

Annex 3

CBFiM in Mexico: La Sepultura Biosphere Reserve in Chiapas

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EXECUTIVE SUMMARY

CBFiM at the La Sepultura Biosphere Reserve exemplifies a number of projects throughout Latin America that are enabling rural communities to take responsibility for managing the fire problems that affect them directly. The La Sepultura project is one of the few examples that go beyond local prevention efforts and community-run suppression brigades to include fire use (prescribed burning) to restore and maintain native fire-dependent ecosystems. It also illustrates that success at the community level requires that broader (national and regional) issues related to fire – including scientific, technical, social and political issues – be addressed simultaneously.

INTRODUCTION

The El Niño year of 1998 caused unprecedented wildfires in southern Mexico (Figure 1) where the number of fires and area burned increased nearly fourfold

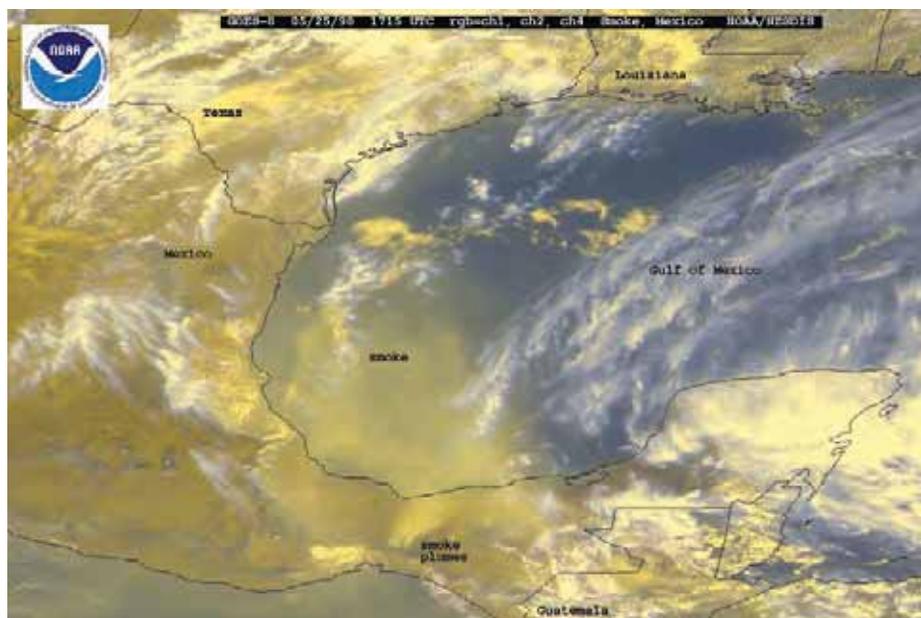


FIGURE 1
Fires in southern Mexico during the 1998 fire season

over the annual average (CONAFOR, 2006). Tropical moist forests and montane cloud forests, which are normally resistant to severe fire damage, were adversely affected by a number of large persistent fires. The southern state of Chiapas was particularly impacted by these fires. There were equally problematic fires in the adjacent northern Guatemalan province of Petén. After the initial suppression response to these fires, and the arrival of the rainy season that finally extinguished them, the Mexican government, research institutes, multilateral agencies, and NGOs evaluated the underlying causes of the fires and focused their attention on improving early warning systems, suppression capacity, and prevention programmes. Because many of the fires originated in the agricultural sector, the Mexican Conservation Fund (FMCN) focused its attention on developing CBFiM programmes in the areas that were most severely impacted by the fires. The Nature Conservancy (TNC) contributed to these efforts by developing an integrated fire management strategy, which was aimed at changing the way that both the Mexican conservation agencies (the National Protected Areas Commission (CONANP) and the National Forestry Commission (CONAFOR)) and rural communities think about and approach fire management issues in and around conservation areas (Myers, 2006; Pantoja-Campa, 2008).

Critical to this paradigm shift was the recognition that some ecosystems, like pine forests and savannahs, depend on fire to maintain their character and biodiversity – values that had led to their protection and inclusion in protected natural areas in the first place – and that fire plays both positive and negative roles in nature and society.

