including a \$16.5 million grant from the Global Environmental Facility to support the Mexican Protected Area System.

Given the success and the administrative flexibility of the FMCN, USAID/M and SEMARNAP agreed to use the FMCN to design and administrate the Wildfire Prevention and Restoration Fund proposed in this Grant Agreement. The FMCN has extensive experience in the establishment and management of financing mechanisms in Mexico, has a strong Board of Directors and excellent technical committees, and it possesses three years of experience in disbursement of funds to local environmental NGOs.

The WPRF will be managed by the FMCN. This includes the management and administration of all resources obligated by USAID/Mexico under this Agreement, as well as the matching funds it raises through other donors and the private sector. As previously indicated, overarching technical and policy guidance

will be provided by the National Advisory Council to be established by SEMARNAP and the GOM for the administration of the National Fire Prevention and Restoration Program.

The WPRF will operate based on operational norms and procedures to be established specifically for its purposes. These norms and procedures, which will include a document describing the project cycle and an operations manual, will be developed by the FMCN and the Technical Implementation Committee and approved by the Advisory Council, at the outset of the activity and before the first grants are given. These administrative guidelines will be formulated from appropriate elements of the USAID/biodiversity grant-giving program and the GEF-Mexico Protected Areas Program.

The Technical Implementation Committee will be set up and chaired by the FMCN. This Committee will supervise program administration and monitoring and will include representatives from key institutions contributing funding to the National Program such as SEMARNAP, CONABIO, the Unidad Coordinadora de Areas Naturales Protegidas, The Nature Conservancy, and the World Wildlife Fund. It is expected that other key environmental organizations with a major involvement in priority areas, such as the Instituto Nacional de Ecología, Conservation International/Mexico, and the Colegio de la Frontera Sur, will participate.

The FMCN will coordinate the design phase of this Grant and will operate and administer the WPRF throughout its implementation phase. The FMCN will have a basic staff of two persons to design, implement and monitor the WPRF. SEMARNAP's primary role will be to provide, through the NTAC, technical and policy oversight to the Program, including facilitation, coordination and collaboration with GOM efforts at the field level.

Concurrent with the initial assessment stages of the Grant, a sinking fund, created from the USAID grant funds to the FMCN, will be established to allow immediate attention to ongoing assessments, fire prevention and control, burnt area restoration, environmental education, and training, and institutional strengthening. The funds to be provided by USAID directly to the WPRF (\$5.75 million dollars) will serve as seed funds for the FMCN. FMCN has agreed to work to raise an additional \$5.75 million through a matching grant arrangement.

Under this Agreement, FMCN will make its best efforts to match, on a one-for-one basis the direct contributions of USAID/Mexico with the goal of establishing a permanent fund for forest fire management in Mexico. Funds generated by the asset management of the sinking fund during the first five years will be reinvested in the Program via the permanent fund to be established through FMCN fundraising.

The FMCN matching funds raised over the life of the program will be used to progressively fund the administrative cost for operations of the Fund. Initially, FMCN will cover a small amount of these costs. By the final year of the Grant, FMCN will absorb the entire amount.

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From the matching portion of the Fund, FMCN will continue activities consistent with the goals and objectives of this program after the active life of this Agreement.

V. Wildfire Prevention and Restoration Fund Activities

The WPRF's activities will fall into three categories which correspond to the three main objectives articulated above.

First, the WPRF will meet Objective 1c by providing a sub-grant to CONABIO to support an ongoing fire damage assessment. Results from this assessment will be used to design the FMCN competitive grants program.

Second, the WPRF will design and implement this competitive grants program for NGOs and community groups. The WPRF will follow the guidelines stated in Objective 2. It is expected that USAID's contribution to the Fund will be matched through efforts by FMCN to raise private sector contributions.

Third, the WPRF will contribute to Objective 3 by funding and facilitating technical assistance, training and institutional strengthening activities as advised by the above assessments and by the Technical Committee.

VI. Program Partners

U.S. Government partners contributing funds to the overall Fire Prevention and Restoration Program include USAID/Mexico, the USAID Global Programs Bureau's Environment Office, and the USAID Office of Foreign Disaster Relief (OFDA) (See Table 1).

Currently, only USAID/Mexico is contributing directly to the WPRF. The USFS will provide technical assistance to the program and possible excess equipment, tools, communication gear and other excess property as in-kind contributions to SEMARNAP.

The FMCN will make its best efforts to match, on a one-for-one basis, the direct contributions of USAID/Mexico to the Fund. Thus FMCN matching funds are expected to be approximately \$5.75 million dollars.

International NGO partners who will participate by either serving on the technical committee for the design and implementation of the WPRF or through ongoing site based management programs include TNC, WWF and Conservation International.

Mexican Government partners contributing funds to the overall program (but not directly to the WPRF) include SEMARNAP and CONABIO.

The Mexican Defense (SEDENA - Secretaría de Defensa Nacional), and Agriculture and Rural Development (SAGAR - Secretaría de Agricultura and Desarrollo Rural) Secretariats will participate through their representation on the National Technical Advisory

Committee under the leadership of SEMARNAP.

Other Mexican institutions which will participate through their membership in FMCN's Board of Directors and Technical Implementation and Evaluation Committees include the Universidad Nacional Autónoma de México, Instituto de Geografía (UNAM), ITESM (Instituto Tecnológico y de Estudios Superiores de Monterrey), (INE/UCANP), and the Unidad Coordinadora de Areas Naturales Protegidas at the Instituto Nacional de Ecología.

VII. Monitoring and Evaluation

This program will be managed as part of USAID/Mexico's Strategic Objective One: "Conservation and Sustainable Use of Protected Areas and other Critical Ecosystems". An indicator or indicators will be developed to monitor the progress of overall Program activities. The FMCN will be responsible for providing USAID/Mexico data on performance indicator(s).

Furthermore, the Technical Implementing Committee of the WPRF will be responsible for developing in addition a monitoring program that tracks the success of specific restoration and prevention efforts. The FMCN will be required to report on this monitoring program in its annual reports to USAID.

National Wildfire Prevention and Restoration Program
September 1, 1998-August 31, 2000
SEMARNAP, FMCN, and USAID

Item	USAID/Mexico Contribution to FMCN's WPRP	Other USAID Contributions to National Program	SEMARNAP/COM Contribution to National Program	FMCN Matching Contribution to FMCN's WPRP	TOTALS
1. Assessments					
1a. Assessment of 1998 Fires Suppression Effort	\$0	\$10 (OFDA)	\$15	\$0	\$25
1b. Assessment of SEMARNAP Institutional Capacity for Fire Management	\$0	\$10 (OFDA)	\$10	\$0	\$20
1c. Assessment of 1998 Fire Damage-CONABIO	\$385	\$0	\$1,405	\$45	\$2,035
2. NGO Competitive Grant Fund					
2. NGO Grant Fund for Conservation and Restoration in Target Areas	\$4075	\$200 (USAID reprogrammed)	\$18,054	\$0	\$22,329
3. Institutional Support and Development					
3a. Technical Assistance to Protected Areas	\$100	\$300 (G)	\$900	\$0	\$1,300
3b. Training and Capacity Building	\$550	\$180 (OFDA) \$200 (G)	\$465	\$0	\$1,395
3c. Institutional Strengthening and Equipment	\$100	\$100 (OFDA)	\$4,100	\$0	\$4,300
3d. Strategic Planning Activities	\$80	\$50 (G)	\$50	\$0	\$180
3e. International Conference	\$0	\$400 (G)	\$200	\$0	\$600
3f. Monitoring and Evaluation	\$60	\$50 (G)	\$40	\$150	\$300
4. Fund and Program Administration	\$200 (Fund)	\$0	\$200 (Ntl. Prog)	\$300 (Fund)	\$700
5. FMCN Private Sector Matching Fund	\$0	\$0	\$0	\$5,750	\$5,750
GRAND TOTAL	\$5,750	\$1,500	439	\$6,245	\$38,934
Percentage	14.8%	3.9%	65.3%	16.0%	100%

Fire Preparedness and Burned Area Recovery Training Program



An air crane refueling at the Type I helicopter base in Cintalapa.



The Forest Service airplane with infra-red technology gets ready to overfly the Chimilapas Area.

