



The Situation of Forest Fires in Guatemala

1. Introduction

Guatemala is a complex country and has a very diverse mix of ecosystems, including forests of broadleaves, conifers, mixed forests, dry forests and swamp, as well as a diversity of wild fauna, floor types and climatic variables and conditions. It has an approximate territory of 108,889 square kilometers of which 39.9% of this is covered by forests, equivalent to 4.3 million hectares (ha) (System of Geographical Information of the National Institute of Forests, 2001).

The incidence and the behavior of the forest fires vary from one geographical area to another. There is also very high cultural and social diversity in the communities that hinder the implementation of general strategies of prevention and control of forest fires. As such, it is necessary to establish strategic actions which are situation specific and long term in order to be able to impact on the processes of the residents' sensitization, generating changes of attitude, for the benefit of Guatemala and the Guatemalan people.

2. Forest Fire Situation 1998-2008

The following Figures 1 and 2 show the area burnt and number of fires per year for the period of 1998-2008 according the official statistics of the Government of Guatemala.

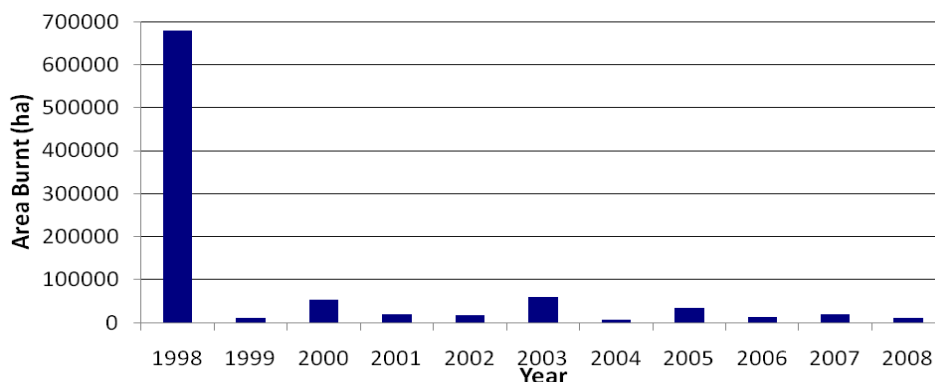


Figure 1. Annual area burned (ha) in Guatemala between 1998 and 2008.
Source: Base Information Profor / INAB

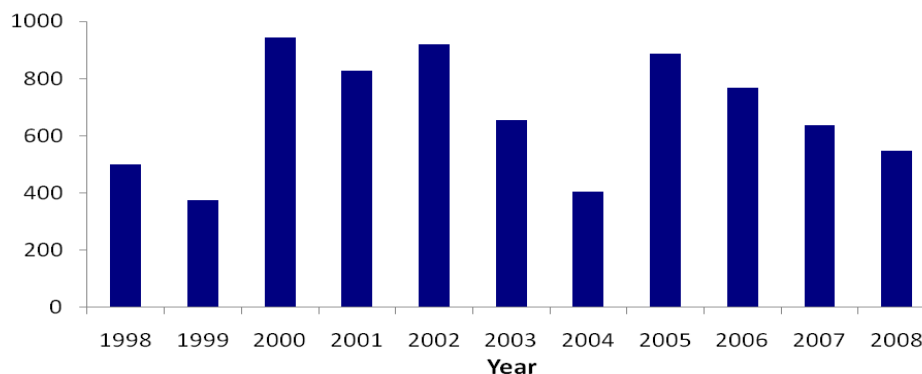


Figure 2. Total Number of Fires per Year in Guatemala, 1998-2008
Source: Base Information Profor / INAB

3. Causes of Forest Fires

One of the main causes of the forest fires is the use of the fire in the agricultural sector. Due to recent efforts to reduce the impact of agricultural fires it has been possible to reduce the proportion of agricultural fires of all wildfires in Guatemala from 40% to 24% from 1998 to 2008. However at the moment, the social inequity, not well guided politicians, weakness of the human capital, among other things, have contributed to an incidence of the forest fires of intentional character. Fire is used by local people to achieve different aims, such as land-clearing for agriculture and makes it more difficult to establish strategies of prevention, since many actions are not within reach of forest technical institutions, and they don't correspond to political decisions of high level. Looking at the smaller scale, causes of forest fires include use of fire by hunters, bonfires inside the forest that have not been properly extinguished, coal workers, the burning of garbage in areas adjacent to forests, and bee-keepers (*colmaneros*) that use fire to extract honey of wild honeycombs, among others.