The case study presented here involves two *ejidos* (communal lands managed by rural villages) that are within the buffer zone of the La Sepultura Biosphere Reserve, Chiapas, Mexico (Figure 2). La Sepultura Biosphere Reserve is one of the most diverse forest reserves in Mexico and the world. It covers 162 700

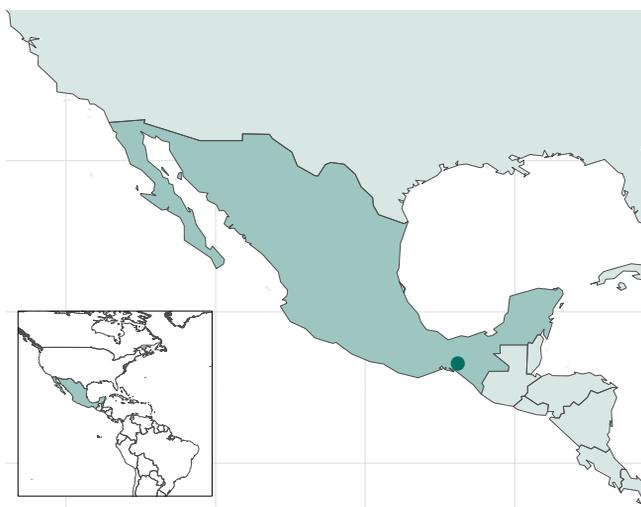


FIGURE 2
Location of La Sepultura Biosphere Reserve

hectares (approximately 413 253 acres) and protects 10 of the 19 vegetation types in Chiapas, including cloud forest, tropical forest and pine-oak forest. In 1998, fires that originated in agricultural lands and the tropical pine forest within the reserve's buffer zone severely damaged adjacent fire-sensitive cloud forest vegetation located within the core conservation area of the reserve. Beyond the biodiversity value of cloud forests, this ecosystem provides important ecosystem services, particularly the maintenance of water quality and appropriate water discharge rates for lowland rural communities and urban areas, as well as for the agricultural sector throughout the region. The two communities, Corazón del Valle and Valle de Corzo, were selected as pilot communities because of the fire problems that originated in their communal forests in 1998, and because there had been a long history of traditional fire use by people living in the pine forest where these communities are located. The communities are only two of 45 *ejidos* located within the biosphere reserve. The total population within the reserve is 25 000. Communal lands and private property comprise 95 percent of the reserve, making it important that land owners and communities are actively engaged in the reserve's management.

The pine forests in the region are dominated by *Pinus oocarpa* (known locally as *ocote*), the most widely distributed pine in Mesoamerica, ranging from central Mexico to northern Nicaragua (Photo). The pines are highly fire-adapted. Larger trees have thick protective bark and high, open canopies that allow for the dissipation of heat. Seedlings require bare mineral soil and direct sunlight: conditions that are created by fire. Saplings have the ability to resprout from the root collar if the main stem is top-killed by fire, providing an "advance regeneration" that can respond rapidly to fire-free periods. The pine forest frequently has a subcanopy of scattered fire-tolerant oaks (*Quercus*) and a diverse, flammable ground cover dominated by bunch grasses. The fire regime



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Pinus oocarpa forest in the La Sepultura Biosphere Reserve that is maintained through the use of fire

that maintains the ecosystem can be described as frequent, low-intensity surface fires that remove pine needle litter and above-ground portions of the grasses while doing limited damage to trees that are over one to two metres in height, as long as the fires are of low-intensity.

Steep slopes and strong prevailing winds create high-intensity flareups that kill some overstory trees and create canopy gaps that permit pine regeneration. The mean fire return interval is probably three to five years. In some portions of its range, however, the forests are fired annually, limiting the establishment of regeneration (Myers and Rodríguez-Trejo, 2009).

The rural populations throughout the range of *ocote* pine forests use fire to prepare agricultural plots, improve forage for cattle, ease travel, control pests like ticks and snakes, and facilitate hunting. These traditional uses have probably been in place for centuries, if not millennia, and they may be responsible for the characteristic structure and areal extent of the forests.