The incident command post at Zanatapec, for the fires in the Oaxaca portion of Chimilapas



United States
Department of Agriculture



United States
Agency for International Development



Secretaria de Medio Ambiente,
Recursos Naturales y Pesca

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

JOINTLY SPONSORED BY USAID AND THE SECRETARIA DE MEDIO AMBIENTE, RECURSOS NATURALES Y PESCA

With Technical and Counterpart Contributions from:

SUBSECRETARIA DE RECURSOS NATURALES	DEPARTMENTS OF AGRICULTURE AND INTERIOR
DIRECCION GENERAL FORESTAL	FOREST SERVICE and BUREAU OF LAND MANAGEMENT

No.	Project/Activity	Type of Project	Responsibility	SEMARNAP	Cost Distribution in US Dollars				BLM	Session Place & Date	Priority
					Mission	US AID	Budget	Forest Service, F&AM Contributed			
1	Establish 2 Program Manager positions, one from USA and one from Mexico, to coordinate these activities.	Technical assistance, 2 people. (1 from USA and 1 from Mexico (50% of salary & travel).	SEM-Oscar Cedeno USAID-Paul White USFS-Paul Weeden	\$30,000	\$40,000	\$25,000	\$5,000		Establish 2 positions, one in USA and one in Mexico City to provide full time program management. Fill positions by 1/1/99.	1	
2	Translate the fire tool catalog from English to Spanish and produce copies for SEMARNAP.	Translation, writing and copying. 2 people, 1 USA, 1 Mexico.	SEM-Arturo Raygoza USAID-Frank Zadroga USBLM-Tom Frey	\$700	\$2,400			\$1,000	Ontario, CA. 1 week, Feb. 1999.	1	
3	Training for administrative personnel in contracting services and equipment for fire emergencies.	Classroom training of 3 people. 1 instructor from USA, 2 students from Mexico.	SEM-Alejo Barreto USAID-Frank Zadroga USBLM-Tom Frey	\$700				\$3,400	Regions 3 or 5, USFS. 1 week, Feb. 1999.	1	
4	Training in the operation of a fire cache system including inventory, distribution, control, re-ordering, and inventory depletion prediction.	Training of 7 people. 1 instructor from USA, 6 students from Mexico.	SEMAR-Alejo Barreto USAID-Frank Zadroga USBLM-Tom Frey	\$4,200				\$10,400	Boise, Idaho. 1 week, March 1999.	1	
5	Instructor Training Course.	A course to train up to 24 instructors who participate in the Mexico Regional training courses.	SEM-Alfredo Nolasco OFDA-Paul Bell USAID-Frank Zadroga USFS-Jay Perkins	\$2,000	\$15,000	\$3,000	\$3,000	\$3,000	San Jose, Costa Rica. 1 week, July 1999.	1	
6	Provide Course in Disaster Administration and Basic Emergency Management.	A course to train 24 SEMARNAP administrators in Basic Emergency Management.	SEM-Roberto Martinez OFDA-Paul Bell USAID-Frank Zadroga USFS-Jay Perkins	\$5,000	\$15,000		\$5,000		Jiutepec, Morelos Mexico. 1 week, June 1999.	1	
7	Review all existing training courses and materials in English and Spanish.	Review training courses and materials in English and Spanish to determine if they can be included in this training program.	SEM-Alfredo Nolasco USAID-Frank Zadroga USFS-Jay Perkins	\$1,000	\$2,000		\$2,000		Marana, AZ. 1 week, February 1999.	1	
8	Develop a system for inventory, control and re-ordering fire equipment.	Technical Assistance. 2 people to Mexico to help set up warehouses and systems.	SEM-Alejo Barreto USAID-Frank Zadroga USBLM-Tom Frey	\$5,800				\$2,000	Mexico, D.F. and Chiapas. 2 weeks, Oct. 99.	2	
9	Familiarization with the National Fire Management System (NFMAS).	Classroom training for 2 people. 1 instructor from USA, 1 student from Mexico.	SEM-Roberto Martinez USAID-Frank Zadroga USFS-Jan Engert	\$700	\$2,400		\$2,000		Region 3, USFS. 1 week, May 1999.	2	
Priority 1 Administration Projects Total				\$43,600	\$70,000	\$19,400	\$28,000	\$15,000	\$17,800		
Priority 2 Administration Projects Total				\$6,500	\$2,400	\$1,000	\$0	\$2,000	\$2,000		
Total of Priority 1 and 2 Projects				\$50,100	\$72,400	\$20,400	\$28,000	\$17,000	\$19,800		

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

No.	Project/Activity	Type of Project	Responsibility	SEMARNAP	Cost Distribution in US Dollars				Session Place & Date	Priority	
					US AID		Forest Service, F&AM				BLM
					Mission	OFDA	Budget	Contributed			
10	Fire Suppression Provide training in basic fire fighting to rural communities located near natural preserves.	Both classroom and field training. 2 sessions with 31 courses for 1,000 trainees each session.	SEM-Oscar Cedeno SEM-8 Delegates USAID-Frank Zadroga		\$70,000					8 states in Mexico, Feb. 1998 and ongoing to year 2000.	1
11	Provide National and Regional level training courses in wildland fire fighting.	Classroom training & field exercises for 60 students. 12 instructors from Mexico, 5-7 instructors from USA. 2 sessions, 120 total students.	SEM-Eduard Rodriguez USAID- Frank Zadroga USFS- Nando Lucero	\$33,000	\$75,562	\$30,562	\$5,000	\$3,000		Los Berros, State of Mexico. 2 weeks each course. 11/98 and 11/99.	1
12	Training in the installation, operation, and maintenance of fire radio systems and repeaters.	Training, classroom and field exercises. 2 people from Mexico to USA.	SEM-Arturo Raygoza USAID-Frank Zadroga USBLM-Tom Frey	\$1,400	\$2,800				\$2,500	Boise, Idaho. 1 week, Sept. 1999.	1
13	Provide fire fighter training on a USFS Hot Shot Crew.	Classroom and field training. 2 people from Mexico to USA.	SEM-Joel Zavala USAID-Frank Zadroga USFS-Gary Benevides	\$1,400	\$8,600			\$1,000		R-5, San Bernardino NF. June-August 1999.	1
14	Training in the field installation, maintenance and disassembly of a radio system.	Technical assistance. 1 or 2 people from USA to Mexico	SEM-Arturo Raygoza USAID-Frank Zadroga USBLM-Tom Frey		\$3,000				\$2,500	Mexico, D.F. & Chiapas. 1 week, Oct. 1999.	1
15	Training exchange with one 12 person Mexican fire fighting crew working in the US.	Training, classroom, and field instruction. 12 persons from Mexico to USA	SEM-Victor Martinez USAID-Frank Zadroga USFS-Mike Conrad	\$8,400	\$18,800			\$1,000		R-5, San Bernardino NF. 2 weeks, August 1999	1
16	Exchange of fire experts between the USA and Mexico to discuss new technology, and plan for the execution of additional training courses.	Information exchange. 4 person (2 from USA and 2 from Mexico)	SEM-Oscar Cedeno USAID-Paul White USFS-Jose Curz	\$1,400	\$7,000			\$5,000	\$3,000	Regions 3 & 5 USFS. Hidalgo EDO. Mex, DF. May 1999, and August 2000.	1
17	Translate the ICS (I-100, I-200, I-300) courses from English to Spanish. Type II level.	Translation, writing, and copying. 4 persons. 2 from USA and 2 from Mex	SEM-Alfredo Nolasco USAID-Frank Zadroga USBLM-Tom Frey	\$1,400	\$14,400			\$2,000		Marana, AZ. 3 weeks, June 1999. (OFDA - Paul Bell)	1
18	Fire Behavior Course	1. Revise and adapt S-290 "Fire Behavior" course to Spanish. 2. Teach S-290 & Behave in Spanish in Mexico to SEMARNAP 24 students. 4 instructors from USA.	SEM Andres Najara USAID-Frank Zadroga USFS-Pat Velasco	\$5,000	\$10,000	\$7,000	\$2,000			1. Course revision and adaptation at Marana, Feb. 1999. 2. S-390, Fire Behave taught at Jiutepec, Morelos, Mexico. 2 weeks, August 1999.	1

Fire Suppression Total, This Page	\$52,000	\$155,562	\$92,162	\$7,000	\$12,000	\$8,000
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U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

No.	Project/Activity	Type of Project	Responsibility	Cost Distribution in US Dollars					Session Place & Date	Priority
				SEMARNAP	US AID	Forest Service, F&AM	BLM	Budget		
				Mission	OFDA	Budget	Contributed			
19	Fire Suppression Establish a national system for certification fire line qualifications. (Red Card System)	Technical Assistance. 2 people. 1 from USA and 1 from Mexico.	SEM-Arturo Raygoza USAID-Frank Zadroga USFS-Jan Engert	\$700	\$4,400	\$1,000	\$1,000	\$1,000	Regions 3, 5, 8, USFS. 1 week, Oct. 1999.	2
20	Training in the use of the wildfire situation analysis (WFSA). In analyzing the appropriate fire control option.	Classroom training. 2 people. 1 from USA and 1 from Mexico.	SEM-Roberto Martinez USAID-Frank Zadroga USFS-Jan Engert	\$1,400	\$3,800	\$1,000		\$1,000	Region 3, USFS. 5 Days, May 1999.	2
21	Provide a course to train Mexican instructors to teach ICS courses in Emergency Incident Management.	Classroom training. 10 people. 5 instructors from USA, 5 instructors from Mexico.	SEM-Alfredo Nolasco USAID-Frank Zadroga USFS-Nando Lucero.	\$3,500	\$22,000	\$5,000		\$2,000	Regions 3 and 5, USFS. 1 week, Nov. 1999.	2
22	Provide training in Mexico in the Incident Command System (ICS).	Classroom training. 6 people. 5 instructors from Mexico and 1 coordinator from USA, and 15 students.	SEM-Alfredo Nolasco USAID-Frank Zadroga USFS-Nando Lucero	\$14,000	\$31,000	\$3,000		\$1,000	IMTA Morelos. 1 week, Feb. 2000.	3
23	Translate the I-420, I-520, I-620 Command/Staff exercises from English to Spanish.	Translation, writing and copying. 4 people. 2 from Mexico and 2 from USA.	SEM-Alfredo Nolasco USAID-Frank Zadroga USFS-Nando Lucero	\$1,400	\$14,400	\$1,000		\$2,000	Marana, AZ. 3 weeks, Nov. 2000.	3

Fire Suppression Total, Priority 1 Projects (Previous Page)	\$52,000	\$155,562	\$92,162	\$7,000	\$12,000	\$8,000
Fire Suppression Total, Priority 2 Projects (This Page)	\$5,600	\$30,200	\$7,000	\$1,000	\$4,000	\$0
Fire Suppression Total, Priority 3 Projects (This Page)	\$15,400	\$45,400	\$4,000	\$2,000	\$1,000	\$0
Total, All Priority 1 Projects	\$326,724					
Total, All Priority 2 Projects	\$47,800					
Total, All Priority 3 Projects	\$67,800					
Total, All Fire Suppression Projects	\$442,324					