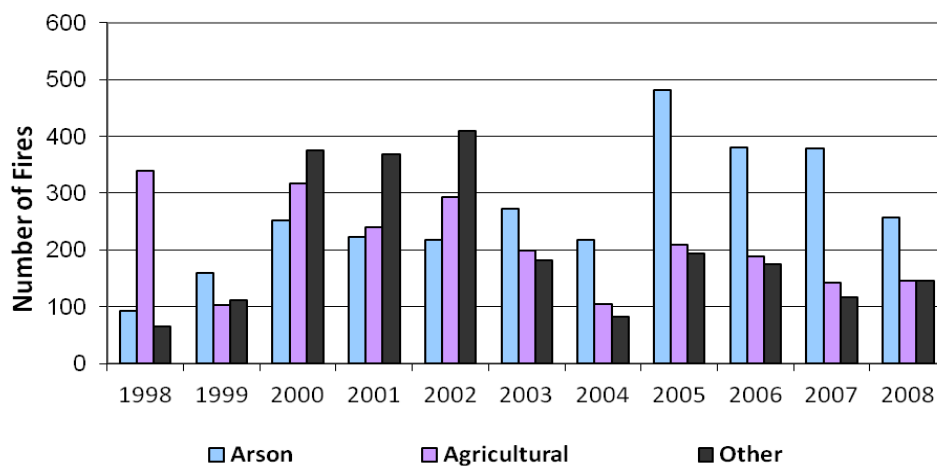


Figure 3. Causes of wildfires in Guatemala, 1998-2008

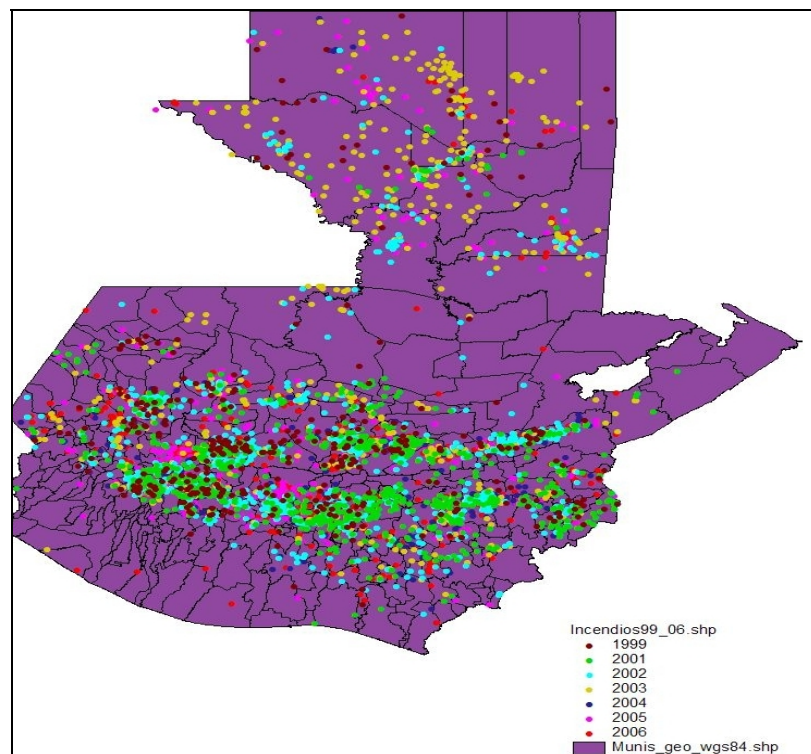


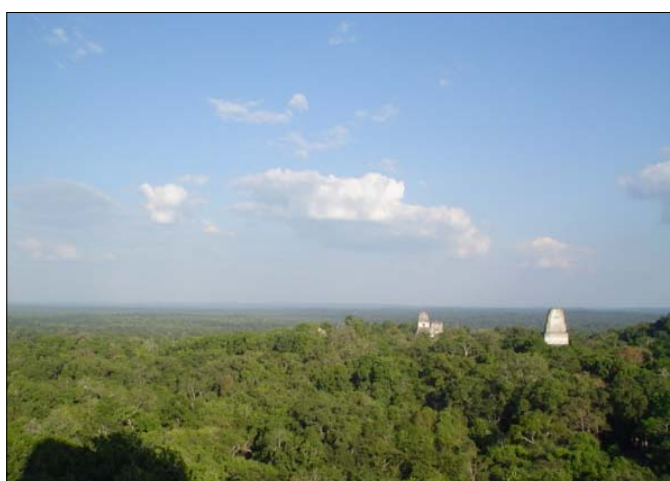
Figure 4. Location of landscape fires in Guatemala, 1998-2008.

Table 1. Summary of official wildfire statistics for Guatemala, 1998-2008

Years	Total No. Fires	No. Forest Fires	No. Fires (non-forest)	No. Mixed Fires	Total Area Affected by Fire (Ha)	Total Forest Area Affected by Fire (Ha)	Total Non-Forest Area Affected by Fire (Ha)	Principle Causes Of Fires
1998	498				678,795.00			Agricultural
1999	374				10,623.05			Meaningful
2000	944				53,404.80			Agricultural
2001	916	827	89		21,997.13	18,636.17	3,360.96	Agricultural
2002	992	920	72		22,467.37	18,007.80	4,459.57	Agricultural
2003	732	653	79		83,058.31	60,209.33	22,848.98	Meaningful
2004	443	404	39		7,462.73	6,702.67	760.06	Meaningful
2005	947	886	61		92,554.45	34,157.12	58,397.33	Meaningful
2006	831	767	64		14,407.24	12,408.41	1,998.83	Meaningful
2007	869	637	57	175	56,046.00	18,757.00	37,289.00	Meaningful
2008	747	547	57	143	28,837.50	10,972.90	17,864.60	Meaningful
TOTAL	8293	5641	518	318	1,069,653.58	179,851.40	146,979.33	

4. Areas of Cultural and Ecological Importance Affected by Wildfires

Due to its recent ecological formation, the Department of the Petén is highly susceptible and sensitive to wildfires. The Department of the Petén has a surface of 35,854 km², corresponding to approximately a third of the country. The surface is distributed this way: 146 km² of water bodies, 5,059 km² constitutes cultivations, grasses and low mounts, 1,500 km² are secondary forests, 27,477 km² natural broadleaf forest and 1,672 km² wetlands between the 50 and 