In Chiapas, a common burning practice was known as *quemadas de cuchillo*, which literally means using fire to “cut” firebreaks, usually on a ridge top. These burned strips were used to contain other fires that were set or occurred accidentally. Throughout Mexico, prior to the 1998 fires, and through 2004, the government policy and message was fire prevention and aggressive suppression, although in many areas the capacity and resources to deal with fire effectively were limited. As a consequence, fires have still been relatively common in the Chiapas pine forests, although prevention and suppression campaigns were having some impact in limiting the number of fires and the size of fires. The rural populations were also beginning to lose their traditional fire knowledge, as government fire prevention messages began to take hold.

OBJECTIVES

The La Sepultura site was selected because it is an example of a site where government land managers (CONANP) were at the forefront nationally in recognizing the important positive role that fire could play in maintaining native pine forests. At the same time, it was recognized that wildfires originating in the pine forest were adversely impacting the montane cloud forests, particularly during droughts resulting from El Niño, and that these El Niño events were expected to become more frequent and severe. Reserve staff also realized that prescribed fire could be an important tool in managing fires in the reserve, but that it would be unlikely that they would have the capacity and resources to implement a prescribed-fire regime effectively within the reserve anytime in the near future.

These circumstances led to discussions of the possibility of using the traditional fire knowledge of the *ejidos* to address fire management needs of the reserve while meeting some of the socio-economic needs of the communities.

Although the communal pine forests within the reserve buffer zone are owned by the communities, the use of forest resources is restricted because the forests are included in the reserve buffer zone. Having the communities develop and implement a fire management plan could provide a basis for sustainable forestry

and possibly ecosystem service payments that would benefit both the communities and the reserve. The project Integrated & Participatory Fire Management in Rural Communities in the La Sepultura Biosphere Reserve was funded by TNC's Global Fire Initiative and the FMCN. The project was administrated by CONANP and the NGO Espacios Naturales y Desarrollo Sostenible, AC.

The objectives of the project were to:

1. document traditional fire uses in the two target communities;
2. develop a conceptual fire-regime model illustrating the role of fire in maintaining desired ecosystem states and conditions;
3. have the two communities develop fire management objectives for their communal pine forests that would meet both their economic needs and the biodiversity objectives of the biosphere reserve;
4. have the two communities develop a fire management plan that would be implemented by the communities with assistance from government agencies (CONANP and CONAFOR);
5. monitor the ecological outcomes through the participation of university researchers;
6. stimulate interest in similar projects throughout southern Mexico; and
7. provide a practical example of appropriate fire use that would help change national and state fire management policies and approaches.

BACKGROUND

This case study is a practical demonstration of appropriate fire use in a political and scientific environment that was resistant, but becoming more receptive, to novel approaches in dealing with fire problems. Beyond the specific community-based effort, there were a broad array of other fire management activities that were occurring simultaneously in the form of scientific studies, technical evaluations, forums, workshops and training courses throughout Mexico and Mesoamerica. These activities, which made the La Sepultura demonstration project timely, included the FAO-sponsored Training Course for Instructors in CBFiM for Latin America that was held in Belize in 2005; forums, workshops, training courses and study tours sponsored by TNC; and the many CBFiM projects sponsored by the FMCN.

Prior to this project, fire use and prescribed burning had not been included in any community fire projects in the region. Although prescribed fire was not specifically prohibited by Mexican law or policy (as it is in many Latin American countries), there were no policies or legislation that specifically allowed, let alone promoted, it. The La Sepultura project provided the catalyst for a review of existing laws and policies, and stimulated similar projects and reviews not only in Mexico, but also in Guatemala and Honduras.