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

No.	Project/Activity	Type of Project	Responsibility	Cost Distribution in US Dollars					Session Place & Date	Priority
				SEMARNAP	US AID	Forest Service, F&AM	BLM	Contributed		
				Mission	OFDA	Budget				
24	Aviation Provide training in the management of helicopter bases during emergencies. (Helibase Manager)	Classroom training and field exercises. 12 people. 2 instructors from USA, 10 students from Mexico.	SEM-Pedro Martinez USAID-Frank Zadroga USFS-Isidoro Solis USBLM-R. Bernal	\$7,000	\$16,000	\$2,000	\$1,000	\$2,500	Regions 3 & 5. 1 week, March 1999.	1
25	Provide training in helicopter management (Helitack Crew)	Classroom training and field exercises. 2 people from Mexico to USA.	SEM-Rafael Contreras USAID-Frank Zadroga USFS-Isidoro Solis	\$1,400	\$12,600		\$1,000	\$1,500	Region 5, Sequoia NF. June-Sept. 1999.	1
26	Translate related helicopter operations manuals including load calculations from English to Spanish	Translation, writing and copying. 2 people, 1 from USA and 1 from Mexico.	SEM-Francisco Rivera USAID-Frank Zadroga USFS-Isidoro Solis	\$700	\$4,400		\$1,000		Region 5, Sequoia NF. 1 week, Nov. 1999.	1
27	Provide technical assistance and training in the emergency management of helicopters	Technical assistance, training and field exercises. 1 person from USA to Mexico.	SEM-Pedro Martinez USAID-Frank Zadroga USFS-Isidoro Solis USBLM-R. Bernal		\$6,000	\$2,000	\$1,000	\$4,000	Quintana Roo and Chiapas. 2 weeks, April 1999.	1
28	Provide training to helicopter pilots in fire fighting and water dropping techniques.	Classroom training and field exercises. 7 persons (2 instructors from USA, 5 students from Mexico)	SEM-Alejo Barreto USAID-Frank Zadroga USFS-Isidoro Solis	\$1,000	\$6,000	\$2,000	\$1,000		State of Mexico. 1 week, Nov. 1999.	1
29	Provide training and assistance in developing a helicopter rappelling crew.	Classroom training and field exercises. 30 people, 2 instructors from USA, 28 students from Mexico.	SEM-Rafael Contreras USAID-Frank Zadroga USFS-Isidoro Solis	\$14,375	\$65,305	\$2,000	\$1,000	\$3,000	Quintana Roo. 1 week, March 2000.	3

Aviation Total, Priority 1 Projects	\$10,100	\$0	\$45,000	\$6,000	\$5,000	\$8,000
Aviation Total, Priority 3 Projects	\$14,375	\$0	\$65,305	\$2,000	\$1,000	\$3,000
Aviation Total, All Projects	\$24,475	\$0	\$110,305	\$8,000	\$6,000	\$11,000

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT - FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

Project/Activity	Type of Project	Responsibility	Cost Distribution in US Dollars						Session Place & Date	Priority
			SEMARNAP	US AID	Forest Service, F&AM	BLM	US AID	Forest Service, F&AM		
No.	Prevention/Protection		Mission	OFDA	Budget	Contributed				
30	Provide technical assistance in the use of a satellite imaging system for fire detection.	SEM-Serigo Varela USAID-Frank Zadroga USFS-T. Bobbe USBLM-Jay Gebhardt	\$1,000	\$3,000		\$1,000		Mexico, D.F. 1 week, Feb/1999.	1	
31	Develop a course for fuel management in Mexico.	SEM-Roberto Martinez USAID-Frank Zadroga USFS-Jan Engert	\$4,200	\$64,800	\$12,000			Mexico, D.F. and Marana, AZ. 2 weeks, Sept. 1999.	2	
32	Latin American Conference for Forest Fire Training.	SEM-Oscar Cedeno USAID-Paul Bell USFS-Denny Truesdale	Not Determined (ND)	(ND)	(ND)	Not Determined (ND)	(ND)	San Jose, Costa Rica, Nov. 99.	1	
Total of Priority 1 Prevention/Protection Projects			\$1,000	\$3,000	\$0	\$0	\$1,000			
Total of Priority 2 Prevention/Protection Projects			\$4,200	\$64,800	\$12,000	\$0	\$0			
Total of All Prevention/Protection Projects			\$5,200	\$67,800	\$12,000	\$0	\$1,000			

Project/Activity	Type of Project	Responsibility	Cost Distribution in US Dollars						Session Place & Date	Priority
			SEMARNAP	US AID	Forest Service, F&AM	BLM	US AID	Forest Service, F&AM		
No.	Safety		Mission	OFDA	Budget	Contributed				
33	Collect and analyze existing information regarding the Mexican fire fatalities of 1998. Search for common causes, begin development of a process to conduct future investigations.	SEM-Victor Martinez USFS-Tony Osa, Pat Velasco USBLM-S. Guches	\$1,400	\$26,400	\$2,500	\$2,000	\$1,500		Puebla, Mexico, Hidalgo, Tamaulipas, Michoacan, Oaxaca, Chiapas, Durango, Morelos, Veracruz. 3 weeks, Jan. 1999.	1
34	Identify the common causes of the 1998 fire fatalities. Begin development of a comprehensive safety program.	SEM Victor Martinez USFS-Tony Osa, Dave Aldrich	\$2,800	\$5,000	\$2,000	\$1,000	\$1,000			1
35	Review the contents of the courses provided to the volunteer fire fighters.	SEM-Eduard Rodriguez USFS Jan Engert		\$3,000	\$1,000	\$1,000	\$1,000		Mexico, D.F., Nov. 99.	2
Total of Priority 1 Safety Projects			\$4,200	\$26,400	\$7,500	\$4,000	\$2,500	\$3,000		
Total of Priority 2 Safety Projects			\$0	\$3,000	\$1,000	\$1,000	\$1,000	\$0		
Total of all Safety Projects			\$4,200	\$29,400	\$8,500	\$5,000	\$3,500	\$3,000		

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

No.	Project/Activity	Type of Project	Responsibility	Cost Distribution in US Dollars					Session Place & Date	Priority
				SEMARNAP	US AID	Forest Service, Other Contributed	BLM	Budget		
				Mission	OFDA					
36	Identify Project Coordinator for USDA/FS.	Curriculum development and overall coordination.	USIAD-Paul White USFS (Jan Engert, Russ Lafayette) SEMARNAP.	\$10,000		\$20,000			USFS, field unit.	1
37	Finalize curriculum and translate material for "train-the-trainer" and Regional course in evaluating and restoring burned areas.	Research and writing.	PONARE University counterpart. USIAD Paul White USFS Project Coordinator.	\$7,000	\$4,000		\$2,000		USA and Mexico City	1
38	Conduct National "train-the-trainer" course in evaluating and restoring burned areas.	Workshop, classroom and field exercises. 3 instructors from USA. 15 participants from priority areas in Mexico, including the University community.	USFS Project Coordinator. PONARE, and State SEMARNAP delegates, and University counterpart.	\$31,000	\$8,000		\$1,000		Central Mexican location, affiliated with a University, (Chapingo, Nuevo Leon).	1
39	Conduct 3 Regional workshops in evaluating and restoring burned areas.	Workshop, classroom and field exercises. 2 instructors from Mexico, 2 instructors from USA. 40 participants from Mexico and Central America in each session.	PONARE, and State SEMARNAP delegates, and University counterpart. USIAD Frank Zadroga, USFS Project Coordinator	\$144,000	\$14,000		\$1,000		Associate with decreed restoration Zones. Consider areas in southern, central and northern Mexico. 2 courses in FY99, May and Sept. and 1 course in FY2000.	1, 2
40	Training in implementation of restoration programs and study tour of rehabilitated sites in the USA.	Classroom training and study tour. Up to 4 Mexican participants in a scheduled US Rehabilitation course, followed by the study tour.	PONARE, and State SEMARNAP delegates, and University counterpart. USIAD Frank Zadroga, USFS Project Coordinator	\$13,600	\$10,000		\$1,000		Reno, Nevada. 5 day course, April 1999. 5 day study tour.	2
Priority 1 Rehabilitation Projects Total, including #38				\$57,000	\$192,000	\$26,000	\$20,000	\$4,000		\$0
Priority 2 Rehabilitation Projects Total, #39				\$2,400	\$13,600	\$10,000	\$0	\$1,000		\$0
Total Priority 1 & 2 Projects This Page				\$59,400	\$205,600	\$36,000	\$20,000	\$5,000		\$0

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, FIRE PREPAREDNESS AND RECOVERY TRAINING PROGRAM.

