# Central American Fire Management Forum

San Salvador, 30-31 October 2007

Symposium Report


PROYECTO TRIFINIO- GTZ

Desarrollo Sostenible en la Cuenca Alta del Río Lempa en la Región de Trifinio

GTZ - cooperación técnica alemana-

## *Index*

## *Abbreviations*

| | |
|---|---|
| ANAM | National Environmental Authority - Panama |
| CBES | El Salvador Fire Department |
| CINF | National Forest Fires Committee – El Salvador |
| COHDEFOR | Honduran Forest Development Corporation |
| EMCFA | General Joint Armed Forces Staff |
| FGR | Environmental Unit of the Attorney General's Office |
| GFMC | Global Fire Monitoring Center |
| GTZ | German Technical Cooperation |
| INAB | National Forestry Institute - Guatemala |
| INAFOR | National Forestry Institute |
| ISTU | Salvadorean Tourism Institute |
| MAG | Ministry of Agriculture and Livestock |
| MARENA | Ministry of the Environment and Natural Resources – Nicaragua |
| MARN | Ministry of the Environment |
| MINAE | Ministry of the Environment and Energy |
| OFDA-LAC | Office of U.S. Foreign Disaster Assistance – Latin America and the Caribbean |
| PNC /DMA | National Civilian Police / Environmental Directorship |
| SICA - CCAD | Central American Integration Secretariat – Central American Environmental and Development Commission |
| TNC | The Nature Conservancy<br>Mesoamerican and Caribbean Region |

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## *Acknowledgements*

The organizing committee of the Central American Fire Management Forum wants to specially thank all those persons, institutions and organizations, which with San Salvador with their determined and unselfish support contributed to the successful carrying out of this event.

Special thanks to the Government of the Federal Republic of Germany, whom through GTZ, financed and provided support to the Forum's organization.

Special acknowledgements to all international participants from institutions and organizations working in fire management:

| ***INSTITUTION*** | ***NAME*** | ***POSITION*** | ***COUNTRY*** |
|---|---|---|---|
| Ministry of the Environment and Energy - SINAC | Luis Diego Román Madríz | Coordinator, National Fire Management Program and member of the National Forest Fires Commission | Costa Rica |
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| Computer Technology Management – MARN, El Salvador | Wilfredo Fuentes, | Specialist in SIG and Remote Sensors Environmental Information System - SIA MARN | El Salvador |
| TNC Guatemala | Lenin Corrales | Scientific for Regional Conservation, Mesoamerican Science Program TNC | Guatemala |
| TNC - Honduras | Ecologist Victoria Pantoja Campa | Applied Fire Ecologist specialized in Fire Management | Honduras |

Our gratitude to all those participating in discussion panels which through their experiences generated valuable inputs for the expected results of the Forum, and specially to the team providing support to the facilitation and writing of the results of Work Panels:

- Panel 1: Main learning, achievement and challenges for fire management in Central America
  - Javier Magaña (Facilitator)
  - Nery Zaldaña (co-facilitator)
- Panel 2: Recommendations on strategic axes in Fire Management Plans
  - Fidel Rauda (Facilitator)
  - Miguel Tejada (co-facilitator)
- Panel 3: Suggestions for improving the legal framework and its application in Central American countries
  - Hugo Zambrana (Facilitator)
  - Claudia Jiménez (co-facilitator)
- Panel 4: Strategies and practices for the integration of local governments to fire management
  - Carlos Escobar (Facilitator)
  - Baliseo Ortiz (co-facilitator)

## *Introduction*

The “Sustainable development in the upper Lempa river basin in the Trifinio region, Trifinio-GTZ” project, carries out since January of 2006, its second execution phase; this has as its general objective that risk management be integrated as a transversal instrument in local development processes of communities and municipalities.

The influence area is 5 municipalities in the department of Santa Ana: Metapán, Santa Rosa Guachipilín, Masahuat, Santiago de la Frontera and San Antonio Pajonal; and 3 municipalities in the department of Chalatenango: San Ignacio, Citalá and La Palma.

The TRIFINIO-GTZ Project has established the goal of fulfilling a series if indicators referring to the increase of municipal investments in measures of risk management, reduction of vulnerable communities, use of methodological tools and instruments to carry out a comprehensive risk reduction process.

During the last decade, the impacts caused by forest fires are considered as a recurring and progressive problem in the Central American region. These impacts are basically concentrated on natural resources from a social-economic and environmental perspective, which in many cases go beyond borders, due to the effects of fire, ashes and smoke, water contamination, soil, loss of biodiversity and direct contribution to desertification.

El Salvador and the countries of the region, aware of this problem, have been carrying out activities for prevention, control, investigation and mitigation in affected areas. Within the framework of these efforts is that the Central American Fire Management Forum was organized.

The Forum counted on participation of speakers representing Central American institutions working in fire management, as well as participation from representatives of OFDA-LAC and of the Global Fire Monitoring Center (GFMC) Germany.

The Forum counted on the attendance of government institutions, representatives of the risk panel of the Trifinio-GTZ Project, NGOs, communities and independent consultants working in the subject.

Attendance to the Forum in both dates exceeded the expectations of the organizers; the first day, there was approximate attendance of 235 persons and for the second day, an estimate of 150 persons was present, staying until the end of the event.

The Forum counted on ample media coverage, organized by the consultants in charge of the Forum’s organization and moderation; prior to the Forum, a full page was published in the newspaper of greater circulation of the country, and there will be two more publications in that same newspaper. The population was also informed about the carrying out of the event by the television channels.

## *Opening Ceremony*

The Central American Fire Management Forum was officially opened by the Minister of Government, Dr. Juan Bolaños, who had the company at the honor panel of national authorities such as: Julián Muñoz / Trinational Executive Secretary of Plan Trifinio, Dr. José Emilio Saudi / Vice-Minister of MAG, Ing. Roberto Escalante / Vice-minister of MARN and representatives of international cooperation: Mr. Jürgen Steinkrüger / Ambassador of the Federal Republic of Germany in El Salvador and Mrs. Regina Bauerochse / Director of GTZ in El Salvador. During the opening ceremony, speeches were pronounced by the Minister of Government, the Trinational Secretary of Plan Trifinio and by the Ambassador of the Federal Republic of Germany, all of them highlighting the importance of this Forum for the Central American region.

## *Forum objectives and methodology*

The Forum aims to introduce the concept of fire management, and to that effect, four great theme axes were discussed:

- Investigation systems for fire causes
- Fire detection and monitoring systems
- Institutional strengthening for the institutions working in fire management in Central America
- Fire prevention strategies

We count on papers on a broader framework on the subject of Fire Management and presentations of experiences of the countries in fire management.

Besides, during the second date, sharing these subjects had as its objective:

- Knowing about and sharing experiences of the Central American region related to fire management.
- Knowing about the operation of organizational structures and their legal framework in each country, as a function of practical applicability.

## *Expected Forum results*

The results expected as a consequence of the carrying out of the Forum were:

- Socialization of the concept of fire management
- Transference of knowledge on fire management
- Strengthening of institutions forming the CNIF
- Strengthening of the technical, operational and administrative capacity, through the socialization of experiences.
- Awareness raising in the population on the problem, causes, effects and prevention strategies for forest fires at the Central American level.

## *Conferences*

Presentations were previously requested to the speakers in Power Point, and a summary to be included in the CD supplied at the beginning of this Forum, and to be used in this Forum Report. Not all of them submitted summaries, and in their absence, we have included in some cases the complete Power Point presentation in this report.

## *1.0 Conferences – Investigation systems for causes of fire*

## *1.1 Comprehensive forest fire management: Community participation, international experiences and guidelines*

**Johann G. Goldammer**
**Global Fire Monitoring Center (GFMC)**

## Community participation in the comprehensive management of forest fires

**Reasons**

Fire is :

- A scattered spatial phenomenon and
- Hard to control in a centralized manner
- The responsibility of fire control must be brought closer to those suffering from them or those benefiting with their use

## Community participation in the comprehensive management of forest fires

**Goal :**

- Safe, rational, sustainable and environmentally compatible use of controlled fire

**Obstacles:**

- The need of legal changes and complementary policies
- Accessibility to technical support and resources of other type required by the communities to assume a central role in fire management .

**Access Points:**

- Definition of mechanisms, methods and “policies” to motivate the community to assume responsibility

**Instruments prepared by the**
**Global Fire Monitoring Center (GFMC)**

- Support to the development of national comprehensive forest fire management programs starting at the local level :

***"Round tables on fire management "***

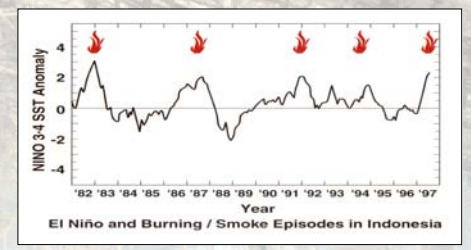
in cooperation with the German Technical Cooperation Agency (GTZ) and other international partners

## Examples: (1) Indonesia

**Consequences of episodes of 1982-83, 1997 and 1991, and in anticipation of future events**

**Strategic planning meeting "Long-term Comprehensive Forest Fire Management" (Bandung, June 1992)**

**Supported by GTZ and GFMC**



## (2) Namibia

**In response to the increasing trend of fires in the northern part of the country:**

**The Namibia-Finland Forestal Program (NFFP)concluded the "National Round Table on Fire Management" (1999)**


**The situation in Africa**

**Example: Namibia**

- *Namibia Strategic Forestal Plan,* 1996; The Namibia-Finland Forestal Program
- *Pilot project for the control of forest fires*. The name and the focus were changed in 1998 to *Comprehensive Forest Fire Management*
- *National guidelines on forest fire management in Namibia* (2001)

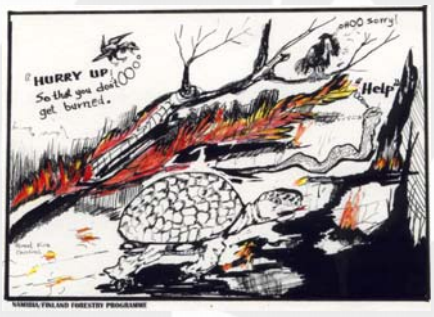
# Namibia

- Provide support to public relations and the extension of forest fire prevention activities in the government and training and mobilization of local communities to fire management units, and

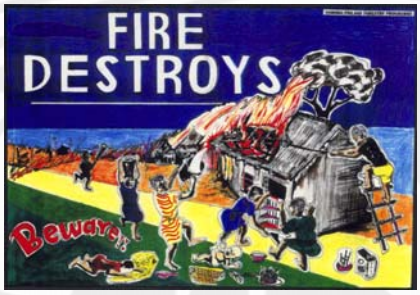
- Awareness-raising on forest fires and public education campaigns in schools and local organizations of the area, incorporating all participants. This includes the production of printed material, posters, theater plays, games radio programs and videos .

Numerous themes related to forest fires presented in posters prepared by the Caprivi Cultural and Artistic Associations (billboards, posters)
* Fire and the environment


Logo

* Property in danger and safety

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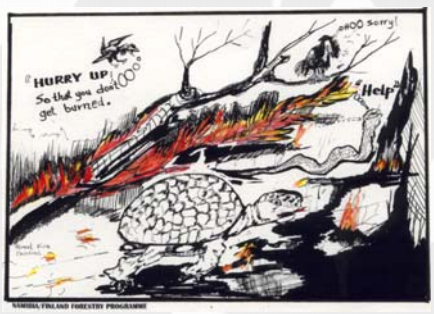
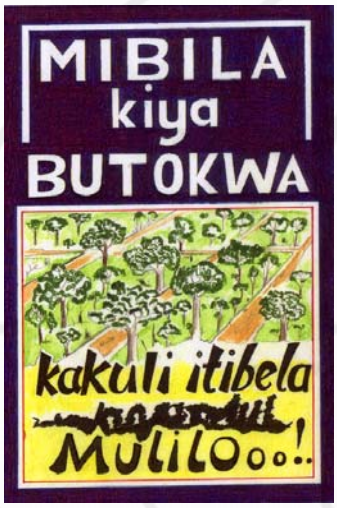


* Community protection






* Fire prevention


## (3) Ivory Coast

- 1986: Formation of a *National Committee of Forest Protection and Crawling Fire Control*

- Personnel from the Forest Ranger Service fill the positions of the General Secretariat and Presidency of the National Committee. These entities coordinate the participation of 14 Ministries which comprise national programs .

## Ivory Coast

The task of this committee is raising the awareness of the population about the damages caused by fires, the need of prevention and fire combat techniques .

## Ivory Coast

At the administrative level, 1,500 committees were created in villages, 57 local committees, and 32 regional committees to decentralize the task of combat and control of fires during the last decade .

## Ivory Coast

- The contracts with the committees are paid monthly (during the 4 months of the dry season). The remuneration is inversely proportional to the size of the area affected by fires. The basis for payment is:
  - US$ 1,000 per month if no area caught fire
  - US$ 800 per month for less than 5 hectares burned
  - US$ 500 per month for less than 10 hectares burned
  - US$ 100 per month for less than 20 hectares burned

## SOUTH AFRICA

### Operation Firestop “Ukuvuka”

- *Ukuvuka: The Firestop Campaign* (*Ukuvuka* is word in the Xhosa language which means “awaken”), bringing together representatives of the government, private sector and the media of a whole society – something without precedent in the South of the African continent:
- Members of the public sector
- Contributions from the private sector

The first area of focus is the land and its vegetation, where the purpose is:

- Controlling the invasion of foreign plants
- Rehabilitating areas damaged by fires .