CASE STUDY SUMMARY

In 2004, CONANP personnel responsible for the La Sepultura Biosphere Reserve and its partners initiated the CBFiM project in the two pilot *ejidos* after they had

completed a reserve fire management diagnostic and plan (CONANP, 2004). The first year, technical meetings were held to ensure that a fire-use project was acceptable to state and federal entities who had fire management responsibilities in the area. These meetings were followed by a series of community meetings and workshops, first to engage the communities, and then to have them develop a conceptual framework and to establish objectives acceptable to both the communities and the reserve. Their participation led to the development of a community fire management plan (Photo).

The process also reinforced the community's efforts to prevent unwanted fires, particularly those that may originate in other *ejidos*, and to combat those fires when they occur.

The primary interests of the communities were in burning to improve the forage quality of understory grasses for their livestock and in reducing fuels to limit fires damaging to the forest and to their property. They were also concerned about a notable lack of the pine regeneration that is needed to sustain the forest in the long term. This lack of regeneration may be the result of excessively frequent burning that prevents the establishment of pine seedlings, but it also may be that burns tend to lack the intensity or flareups needed to create regeneration gaps in the canopy. The primary interest of the reserve staff was to implement a fire regime that would maintain the biodiversity of the pine forest, while preventing damaging fires from entering adjacent broadleaved forests.

An important component concomitant with the activities of the two communities was the assurance that reserve staff and technicians had the capacity to understand fire ecology and fire effects, and could implement safe and effective prescribed burns. Thus, a series of prescribed-fire training courses was initiated, coordinated by TNC, that were held in Mexico, Belize, Guatemala and Honduras; some key technical staff were sent to prescribed-fire training courses in the United



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Community members from Corazón de Valle prepare vegetation, fuel and burn-unit maps for their communal forest

States of America; and a study tour was coordinated for La Sepultura reserve staff to the pine-oak forests of Arkansas, United States of America, to observe the long-term positive effects of prescribed fire.

To ensure documentation of the project, TNC and the FMCN provided funds to a doctoral student from Colorado State University, United States of America. The student was hired to document local fire practices and the fire-related perceptions held by the two *ejidos* and the reserve managers, and to monitor fire effects, particularly the role of fire in stimulating pine regeneration (Huffman, 2010).

After the first year of the project (2005), both communities had a community integrated fire management plan that outlined their specific visions regarding the traditional use of fire needed to maintain their livelihoods, while it also incorporated the role of fire in maintaining the natural dynamics of the pine forests. These plans included outlines for specific prescribed burns to be conducted during the second and third years of the project.

The prescribed burns incorporated both traditional methods known to the older members of the community and modern prescribed-fire techniques. The Nature Conservancy donated equipment such as drip torches, back pack pumps, hand tools and safety clothing.

The communities also used prescribed-fire planning forms that were being established as the standard in Mexico, under a new draft forest-management law, and prescribed-fire rules (Norma Oficial Mexicana NOM 015) that were being developed during this period. These forms and processes were officially formalized in 2009.

In May 2006, the communities completed their first planned prescribed burns (Photo). The burns were conducted by the *ejido* members. They were assisted by personnel from CONANP, CONAFOR and the municipality of Cintalapa. The objectives of the burns were to: reduce hazardous fuels, remove vegetation to favor pine regeneration, improve the forage quality of grasses and train younger



Community members from Corazón del Valle set a backing fire during their first prescribed burn

community members in the use of prescribed fire. The day following the burns, community members assisted researchers in evaluating fire effects.

These prescribed burns were the first planned and conducted by rural communities in Mexico that had both economic livelihood and ecological objectives. They provided a valuable demonstration that set the stage for applying the planning and implementation process to other communities with pine forests or other flammable vegetation types that could be burned to prevent the spread of fire into sensitive vegetation types. In May 2007 and 2008, the communities successfully planned and implemented the prescribed burns outlined in their plans.

One of the limitations of this project was the lack of specific financial incentives for the communities to maintain the fire management programme over time, and to help pay for equipment and training. An alternative would have been to initiate the project with clear incentives related to sustainable forest use, or payments for ecosystem services or carbon sequestration. CONANP is currently in discussion with the communities about developing an incentive programme.