Project/Activity No.	Type of Project	Responsibility	Cost Distribution in US Dollars					Session Place & Date	Priority
			SEMARNAP	US AID Mission	OFDA	Forest Service, Other Budget	Contributed		
41	Training exchange with experts from Mexico working on a US rehabilitation team in the USA.	USFS Project Coordinator	\$1,200	\$6,800	\$6,000	\$1,000		USA and Mexico City	2
42	Training exchange with a USA rehabilitation team working with Mexicans on a restoration site in Mexico.	USFS Project Coordinator, State SEMARNAP delegate, and site manager.	\$2,000	\$8,000	\$6,000	\$1,000		Mexico	2

Total Priority 2 Projects This Page Only, #40 and #41.	\$3,200	\$14,800	\$12,000	\$0	\$2,000	\$0
Total of Priority 2 Rehabilitation Project #39 previous page.	\$2,400	\$13,600	\$10,000	\$0	\$1,000	\$0

Total of All Priority 2 Projects, both pages.	\$5,600	\$28,400	\$22,000	\$0	\$3,000	\$0
Total of all Priority 1 Rehabilitation Projects #34-37, previous page.	\$57,000	\$192,000	\$26,000	\$20,000	\$4,000	\$0

Total for all Rehabilitation Projects, both pages.	\$62,600	\$220,400	\$48,000	\$20,000	\$7,000	\$0
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Project/Activity No.	Type of Project	Responsibility	Cost Distribution in US Dollars					Session Place & Date	Priority
			SEMARNAP	US AID Mission	OFDA	Forest Service, Other Budget	Contributed		
43	Select 2 demonstration areas for identifying plant material, propagation, planting and monitoring.	PONARE, INIFAP partners.. USAID Frank Zadroga. USFS Program Coordinator and Pacific NW Region; New Mexico State.	\$5,000	\$12,500	\$7,500			Select 2 decreed "Ecological Restoration Zones" in Mexico. Consider El Ocote in Chiapas and Sierra Gorda, in Querriearo.	1
44	Training in forestation at each demonstration site.	PONARE, INIFAP partners.. USAID Frank Zadroga. USFS Program Coordinator and Pacific NW Region; New Mexico State.	\$4,400	\$75,000	\$18,000			Demonstration site	1
45	Translation of nursery materials, manuals, nursery notes.	PRONARE, Ricardo Sanchez. USAID Frank Zadroga. USFS - Tom Landis,	\$2,000	\$10,000	\$2,000			Mexico City	2

Total for Priority 1 Reforestation Projects	\$9,400	\$87,500	\$25,500	\$0	\$0	\$0
Total for Priority 2 Reforestation Projects	\$2,000	\$10,000	\$2,000	\$0	\$0	\$0
Total for all Priority 1 and 2 Reforestation Projects	\$11,400	\$97,500	\$27,500	\$0	\$0	\$0

Project Cost Summary

	Priority 1								
	SEMARNAP	USAID		Forest Service			BLM	Total	
		Mission	OFDA	F&AM Budget	F&AM Contributed	Other FS Budget Funds			Other FS Contributed Funds
Administration	\$43,600	\$70,000	\$19,400	\$28,000	\$15,000			\$17,800	\$193,800
Suppression	\$52,000	\$155,562	\$92,162	\$7,000	\$12,000			\$8,000	\$326,724
Aviation	\$10,100	\$0	\$45,000	\$6,000	\$5,000			\$8,000	\$74,100
Prevention/Protection	\$1,000	\$3,000	\$0	\$0	\$1,000			\$0	\$5,000
Safety	\$4,200	\$26,400	\$7,500	\$4,000	\$2,500			\$3,000	\$47,600
Rehabilitation	\$57,000	\$192,000	\$26,000			\$20,000	\$4,000	\$0	\$299,000
Reforestation	\$9,400	\$87,500	\$25,500			\$0	\$0	\$0	\$122,400
Total	\$177,300	\$534,462	\$215,562	\$45,000	\$35,500	\$20,000	\$4,000	\$36,800	\$1,068,624

	Priority 2								
	SEMARNAP	USAID		Forest Service			BLM	Total	
		Mission	OFDA	F&AM Budget	F&AM Contributed	Other FS Budget Funds			Other FS Contributed Funds
Administration	\$6,500	\$2,400	\$1,000	\$0	\$2,000			\$2,000	\$13,900
Suppression	\$5,600	\$30,200	\$7,000	\$1,000	\$4,000			\$0	\$47,800
Aviation									\$0
Prevention/Protection	\$4,200	\$64,800	\$12,000	\$0	\$0			\$0	\$81,000
Safety	\$0	\$3,000	\$1,000	\$1,000	\$1,000			\$0	\$6,000
Rehabilitation	\$5,600	\$28,400	\$22,000			\$0	\$3,000	\$0	\$59,000
Reforestation	\$2,000	\$10,000	\$2,000			\$10,000	\$2,000	\$0	\$26,000
Total	\$23,900	\$138,800	\$45,000	\$2,000	\$7,000	\$10,000	\$5,000	\$2,000	\$233,700

	Priority 3								
	SEMARNAP	USAID		Forest Service			BLM	Total	
		Mission	OFDA	F&AM Budget	F&AM Contributed	Other FS Budget Funds			Other FS Contributed Funds
Administration									\$0
Suppression	\$15,400	\$45,400	\$4,000	\$2,000	\$1,000			\$0	\$67,800
Aviation	\$14,375	\$0	\$65,305	\$2,000	\$1,000			\$3,000	\$85,680
Prevention/Protection									\$0
Safety									\$0
Rehabilitation									\$0
Reforestation									\$0
Total	\$29,775	\$45,400	\$69,305	\$4,000	\$2,000	\$0	\$0	\$3,000	\$153,480

Totals	
Priority 1 Projects	\$1,068,624
Priority 2 Projects	\$233,700
Priority 3 Projects	\$153,480
Total All Projects	\$1,455,804

Project Cost Summary

Funded by SEMARNAP	
Priority 1 Projects	\$177,300
Priority 2 Projects	\$23,900
Priority 3 Projects	\$29,775
Total	\$230,975

Funded by USAID Mission	
Priority 1 Projects	\$534,462
Priority 2 Projects	\$138,800
Priority 3 Projects	\$45,400
Total	\$718,662

Funded by USAID/OFDA	
Priority 1 Projects	\$215,562
Priority 2 Projects	\$45,000
Priority 3 Projects	\$69,305
Total	\$329,867

Funded by FS-F&AM Budget	
Priority 1 Projects	\$45,000
Priority 2 Projects	\$2,000
Priority 3 Projects	\$4,000
Total	\$51,000

Contributed by FS-F&AM	
Priority 1 Projects	\$35,500
Priority 2 Projects	\$7,000
Priority 3 Projects	\$2,000
Total	\$44,500

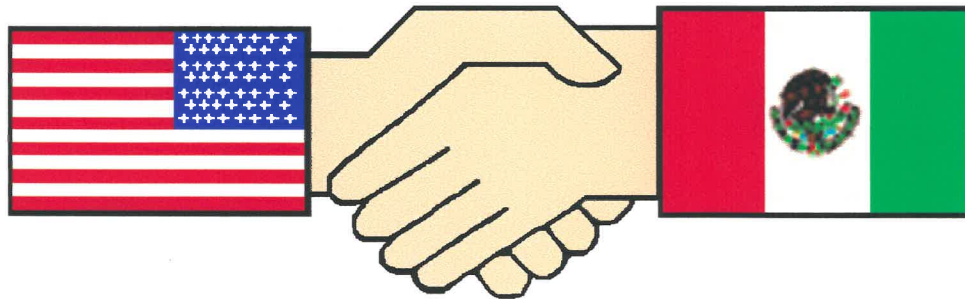
Funded by Other FS	
Priority 1 Projects	\$20,000
Priority 2 Projects	\$10,000
Priority 3 Projects	\$0
Total	\$30,000

Contributed by Other FS	
Priority 1 Projects	\$4,000
Priority 2 Projects	\$5,000
Priority 3 Projects	\$0
Total	\$9,000

Funded by USDI - BLM	
Priority 1 Projects	\$36,800
Priority 2 Projects	\$2,000
Priority 3 Projects	\$3,000
Total	\$41,800



Final Report



Mexico Wildland Fire Assessment Oaxaca and Chiapas

May - June 1998



US Department of Agriculture



US Agency for International
Development



Secretaria de Medio Ambiente,
Recursos Naturales y Pesca

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1. Executive Summary

The 1998 catastrophic wildland fires in Mexico have neither precedent nor antecedent. What the world witnessed in Mexico during 1998 was historic and unique. Smoke from thousands of uncontrolled wildland fires, burning simultaneously throughout Latin America, drifted over portions of the United States, creating health alerts and health hazards in many cities. Through the U. S. Agency for International Development, more than \$7.5 million dollars of aid and technical assistance was provided to Mexico. The cornerstone of the assistance package was the Technical Assistance Team which evaluated the wildland fire situation in the Chimilapas Area, located in the States of Oaxaca and Chiapas. This report summarizes the Assessment Team's findings during their initial assessment and subsequent fire suppression operation. This report also recommends a number of steps that the Government of Mexico (GOM) can take to meet future fire suppression challenges. Implementation of these recommendations will increase and enhance GOM's ability and capability to respond to both "normal" and catastrophic wildland fire seasons.

2. Background

In a letter dated May 14, 1998, from Dr. Victor M. Villalobos Arambula, Sub-secretary of the Secretaria de Medio Ambiente Recursos Naturales y Pesca (SEMARNAP), to Dr. Jesus Reyes Heróles, U. S. Mexican Ambassador, a formal acceptance to the offer of assistance from the United States was made. Senor Villalobos made the acceptance because hundreds of uncontrolled wildland fires were burning simultaneously in several different Mexican states. Of particular concern to Senor Villalobos, were the fires in the states of Oaxaca and Chiapas, which were threatening the biologically sensitive area, known as Chimilapas. This area is one of the most important jungle reserves in the Northern Hemisphere because of its biological diversity of flora and fauna.

The wildland fires burning in Mexico affected the United States interests in three fundamental ways:

- 1) Carbon dioxide emissions increase global warming;
- 2) Loss of biodiversity in a unique and rare jungle vegetation type;
- 3) An increase in air pollution (smoke) in the border and gulf coast states.