The second area of focus is the communities and the individuals, through assistance for:

- Create sources of employment, training and reduction of poverty for the less-favored population
- Protect the most vulnerable populations from fires
- Promote cooperation and social cohesion among communities

**UKUVUKA followed up by "Working on Fire" (WoF)**

Involvement of unemployed people in a marginal social situation, especially young people

Training on fire extinction

**UKUVUKA followed up by "Working on Fire" (WoF)**

Involvement of unemployed people in a marginal social situation, especially young people

Training on fire extinction

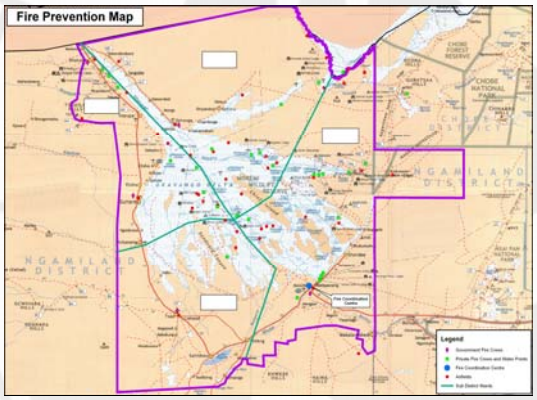
**UKUVUKA followed up by "Working on Fire" (WoF)**

Preparation of public information and educational materials

**UKUVUKA followed up by "Working on Fire" (WoF)**

Preparation of fire management plans at the national level and in cooperation with neighboring countries ("WoF International")

Example: Botswana




**Training on fire management based on the communities**

**Approaching participative planning**

**Example: Nepal**

## Participative planning

- Identification of zones, changes, contrasts, general conditions and characteristics of the topography of the community ("Transect walk")

- Present and analyze the information on use of the land, forests, water and other resources, and risk zones (participative preparation of a local map)

**"Transect Walks"**

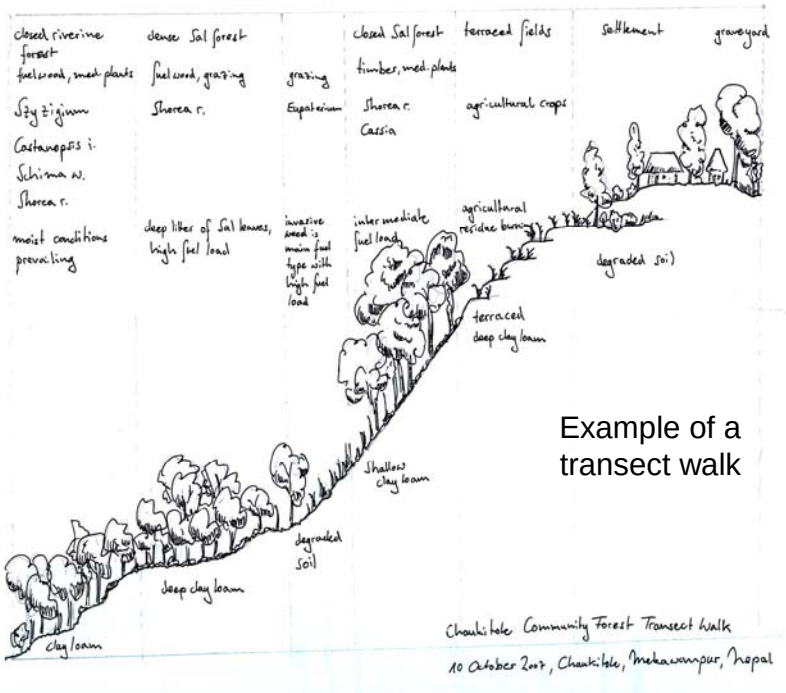
## What are "transect walks"?

A walk carried out by local inhabitants to prepare a map (topography, type of vegetation, human settlements, hydraulic resources, "hot points"…

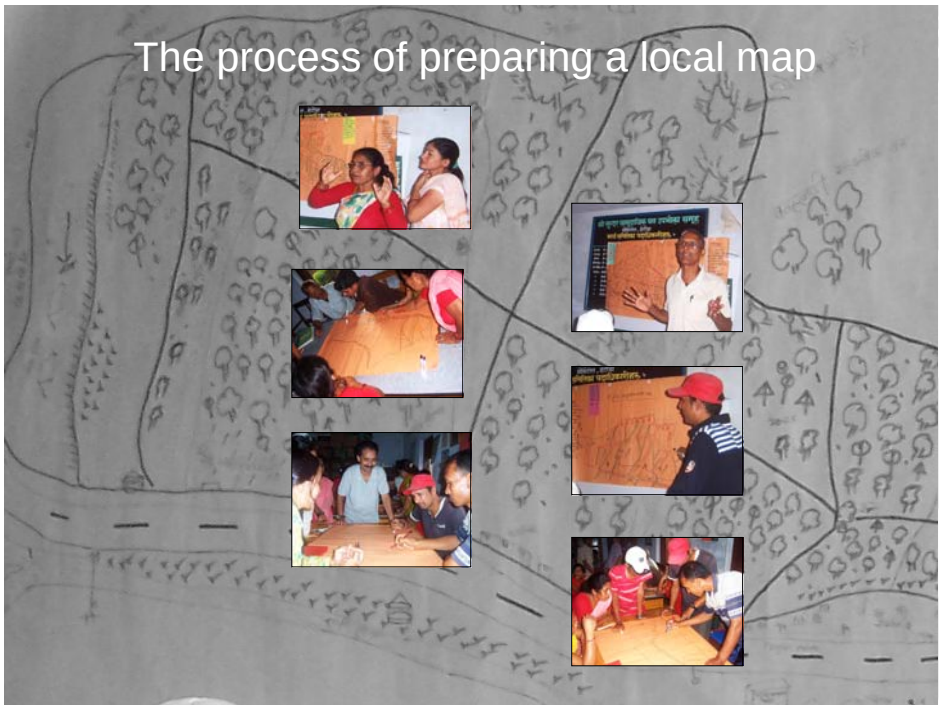
**“Transect Walks”**

**Why “transect walks”?**

These walks help identify risk zones, changes in the use of the land, environmental situation …serving as a basis in the local-level planning process




Example of a transect walk




## Main actors in the process

- Global Fire Monitoring Center (GFMC)
- US Forest Service
- World Bank
- The Nature Conservancy (TNC)
- Government of Spain
- Australasian Fire Authorities Council

- Many more

## Voluntary-type guidelines

- Introduction
- Multisectoral aspects
- Principles
  - Social and cultural
  - Economic
  - Environmental
  - Institutional
  - Strengthen capacities
- Strategic actions

## Objectives

✓ Establish **principles** for activities responsible of fire management

✓ Contribute to the establishment and execution of **(sub)national policies** and support the establishment/improvement of the legal, regulatory and institutional framework for a responsible management of fire

✓ Provide orientation for the formulation and application of **international instruments, binding or voluntary**

## Objectives

- ✓ Facilitate **mutual assistance and technical and financial cooperation** in fire management, between organizations and donor organizations
- ✓ Promote contribution on responsible fire management based on **community participation** in food security and the needs of subsistence of the population
- ✓ Defend the programs of sustainable management of the land and natural resources which consider fire management in an ecologically appropriate manner and the extinction of undesired harmful fires

## Voluntary-type guidelines

- Globally applicable and non-binding
- For:
  - the civil society
  - the private sector
  - FAO members and non-members
  - those responsible for policies and for (sub) regional and global organizations
  - owners of forests, pasture land and other ecosystems
  - all those interested in the harmful impact of fire and in the use of beneficial fire

## Relationship with other international instruments

- Principles and strategic actions according to :
  - Framework Agreement on Climatic Change (UN)
  - Convention of the Fight Against Desertification (UN)
  - Agreement on Biological Diversity (UN)
  - Millennium Declaration (UN)
- Inspired by other mechanisms, codes and guidelines
- According to policies and existing programs of organizations, agencies and governments

## **Preparation for action and methodology**

- Work document:
- Methodology to transform guidelines into policies, plans and practices

- Two phases :
  - a process with multiple parts interested at the national level
  - a process with multiple parts at the regional level with representatives of neighboring countries

## Observations

**The situation in El Salvador**

- Fires represent a threat for the environment and the society
- The problem has been identified
- There is the beginning of a solution at the local (i.e. TRIFINIO project), national (National Forest Fire Commission) and regional (CCAD, SICA…) level
- Lack of financial resources

## Recommendations

**The situation in El Salvador**

- Continue strengthening already existing initiatives (community, national…)
- Create financial trusts to strengthen the operational capacity of the entities involved, i.e. increase the municipal taxes of landowners in the municipality
- Get private enterprise involved, i.e. companies from the tourism sector, lumber industries…

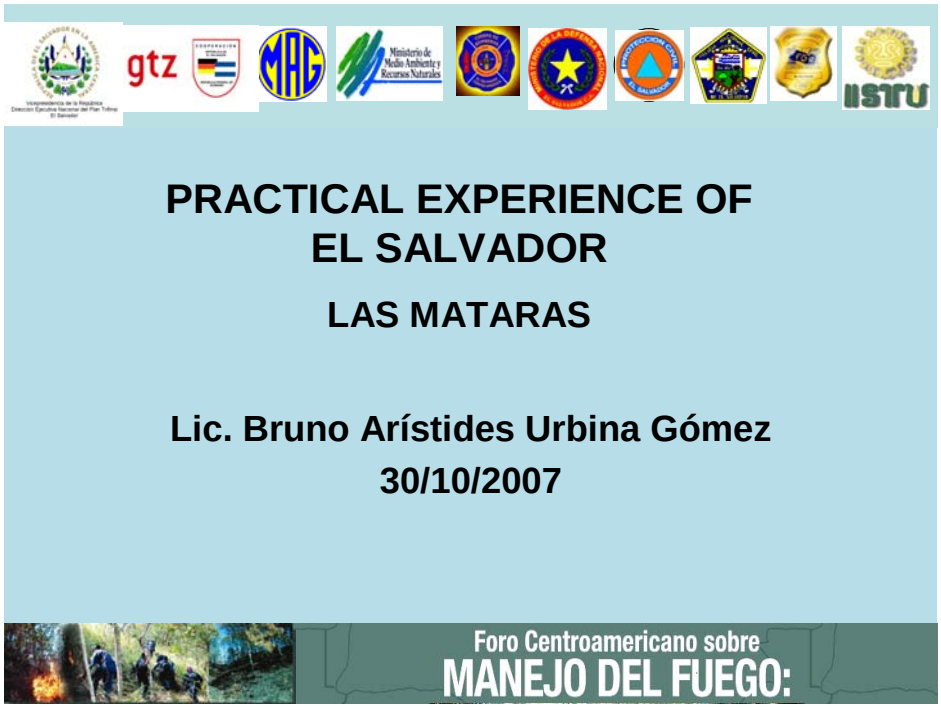
## Recommendations

### The situation in the region

- Continue strengthening regional initiatives
  - TRIFINIO
  - CCAD
  - Central American Integration System (SICA)


## *1.2 Practical Experience of El Salvador*

**Lic. Bruno Arístides Urbina Gómez**
**Environmental Unit**
**Attorney General's Office, FGR**



## Legal Framework

1-**Constitution of the Republic**

**Article 117**. It is the duty of the State to protect natural resources, as well as environmental diversity and integrity, to guarantee sustainable development.

The protection, conservation, rational use, restoration or substitution of natural resources is declared of social interest, in those terms established by the Law.

**Article 193.** It corresponds to the nation's District Attorney: No. 3: Lead the investigation of crimes with the collaboration of the National Civilian Police in the form determined by the Law. No. 4: Initiate penal actions by virtue of their office, or at the request of a party.


## Continued

2- **Forestal Law**

**Article 25.** MAG will have the power of adopting and making effective those measures that considers necessary in order to prevent, control and fight forest fires in forestal plantations and natural forests.

**Article 28.** Burnings in natural forests and forestal plantations are strictly forbidden, with the exception of those burnings prescribed as a forestry activity.

## Continued

2- **Forestal Law**

**Article 25.** MAG will have the power of adopting and making effective those measures that considers necessary in order to prevent, control and fight forest fires in forestal plantations and natural forests.

**Article 28.** Burnings in natural forests and forestal plantations are strictly forbidden, with the exception of those burnings prescribed as a forestry activity.


## Continued

**3- Organic Law of the General District Attorney's Office of the Republic**

**Article 18.** It corresponds institutionally to the General District Attorney's Office of the Republic:

Letter "h' To defend state property, natural resources, cultural patrimony and all state assets.

**4- Penal Code**

**Article 258 Forest Depredation**: That person which destroys, burns, cuts or damages, totally or partially, forests or other vegetable formations, natural or planted, which were legally protected, will be penalized with prison of three to six years.

## Continued

**Article 259. Depredation of Protected Flora:** The person cutting, falling, burning, uprooting, trading, or carrying out illegal traffic of any species or subspecies of protected flora, or seriously affects its natural environment, will be penalized with prison of one to three years.


## Continued

**262-B Stubble Burning:** The person intentionally burning stubble or crops of any sort will be penalized with a fine worth between ten and two-hundred fine-days; each fine will be equivalent to the daily minimum wage, according to the economic capacity of the offender.

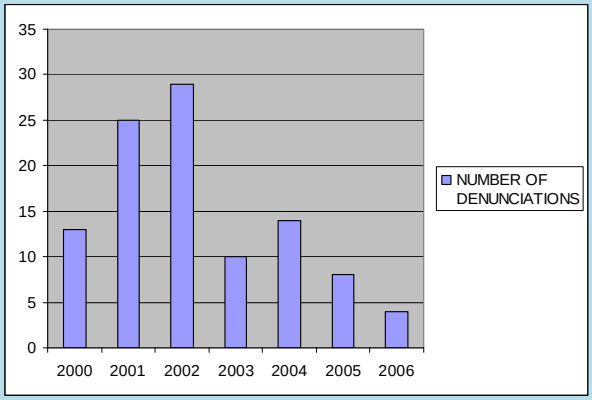
Excepted from any penalization are farmers carrying out strictly cultural agricultural work.

**Article 265 Fire:** The person who through the use of fire creates common danger to all persons or goods, will be penalized with prison of three to six years.