CONANP will continue to provide support and guidance to these two communities, but they are also applying the concepts and process to other communities in other protected natural areas in southern Mexico. The publicity that Valle del Corzo and Corazón del Valle received during the project stimulated a number of other communities to request assistance in developing their own fire-management project. Some of these communities have pine forest situations similar to La Sepultura, while others simply have problems with escaped agricultural fires that negatively impact tropical forests. The local NGO, Ambio has started a programme to provide rural farmers with the training they need to conduct safe and secure agricultural burns. As escaped fires are reduced, rural farmers receive payments as part of a carbon sequestration project.

The popularity and success of the La Sepultura project led reserve staff to produce a guide to developing CBFiM projects (Negrete-Paz, Vásquez-Vásquez, and Cruz-López, 2008), along with a brochure and poster (Figure 3), and to publicize the results through a variety of forums (Pantoja-Campa *et al.*, 2008).

Concurrent with this project, fire management in Mexico took a great step forward with the approval in 2006 of a National Strategy for Fire Protection and Fire Management. It recognized the important ecological role that fire plays in fire-dependent ecosystems and the important economic role that it plays in agriculture and rural communities. The strategy was followed in 2009 by approval of new rules (NOM 015) for the use of prescribed fire in forested ecosystems. For the first time the rules established that:

1. prescribed fire is an accepted method of managing forests, and controlled burning is accepted for agricultural purposes;
2. the federal government has the obligation to identify and produce maps of vegetation according to its response to fire, e.g. fire-dependent, fire-sensitive, and fire-independent;
3. the Ministry of the Environment (SEMARNAT) and the Ministry of Agriculture (SAGARPA) are obligated to establish a national programme to promote the new rules; and

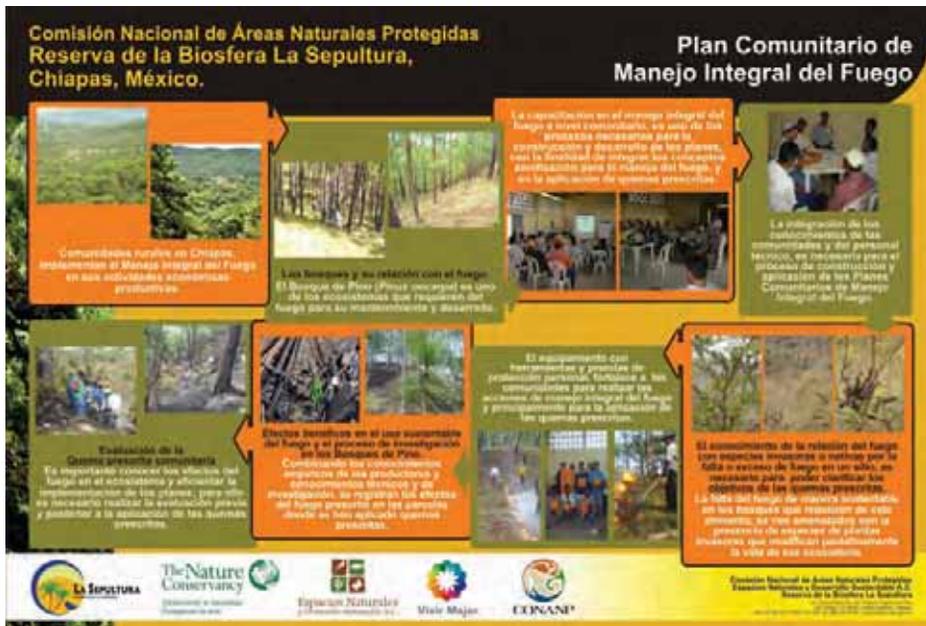


FIGURE 3

Poster produced by the La Sepultura Project to promote CBFiM

4. appropriate agencies are obligated to develop capacity in fire use.

These policy and rule changes that recognize the ecological role and importance of fire were the direct result of the efforts of many of the people involved in funding, promoting and guiding the project at La Sepultura Biosphere Reserve. The entire process illustrates the need to address fire management problems and issues at a number of levels simultaneously in order for any one of them to be effective in the long term.

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