Numerous appeals from within the United States were made to the Administration to provide fire suppression assistance to the Mexican government including requests from the Governor of Texas, George Bush, and both Texas Senators.

On Friday, May 15, the Office of Foreign Disaster Assistance (OFDA) was given the task to identify and send an **Assessment Team** of wildland fire experts to Mexico to assess the wildland fire situation in Oaxaca and Chiapas. The assistance provided to Mexico was to be based on the Assessment Team's findings.

At the time of the initial assignment, the proposed members of the Assessment Team were Paul Weeden, Mike Conrad, Jay Perkins, and William Alfred, all USDA Forest Service, and Rene Carillo, USAID/OFDA Costa Rica.

3. Initial Briefing

On Saturday, May 16th Paul Weeden and Mike Conrad, USDA Forest Service met with Paul White, USAID Program Administrator, US Embassy, at the Marco Polo Hotel. Also present at the meeting were Rene Carillo, Office of Foreign Disaster Assistance (OFDA) Costa Rica, Oscar Cedeno and Roberto Martinez, from SEMARNAP, Richard "Dick" Owens, Operations Director, OFDA and Guy Lawson, Information Specialist, OFDA.

In addition to those originally assigned to the team, two other professional wildland fire experts, Charles "Boo" Walker and Maurice "Marty" Martinez, from the Texas Forest Service were at the Marco Polo Hotel. They had been sent to Mexico by the Governor of Texas to provide technical assistance to Mexico. At this time they were not part of the Assessment Team designated and mobilized by the Office of Foreign Disaster Assistance.

The Assessment Team's initial briefing began at 5:00 PM and concluded at 8:30 PM. The briefing was highly informative, extremely comprehensive, and very thorough. Paul White, Agency for International Development Program Director, American Embassy conducted the initial briefing. Oscar Cedeno and Roberto Martinez, presented the team members with an outstanding array of information concerning the 1998 fire season.

During the initial briefing two important decisions were made by Paul White. The first decision was to approve Paul Weeden's recommendation that the team make due haste and travel to the Chimilapas area in the states of Oaxaca and Chiapas and make personal observations, interview fire suppression personnel, and talk with government authorities as a part of their fact-finding mission. The second decision was to approve a change in the composition of the original team and include Charles Walker and Mauricio Martinez in place of Bill Alred and Jay Perkins.

Both Jay Perkins and William Alred were scheduled to arrive in Mexico on Tuesday, May 19th. However, because of the urgency of the wildland fire situation, it was felt that the team needed to advance the fact-finding mission.

In retrospect both of these decisions proved to be excellent ones. Jay Perkins was diverted to conduct the fire assessment in Guatemala. Bill Alred continued to Mexico City and began preparations to mobilize tools, equipment, and personnel for the response to Mexico.

Both "Boo" Walker and "Marty" Martinez provided valuable insight and recommendations for the Assessment Team and made valuable contributions to its success. Bill Alred provided excellent service to the team in mobilizing equipment and personnel for the response.

4. Assessment Team Findings

All Assessment Team members firmly believe that predicting an event of this magnitude was impossible. The circumstances leading up to the disastrous wildland fires of mid-May have not happened in this century. Based on the Assessment Team's evaluation conducted from May 16th-20th, and their experiences in implementing their recommendations from May 21st to June 5th, the following findings are made.

- The fire fighters, military personnel, volunteers, and others involved in the suppression effort, as well as those who were involved in the support of the suppression personnel, distinguished themselves by their accomplishments.
- Since January, SEMARNAP, the military, and the volunteers together successfully controlled more than 14,290 fires that charred more than 583,489 hectares (1.4 million acres) throughout the country.
- From the beginning of 1998 to about May 12th, the SEMARNAP fire suppression organization, including the military and the volunteers, successfully controlled and extinguished all wildland fires using their suppression resources available to them in Mexico, without outside assistance. This was a remarkable achievement.
- Statistical information maintained by the SEMARNAP Mexico City Office indicated the following:
 - 1) the number of fires from January to May was significantly greater than the average number of fires for the previous 5 years.
 - 2) the total number of hectares burned both per fire and the total number of hectares consumed per fire were significantly above the 5 year average.
 - 3) the average number of hectares burned before the fire was controlled was also significantly above the 5 year average.
- These statistics indicated that the fires of 1998 were getting larger much quicker, and were also more difficult to control when suppression action commenced. This was to be expected, given the extreme drought conditions that were pervasive throughout Mexico in 1998 and was similar to what happened in the United States, particularly in Texas and Florida that same year.
- 1998 will be the worst year this century for both the numbers of wildland fires and the number of hectares burned in Mexico.
- Sadly, 1998 will also be **THE WORST** year this century for the number of Mexican citizens killed while trying to suppress the severe and intense wildland fires. During the 1998 wildland fire season 70 people died trying to suppress the wildland fires. Many of those killed are the "volunteers" or people who lived in a village or town close to the fire and who have a responsibility to be available for fire suppression work. Ten people lost their lives when a MI-8 helicopter crashed on June 1.

- At times, erratic fire behavior was common in the lighter, flashy fuels. Most, if not all, of the fatalities occurred in this fuel type.
- The magnitude and severity of Mexico's wildland fire situation was **NOT** overstated, exaggerated or embellished. The severity of the 1998 fire season was directly related to two causal factors:
 - 1) the intense, prolonged drought throughout the country; and
 - 2) hundreds or *even thousands* of human caused fires ignited between May 12th and May 15th. These fires were set for traditional "slash and burn" agricultural purposes.
- About May 15th, a very strong weather system swept through Chiapas and Oaxaca. This weather front brought very strong winds, but no moisture. This wind event rapidly pushed the slash and burn field clearing fires into forested areas. The fires quickly became firmly established in the very dry combustible fuels. This is similar to what happened in Yellowstone National Park in 1988.
- Pushed by strong winds, many of the slash and burn fires were pushed into areas that had not burned in decades, perhaps even hundreds of years.
- The large fires, which were burning in Oaxaca and Chiapas when the Assessment Team made its evaluation, began during this narrow timeframe. (May 12th - 15th).
- During periods of inversion most of the fire was a ground fire. When the inversion lifted, the fire activity increased and occasionally moved through the forest canopy.
- Many of the fires burned in heavy "duff" or ground fuels, which had not burned in 100+ years. These fuels were extremely dry – perhaps the driest ever recorded in this century. This caused great quantities of smoke to be put into the atmosphere.
- Many of the fires burned in areas that are sparsely populated. Obtaining more volunteer help in some areas, like the remote areas of Oaxaca, was impossible because the area is so remote and sparsely populated.
- No amount of suppression resources would have been successful in combating these hundreds or thousands of fires when they initially started. Indeed, no country in the world possess sufficient suppression resources to respond to a wildland fire emergency of this magnitude.
- Hazards created by the strong winds and heavy smoke inversions made flying reconnaissance missions impossible. These conditions also grounded any air resources that were available for suppression action. This happens in the United States, particularly in southern California where the area is subject to the "Santa Anna" winds.

- New fire starts occurred daily. Because of the dry weather conditions and winds, many of these new starts were difficult to control. These new starts depleted available suppression resources, which could have been committed to the larger or “project” fires. (Committing available suppression resources to the new starts is a sound fire management practice. We do the same thing in the United States. A strong and aggressive initial attack is necessary in order to limit the number of large fires that create a significant drain on personnel, budgets, and other resources.)
- These new wildland fire starts continued in spite of an intensive public awareness campaigns and ambitious wildland fire prevention programs.
- **Initial attack of the new fire starts since about May 15th was 100% successful.** No new “project” or “campaign” fires were allowed to start, even though the weather and drought conditions remain unchanged and the farmers and ranchers continued to burn their fields. However, committing suppression resources to an aggressive initial attack operation created a shortage of suppression resources for the larger fires.
- Many fires spread deep into practically inaccessible mountain ranges and steep canyons. This, together with strong and erratic winds, daily smoke inversions, and limited suppression resources made it very difficult to get fire crews to the fires and then support them with tools, equipment, and meals. The smoke inversions and intermittently strong erratic winds limited helicopter flying time.
- Many wildland fires were actively burning in areas that were sparsely populated. Obtaining additional volunteers to fight these fires was not possible. The military had already committed its available personnel and the SEMARNAP personnel were already assigned to other fires elsewhere in Mexico.
- Logistically supporting the available fire fighters was a dismaying task because of the above stated conditions.
- Because of the prolonged dry season, both live and dead fuel moistures were at record lows. These extremely dry conditions, abundance of dry fuel, strong winds, thick inversion layers, and limited suppression resources, caused several of the fires to spread rapidly into areas that are sparsely populated and into steep and practically inaccessible terrain. The fires became very large, very quickly. Many of them burned together, creating a much larger fire front, greatly increasing the difficulty to control them. Several days of strong winds caused erratic, unpredictable, dangerous, and catastrophic wildfires
- Many of the fires burned together, creating a much larger fire front, greatly increasing the difficulty to control them and increasing the dangers to the fire suppression personnel.