## TABLE OF NUMBER OF FIRES PER YEAR REPORTED IN THE FGR

| YEAR | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| NUMBER OF DENUNCIATIONS | 13 | 25 | 29 | 10 | 14 | 8 | 4 |

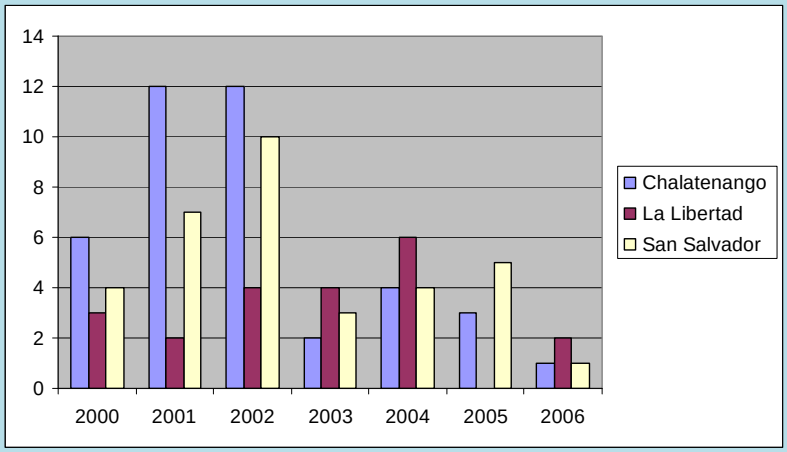

## GRAPH OF NUMBER OF FIRES PER YEAR REPORTED IN THE FGR




## TABLE OF NUMBER OF FIRES PER YEAR AND PER DEPARTMENT

| DEPARTMENT | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| Chalatenango | 6 | 12 | 12 | 2 | 4 | 3 | 1 |
| La Libertad | 3 | 2 | 4 | 4 | 6 | 0 | 2 |
| San Salvador | 4 | 7 | 10 | 3 | 4 | 5 | 1 |


## GRAPH OF NUMBER OF FIRES PER YEAR AND PER DEPARTMENT




## Case Theory

On April 3, 2002, Mr. xxxxx appears at the Unit of Reception of denunciations of the District Attorney's office to file a denunciations against accused parties xxxxxx, xxxxxx for the perpetration of the crime of forest depredation, given that on April 1st, a big fire broke out in the property of the denouncing party, in the location known as Cerro Las Mataras.

Functional direction:

1- The functional direction is issued on April 5, 2002.

2- A site inspection is carried out, with participation of technicians of different institutions.


## Inspection Results

• 40 *manzanas* cultivated with pine, with an average density of 300 trees per *manzana*.

•5 *manzanas* of coffee, with a density of 2,200 coffee trees per *manzana*.

• 65 *manzanas* of natural forest burned.

•Economic valuation: 457,000 *colones*.

## Fiscal Requirement

The fiscal requirement was presented at the Justice of the Peace of San Francisco Morazán on December 6, 2002.

Judicial Resolution.

a) Formal arraignment with arrest

b) Civil action considered as carried out

c) 60 days authorized for arraignment

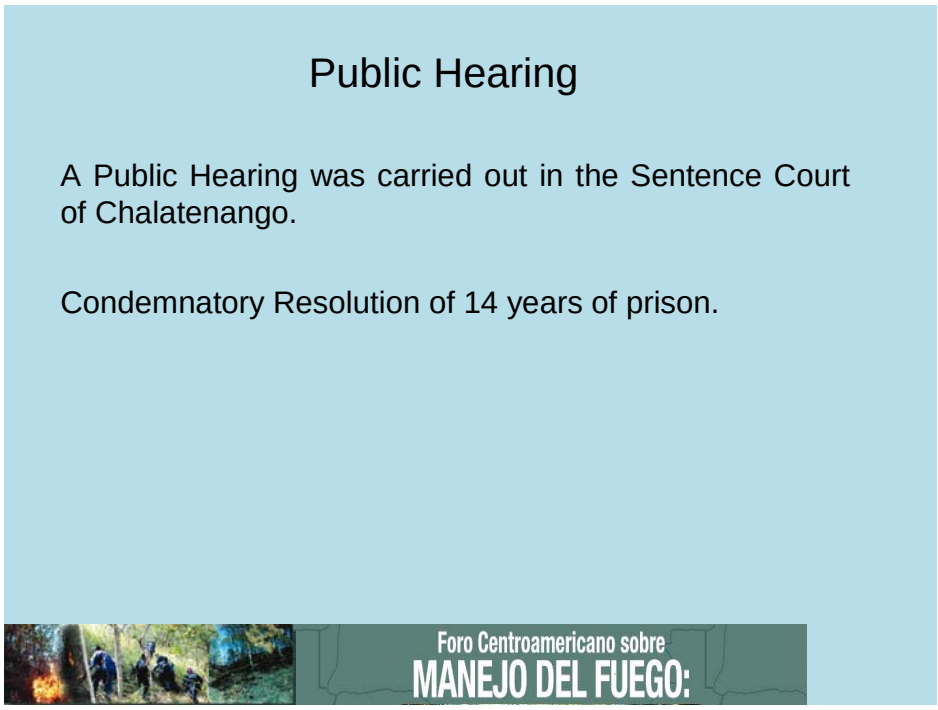

## Accusation Report

• The Accusation Report was presented in the First Instance Court of Dulce Nombre de María on February 24, 2005, and the preliminary audience was held on March 11, 2005.

•Result.

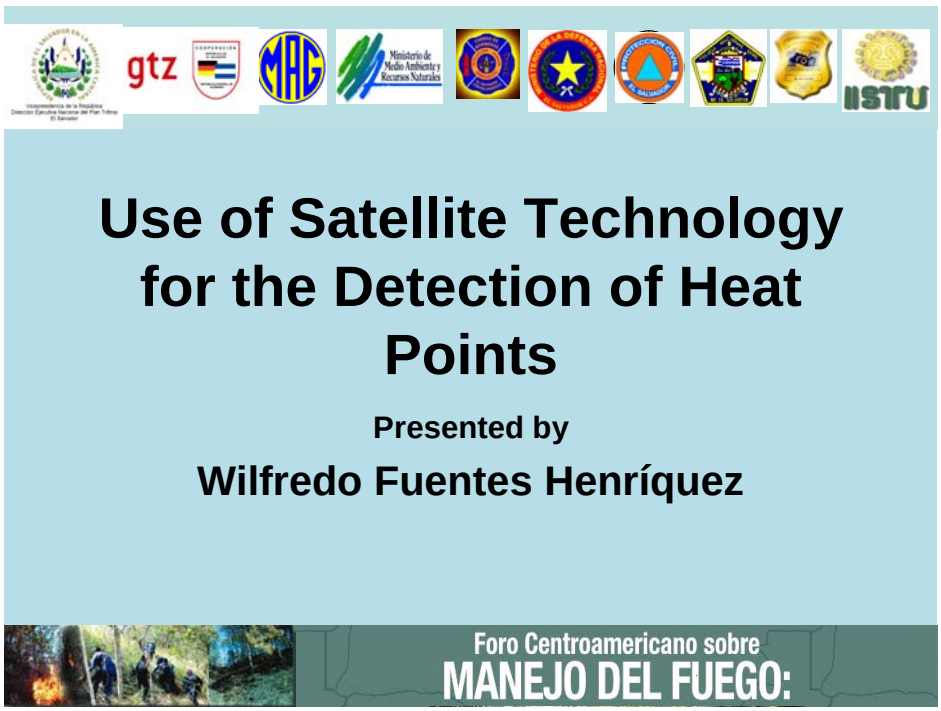
• A trial for the crime of fire was ordered.

• The proof submitted is admitted.

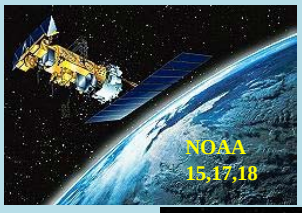



## *1.3 Use of satellite technology to detect heat points*

**Ing. Wilfredo Fuentes**
**Computer Technology Management – MARN, El Salvador**



**Heat Point Teledetection System "FOREST FIRES"**




WHAT IS A HEAT POINT ?

IS IT A FIRE ?

**A heat point is considered as the minimum spatial element of an image (pixel) which reports an elevated temperature**

**The minimum value**
**Night images is of 25ºC**
**Day images is of 42ºC**

**Therefore,**
**a heat point is any heat source which has an emission in the red-near infrared spectrum range. Sufficiently strong to be detected by the sensor**

**That source can be provoked by**
**fires, agricultural burnings,**
**soils warmed up by the sun,**
**large chimneys (gas flames in oil wells),**
**active volcanoes, etc**

SOURCE: CANABIO /MEXICO

## BEGINNINGS OF THE USE OF SATELLITE TECHNOLOGY

**In the middle of 2004, with the establishment of the National Node for the monitoring of changes in coverage, use of the land, forests, and modeling for carbon capture, all components of the Climatic Change project, and counting on the facilities of the SIAM-SERVIR (CCAD/NASA) Project, satellite images were initially collected, of the AQUA and TERRA type, which were designed precisely to monitor the oceans (AQUA) and terrestrisl coverage (TERRA)**

**Types of forest or vegetable coverage affected by fires during 2004, using the reports from the heat sensors installed in the AQUA and TERRA satellites (MODIS). El Salvador**

**Fire Monitoring in the Walter Thilo Deininger Natural Protected Area and Jiquilisco Mangroves in El Salvador**

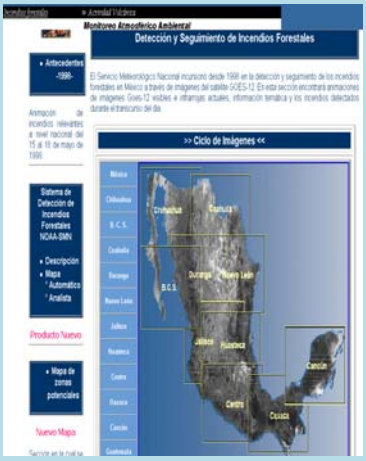
*Fire in Santa Clara NPA March 7, 2007*
*A. Sermeño*

Foro Centroamericano sobre
MANEJO DEL FUEGO:

## REGIONAL TELEDETECTION SYSTEMS

SERVIR
NASA/CATHALAC/CCAD


SMN/ Mexico
CONAGUA/SERVICIO METEOROLOGICO NAC

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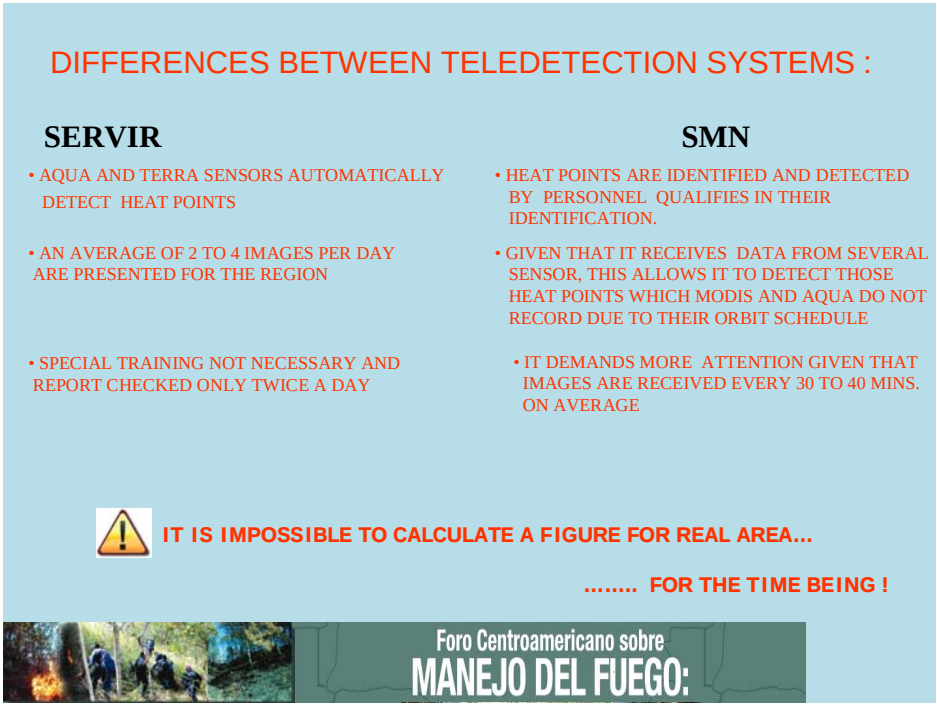


## *1.4 Ecoregional Evaluation of Mesoamerica*

Lenin Corrales
Regional Conservation Scientist
Mesoamerican and Caribbean Region
The Nature Conservancy (TNC)
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**Ecoregional Evaluation of Mesoamerica: Spatial and Temporary Fire Patterns in Mesoamerica and Economic Valuation of the Impacts of These Fires on Different Sectors of Regional Economy**

In a region which has 12% of the estimated global biological wealth in only 2% of the emerged territory of the planet (CCAD, 2003), with natural terrestrial ecosystems ranging from wet forests, mountainous forests, dry forests, pine savannas, firewood semi-arid land, forming 18 different terrestrial ecoregions, it is to be assumed that the affectation of biodiversity due to fire occurs in a different manner in regard to intensity and damages.

Using the data for fire occurrence in the last 5 years in the region, the science program of TNC of Mesoamerica worked in a model which predicted the probability of occurrence of fires in the region based in the use of a model based in logistic regression using 21 variables, which included population density, deforestation, distance to agricultural activities, distance to roads, distance to rivers, distance to pasture land, elevation, distance to urban areas, vicinity of protected areas, climatic anomalies of rain at the local level and the vegetation index (EVI).

As a second aspect of analysis, the impacts of fires on society and on the countries' economies were evaluated.

The economic value of the analysis was carried out as a function of the uses of forests, identifying three types of forest: 1) Production forests, 2) Protection forests, 3) Conservation forests. Likewise, the economic value was based on direct and indirect impacts (CCAD-PROARCA/APM. 2006).

Finally, the three main focuses of economic analysis have been the following: a) Determining the Total Economic Value of the forest in the region – to have an idea of the potential of such natural resources; b) The economic value of the hectares burned annually, as a function of the type of forest and indirect impacts generated – to know about the annual damage as a function of the burned area, and c) Determining the cost per hectare and per Heat Point – based in a previously established relationship between detected heat points and areas burned annually (CCAD-PROARCA/APM. 2006).

**Bibliography**

CCAD. 2003. *Regional Strategy for the Conservation and Sustainable Use of Biodiversity in Mesoamerica*. Central American Environmental and Development Commission, Technical Biodiversity Committee. Managua, Nicaragua. 37 p.