600 meters above sea level. Petén is a forest refuge of an incalculable quantity of fauna and wild flora. The faunal diversity includes the jaguar, tapir or *danto*, *tigrillo* (*Leopardus tigrinus*), ocelot, white line deer, boar, howling monkey, monkey claws, birds like the red *guacamaya*, the *cojolita*, the pheasant or *pajuil* and endemic species as the turkey *ocelado* (or turkey of Petén), the crocodile *moreletti* and the white fish. The Department of the Petén has protected areas of excellent importance among them the Parks National Lagoon of the Tiger, Sierra of the Lacandón and Reservation of *Biósfera Mayan Montañas Chiquibul*. In their majority the orography of the department is plains being inside these, important sources of water among those that the saline rivers, Santa Isabel or Cancuén highlight, Machaquilá, San Pedro and Usumacinta that end likewise in the gulf of Mexico and the Deep or Blue rivers, San Pedro and Mopén that end in the sea of the Antilles, highlight the lake Petén Itzá, the lagoons Sacpuy, Yaxhé, the Lost One, the Tiger, Two Lagoons, the Repasto, Yaloch, Petexbatún, Long and the Puddles, besides the Lagunetas San Diego, the Gloria, the Mendoza, Macanché and Salt Petén. Located inside the department are approximately 2000 archaeological places, among the most important are Tikal, Mirador, the Peru, Black Stones, Altar of the Sacrifices, Ceibal, Aguateca, Two Piles, Yaxhá, Nahúm and Cancuén. The majority of these cultural heritage sites are located inside the protected areas and outside of the protected areas Ixcún, Ixtontón, The Shawl, among others.



Figures 5 and 6. Areas of cultural importance include heritage sites of ancient Mayan culture.