- The extraordinary fire season, both in number of fires and severity of fires overwhelmed Mexico's wildland fire suppression capabilities. This same situation happened in the United States 3 times in the past 12 years. (1987, 1988 and 1994) It has also happened to other countries such as Canada and Australia.
- The high jungle ecosystems that previously have not been susceptible to wildfires burned for the first time in memory and perhaps the first time ever.
- It was predicted that the fires will continue for weeks or perhaps months unless:
 - 1) A significant change in the weather occurs, bringing about 3 or 4 inches of rain that penetrates the closed jungle canopy;
 - 2) A significant commitment of both hand crews and helicopters is made for the Chimilapas area, including the logistical support network and crew supervision;
 - 3) The farmers and ranchers living in the affected areas stop burning their fields, so that suppression resources do not have to be diverted to the new starts.
- SEMARNAP recognized the potential of this fire season as early as October 1997. They instituted a number of well thought out and effective plans, including:
 - 1) Two budget augmentations;
 - 2) increasing their fire prevention programs;
 - 3) instituting a highly effective data gathering and reporting system;
 - 4) conducting additional training for volunteers;
 - 5) increasing the coordination with the military and the local civilian volunteer groups; and
 - 6) establishing contacts with fire suppression resources in both Mexico and the United States. For a more in-depth report on SEMARNAP's proactive response to the fire problems of this year, please refer to the **Government of Mexico Preparations Section** on page 19.
- The skill level of the SEMARNAP personnel and the cooperation provided by the military, and local citizens volunteer made some progress in controlling priority fires. However, the magnitude of the problem overwhelmed Mexico's wildland fire suppression capacity.
- The suppression personnel distinguished themselves, working through long and arduous conditions since January. They continued to work diligently long into the time when the normal summer rains should have started.
- The daily fire situation report (Informacion de Incendios Forestales) was outstanding. It provided a detailed overview of the fire situation in each Mexican state and a national summary.

- The weekly fire situation report, prepared each Wednesday, was likewise outstanding. Among several other pieces of helpful information, it gave a detailed report of the number of fires reported, the area burned, and the average of hectares burned per fire.
- On June 2nd, a process was instituted to coordinate the movement of suppression resources across state boundaries, under the coordination of the “Delegados” (equivalent of a State Forester) of Oaxaca and Chiapas, the Incident Commander and the military. This is a Multi-agency Coordination Group. This group was established under the leadership of The Secretary of the Environment, Julia Carabias. This group was charged to consider the Chimilapas Area as one single area and to set a priority for each fire in the area, and report back to her on the suppression progress.
- The regional training courses, like the one held in Chiapas during 1992, are highly effective and beneficial in training fire suppression personnel. These types of regional courses are intensive, lasting about two weeks, with both classroom learning and hands-on learning by completing at least one prescribed fire.
- At no time in the history of the Mexican Federal government has it ever had to deal with so many fires, occurring simultaneously, burning over such a widespread geographical area, in ecosystems that have not been burned for decades or hundreds of years, in such remote and inaccessible terrain.
- The personnel in SEMARNAP are now being called upon to direct three aspects of the suppression operation that they have never had to do in their history, because they have never had this level of suppression challenge. The suppression aspects are:
 - 1) Managing many large and complex fires burning simultaneously,
 - 2) Coordinating and directing a large contingent of heavy lift and medium duty helicopters, in close support of an extensive land based suppression operation, and
 - 3) Conducting a large scale suppression actions in biologically sensitive ecosystems that have not burned in hundreds of years.
- There are currently only three other countries in the world that have the organizational skills, training, experience, and suppression resources to safely conduct the above described suppression operation. These countries are the United States, Canada, and Australia.
- The SEMARNAP personnel who worked closely with the suppression specialists from the United States now have the skills to safely manage and coordinate a large and complex helicopter operations in close logistical and operational support of fire crews.

- We were favorably impressed by the organizational structure in Chiapas. The wildland fire situation in Chiapas was more serious than in Oaxaca. Nevertheless, the organizational structure in Chiapas was sufficient to manage both the suppression of the fires and the logistical support of the fire suppression personnel. They operated effectively and efficiently because of the Regional Training Course sponsored by SEMARNAP in 1992.
- In the areas where the regional training courses have been completed, the fire organizational structure is notably stronger. In states that have not had regional fire training courses or have not sent their employees to fire training, their organizational structure is notably weaker and less effective.
- The benefits of the regional training courses are evident in the level of emergency management organization in place to suppress the fires, a logistical network to support the fire fighter, and a system to insure that a quick flow of accurate information takes place.
- The biggest problem was that there were too many priority fires for the number of suppression resources available in Chiapas and Oaxaca.
- This was an outstanding opportunity for SEMARNAP to provide training opportunities for fire suppression supervisors from the United States in methods of suppressing and controlling fires in steep terrain, in remote areas, with limited resources. This type of training would be particularly helpful when we experience large fires in remote parts of the western United States.
- At least one fire, and perhaps others burned across state boundaries. One fire started in Oaxaca and has burned into Veracruz. A system of coordination and assigning suppression resources between states is recommended so that a coordinated suppression effort across state boundaries can be developed and implemented.
- Other fires have started in Mexico and burned into Guatemala, or visa-versa. A system to coordinate suppression response across international boundaries must be discussed and agreements made on how to implement a suppression response when this occurs. This would also be particularly helpful for wildland fires along the US/Mexico border.
- The military has a good logistical system to feed and care for its soldiers on fire assignment. However, there is no mechanism in place for the military to feed and care for the volunteer and SEMARNAP fire suppression personnel.
- A faster decision making process must be adopted to mobilize military units cross State boundaries. Generals do not have the authority to send troops out of their assigned area of responsibility. For example, the military unit assigned to Chiapas could move personnel within the States of Chiapas, Tabasco, and Veracruz. However, without National approval, they could not cross into Oaxaca, only 50 miles away. The same was true of the military units in Oaxaca. This adds another level of coordination and communication that made immediate mobilization and deployment of suppression personnel very difficult.

5. Recommendations

*If you give a person a fish, you have feed them for the day.
However, if you teach him how to fish, you have helped him feed
himself and his family forever.*

This principle is certainly true with the many dedicated and professional employees of SEMARNAP. Presently, Mexico has the skills, training, abilities, and organizational effectiveness to suppress fires of short duration, even multiple fires of short duration. However, implementing the following recommendations will provide SEMARNAP the skills, knowledge, experience, training, and equipment to manage multiple large “project” fires over an extended period of time.

The following recommendations will help correct some current operational deficiencies as well as start a longer term process which will provide SEMARNAP personnel with the tools as well as the coordination and management skills to direct the suppression effort of multiple large-scale fires. These recommendations are divided into the following broad categories, Safety, Overall Program Management for both Countries, Executive Level Actions for Mexico and the United States, Basic Fire Suppression Training, Advance Fire Suppression and Operational Training for SEMARNAP, Aviation Training, Radio Systems Training, Tools and Equipment, Improving SEMARNAP’s Organizational Effectiveness, Prevention, and Technology. A short narrative conclusion is also included.

Even if Mexico never experiences another catastrophic wildland fire season such as it did in 1998, implementing these recommendations will greatly increase the organizational effectiveness for “normal” fire years. They will be significantly more self-sufficient and self-reliant for future wildland fire emergencies.

5a. Safety

Because fire fighter safety is the number one priority for both SEMARNAP and the wildland fire management agencies in the United States it is listed first. Since the 1998 fire season was one of the worst, if not the worst in terms of the number of fire suppression personnel killed, steps **MUST** be taken to insure this never happens again. Implementing the following recommendations is a **MUST** to insure the safety of suppression personnel.

1. SEMARNAP and the United States jointly conduct an in-depth accident review of the fire entrapment fatalities that occurred during the 1998 fire season. They report their findings to their respective agencies, USAID, the Fire Management Study Group of the North American Forestry Commission and the Bi-national Commission. Based on the findings of this Accident Review Board, an extensive safety program be implemented by SEMARNAP, with technical assistance from the US wildland fire management agencies. This program **MUST** be funded by SEMARNAP and USAID.

2. SEMARNAP has developed a training course for the volunteer fire fighters. It is recommended that US technical experts review this course for content and participate in several courses to review the level of instruction. These courses must be continued annually and actively supported by Mexican and USAID as well as US technical experts.
3. SEMARNAP, the military, and other Mexican agencies that use helicopters for fire suppression missions, **MUST** develop an intensive helicopter pilot training program. This program must deal with all aspects of safely conducting fire suppression operations, including water drops, logistical support, and personnel movement.
4. SEMARNAP should study and consider adopting a fire assignment qualification system, similar to the “Red Card System” used by the Federal wildland fire management agencies in the United States. The “Red Card System” helps identify the level of training and experience that a fire fighter has, so that he or she can only be placed in a fire assignment for which they are qualified.

5b. Overall Program Management for both Countries

1. Implementing, coordinating, overseeing, and following up on the recommendations in this report and coordinating a training and technical exchange program of cooperation will be very demanding for both countries. It could well be a full time job for personnel from Mexico and the United States. The most important part of implementing the recommendations, is the program’s overall management and coordination.
2. The funding to implement the recommendations to improve SEMARNAP’s organizational effectiveness be provided by the US Agency for International Development.

5c. Executive Level Actions for Mexico and the United States

1. SEMARNAP, Mexico City, must have the authority, autonomy, policy, and special legislation allowing them to accomplish the following 4 action items.
 - i) The authority to negotiate agreements, interact with their counterparts in State SEMARNAP offices, the military, and other Mexican government organizations, and the authority to enforce the agreements.
 - ii) Develop a fire budgeting process similar to the National Fire Management Analysis System (NFMAS) used by the USDA Forest Service.
 - iii) Establish an Emergency Fire Fighting Fund in order to rapidly receive supplemental budget augmentations during fire emergencies, to purchase additional tools, equipment, contract for additional aviation resources, pay personnel, etc. (Also see item 5i(3), page 17.)
 - iv) Improve the administrative processes to acquire, store, and account for tools and equipment ordered during fire emergencies and sent to the States.