CCAD-PROARCA/APM. 2006. *Model of Forest Fires and Economic Valuation of the Impacts of these fires on different sectors of regional economy: Analysis of the impact of fire on the ecosystems of the Central American region in the 2000-2005 period.* Consultancy Report: Danilo Saravia, Rado Barzev and Carlos Poveda. Central American Environmental and Development Commission (CCAD), Environmental Program for Central America /Component of Protected Areas and Green Markets (PROARCA/APM). 54 p.

## *2.0 Conferences on Institutional Strengthening in Central America*

The second block of presentations was oriented to knowing the efforts made by international and national institutions make to strengthen government institutions and NGOs working on the subject of fires in Central America.

## *2.1 Disaster Assistance Offices*

**Eng. Luisa Alfaro**
**OFDA-LAC / USAID**

# Disaster Assistance Office

**Latin America and the Caribbean**

**Headquarters in San José, Costa Rica**

USAID
FROM THE AMERICAN PEOPLE

## OFDALAC

•Has the responsibility of providing support in cases of disasters abroad and of coordinating the response of the Government of the United States in the face of disasters abroad .

## OFDA's Mandate

**Saving lives, relieving suffering and reducing the economic impact of disasters**

**Countries where OFDALAC is providing support**


## Activities supported by OFDALAC

- **Training**
- **Technical Assistance:**
  - **Support in the preparation of the National Forest Fire Policy**
  - **Fire Management Strategies**
  - **Forest Fire Plans**
  - **Forest Fire Protocols**
  - **Forest Fire Procedures**
  - **Mobilization drills**
  - **National Forums**
- **Help in case of disasters**

# Training

- Module of Basic Forest Fire Control Techniques
- Forest Firemen Course
- COPCIF Course
- Effective Water Management Course
- Formation of CBF and COPCIF Instructors

# Training

- SCI Module for decision makers
- SCI Basic Course
- SCI Course
- Workshops for the formation of Instructors for BSCI and CSCI courses
- Workshops for the preparation of protocols and procedures

Fire in Bogota, Sept. 07

Fires in Bolivia, Sept. 07

Fires in Paraguay, Sept. 07

## Let's remember that controlling an incident

- **Implies great risks**
- **Generates a lot of confusion**
- **Requires the use of many resources**
- **Requires the participation of many persons**
- **Requires of critical decision-making**

## Consequences of the poor management of incident situations

- **Improvisation**
- **Mistakes**
- **Excess resources**
- **Difficulty for control**
- **Destruction**
- **Deaths**
- **Economic losses**

**Chaos**

**Crisis!**

When a system that allows to manage incidents in an optimal manner is not available

**The incidents or emergencies take over their control**

## Need of strengthening of Fire Management Programs in Latin America

**It is necessary that National Fire Management Programs and the allocation of resources on the part of the State be strengthened**
**Each institution must count on internal procedures and inter-institutional protocols for the attention to incidents in forest fires**
**Strengthen technicians in decision making to manage incidents of a large magnitude**
**Each country must count on a technical commission, which provides advice to the current authorities on emergency situations**
**Improve communications systems and their integration**
**Strengthen the acquisition of equipment and tools for the control of forest fires, and carry out maintenance programs for them**
**Some countries in the region require strengthening of their legislation .**

- **Strengthen environmental education programs in the component of forest fires**

- **Strengthen the capacities of the countries where the Fire Department has responsibility in the control of forest fires**

- **Strengthen training programs for the Armed Forces**

- **Strengthen detection and monitoring programs**

- **Strengthen the carrying out of national or reegional encounters**

## *2.2 Fire Management Program in Costa Rica*

**Ing. Román Madriz Luis Diego**
**Coordinator of National Fire-Management Program**
**Ministry of the Environment and Energy, National Conservation Areas System**
**Costa Rica**
Electronic mail: diego.roman@sinac.go.cr

**Summary**

Costa Rica does not escape the incidence of forest fires which appear during the period with less rain, comprising approximately from January to May, but which can arrive early or late, depending on the prevailing climatic behavior. The Pacific drainage basin is the zone with more incidence, as well as the Los Chiles and Upala cantons, both bordering with Nicaragua and located in the northern zone of the country, which have their influence from the Atlantic drainage basin. Forest fires in Costa Rica are entirely due to human-related causes, many of them due to burning: agricultural, rounds, or pasture, and also due to intentional causes and to hunting.

Seeing these problems, the country has made great efforts since the end of the decade of the seventies to reduce the incidence of forest fires, and the damages and effects caused from the environmental, social and economic point of view; that is the reason why actions leading to the prevention and control of fires have been carried out; likewise, there is legislation on the subject available. Costa Rica, since 1977, has strengthened its actions through National Fire-Management Strategies; besides, there is a National Fire

Commission; there is also a National Commission on Forest Fires, called CONIFOR, which is formed by ten government institutions and two non-government institutions; this Commission is attached to the Ministry of the Environment and Energy (MINAE), through the National Conservation Areas System (SINAC); the formulation, management, support, follow-up and evaluation of the inter-institutional guidelines defined in the National Strategy and the actions described in the National Fire Management Plan corresponds to this Commission.

At the internal level of SINAC-MINAE, there is a National Forest Fires Technical Committee called COTENA, formed by those in charge of the Fire Management Program of the eight Conservation Areas which have the greater incidence of forest fires; at the level of these areas, a series of actions are carried out for the prevention and control of forest fires, emphasizing the incorporation of society to fire management actions through education and training; these persons are known as forest firemen/women, which help SINAC in the protection and conservation of natural resources, which has made them set an example at the Latin American and world level.

As to the statistics of incidence of fires in number of hectares, SINAC-MINAE, as the responsible for the prevention and control of forest fires in the Areas of Natural Patrimony of the State, has consolidated since 1998 all information generated related to forest fires, both within and outside Wild Protected Areas (ASP, in Spanish); these locations form 25% of the national territory and are under some category of management for the control of biodiversity. The data from the average area of the period from 1998 to 2007, both within and outside ASP, add up to 35.127,62 ha, an average which has been decreasing during the last years; of this area, 86,57% belongs to private property and 13,43% to Protected Areas. In regard to the types of vegetation affected by forest fires, areas covered with pastures and tree-type pastures are the most affected by fire in Costa Rica, with the average area for both between 1998 and 2007 being 15.586,96 hectares, representing 43.45% of the total recorded area, followed by the areas of bushes and scrub lands (*tacotales)*, which are ecosystems which are in an important regeneration process; these areas add up to 8.787,30 hectares, representing 25,59%.

Forests are also affected by these disasters; in the ten years of records at the national level, the average area is of 3.952.02 ha, equivalent to 10,47 % of the total area, but it must be highlighted that this ecosystem has considerably reduced its affected area in the last years.

The number of fires fought from 2000 to 2007 has been of 903, for an average of 113 incidents where there has been control and extinguishing of fires.

Currently, the Fire Management Program of Costa Rica bases its operation in three areas: prevention, control and use of fire, which is known as the fire management triangle.

**Prevention:** All those activities leading to make the population aware of the effects and causes of forest fires are carried out, and they receive training on how to make better use of fire; that is why training and formation activities of forest firemen and women are carried out, as well as talks in schools, development associations, farmers and native groups, road blocks, residential visits, get-togethers, handing out of informative material, installation of billboards and signs, as well as use of radio and television spots at the national level, carrying a message related to the protection of natural resources.

The maintenance and construction of forest-fires mitigation works, commonly known as firebreaks, is framed within the prevention activities; annually, around 1,250 kilometers of this type of works are established within the Wild Protected Areas.

**Control:** The Permanent Alert System is implemented during the most critical area of dangerousness of fires at the national level, which allows to have a monitoring of what is going on at the national level, for which fixed and temporary surveillance posts are put into operation (detection towers), land, water and air patrols are also carried out; remote sensing systems are used, and in the same manner, in case of an incident, the levels of fire fighting are applied, which are dealt with under the Incident Command System (SCI), applying terrestrial means for their control and extinction, using equipment and tools, all-wheel-drive cistern trucks, or aerial control using helicopters either, if required.

**Use:** Fire is used as an ally in the establishment of works for the mitigation and reduction of combustible loads in those areas which require so, through the application of controlled burning.

¨The current and future challenges in matters of fire management are numerous, which makes it necessary to implement actions tending to improve the work currently carried out; therefore, the program has established, through the National Fire Management Strategy 2006-2010, important challenges for the comprehensive management of fire, with the presence of a **culture of fire**, the **ecology of fire** and actions of **fire management** (prevention, use and control)

## *2.3 Central American Fire Management Strategy*

**Mr. Bruno Bustos**
**CCAD / SICA**

COMISION CENTROAMERICANA DE AMBIENTE CCAD Y DESARROLLO

### What is CCAD ?

- Central American Environmental and Development Commission (1989)
- Organ of the Central American Integration System (SICA) responsible for the environmental agenda in Central America
- Integrated by the 7 countries of Central America and the Dominican Republic as an associated organism

**Main objective: Contributing to the sustainable development of the Central American region, strengthening the regime of cooperation and integration for environmental management**

COMISION CENTROAMERICANA DE AMBIENTE CCAD Y DESARROLLO

### Structure

**Natural Patrimony**

**Comittees**

- Biodiversity
- CITES
- Desertification
- Forests
- Protected Areas
- Wetlands


# Central American Forestal Strategy EFCA

**Objective: Positioning the forestal sector as an agent of economic, social and environmental development of the countries of the region.**


## Background of Fire Management Strategy

- **2002. Summit of Heads of Government of the Tuxtla mechanism of dialog and settlement**
- **2002. Mesoamerican meeeting of cooperation in protection against forest fires**
- **2002. Workshop, Regional Stategic Plan for the management of forest fires and plagues**
- **2004. Workshop, Plague Management Program for Central America and Mexico**
- **2004. Meeting of the regional forest fire networks for Mesoamerica, the Caribbean and South America .**
- **2005. Two workshops for the preparation of the document of Central American Regional Fire Management Strategy**


# Justification

- Problem caused by :
  - Social Inequality
  - Land ownership
  - Lack of forestal culture and information
  - Badly-oriented government policies
  - Proposals out of the real context
  - Impacts on the economy of the countries


# Vision

- Central America with defined policies and regulations, organizational structures and plans consolidated with the necessary resources for fire management, with the purpose of minimizing the impacts (social, environmental and financial) caused by forest fires and agricultural burnings .


# Vision

- Central America with defined policies and regulations, organizational structures and plans consolidated with the necessary resources for fire management, with the purpose of minimizing the impacts (social, environmental and financial) caused by forest fires and agricultural burnings .


# General Objective

- Reducing the negative impacts originated by forest fires on the ecosystems and promoting fire management with ample participation and integration of the efforts of the countries

# ACTION PLAN 2006 - 2009

## Action Line

- Political and institutional strengthening
- Strengthening of legal framework
- Research
- Information Systems
- Prevention
- Detection and monitoring
- Control
- Rehabilitation

## *2.4 National Forest Fire Prevention and Control Plan 2005 -2009 in El Salvador*

**Eng. Hugo Zambrana**

Technician in charge of the forest area, Directorship of Natural Patrimony, Ministry of the Environment and Natural Resources, El Salvador. / Member of the National Forest Fire Commission and involved in the formulation of the National Fire Prevention and Control Plan

**Summary**

Forest fires of an anthropogenic nature, that is, caused by the actions of humans, both intentionally and by neglect, are frequent in the country. Previously, fire control efforts have been made in specific zones, including a contingency prevention and control plan, which was carried out by different institutions. Facing this problem, and with the technical and financial support of the Office of Foreign Disaster Assistance of AID (OFDA), the process of formation of the national commission started, and proposed to national authorities the formulation of the forest fire prevention and control plan, which was formulated for the 2005–2009 period. Among the members of the Commission, and which have participated in the formulation of the plan, the following institutions can be mentioned: Ministry of Agriculture MAG, Ministry of the Environment MARN, El Salvador Fire Department CBES, General Attorney's Office of the Republic, National Civilian Police PNC, National Defense Ministry MDN, Salvadorean Tourism Institute ISTU, now part of MITUR, Ministry of Government MIGOB, Civilian Protection.

The plan contains the following components:

**Background:** The background, the support from OFDA, the formation of the commission and other are described here.
**Justification:** The reasons justifying the formulation of a plan because of the damage caused by fires and due to the institutional and social reaction to face them are presented here.
**Legal framework.** All national laws, which intervene in matters, related to fire, from the republic's constitution to the penal code, forest law, environmental law, fire department law and others.

**General Objective**. The general objective of the plan is presented here, along with the **Specific objectives**

**Action Lines:** There are four action lines: 1- Prevention, 2- Fire control, 3- Investigation of causes, responsible and damages, and 4- Mitigation, which refers to the actions to be carried out to restore affected areas.

Actions per action line. The main actions per line of action are presented. For example, there is an action mentioned for each line, therefore…

For prevention. Define organizational structures at the national, municipal and local level with responsibilities and degrees of participation.

For control. Determine at the inter- and intra-institutional level the operational procedures, levels of coordination and participation when a fire occurs.

Investigation. Form an inter-institutional team to participate in the investigation processes oriented to identify the causes and responsible of fires.

Provide technical support to forest owners on the methods of recovery of areas affected by forest fires.

**Follow-up and evaluation** refers to the activities that it is expected that will be carried out to provide follow-up to the compliance, such as periodical meetings with commission members, preparation of reports for each institution involved, annual revision of operational plan, and others. These are grouped in three components: evaluation meetings, reports, and evaluation sessions.