On the other hand Petén has a rate of demographic growth of 8.5%, the highest in Guatemala with a current population of 546,003 inhabitants. The majority of these people live in rural areas and they carry out activities of subsistence agriculture (such as sowing cultivations) which causes pressure on the natural resources of the area. Factors such as this exert pressure of the region, although it has been designated as a protection area. There have been a high number of forest fires incidents within Petén in recent years. Between 1998 and 2007 forest fires have affected more than 600,000 ha of forest. Among the main causes of the burns are agricultural, bonfires, and deliberate use of fire by users of the forest including *xateros*, hunters and beekeepers. These regular fires pose a danger to the flora, fauna, soils, and has severe repercussions for biodiversity and ecosystem function.

5. Economic and Ecological Damages Caused by Forest Fires

The economic damages due to wildfires in Guatemala are concentrated in the loss of products of the forest which are used by the population for obtaining economic revenues, these include timber and non timber forest products; wood, firewood, needles and pine fruits, *xate*, pepper etc. There are also agricultural losses and decline in food productivity as a consequence of the forest fires, either by direct contact of the fire or for the proliferation of plagues and later illnesses to the occurrence of these.

Furthermore, there is also evidence of the loss of revenues from visitors to the wild areas for recreation and tourism because during the fire season the scenic beauty is diminished and the airports occasionally close as a consequence of the smoke caused by the forest fires. Effects include direct losses in the population's income due to the decrease of tourists. Smoke from the fires can have perverse outcomes on human health, causing respiratory illnesses with children and elderly people most vulnerable. The impact of smoke on health has an economic impact also, as victims have to appeal to economic payments on the part of the population to heal these ailments.

From the ecological and environmental point of view the damages are similar to those seen in neighboring countries include fragmentation of the forest, soil erosion, loss of habitat for wildlife, nutrient depletion and other harmful effects on forest soils, changes in forest structure with the consequent invasion of other exotic species into the area, desertification of lands, contamination of sources of water, and of the atmosphere, proliferation of plagues and illnesses in the forests, death and emigration of wild animals, and pressure on native flora, among others.

Table 2. Estimates of economic losses in 2003 due to forest fires

	Value (in millions of Quetzales)	Value (in millions of US Dollars)
Timber	82.8	11.4
Non-timber forest products	20.8	2.77
Emissions CO ₂	43.3	5.77
Value of Existence	359.8	47.97
Total	506.7 Million Quetzales	67.91 million \$US

Source: Consultancy CATIE/INAB/CONAP

6. Prevention of forest fires

Several institutions collaborate together as the National System for the Prevention and Control of Fires Forest (SIPECIF) to execute diverse actions in Guatemala in an attempt to counteract the incidence and effects of the forest fires. Such preventative actions include:

Detection

National level journeys using pickup vehicles or motorcycles are implemented for fire detection. Air journeys using airplanes or helicopters are also occasionally used, although due to the high cost these are made with little frequency. Another detection form is a stationary one using observation towers in diverse areas with protection priority. Finally fire detection by satellite has been introduced in Guatemala, with the National Commission for Biodiversity with headquarters in Mexico sending Guatemalan officials daily information regarding heat and fire observations, which are verified with field observations.

Analysis of risk

The objective is to prepare personnel to have a direct contact with the population mainly community leaders, such as mayor. Through an analysis of the environmental situation in the community, municipality or region, and through the graphic representation of the area, the designated leader can analyze risk and prepare a plan of prevention and control of forest fires. This is to be done collaboratively with different stakeholders and with shared responsibility and involvement on the part of the community.



Figure 7. Community members preparing a fire prevention plan

Training of forest fire fighters

With a duration of three days, it is a course that consists of 11 theoretical-practical lessons and a field phase using the interactive method and participative teaching with the objective of forming forest firemen able to direct and to execute tending actions to control and to extinguish the forest fires in a sure and effective way.

Management of forest fuels

Training has been conducted for locals to learn how to create firebreaks which impede the advancement of a fire. This practice is implemented by foresters, community member, and proprietors of state-led projects, among others. Another practice of handling of fuels is prescribed burning, which consists on making a plan of fire management for the area to work using parameters of relative humidity, wind direction and speed, topography, fuels, etc. The objectives of prescribed burning range from the reduction of fuels, to propitiate natural regeneration, but also for the elimination of plagues and illnesses. With regard to the black lines their application is not still significant.