2. The USDA Forest Service should establish a national level position (not necessarily located in the Washington Office, perhaps in Phoenix, Arizona or southern California), to develop and coordinate all aspects of this increased and revitalized program of cooperation. The funding for this position should be provided by USAID.
3. The Fire Management Study Group of the North American Forestry Commission should provide the overall coordination and direction for the revitalized program of mutual cooperation between Mexico, the United States, and Canada. The coordination and program of work can be presented for approval at their annual meeting.
4. SEMARNAP, the military and other agencies involved in fire suppression operations develop mutual agreements and memorandums of understanding, defining how they will support each other both logistically (feeding, transportation, etc.) and operationally (suppression) on the fire line. The military has a good logistical network and organization to feed and care for its soldiers on fire assignments. However, there is no mechanism in place for the military to feed and care for the volunteers and SEMARNAP fire suppression personnel.
5. A faster decision making mechanism must be in place to permit the military commanders to mobilize across State boundaries. We observed a clear example of this deficiency for the Chililapas area. The military unit assigned to Chiapas and stationed in Tuxtla Gutierrez had the authority to move military personnel within the States of Chiapas, Tabasco, and Veracruz. However, without Cabinet level approval from Mexico City, they could not cross into the State of Oaxaca and support the suppression effort in Chililapas. The same is true of the military units in Oaxaca. This adds another level of coordination and communication that was difficult to deal with. During our involvement in the assessment and mobilization we were not successful in overcoming this operational deficiency.
6. The level of authority of the Mexico City Office of SEMARNAP must be elevated to be superior to the authority of the State SEMARNAP offices. The Mexico City Office must have the ability to move personnel, aircraft, tools, and equipment across state lines, in an expeditious manner.
7. The Mexico City Office must have the authority to ensure a rapid mobilization effort; ensure that personnel are used in the most effective manner; and that all suppression resources are used effectively when a widespread wildland fire emergency exists.
8. SEMARNAP must develop agreements with other Mexican government agencies and NGOs to establish Burned Area Emergency Rehabilitation (BAER) Teams. These teams are comprised of natural resource management personnel who visit the fire area, even before the fire is controlled, to recommend what measures must be taken to protect the productivity of the land and the health of the ecosystems.

9. The United States and Mexico initiate an active program of exchanging fire program experts on an annual basis, similar to what has been done with Australia. One year the experts from the US go to Mexico, the next year the experts from Mexico come to the United States. This facilitates technology transfer and identifies training needs and opportunities. The national level Program Manager would manage this exchange program.
10. SEMARNAP develop and fully fund at least one heli-tack program with the proper training and qualified personnel and station it where appropriate.

5d. Basic Fire Suppression Training

1. SEMARNAP continue to send their employees to work on hot shot and helitack crews in the United States for 2 or 3 month assignments. These employees will receive a very high level of training and experience during their training assignment. It is recommended that this type of training be based out of the Forest Service Regions 3 and 5. Other wildland agencies, with hot shot crews and heli-tack crews should be a part of this training program. SEMARNAP should send at least 6 employees each year to receive this specialized training.
2. SEMARNAP personnel receive training in the use of the Wildland Fire Situation Analysis (WFSA).

5e. Advanced Fire Suppression Training

The Assessment Team noted suppression deficiencies in the following areas:

- 1) Lack of experience in managing large and complex fires for an extended period of time.
- 2) Managing large helicopter operations utilizing both large and medium size helicopters.
- 3) Coordinating the helicopter operations is close support of suppression actions.
- 4) Setting up and maintaining a radio communications network.

Acquiring the full range of skills necessary to manage large and complex fires for an extended period of time, coordinate the use of helicopters in support of suppression personnel, and set up radio communication systems are perhaps some of the most difficult fire management and emergency skills to acquire. They are introduced in the classroom and augmented by on the ground experience and practice. Implementing the following recommendations will start SEMARNAP personnel on the path to acquire these level fire suppression skills.

This is a very broad area and has been divided into 3 parts, adoption of the Incident Command System (ICS); Aviation Training, and Radio Systems.

5e(1) Incident Command System

The most important component in developing advanced fire suppression skills to manage large and complex wildland fires is the development and implementation of an Emergency Management System, similar to what is used in the United States, Canada, and Australia. All United States Federal wildland fire agencies as well as most large city, county and state fire organizations use a system named the "Incident Command System" (ICS). This system provides common terminology and helps build a logistical, financial, and informational network to support fire operations. It gives the Federal government many more resources to call upon in the event of a large wildland fire emergency.

1. In order to implement an emergency management system, training courses that are more advanced than the Regional Courses will need to be developed jointly by SEMARNAP and the US. (The regional courses are currently designed to take fire fighters from a basic level of understanding to an intermediate level of understanding.) The courses, which are recommended, are the I-100, I-200, I-300 and eventually the I-420 courses.
2. These courses will first need to be translated from English to Spanish. After the translation, the courses will need to be developed under the "Train the Trainer" concept. With help and involvement of technical experts from the United States, these courses can be translated and taught in Mexico or the United States. Perhaps the first course should be taught at the Forest Service facility in Marana, Arizona. The facilities are specially designed for this type of instruction. Once the first "Train the Trainer" course has been developed and field-tested, it can be packaged for use in Mexico. This level of course will give the SEMARNAP personnel a good oversight and training on how to plan, implement, and logistically support a large project fire.
3. Once the course is ready to be taught in Mexico, technical experts from the United States should assist SEMARNAP in conducting these courses on a regular basis each year in Mexico.
4. In addition to the I-420 courses, a more advanced I-520/620 course, in Spanish must be developed. SEMARNAP and US technical experts must jointly develop the I-520/620 course. The first two courses should be taught at the Marana, Arizona facility. The successful graduates from these courses will be trained and experienced so that they can teach the course in Mexico.

5e(2). Aviation Training

1. The US wildland fire management agencies identify Spanish speaking personnel, highly skilled in helicopter operations, who can come to Mexico and work on heli-tack crews for 1-3 months. Their objectives will be to help oversee the management of the heli-tack program and provide training in all aspects of helicopter management.

2. Many more SEMARNAP personnel receive on-the-job training in Helicopter Manager positions in the US with the Forest Service or Bureau of Land Management. This must be an ongoing program, lasting for several years. SEMARNAP personnel should be sent to the US in pairs and assigned together on a heli-tack crew. They should be on the heli-tack crew for at least 2 months. A 3 or 4 month training assignment is preferable.
3. The helicopter load calculations must be translated into Spanish and the metric system incorporated into the load calculations.

5e(3). Radio Systems Training

1. SEMARNAP, Mexico City must retain all three radio systems sent by USAID and all 3 systems be controlled and maintained as part of Mexico's National Fire Cache, in Mexico City.
2. SEMARNAP must identify personnel who have the interest and ability to learn how to set up, maintain, and use the USAID provided radio equipment and that they be sent to the US for training and experience. These individuals will not receive technical training in how to repair radios. However, they will receive "Communications Unit Leader" training which provides the skills to set up repeaters, and build small communication networks similar to what was done in Oaxaca and Chiapas.
3. Communication Unit Leaders be sent from the US to Mexico to train and instruct SEMARNAP personnel how to setup, maintain, dismantle, and store radio systems.

5f. Tools and Equipment

The two most important outcomes of USAID's assistance were: 1) providing SEMARNAP a large supply of high quality fire suppression tools, and 2) the training opportunity provided by the Helicopter and Air Operations personnel.

When the tools arrived, the Assessment Team noted that SEMARNAP immediately implemented a good accountability, inventory, and tracking system. Many of the following recommendations will help improve this system and provide the framework for a comprehensive tool and equipment support network throughout Mexico.

1. All equipment sent by USAID to SEMARNAP must be assigned to the Mexico City SEMARNAP office and be subject to their control and distribution.
2. SEMARNAP establish a national fire cache in Mexico City, similar to the National Interagency Fire Cache located in Boise, Idaho.

3. SEMARNAP establish three regional fire caches in areas that are subject to repeated fires and where the life, property, and natural resources are at high risk.
4. Management and control of the regional fire caches must **NOT** be subject to the control of the SEMARNAP Delegado of the state in which it is located. Control of the regional warehouses must be handled either by: 1) control by the Mexico City SEMARNAP office, or 2) control by a "Board of Directors" made up of the Sub-delegado from the State SEMARNAP organizations of each state served by the regional warehouse.
5. SEMARNAP must set up a warehouse inventory, distribution, and accountability system for their national and regional fire caches. Their personnel should receive training in the United States on developing and maintaining a warehouse inventory, distribution, and accountability system for their fire caches.
6. Technical experts from the United States come to Mexico and work directly with the SEMARNAP personnel on developing and implementing their warehouse inventory, distribution, and accountability system.
7. SEMARNAP implement a tool inventory and ordering system using the same National Fire Equipment System (NFES) numbers that are in use in the United States. This will greatly reduce any future confusion about tool and equipment ordering and greatly facilitate the movement of tools across the international boundary.
8. SEMARNAP and the United States jointly translate the tool catalog and make copies of the catalog available to SEMARNAP. All SEMARNAP tool orders be placed through the Tool Catalog. This will insure that the tools when ordered are durable and compatible, not only with the current equipment, but also with equipment used in the United States.
9. Make copies of the fire equipment specifications books and catalogs available to SEMARNAP. Translate these books and catalogs into Spanish.