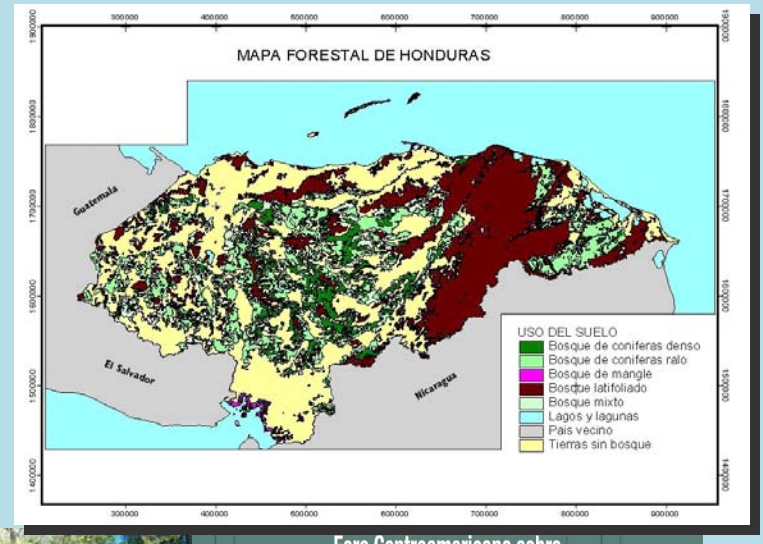
**Later on, the expected results of the plan execution are presented,** among which are: Generating a greater level of awareness in the population to prevent the incidence of forest fires, improving the level of organization and coordination for the attention to forest fires, greater involvement of the communities through the formation of local brigades trained in first-response attention, technical strengthening at the institutional level and reducing the advance and expansion of forest fires, when these appear.

**The last component refers to the Records,** that is, the list of personnel, institutions, phone numbers, offices and other information important to communicate and react in the event of a fire.

## *2.4 Municipalization and Decentralization of the Protection against Forest Fires*

**Lucky Medina**
**Environment Department**
**AFE-COHDEFOR**

## Honduras Forestal Map

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MANEJO DEL FUEGO:

## Natural vocation of soils

Results of the Forest and Tree Inventory
2005-2006/ TCP/HON/3001 (A)

- **75%** of the land is suitable for forests
- **15%** is suitable for agricultural use
- The remaining **10%** qualifies for livestock raising

Foro Centroamericano sobre
MANEJO DEL FUEGO:

- **Estimates for forests:**
  - 1,679,735 ha. of conifers (16.3%)
  - 2,565,992 ha. of latifoliated forests (24.9%),
  - 536,601 ha mixed (5.2%) and
  - 47,682 ha mangrove forests (1%)
  - And 961,592 ha. not in inventory


## National Plan of Protection Against Forest Fires and Fire Management Plan 2007

- Decentralization is considered in the National Forest Fire and Fire Management Plan 2007 as the starting point to deal with the recurring situation of forest fires in the country

## The human contingent and logistics capacity

- Participating at the national level, they form a capacity of response which, with different degrees of organization and logistics, they are the first actors in case of an event, which is local at the beginning, of human origin, and has social/economic and cultural motivations.


## AFE - COHDEFOR

- In its role as Facilitator, Coordinator, Accumulator and Distributor of annual and historic information on the occurrence of fires, it provides technical assistance in organization, training, project management and equipping, for the processes generated at the local, municipal, departmental and national level.

## Main Actors

More than 40,000 Hondurans, expressed as:

- 74 municipal teams (729)
- 282 Agroforestal groups (9,310)
- Armed Forces (2,030)
- Teams of forests owners (6,064)
- Teams from the forestal industries (620)
- Municipal/Local committees and water panels (10,036)
- NGOs (898)
- Environmentalist organizations ( 360)
- Others (Firemen, EAP, ESNACIFOR, SANAA) (218)
- Projects: MARENA (8,755), PBPR ( 2,618),
- AFE-COHDEFOR (164)


## 10-year Process

- National Forestal Protection Strategy 2003-2015
  - The municipality is the axis of protection against forest fires
  - Responsibility is shared
  - Strengthening of local capacities

## Projects with the forestal protection component

- **El Cajón Project (1997) (BID)**
  - Project promoting forest protection in the basin of the Francisco Morazán Dam through a program of municipal activities and incentives
    - Firebreaks of 2.5 m, burnings, surveillance, organization, training, etc.
    - Municipal contract for area not burned


## Projects with the forestal protection component

- **Honduras- Canada Environmental Fund**
  - Project for the strengthening of forestal protection at the community-municipal level
  - Aimed at the 13 municipalities with the greatest occurrence of fires and area affected
  - These 13 municipalities (of 298), account for 50% of the total area burned in Honduras
  - The municipalities have a hierarchy based on statistics of more than 30 years

**With this project:**

- Protection plans for each municipality
- Equipment and tools
- Training materials
  - Flipcharts
  - Workbooks
- Publicizing material
  - T-shirts with municipal motifs
  - Posters with photographs of the municipality
- Identification of municipal teams
  - Vests
  - Caps


## Rural Area Management Project (PAAR) 1998-2002 (BM)

- Support to 36 municipalities: selected by IDH, forestal coverage, ownership
- Contracts directly with the municipalities
  - Construction of 10-meter wide firebreaks
  - Controlled burnings
  - Generation of employment in the communities
- Training
  - Technicians (independent, private enterprise, municipalities, NGOs, etc.)
  - Community members
  - Forests owners

## Forest and Rural Productivity Project PBPR 2003-2007 (36 municipalities)(WB)

- Municipal protection plans
- Firebreak construction
- Controlled burnings
- Radio communications
- Observation towers
- Training
  - By community village (CBF)
  - Technicians (COPCIF, CPI)
- Equipment and tools
- Means of communication


## Forest and Water Project (USAID-AFE)

- Choluteca River basin
- 3 main areas: Yerbabuena, Guanacaure
  - Yuscarán
- Community forestal protection projects
- Incentives system: Project-community-municipality
  - Community centers, perimeter fences, bridges, river fords, etc.
- Systematization of experiences

## Natural Resource Management in Prioritary Basins Project MARENA (BID)

- Located in the upper parts of three priority basins of the Republic of Honduras: Nacaome, Ulúa and Chamelecón
- Covers 14 sub-basins
- 102 municipalities
- With an area of 17,630 $Km^2$
- Population estimated in 1,263,000 inhabitants


## MARENA

- Municipal protection plans
- Transfer of funds to municipalities for the protection plan
- Organization of community groups
- Workshop on forest fire prevention and combat
- Construction of firebreaks
- Maintenance of firebreaks
- Controlled burnings
- Hiring of security guards
- Systematization of municipal forestal protection experiences
- Method of technical forestal assistance by sub-basin

## PROBOSQUE (BID)

- Municipal protection plans 2006-2008
- Agreement contract with municipalities
- Transfer of funds to execute plan


## FORCUENCAS (UE)

- 2006…
- Basins of the Choluteca, Río Negro and Patuca rivers
- Method:
  - Submittal of projects according to demands of municipalities, agro-forestal groups, communities

## Private Enterprise and Forest Fire Prevention

Strategic Alliances

- Means of Communication: Ribbons (*Cintillos*)
- Airlines: Banners and stickers
- Soccer teams: Banners in the Olimpia-Motagua game
- Foundations: Stickers
- Phone companies: Phone messages and banners
- Fish by forest
- Education by forest


## Environmental Conservation and National Reforestation Program

"María Carla Rivera Tejada"

1% of the National Budget for Forestal Protection and Reforestation

- Executive Decree PCM-02-2006
- Allocation of 1% of national budget
- Environmental conservation and national reforestation program
- Elligible sub-programs:
  - Conservation of protected areas
  - Protection of forestal resources
  - Protection of hydric resources
  - Reforestation


## Types of projects

- Delimitation of areas:
  - Micro-basins, protected areas
- Fire prevention and control
- Community forestal protection plans
- Protection of natural regeneration
- Social plantations
  - Agroforestry
  - Energy production
- Industrial commercial plantations

www.serna.gob.hn www.cohdefor.hn

**AMOUNT ALLOCATED BY DEPARTMENT**

| Departamento | Monto Asignado en Lps. | % | No. de Proyectos | Municipios Beneficiados |
|---|---|---|---|---|
| Intibucá | 12,198,679.27 | 15.9 | 13 | 10 |
| Comayagua | 11,878,114.90 | 15.4 | 33 | 21 |
| Francisco Morazán | 11,386,597.55 | 14.8 | 47 | 23 |
| Santa Bárbara | 10,619,225.00 | 13.8 | 39 | 26 |
| Olancho | 4,480,854.00 | 5.8 | 26 | 10 |
| Yoro | 3,998,137.20 | 5.2 | 19 | 5 |
| Choluteca | 3,900,923.25 | 5.1 | 19 | 11 |
| Cortés | 3,557,536.00 | 4.6 | 10 | 3 |
| La Paz | 3,487,417.00 | 4.5 | 13 | 11 |
| El Paraíso | 3,284,661.00 | 4.3 | 13 | 9 |
| Lempira | 2,558,985.35 | 3.3 | 18 | 7 |
| Gracias a Dios. | 2,001,235.67 | 2.6 | 10 | 3 |
| Ocotepeque | 1,375,840.00 | 1.8 | 7 | 7 |
| Valle | 719,090.00 | 0.9 | 3 | 3 |
| Copán | 616,659.00 | 0.8 | 5 | 4 |
| Atlántida | 434,660.00 | 0.6 | 2 | 2 |
| Colón | 400,000.00 | 0.5 | 1 | 1 |
| **Total** | **76,898,615.19** | **100.0** | **278** | **156** |


## Aspects to take into account

- The high frequency of forest fires in Honduras is causing serious damage to forestal resources, negatively compromising the services provided by the ecosystems, such as water and air quality

## Results of Interinstitutional Coordination



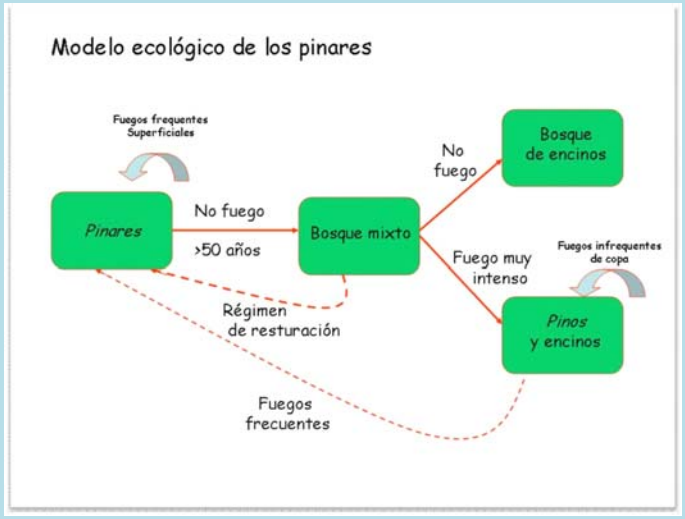
## Aspects to take into account

- Conventional fire prevention and supression approaches have frequently resulted in undesired consequences because pine ecosystems depend on an ecologically appropriate fire regime to maintain the landscape

## Aspects to take into account

- Without fire, pine forests will be replaced by other types of vegetation, and key species will be lost
- The total supression of fire can also lead to the accumulation of dangerous levels of forestal combustibles which frequently result in more harfmful fires


## Pine-forest ecological model




## Aspects to take into account

- To maintain the biodiversity of pine forests, it is required that fire prevention and control strategies be integrated with the appropriate use of fire as a management tool, adequate to the ecological and social-economic realities

- The National Forestal Administration currently works with The Nature Conservancy (TNC) in the definition of a strategy for the Comprehensive Management of Fire

# *3.0 Fire prevention strategies conferences*

## *3.1 Policies - Regulations and Forest Fires in the Republic of Panama*

**Eng. Helvecia Bonilla**
**National Environmental Authority (ANAM)**
**Directorship of Environmental Quality**
**Department of Environmental Disasters**

The Republic of Panama has an area of 75,517 km$^2$; it borders with the Caribbean to the North, with the Pacific Ocean to the South, with the Republic of Colombia to the East and with the Republic of Costa Rica to the West. Besides, it counts on a territorial sea of a length of 12 nautical miles and an area of 319,823.9 km².

The country is divided in nine provinces, 75 districts or municipalities, five indigenous regions (KunaYala, Emberá, Kuna de Madugandí, Ngöbe-Buglé and Wargandí), and 620 *corregimientos*.

Panama's weather shows two basic seasons, the rainy season from mid-April to mid-November, and the dry season from December to April. According to Köppen's climate classification, Panama has dry tropical weather, humid tropical (greater predominance), very-humid tropical, humid temperate and very humid temperate.

Average annual precipitation is of 3,000 mm with temperatures from 21º to 34.5 ºC and an average of 27.5 ºC, moderately high and constant temperatures throughout the year.

Panama's relief is highly mountainous, with coastal plains mainly in the Pacific drainage basin; the Central Mountain Range extends from the border with Costa Rica to the border with Colombia, dividing the country in two drainage basins, Pacific (the largest) and Caribbean.

75% of Panama's soils have a forestry vocation and within them, 42% are formed by natural forests and forest plantations. Soils are preferably forestal, 45% of Panama's soils are Category VII; 19.4% are Category VIII, and only 2.4% is arable with few use limitations. 77.6 % of the country's total area has steep and very steep slopes.

According to the census of 2000, the Republic of Panama has 2,839,177 inhabitants, for a population density of 37.6 inhabitants per square kilometer.

The National Protected Areas System has an area of 2,600,018.050 hectares, representing 34 % of the national territory, integrated by 66 protected areas in 17 management categories, of which 15 are municipal.

Demographic growth, with its growing demand on the basis of natural resources, endangers the capacity of the ecosystems of satisfying the needs of the current and of future generations of Panamanians in a sustainable manner. Its impact on the environmental conditions of the new human settlements that emerged near the main cities in the country, and the pressure exerted by these settlements on wooded areas and their

rich biodiversity, can already be noticed; they have deteriorated the existing environmental quality considerably.

Within the main environmental problems identified are: Environmental pollution from urban growth; forest resources subject to intense pressures; insufficient adequate instruments for attention to these problems; increase of natural and anthropogenic threats, such as in the case of forest fires, which represent a permanent risk for the country, with transcendental implications for the use of natural resources; given that they are a motive of disturbance and degradation of ecosystems, the main cause of deforestation is associated with the loss of forests due to survival agriculture and pastures; using fire as a means of eradicating forest cover, forest fires and agricultural burnings become sources of emission of pollutants to the atmosphere and contribute to the deterioration of the ozone layer and to global climatic change.

In the Republic of Panama, as in other countries of the Latin American region, social research has been carried out, describing the behavior of migrant populations towards wooded areas and their economic, cultural and ecologic incidence. In 1983, Dr. Stanley Heckadon[1] showed the results of his social research on what he calls "*the pasture culture*". The document published indicates the following: "*Ecologic degradation is one of the factors with the greatest contribution to the crisis of rural economy based on extensive cattle farming and cutting agriculture. It is the literal product of the death war fought by producers against Nature, using the most economic technique: fire*".