Awareness rising

Guatemala has 23 languages so the task of spreading a national message on the management of forest fires is a difficult one. It is mainly attempted using different means such as radio, television, posters, calendars and pamphlets.



Figure 8. Promotional material intended to raise awareness and educate people about forest fires and their control and prevention.

7. Organization for Forest Fire Control

At national level, there are 20 Emergency Operation Centres (COEIF), who manage forest fire incidents. These they are led by the departmental governor and worked by the institutions that together form the SIPECIF. This system employs approximately 30 forest fire brigades in the whole country who, with the supported of community volunteers and technical personnel, control and liquidate the catastrophes that happen inside their designated areas.

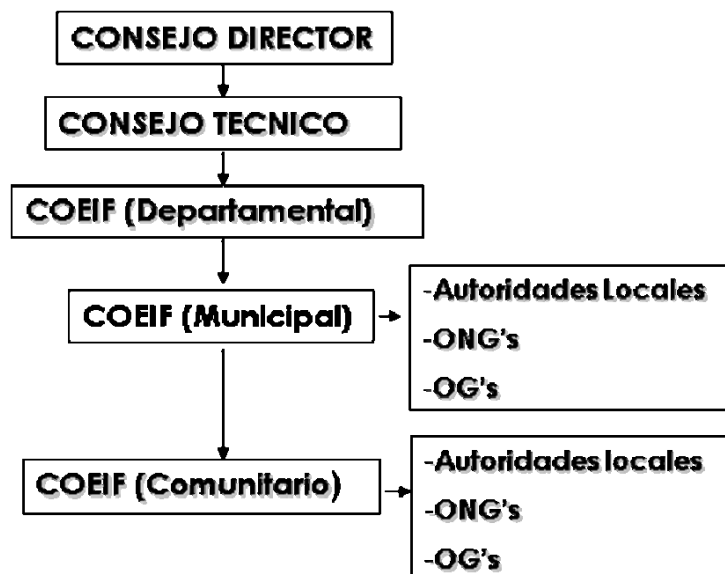


Figure 9. Chain of command for forest fire management

Integrated Fire Management

Currently an integrated fire management plan is being employed in a little more than 1400 ha of mixed forest in the National Forest Property of San Jerónimo in Low Verapaz. Two prescribed burns have been implemented under this plan, with the objective of reducing forest fuels and encouraging natural regeneration. Having planned for the year 2008 the execution of this plan includes prescribed burns in critical areas, black lines, definition of protection areas and areas of forest handling, among others.

8. National Cooperation in Fire Management

Everything related to the topic of the management of wildfire is executed by applying the governmental agreement 63-2001. The national forest fire fighting capacity (the prevention and control of fires) is based on SIPECIF. This agency works together with the National Institute of Forests, the National Council of Protected Areas, the Ministry of Atmosphere and Natural Resources, the National Coordinator for the Reduction of Disasters, the Ministry of the Defense and the Secretary of executive Coordination of the Presidency, institutions that work on the whole to lessen the impact of forest fires on the environment and the economy.

9. International Cooperation in Fire Management

The international support of organizations such as TNC, CCAD, AECI, FAO, OFDA-LAC, SEMARNAT, AID, DOI and GTZ (among other) has strengthened the aspects of prevention and control of forest fires. With the help of these international partners at national level elaboration and execution of plans of integrated fire management, handling of fuels, personnel training, improvement of fire detection abilities, among other things, have been achieved.

10. Analysis and Recommendations

- A high proportion of all forest fires are deliberately lit. These are the result of various forest users in the pursuit of forest products for subsistence and economic gain.
- The introduction of the concept of good fire has caused divergences of opinions in the population for the repetitive slogan that 'all fire is bad'.
- The investigation has been very scarce regarding the integrated handling of the fire, as well as in aspects of valuation and environmental restoration.
- The budgets are guided in way in which more is allocated to fire control and less to fire prevention. Both are needed for sound management to minimize the impact of forest fires.
- It is necessary to implement a national system for dealing with forest fires that serves as a guide for the execution of tending actions and for the appropriate handling of fire incidents.
- Although there are 23 specific technicians on the topic of forest fires hired at national level, technical invigoration is necessary for the application of the system of command of incidents, in the attention of big catastrophes.

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