5g. Improving GOM Effectiveness in Wildland Fire Mobilization

1. As previously stated in item #5c, *Executive Level Actions* on page 11, a faster decision making mechanism must be in place to allow the military to mobilize outside their predetermined areas of responsibility.
2. SEMARNAP, the military, and other agencies involved in fire suppression operations must work together to logistically support each other on fire assignments. The military has a good logistical organization and network to feed and care for its soldiers on fire assignments. However, there is no mechanism in place for the military to feed and care for the volunteers or the SEMARNAP fire suppression personnel.

5h. Increasing SEMARNAP Organizational Effectiveness

1. SEMARNAP and the US Forest Service should conduct an extensive internal review of the current organization to determine if SEMARNAP is effectively organized for a rapid mobilization response, as well as being readily able to mobilize and task the military, other state SEMARNAP organizations, and other GOM agencies.
2. SEMARNAP personnel receive training in the United States on how the wildland fire agencies use the Administratively Determined ("AD") pay rates to hire additional fire fighters and support personnel.
3. SEMARNAP personnel receive training on how the wildland fire agencies use the Emergency Rental Agreements (ERAs) to increase the amount of equipment and services available to the agency during the fire season. These agreements are developed each year, before the fire season starts, and sets forth the services to be rendered and the costs of the services. The negotiation is completed before the fire season starts, so there is no delay in receiving the equipment and services. There is also no price "gouging" when the emergency begins.

5i. Technology

1. SEMARNAP employees should be sent to the United States to learn and observe the current uses of Geographic Information Systems, Fire Protection Assessment processes, developments in satellite communications, and other forms of technology which are rapidly evolving and being implemented.
2. SEMARNAP should develop a National Fire Danger Rating System based on Mexican fuel models. Once the fuel models have been identified and a Fire Danger Rating System developed, these will be the key component of prevention programs, prescribed fire programs, and suppression mobilization.
3. As stated under item 5c(iii) *Executive Level Actions for Mexico and the United States*, on page 11, SEMARNAP should learn, develop and use the National Fire Management Analysis System (NFMAS). This is a scientific method to determine the number and kinds of suppression resources that should be in place before fire season starts. It is an economic model that balances the number of acres burned against a given budget level. For example, if less money is appropriated, fewer fire suppression resources can be funded, resulting in an increase in acres burned. With larger budget appropriations, wildland fire damages are expected to decrease. It is a scientific approach to budgeting for wildland fire emergencies.

5j. Prevention and Rehabilitation

1. SEMARNAP must be funded to implement a very active fire prevention program using public service announcements on radio, television, newspapers, magazines, etc. The announcements will need to be in Spanish and the Indigenous dialects found in many of the states.
2. The prevention program must include working with children in the elementary grades, as well as farmers and ranchers who use fire as a traditional and cost-effective way to clear their fields.
3. The GOM establish a program and policy, with funding and cooperation from various non-government organizations to begin the process of restoring, rehabilitating, and reforesting the areas damaged by the 1998 wildland fires.

5k. Miscellaneous

The Fire Line Hand Handbook needs to be republished in Spanish and distributed to SEMARNAP.

6. Conclusions

The national leaders of SEMARNAP and the US Government wildland fire management agencies must be committed to supporting, implementing and providing a budget if the recommendations made in this report are to be successful.

Although no detailed calculations have been made, it is felt that funding and implementing a program of this magnitude would cost about \$350,000 a year. While this may seem like some to be a lot of money for an annual program, the \$7,500,000 USAID program supplied in 1998 would support this level of a program for more than 21 years.

In considerably less time than 21 years, Mexico will acquired the level of management and operational skills to more than adequately correct all operational deficiencies that were noted in the initial assessment, the subsequent mobilization, and fire suppression operations during the 1998 fire season.

7. Special Commendations

The Assessment Team believes that SEMARNAP or other officials in the Mexican government should be commended for the following specific actions:

- ♦ Sponsoring and conducting the Regional Level Training Courses which have been held throughout Mexico during the previous 8 – 10 years.
- ♦ Recognizing by October 1997 that the following year had the potential to be a very severe fire season.

- ◆ Identifying in mid-February 1998 that the country was in the midst of a very serious fire season and submitted a budget augmentation request to double their initial 1998 budget. This budget augmentation was approved in March.
- ◆ Requesting and securing a second budget augmentation was approved in May after the Assessment Team presented its assessment report. This budget augmentation was equal to the budget augmentation requested in February and approved in March.
- ◆ Instituting the “Daily Fire Situation Report” (Informacion de Incendios Forestales) which gave a detailed overview of the daily fire situation in each state.
- ◆ Instituting “The Weekly Fire Situation Report,” which was prepared and made available each Wednesday, was likewise outstanding. Among several other pieces of helpful information, it gave a detailed report of the number of fires reported, the area burned, and the average of hectares burned per fire.
- ◆ During the 1998 fire season SEMARNAP increased its coordination with the military and the local civilian volunteer groups.
- ◆ In 1997 SEMARNAP trained 20,000 volunteer fire fighters.
- ◆ Between January and May, 1998, SEMARNAP trained more than 15,000 volunteer fire fighters, even though they were in the midst of the worst fire season in their history.
- ◆ Setting up a process to coordinate the movement of suppression resources across state boundaries, under the coordination of the “Delegados” of Oaxaca and Chiapas, the Incident Commander and the military by The Secretary of the Environment, Julia Carabias.
- ◆ Julia Carabias charge to the group to consider the Chimilapas area as one area and to set a priority for each fire in the area, and report back to her on the suppression progress.
- ◆ Even though the weather and drought conditions remain unchanged and the farmers and ranchers continued to burn their fields, no new “project” or “campaign” fires started after the outbreak of the catastrophic wildfires between May 12th and May 15th. Initial attack after this period was 100% successful. This is commendable, considering the substantial mobilization commitment to the large, priority fires.

7. Summary Mexico’s Preparation and Response to the 1998 Wildfires

SEMARNAP has been diligently and actively improving and increasing its fire management program for more than 15 years. During this period the expertise of individuals increased from that of entry-level fire fighters to national level leaders in wildfire management programs. In 1997, for example, SEMARNAP conducted 514 fire fighter training courses, which trained approximately 20,560 individuals in preparation for the 1998 fire season.

Another significant improvement was the development of a comprehensive fire statistical reporting system. This system gave SEMARNAP the ability to predict as early as mid-February 1998 that 1998 was an extremely unusual fire occurrence year. They accurately noted that 1998 was appar-

ently going to be a fire season significantly above the 5 year average for both the number of fires and the number of hectares burned.

With this information, SEMARNAP instituted many fire suppression training programs, specially designed to increase the total number of fire fighters that could be mobilized in the case of a fire emergency. From January to May 1998, they completed 395 fire fighter training courses in 30 different states and trained more than 15,800 fire fighters.

Another major accomplishment was a significant budget augmentation from the President and National Assembly, which doubled the initial 1998 SEMARNAP budget. Their budget was originally about \$10,000,000 (US currency). This initial budget was augmented by an additional \$10,500,000 (US) in March. After the assessment team completed its report, the SEMARNAP budget was again augmented by an additional \$4,800,000 (US).

Other aggressive steps taken include augmented fire prevention programs and the institution of a highly effective data gathering and reporting system. Effective measures were taken to increase coordination with the military and to train additional military personnel. They also increased their interaction and coordination with the local civilian volunteer groups. Further, they established contacts with fire suppression businesses to purchase tools and contract for additional helicopters in both Mexico and the US.

From January through the first part of May they fought and successfully controlled more than 10,000 fires. They did this with the fire suppression resources they had available in Mexico. They moved suppression personnel and equipment between States, then the state SEMARNAP officials identified their priority fires. This information was conveyed to the central Federal office and they helped to set the priority fires on a national basis.

From January to the first part of May, SEMARNAP mounted a successful control effort. However, beginning about May 12th, the farmers and ranchers began their customary "slash and burn" agriculture fires. The farmers and ranchers set the fires believing that on May 15th the summer rainy season would start, as they traditionally have in previous years. Literally hundreds and perhaps thousands of fires were ignited within a three day period. With this "ignition event," under extreme drought and burning conditions, the new fire starts overwhelmed the available initial attack fire suppression forces.

This ignition event also overwhelmed the fire suppression resources that were already deployed and actively suppressing wildland fires in other areas of Mexico. Many of the fire suppression resources had already been working continuously for more than five months.

The slash and burn fires occurred in all regions and all states. The two states hit particularly hard were Oaxaca and Chiapas. The geographical distances in Mexico, and the commitment of suppression resources through out the country made an immediate response impossible. The fires in Oaxaca and Chiapas, pushed by strong winds quickly became catastrophic fires. Similar things happened in all states throughout the country. This can be compared to what happened in the United States in 1987, 1988 and 1994.

Because fires continued to burn actively in other States, the mobilization of additional fire crews and military personnel was to Oaxaca and Chiapas was extremely difficult, if not impossible.

Because of the prolonged and severe drought, ecosystems that probably have not burned in hundreds years were heavily damaged by wildfire.

SEMARNAP's overall organizational effectiveness, and the fire management skills of the program managers at both the National and State levels have increased substantially over the past 15 years.

Many fire suppression personnel have received training and experience and now have the necessary skills and abilities to manage even the worst wildland fire situations. 1998 was a significant test of years of training and experience and they successfully demonstrated the knowledge, leadership, and skills to confront the worst wildland fire event of this century.

A professionalism and commitment exists in SEMARNAP's wildland fire suppression program, which is greater now than it ever has been. This level of professionalism is continuing to expand. There is a significant concern for and commitment to fire fighter safety as well as natural resource protection which equals that of the natural resource management agencies in the United States.