These, and other publications such as the Colonization and Destruction of Forests in Panama[2], have allowed us to identify with great clarity, the cultural and economic origins of agricultural activities based on burnings, carried out in this 21st century by those descending from the great migrations of the 1950 – 1980 period.

The analyses of the relationship between the indiscriminate use of fire, productivity and the sustainable use of natural resources are more and more relevant each time. The general argument is that the intensive use of fire on the part of the rural population, without management and protection measures, reduces soil productivity to the point that it cannot support its inhabitants; and these have no alternative but intervening new areas (generally the most fragile) to seek their livelihood, causing more deterioration of natural resources and not solving the problems of subsistence.

Every dry season, forestal resources are threatened by the ancestral agricultural practices of our people, such as cutting and burning, which although regulated by the National Environmental Authority, still become a problem, which has incidence in the origin of forest fires in Panama.

The presence of the invasive species *paja canalera* or *paja gringa (Sacharum pontaneum)*, which has invaded great extensions of deforested areas, becoming a highly flammable material in the dry season, is where most forest fires located in the Panama Canal basin start; given that they are located in areas surrounding the forest and due to the action of

[1] El Dr. Stanley Heckadon is a sociologist, anthropologist and researcher of the Smithsonian Institute based in Panama. In 1983, he published the book "When Mountains Are Gone".
[2] The Panamanian Anthropologist Society published in 1982 this collection of works on the problems of rural migrations and their incidence in deforestation.

wind, topography, temperature and their light and combustible nature, fire penetrates the forest, affecting that natural resource.

The country shows several factors which influence the rapid propagation of these disasters; according to studies and records, the specific activities constituting the origin of forest fires in the country are: pasture burning; agricultural burning; smokers; furtive hunters; garbage burning; changes in the use of the soil; intentional; negligence, and others.

The Statistical Records of the National Environmental Authority for the decade of 2000 (2000 to 2007) indicate that a total area of 58,570.85 hectares was affected, of which 27,946.97 correspond to forest fires specifically, and 30,623.88 correspond to fires in agricultural vegetation and of other type.

AREA AFFECTED IN HECTARES PER PROVINCE

**SUPERFICIE AFECTADA EN HECTÁREAS**
**POR PROVINCIA**

| Provincia/ Comarca | AÑOS | | | | | | | | | | | | | | | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | | 2001 | | 2002 | | 2003 | | 2004 | | 2005 | | 2006 | | 2007 | | | |
| | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. | For. | Agr. |
| Bocas del Toro | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coclé | 172.00 | 340.00 | 264.10 | 311.90 | 143.20 | 74.00 | 772.00 | 1,027.00 | 97.28 | 1,592.70 | 1,574.00 | 1,362.50 | 1,859.00 | 1,727.00 | 479.85 | 2,161.30 | 5,361.43 | 8,596.10 |
| Colón | 0.00 | 0.00 | 0.00 | 0.00 | 32.00 | 24.00 | 9.00 | 52.00 | 19.60 | 81.50 | 0.00 | 0.00 | 70.00 | 190.00 | 70.00 | 380.00 | 200.60 | 727.50 |
| Chiriquí | 98.90 | 131.10 | 15.00 | 335.00 | 1,258.00 | 265.00 | 270.05 | 116.30 | 498.80 | 1,454.87 | 30.00 | 135.30 | 118.12 | 241.65 | 49.25 | 245.70 | 2,338.12 | 2,924.92 |
| Darién | 0.00 | 0.00 | 0.00 | 0.00 | 8.00 | 60.00 | 9,977.00 | 1,000.00 | 28.50 | 250.00 | 995.00 | 410.00 | 190.00 | 200.00 | 203.65 | 1.50 | 11,402.15 | 1,921.50 |
| Herrera | 7.00 | 0.00 | 1,238.25 | 1,090.00 | 189.75 | 267.10 | 49.85 | 93.75 | 35.55 | 171.50 | 8.00 | 95.30 | 117.50 | 173.00 | 46.00 | 140.25 | 1,691.90 | 2,030.90 |
| Los Santos | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 255.00 | 3.00 | 4.50 | 5.50 | 178.50 | 377.00 | 7.00 | 860.00 | 648.50 | 1,409.50 | 1,093.50 | 2,655.25 |
| Panamá | 21.10 | 1,249.20 | 490.75 | 233.75 | 175.97 | 1,146.66 | 1,498.85 | 2,469.80 | 683.28 | 2,736.91 | 100.30 | 623.80 | 213.75 | 953.23 | 1,166.00 | 1,461.06 | 4,350.00 | 10,874.41 |
| Veraguas | 185.00 | 0.00 | 108.70 | 159.30 | 80.20 | 15.00 | 11.25 | 0.00 | 355.75 | 0.00 | 110.00 | 0.00 | 355.50 | 200.00 | 27.87 | 0.00 | 1,234.27 | 374.30 |
| Ngöbe Bugle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 519.00 | 5.00 | 519.00 |
| TOTAL | 484.00 | 1,720.30 | 2,116.80 | 2,129.95 | 1,887.12 | 1,852.01 | 12,843.00 | 4,761.85 | 1,723.26 | 6,292.98 | 2,995.80 | 3,003.90 | 2,930.87 | 4,544.88 | 2,696.17 | 6,318.31 | 27,946.97 | 30,623.88 |

Observación: A partir del 2004 se hace la clasificación según el uso del suelo y la vegetación (Forestal, Agropecuario)

The behavior of forest fires in 2001 and 2002 shows a decreasing trend in regard to the surface affected by year; however, there was a significant increase in 2003 in regard to surface affected, which was due to the presence of the El Niño phenomenon in that year; however, for 2005, 2006 and 2007, the surface affected by agricultural fires shows an increase due to the bad practices carried out by farmers in their agricultural activities.

With respect to environmental matters, Panama has generated a legal and institutional scheme framed in policies, strategies and specific instruments. In regard to forest protection, the State undertakes the responsibility of preventing and watching over those areas, which are susceptible and affected by forest fires; at the same time, it establishes institutional authorities in regard to their prevention and control. Within this legal and political framework, specifically in regard to institutionality, the National Forest Fire Coordination is under the responsibility of the new Department of Environmental Disasters, created through Executive Decree 163 of August 22, 2006, “through which the new organizational structure and its functions adopted by ANAM” are established.

Between 2003 and 2005, ANAM approved, from the technical standpoint, 7 environmental policies, whose drawing up is framed within Law 41 of July 1$^{st}$, 1998 (General Environmental) and the National Environmental Strategy. These policies are:

- National Policy for the Comprehensive Management of Non-Hazardous Residues and Hazardous Waste.
- National Environmental Information Policy
- National Environmental Management Decentralization Policy
- National Water Resource Comprehensive Management Policy
- National Cleaner Production Policy
- National Climatic Change Policy; National Environmental Supervision, Control and Inspection Policy. Presently, its approval by the National Environmental Council is being sought.
- National Forestal Policy and its Strategy

Executive Decree No. 2 of January 17, 2003 was published in Official Gazette No. 24,724 of the Republic of Panama, "*through which the Basic Principles and Guidelines of Forestal Policy in Panama*" are approved. Within the strategic objectives of the forestal policy of Panama was establishing the adequate prevention and management of plagues, diseases, and fires with impact on forest resources. Strategic actions of the forestal policy of Panama were determined, which consider creating, establishing and providing the necessary resources to the National Commission for the Prevention, Control and Management of Forest Fires.

In 2006, under the technical assistance of OFDA/LAC/USAID, Panama prepared the document on the *National Policy for the Comprehensive Management of Fires in the Republic of Panama,* with the objective of reducing the occurrence and negative effects of forest fires on ecosystems, through a comprehensive mitigation, prevention, control, and rehabilitation system with the coordinated participation of all actors involved in order to guarantee the sustainability of natural resources and to contribute to the improvement of the quality of life of Panamanians. The guidelines of this policy aim to: minimize health threats; prevent the loss of biodiversity; minimize the occurrence and impact of forest fires in the hydrographic basin of the Panama Canal and in other basins in the country; avoid changes in the structure and function of ecosystems and the diverse types of vegetation; minimize the deterioration of the quality and quantity of water, as well as of environmental quality; minimize soil degradation, which has incidence in the loss of productivity; avoid and prevent the degradation of natural and cultural resources in critical areas.

Within the institutional context and the social-economic situation of the country, the principles of the National Policy for the Comprehensive Management of Fires in the Republic of Panama are based on the principles of Integration, Participation, Sustainability, Equity, Efficiency and Effectiveness. This Policy contains general guidelines which identify the principles, objectives, policy guidelines, strategic lines, which must be materialized in plans, programs and projects which the State will undertake with the purpose of preventing and watching over those areas affected by forest fires.

Likewise, with the support of OFDA/LAC/USAID, work was carried out in September of 2007 in the *Strategic Plan for the Comprehensive Management of Fire,* which has the mission of contributing to reduce the negative effects of forest fires through the establishment of strategic alliances between institutions at the national, provincial and municipal levels and at that one of private institutions and of institutions of the civil society organized to implement the policies, plans, programs and projects for the management of fire, with the purpose of preserving natural resources and for the improvement of the quality of life of the Panamanian population.

This plan has as its vision, being a Comprehensive System, promoting actions of prevention, detection, mitigation, investigation, control and rehabilitation leading to regulate the use of fire, guaranteeing the conservation of biological diversity and the maintenance of the vital functions of ecosystems. The objective of this plan is reducing the occurrence and negative effects of forest fires on ecosystems, through a comprehensive mitigation, prevention, control and rehabilitation system, with coordinated participation from all actors involved, in order to guarantee the sustainability of natural resources and contributing to the improvement of the quality of life of Panamanians.

The program measures forming the route map of the Ecologic Regime are established by the Political Constitution of Panama, which considers provisions related to Public Health, the responsibility of Panamanians in the face of sustainable development, and the exploitation of renewable and non-renewable resources, which are enough support to justify the protection of the elements of the ecosystem and of the social and economic development which also protects it.

Principle No. 11 of the Rio de Janeiro Declaration on Environment and Development determine that “the States must enact efficient laws on the environment”; the declaration continues stating that “environmental regulations, and the objectives and priorities in matters related to the environment, must reflect the environmental and development context to which they apply”. As a result of the application of this principle, the efficiency of environmental regulations is strengthened by increasing the legal protection to environmental components with the intervention of Penal Law in environmental matters.

As of the decade of the 1990s, the Republic of Panama has approached matters related to the need of considering environmental aggressions and their components as being under legal jurisdiction, considering that administrative sanctions are not enough to suppress these behaviors.

In response, during the formation of the hard core of Environmental Law regulations which rule these matters in Panama, was the penal figure aimed at increasing the efficiency of the regulations approved in the Forestal Law of 1994 and in the Wildlife Law of 1995, and the crimes of Ecological Crimes and Crimes Against Wildlife were established.

Law Nº 1 of February 3, 1994 (Forestal Law of the Republic of Panama), in its Title VII called “About infractions and procedures”, establishes in its Chapter II, article 99 and subsequent ones, the figure of Ecological Crime, which goes beyond the repression of those conducts which nave a direct incidence on forest resources. Assumption No. 1, considered as “Ecological Crimes”, according to this regulation is “Producing forest fires”. The abovementioned Law describes the punishments corresponding to ecological crimes, which include fines of up to fifty thousand Balboas (B/. 50,000.00); prison from 6 months to 5 years, according to the magnitude of the damage caused, and punishments for public officers participating in such crimes.

Law No. 24 of 1995, or Wildlife Law, in its Title III, which was at the same time called “About the Legal Protection of Wildlife”, had its first chapter called “About Crimes Against Wildlife and its Integrity”, establishes five situations of penal crimes which include death of wildlife species, hunting, capture, and fishing of wildlife endangered species.

Both laws related to crimes against wildlife, such as ecological crimes, have not been effective to reduce the incidence of extreme environmental aggressions in Panama. With

regard to the Forestal Law, the efficiency was relative, probably due to the combination in one rule of administrative and penal provisions; in this regulation, in a physical and conceptual form, the evaluation, investigation and determination of the penal crime was outside of the Penal Code, which was carried out through an Ad-Hoc Commission which, under a resolution, lodged the accusation before the courts.

Probably seeing the partial efficiency of the abovementioned laws, Law No. 41, or the General Environmental Law of the Republic of Panama, was approved in 1998, which rearranges environmental management in the country, creating the conditions for investigations of "Ecological Crimes". This Law establishes the bases to start a real penal environmental jurisdiction.

After an efficient campaign through the Public Ministry, with collaboration from an environmentalist civil society and independent citizens, Law N° 5 of January 28, 2005 is approved (G.O. 25,233 of February 4, 2005) "*Which adds a Title called Environmental Crimes to Book II of the Penal Code, and issues other provisions".*

This law creates a new Title XIII "Crimes against the environment and territorial ordering" to Book II of the Penal Code, adding new articles. The basic penal types established in this addition to the Penal Code are the following:

1. Crimes against Natural Resources
2. Crimes against Wildlife
3. Crimes in the Obtaining, Approval and Compliance with Environmental Documentation.
4. Crimes against Urbanistic Regulations

**Chapter I. Crimes against Natural Resources**

**Article 399:**
Those setting fire to vegetable masses will be punished with one to three years of prison or its equivalent in fine-days or imprisonment during weekends.
The punishment will be increased from one fourth to one half part in any of the following cases:

1. In case of loss of fertility or drying of the soil
2. When an area greater than five hectares is affected
3. When there is significant damage to the quality of vegetable life
4. In case of actions to obtain economic benefits
5. In case of protected areas or hydrographic basins

Controlled and authorized burning by competent authorities does not constitute a crime.

This new provision binds organizations such as the Public Ministry and the Technical Legal Police to get involved in the subject of investigating the causes of forest fires and it creates the environmental district attorney's offices in the country to deal with these and other subjects related to environmental aggressions.

As a result of the start up of the new provision, under the technical assistance of OFDA/LAC/USAID, the National Environmental Authority, the Fire Departments of the Republic of Panama, SINAPROC, the Technical Legal Police and other state institutions, work in a protocol to act in order to control and investigate the causes of forest fires.

The new Environmental Crime will be in full force within three months, integrating the set of regulations demanding environmental responsibility to those carrying out environmentally condemnable behaviors.

## *3.2 Creation of SIPECIF and its focus on the Prevention of Forest Fires*

**Axel Misraim Romero Solares**
**Institutional person in charge of Forest Fires / National Forest Institute, Guatemala is currently the Focal Point Central American Group of Forest Fires for Guatemala and a Member of the Technical Council of the National System for the Prevention and Control of Forest Fires -SIPECIF.**

From 1998 to 2000, the National Forest Institute was directly responsible for the subject of forest fires outside protected areas, while inside Protected Areas, the responsibility fell on the National Council of Protected Areas.

As of 2001, according to GOVERNMENT AGREEMENT NO. 63 – 2001 dated Guatemala, February 16, 2001, the NATIONAL SYSTEM FOR THE PREVENTION AND CONTROL OF FOREST FIRES -SIPECIF- is created, with its duties being:

a. Coordinating actions for the prevention and control of forest fires
b. Maintaining constant training, development, research and education
c. Publicize all measures necessary to prevent forest fires
d. Maintain the President of the Republic informed
e. Preventing risk situations and watch over the efficient control of forest fires
f. Watch after the recovery of destroyed areas
g. Promote the necessary legislation related to the use of fire
h. And all those activities related to the purposes of SIPECIF.

It is formed by: The Secretariat for Executive Coordination of the Presidency, the Ministry of National Defense, the Ministry of the Environment and National Resources, the National Forest Institute, the National Council of Protected Areas, and the National Coordinator for Disaster Reduction.

SIPECIF is responsible for the subject of forest fires; for the effects of this presentation, the focus will be on some of the activities that are carried out from the viewpoint of prevention:

**RISK ANALYSIS WORKSHOP (AdR).** The objective is preparing personnel to have direct contact with the population, mainly with community leaders, Auxiliary Mayors and/or COCODES and where through an analysis of the environmental situation in the community, municipality or region, through the graphic representation of the area, a forest-fire prevention and control plan is prepared, jointly and with shared responsibility, with the community appropriating of the process and the involvement of the different instances which have competence in the area.

**EXTENSION COURSE FOR PREVENTION OF FOREST FIRES (CEPIF).** It is a two-day event. A forest fire prevention manual is used, with the help of visual aids (Power Point

presentations and flip-chart for locations without electricity) which was prepared by the forest fire unit of the Project of Forest Protection of INAB as well as a video on prevention (prepared by SIPECIF). Its central objective is preparing, technically and didactically, technicians, promoters, extension agents, community leaders, presidents of COCODES, among others, to be information transmitters and for them to promote in their communities, the prevention of forest fires through awareness-raising and community organization, focusing on agricultural burnings.

**FOREST FIREMEN COURSE (CBF).** With a duration of three days, it is a course consisting of eleven technical-practical lessons and a field stage, using the interactive and participative teaching method, with the purpose of forming forest firemen and women able to lead and carry out actions tending to control and liquidate forest fires in a safe and effective manner.

**MANAGEMENT OF FOREST FUELS.** There has been work carried out with perimeter firebreaks and internal ones to prevent the spreading of fire; this is a practice applied by forest farmers, communities, concessions, project owners encouraged by the state, among others. Another fuel management practice is prescribed burnings, which consists of making a fire management plan of the area where work will be carried out, using perimeters of relative humidity, wind direction and velocity, topography, fuels, etc. with defined objectives which can go from the reduction of fuels, promoting their natural regeneration, to the elimination of plagues and diseases. With respect to black lines, their application is still not significant.

**PUBLICIZING:**
Guatemala counts on 23 languages, therefore, publicizing is carried out by regions, using the different media, mainly radio, television, billboards, calendars, leaflets, brochures, among others.

**STRATEGIC ALLIANCES:**
With the support of international organizations such as TNC, CCAD, AECI, FAO, OFDA-LAC, SEMARNAT, AID, DOI, and GTZ, among others, preventive aspects have been strengthened, both at the border level and in the execution of plans, fuel management, etc.

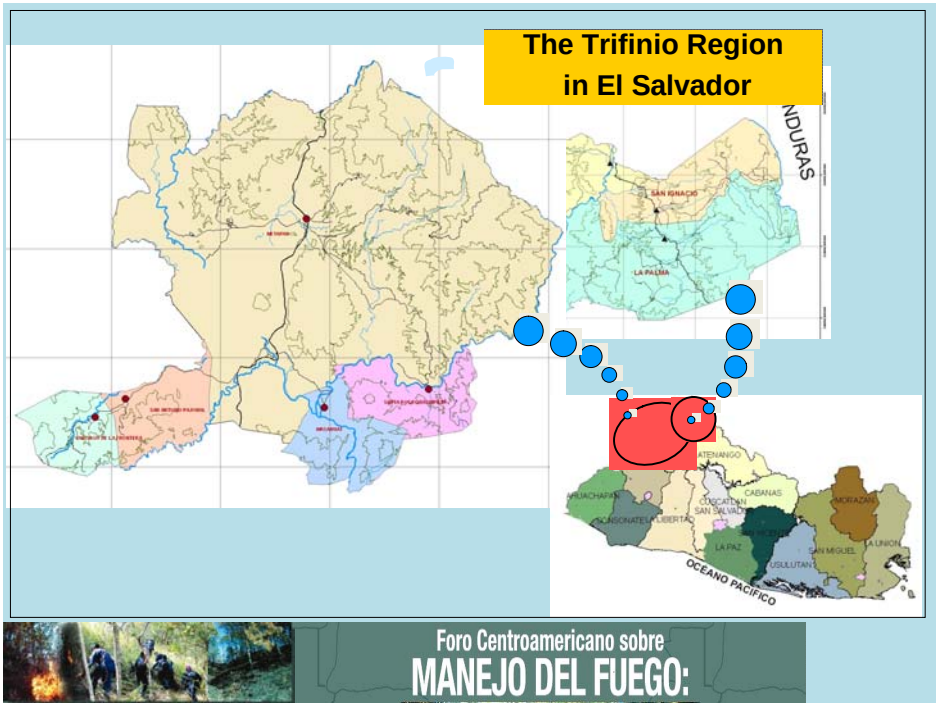
**PREVENTION ACHIEVEMENTS:**
- Preparation of an extension manual for the prevention of forest fires, including Power Point slides, videos on prevention and flipcharts with slides for talks in locations without electrical energy.
- More than 100 extension instructors for the Prevention of Forest Fires
- Agricultural burnings reduced to the background
- Manual on preventive forestry for fuel management prepared
- More than 100 instructors trained in the course for Forest Firemen
- 23 technicians hired at the national level, whose specific work is forest fires
- Preparation of the Fire Management Policy at the national level.

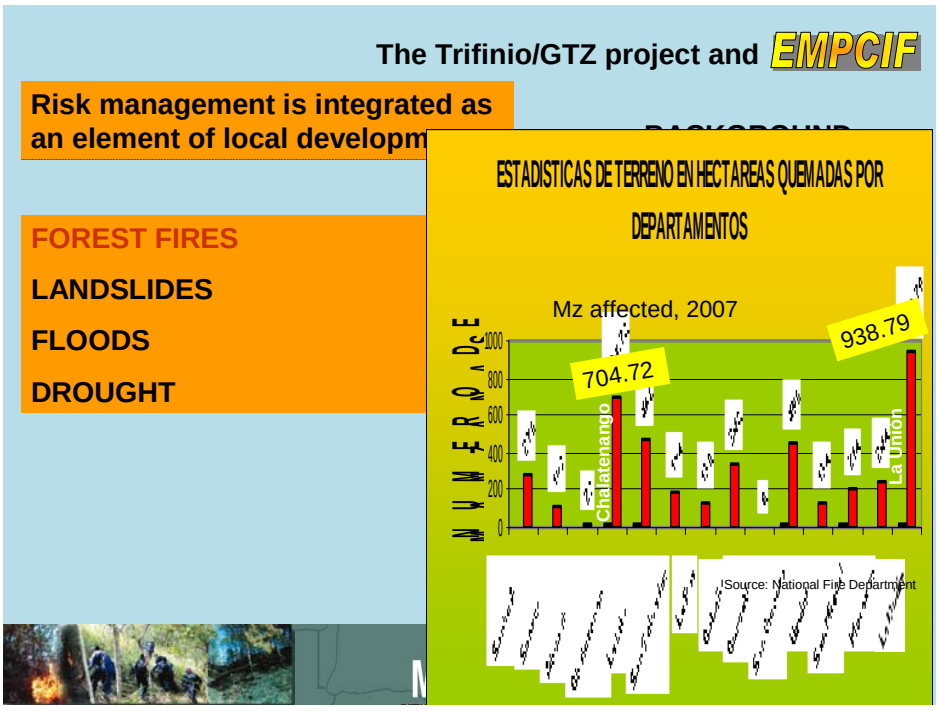
**LIMITATIONS FOR PREVENTION:**
- High index of intentional fires, which involves the structuring of prevention plans oriented towards publicizing, which is expensive
- The introduction of the good-fire concept has caused divergences of opinion among the population because of the repetitive slogan that fire is bad

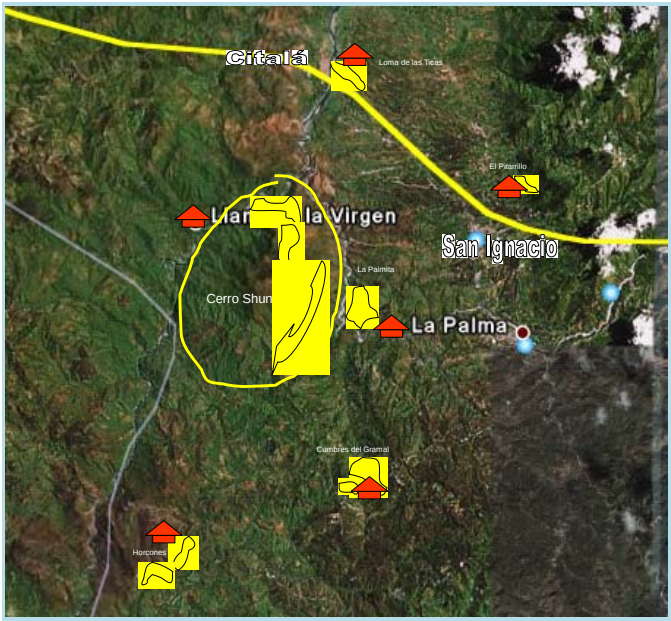
- Research related to the comprehensive management of fire has been scarce, and so have been aspects of environmental valuation and restoration.
- Budgets are oriented in a reactive manner, especially in control, reducing that one for prevention.
- Maps of forest coverage not validated in contrast to CONABIO heat points

## *3.3 Creation of SIPECIF and its focus on the Prevention of Forest Fires*

**Javier Magaña**
**National Advisor, Trifinio – GTZ Project**


The Trifinio Region
in El Salvador
HONDURAS
SAN IGNACIO
LA PALMA
CHALATENANGO
CABAÑAS
MORAZAN
LA UNION
LA PAZ
SAN MIGUEL
USULUTAN
OCEANO PACIFICO
Foro Centroamericano sobre
MANEJO DEL FUEGO:


The Trifinio/GTZ project and EMPCIF
Risk management is integrated as
an element of local developm
FOREST FIRES
LANDSLIDES
FLOODS
DROUGHT
ESTADISTICAS DE TERRENO EN HECTAREAS QUEMADAS POR
DEPARTAMENTOS
Mz affected, 2007
NUMERO DE
1000
800
600
400
200
0
704.72
938.79
Chalatenango
La Union
Source: National Fire Department


- Areas of greater recurrence
- Origin due to actions of persons: pasture burning, agricultural burning, crime, "*colmeneros*", powder

| *Yr.* | *Amt.* | *Area (Ha)* |
|---|---|---|
| 04 | 22 | 395.00 |
| 05 | 20 | 166.75 |
| 06 | 13 | **422.24** |
| 07 | 15 | 160.00 |

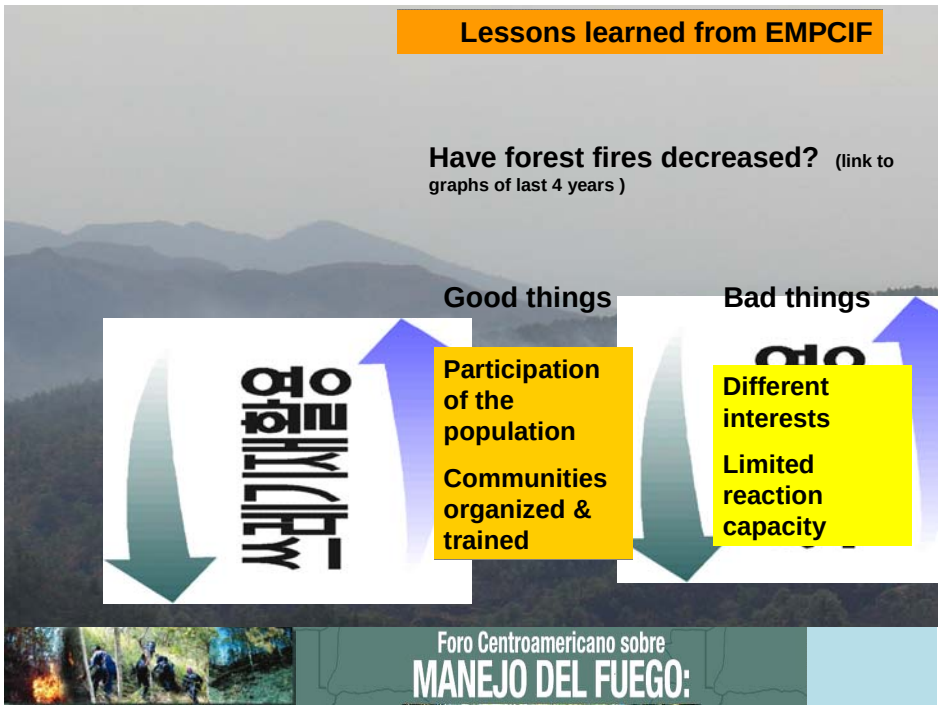
Foro Centroamericano sobre
MANEJO DEL FUEGO:


The building of a strategy
General diagnosis of the zone (cause- effect)
Identification of key actors and differentiated roles
Intersectoral planning from the Local Risk Management Panel
Definition of a strategy
EMPCIF
Foro Centroamericano sobre
MANEJO DEL FUEGO:


Differentiated interests
"Non-traditional" actors
Cultural aspects
Incentives and adequate technical assistance and training systems
Foro Centroamericano sobre
MANEJO DEL FUEGO:


The building of a strategy
General diagnosis of the zone (cause- effect)
Identification of key actors and differentiated roles
Intersectoral planning from the Local Risk Management Panel
Definition of a strategy
Link to images of each step
EMPCIF
Foro Centroamericano sobre
MANEJO DEL FUEGO:


Intersectoral planning from the Local Risk Management Panel
MINED
Group of youths
MSPAS
Asoc. Cayaguanca
LRM panel
PNC
Communities
MAG
Cultural Houses
Municipalities
Proposal of 4 work components
Foro Centroamericano sobre
MANEJO DEL FUEGO:


Lessons learned from EMPCIF
Have forest fires decreased? (link to graphs of last 4 years )
Good things
Bad things
Participation of the population
Communities organized & trained
Different interests
Limited reaction capacity
Foro Centroamericano sobre
MANEJO DEL FUEGO:


Lessons learned from EMPCIF
INSTITUTIONAL STRENGTHENING
Municipalities and microregionalization
Forest managemetn plans …oportunities, consider land ownership
Traditional and conventional tools
Combine local monitoring with heat points and the multithreat alert system
Reduction of forest fires
Foro Centroamericano sobre
MANEJO DEL FUEGO:

## *3.3 Forest fire prevention strategy in Nicaragua*

Ing. Zaida Zúniga Moreno
INAFOR-Nicaragua

Nicaragua has a forest cover estimated in 5,450,000 hectares, of which some 536,846 has. constitute the pine forest, which is distributed in 379,237 has. in the Atlantic Zone, 145,869 has. in the northern central zone, and 11,738 has. close to the Pacific Zone. All the forest mass of Nicaragua is annually endangered by the incidence of forest and agricultural fires, which constitute a problem with great impacts in environmental, economic and social matters in the country. Seeing this problem of fires, INAFOR, within the strategic work lines, has implemented a work alliance with organizations, institutions and local governments for the preparation and promotion of a Plan for the Prevention and Management of Forest Fires, with its axes being: 1) strengthening of organizational capacities, 2) strengthening of the technical and logistic fire fighting capabilities. The plan's central objectives are: Contributing to the environmental protection process and to the improvement of the quality of life of the rural and urban population through the reduction of the occurrence of forest fires. 1) The articulation of institutional capacities and resources, 2) The awareness-raising of local and community actors, 3) The strengthening of the technical, institutional, municipal and community capacities for the Prevention, Mitigation, Fight and Control of Forest Fires, 4) Establishment of a permanent diffusion campaign for environmental protection and for the prevention of forest fires, and 5) The strengthening of the citizen awareness in fire prevention. The central strategy is the strengthening of the capacity of local management for the mitigation and control of forest fires, integrating the work of local governments, national institutions, non-governmental organizations, international institutions, forest owners, and organized communities into this effort, all with the purpose of promoting actions for the prevention and mitigation of forest fires in a context which guarantees sustainability. To date, the results of the process have been very satisfactory and can be seen in a reduction of the number of fires and in the forestal and agricultural area affected by fires in the last year, 2007.

## *3.4 Comprehensive Fire Management Sustaining Ecosystems and the Means of Human Life through Comprehensive Fire Management*

Victoria Pantoja-Campa
Applied Fire Ecologist for Latin America, The Nature Conservancy
Stationed in the offices of TNC-Honduras.

The Nature Conservancy is a non-governmental international organization which has as its mission preserving plants, animals and natural communities representing the diversity of life on Earth through the protection of soil and water that these need to survive. TNC's headquarters is located in Arlington, Virginia, United States and works in more than 30 countries, establishing networks and alliances with the cooperation of local partners.

The Global Fire Initiative Team of TNC is in charge of developing strategies and actions to reduce the threat implied by altered fire regimes (too much fire, too little fire, and inadequate burnings) for biodiversity. This is carried out through: - the evaluation of needs; - contributing technical elements to orient fire-related policies; - providing and applying knowledge in fire-related sciences; - comprehension of structural factors (social and economic); - promoting education and prevention actions based on the community; - the use of fire to support ecologic processes in dependent ecosystems and to prevent fires of high intensity and with a high recurrence; - with training and education through networks and associations; and, promoting the concept of Comprehensive Management of Fire and its application through the carrying out of Plans for the Comprehensive Management of Fire (PMIF).

***Comprehensive Management of Fire*** (MIF) focuses on problems and matters related with desired and undesired fires, in the context of the natural environments and social-economic systems where these occur, evaluating and balancing the risk of fire with the positive impacts that fire can play in a conservation area, landscape or region. It is possible that MIF always involves local communities in decision making to define actions related to the management and use of fire to maintain ecologically sustainable products and services. MIF is an integration of science and society with fire management technologies at different levels. In the holistic focus, the object is that when approaching matters related to fire, biological, environmental, cultural, social economic and political interactions are considered (Kaufmann *et al*, 2003, quoted by Myers, 2006). MIF allows that when fires appear, there can be appropriate response to:

1) Evaluate and characterize impacts in harmful, beneficial or benign
2) Balance benefits and risks, and
3) Respond effectively and appropriately

There are three wide response categories of vegetation to fire: **ecosystems dependent on fire,** where fire is essential, if the fire factor is altered the ecosystem will become something different and habitats and species are lost; **ecosystems sensitive to fire,** the species of these ecosystems do not count on adaptations to respond to fires and mortality is high, even when the fire intensity is low; and, **independent of fire,** here fire plays a small or negligible role, because they are too cold, humid or dry to burn (Hardesty *et al*, 2005,

quoted by Myers, 2006). Myers (2006) has included ecosystems influenced by fire which can be linked to ecosystems dependent on fire, because frequently, they are found as a transition between them.

The **fire regime** is the set of recurring fire conditions characterizing a specific ecosystem. The conditions are within a specific range of frequency, fire behavior, severity, moment and size of the burning, model of fire propagation and model and distribution of the burning. The **altered fire regime** shows in human activities –extinguishing and prevention -, or in excessive and inappropriate burnings, or in the fragmentation of the natural environment which affects the ecological integrity of the ecosystem. The **prescribed fire regime** is a repeated model of controlled burnings destined to produce an anticipated or expected result.

For the social-economic-cultural component, the following questions are a useful guide: What is it burning?, where is it burning?, why is it being burned?, why is the burning necessary?, when is it being burned?, how is the burning being carried out?, what role, if any, play provoked fires in maintaining desired ecosystems?

TNC has carried out workshops in Belize, Costa Rica, Guatemala and Honduras to publicize the MIF concept and to strengthen the capacities in prescribed burnings. In international courses, there have been representatives present from Belize, Costa Rica, Honduras, Guatemala and Panama. Training on MIF and more specifically, in prescribed burnings, is detonating reflection processes (such as, for example, in Honduras, where they are now working to expand their form of approach to the problem of altered fire regimes) to start planning a form of approaching the subject of fires where the positive effects on ecosystems are acknowledged and the inclusion of the communities in fire planning gains strength.

## *Discussion panels*

During the second day, four discussion panels for the following subjects were organized:

- Panel 1: Main learning, achievements and challenges for fire management in Central America
- Panel 2: Recommendations on strategic axes in Fire Management Plans
- Panel 3: Suggestions for improving the legal framework and its application in Central American countries.
- Panel 4: Strategies and practices for the integration of local governments to fire management

## *Conclusions of the discussion panels:*

## *Panel 1: Main learning, achievements and challenges for fire management in Central America*

Taking as a basis the presentations, which occurred during the two days, which are achievements and challenges for fire management in Central America, the panel concluded:

**Main achievements**

- Awareness raising: There is a degree of awareness in the region which has generated effects of legislation on the matter. Experiences in Central America, which are expressed voluntarily at the local level
- Technification: qualified human resources in the region, multiplying entities which facilitate integration through an exchange of experiences
- Organization of the National Forest Fire Commission, with interinstitutional integration based on a Central American effort (a common process in the region)
- Legislation: There is legislation at the regional level which can be of help for adopting the experiences in the different countries
- Central American reunification to standardize criteria and avoid isolated efforts, as a product of the differentiated advances surrounding the development of regional meetings
- Counting on a Central American Fire Management Strategy, and on a Central American Manual

**Main achievements**

- Financing: Lean on the legislation to find financial sources
- Legislation: Incidence of the subject on decision–making entities of the highest level. Publicizing of existing laws and of the problem of forest fires. Use the appropriated language in these procedures..

- Research: Comprehensive scientific research on fire management. Institutionalization of those organizations dealing with the subject of forest fires in each country.
- Training-Technology: Promote and apply the development of adequate technology.
- That each Central American country has human matters duly technified in the subject of fire management… INSTITUCIONALIZATION.
- Organization: strengthen cooperation structures in the regions. The region should be organized with early capacity of response in the face of an emergency related to fire management.

## *Panel 2: Recommendations on Strategic Axes in Fire Management Plans*

**Reforms to the Law**
Diagnosis of the legal framework
Presentation of proposals to the legal framework
Publicizing

**Education**
Modification to curricula in order to protect ecosystems, at all levels of educational and technical facilities.
*Awareness raising for local governments.*
*Allocation of a fire-management budget.*

***International or National Cooperation***
*Creation of the forestal protection fund (Dec. 50, damage compensation)*

***Institutional and community integration***
*Integration of Civilian Protection at all levels*
*Integration of private enterprise through actions of compensation and local social responsibility.*
*Integration of the communities to the prevention and control of fire.*

***Monitoring***

**Recommendations for the preparation of strategic plans**

- Form a multidisciplinary team to prepare the Fire Management Plan
- Inventory of human, financial and infrastructure resources.
- Collection of all information
- Integrate all civil society organizations (ONG) into CNIF
- Existing.

**Conclusion:**
Maintain and implement this type of events in order to maintain close bonds at the regional level and therefore, know about and exchange regional experiences

## *Panel 3: Suggestions to improve the legal framework and its applications in the Central American countries*

**Suggestions to improve the legal framework:**

- Submit requests before the institutions of each country, so that the legal and technical recommendations of the Central American strategy on fire management are taken up again (prevention, control and mitigation)
- Promote legal integration at the national level to harmonize the current fire management legislation
- Seek financial mechanisms (taxes) to strengthen the response capacity of the institutions through the prevention and mitigation in the face of emergencies
- Promote and establish binational or trinational fire management agreements
- Incorporate regulations for the application of prescribed and controlled burnings
- Submit the legal framework to obtain inputs and to update them to consultation by the civil society

## *Panel 4: Strategies and practices for the integration of local governments to fire management*

- Integrated management of local authorities with the different actors
- Support, promote and provide follow-up to legislation pertinent to forest fires
- Identify, evaluate and define mechanisms to generate incentives due to the management of fire prevention
- Collect and identify the organizations and spaces established to increase the awareness, educate and motivate participation in the subject of forest fires
- Establish a Communications Plan which emphasizes publicizing mechanisms on the subject of fire management
- Successful exchange tours among Municipal Offices on fire management
- Increase the awareness of all communities on the problem of fires, including schools so that the people take conscience and take the necessary precautions to prevent fires
- Allocate communications media and tools to the communities as a first response
- Train municipal environmental committees in regard to fires
- Train Adescos in all related to the environment, mainly in those zones more prone to fire
- Share positive experiences of communities already involved and benefited with prevention
- Establish a program of local and national simulations on fire management
- Coordinate with the network of natural area managers in matters related to fire management

## *Forum Conclusions*

The conclusions of the Forum are presented next, and were prepared by the forum's moderator and presented by Eng. Delmi Azucena in representation of CNIF.

- This forum has allowed to initially know a general panorama on the situation of fire management in the world, and highlights the importance of the subject, which is taken up again by the United Nations through the Global Fire Monitoring Center (GFMC)
- There is a legal framework for fire management in the Central American region, subject to improvements or with voids, but which can be improved and applied. Effectiveness of application is needed.
- The importance of forest fires and their environmental, social and health impacts has been acknowledged; it is still necessary to publicize these negative impacts even more.
- There are different fire management strategies at the regional level and within each country; we must focus on the comprehensive management of fire
- The forum contributes to increase the awareness of the population on the importance of fire management, through a complete coverage by the communications media
- There are methods, ranging from scientific to popular, for fire detection and monitoring; the countries of the region, with the limitations that are known to us, must work on increasing the awareness of the population on the importance of preventing forest fires
- It is necessary to define strategies to make fire management actions sustainable, even when cooperators are no longer present; in Central America, El Salvador and Panama are examples of the reduction in international cooperation. Therefore, sustainability is urgent
- The efforts towards fire management, as with any local development strategy, must consider the participation of local actors and the leadership of local governments
- The reduction of forest fires requires a change of attitude in the population, which is only possible to achieve getting the civil society in its broadest concept involved, which includes local actors, private sector, churches, NGOs, governments, etc.
- There is a high degree of intentional fires, which leads to the structuring of prevention plans oriented to publicizing, which is costly; therefore, it is necessary to take up regional initiatives again to include fire management in the national and local budgets of the countries
- There must be a good conceptual management of the introduction of the concept of fire, given that it has caused divergence of opinions among the population; for example, the repetitive slogan that fire is bad
- Investigations with regard to comprehensive fire management have been scarce, as well as in aspects of valuation or environmental restoration
- There are different scientific methods/tools for fire detection and monitoring; it is necessary that these methods/tools be shared among experts
- It is necessary that budgets are reoriented, specially that they focus not only on Control but also on Prevention

## *Event closing ceremony*

The closing ceremony, or official closing, of the event was carried out by Mrs. Regina Bauerochse Barbosa, Director of the GTZ Agency in El Salvador, who acknowledged the success and importance of this event, besides making a reflection on the subjects discussed and the importance for GTZ of cooperating in this subject.