FIRE MANAGEMENT IN LA ENCRUCIJADA BIOSPHERE RESERVE'S WETLANDS

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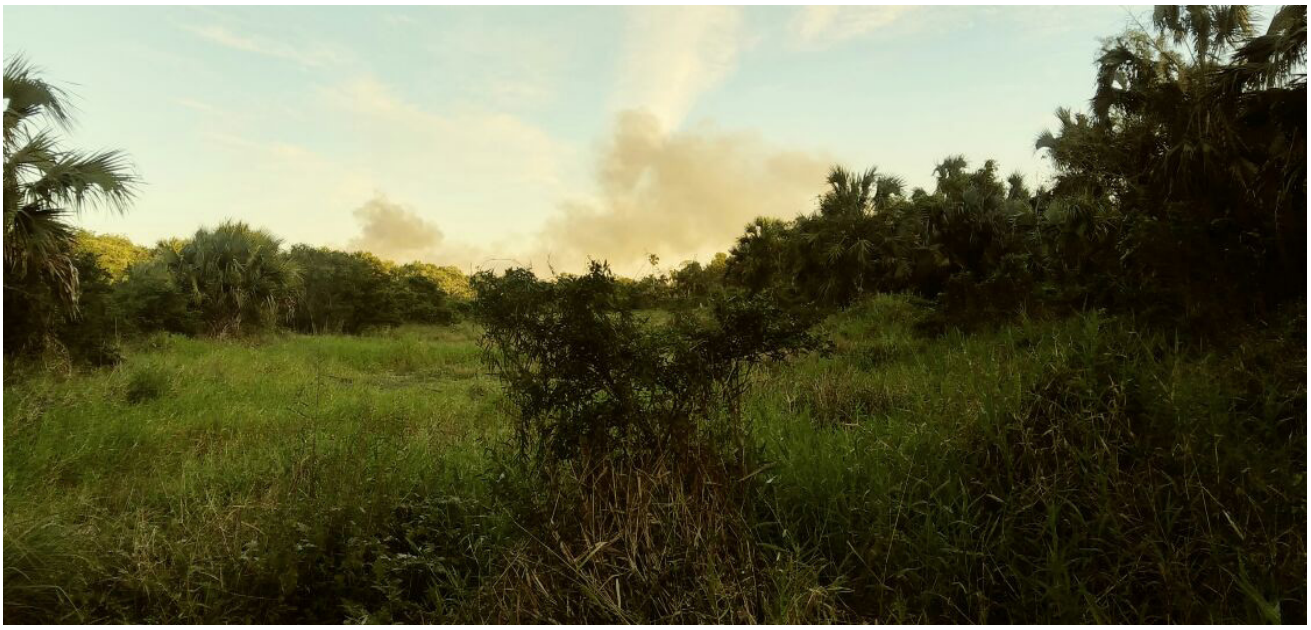

La Encrucijada Biosphere Reserve's wetlands / Author image.

Fire is a natural element associated with various human activities and is an environmental factor of great importance in the dynamics of ecosystems.

However, its frequency and intensity have made it one of the main agents of disturbance in forests and jungles. Since mankind has exercised dominion over fire, it's anthropic manifestation has led to landscape transformation and dynamicsThus, the fire issue highlights the negative environmental and social impacts of fire on forest ecosystems.(NPS, 2009).

The Biosphere Reserve of La Encrucijada (REBIEN) has diverse ecosystems, with coastal wetlands being the most characteristic of this protected natural area. Coastal wetlands are ecosystems with high ecological value, great biodiversity and productivity of aquatic and terrestrial flora and fauna, but they are also part of fragile and threatened environments, with a high risk of deterioration and degradation. In the coastal wetlands of REBIEN, the presence of fire would seem out of place due to the hydromorphic condition of the soils in these ecosystems and the high humidity levels of the prevailing biota; however, as CONABIO (2007) points out, there are some types of vegetation where fire is present year after year due to anthropic management of its use (hunting of wildlife or to open up areas for cultivation and/or pastures), causing the mortality of species of great ecological heritage.

La Encrucijada Biosphere Reserve's wetlands / Author image.

Uses and customs in the management of fire

The discovery of fire throughout history has been an essential element for agricultural and hunting practices, especially in REBIEN since the time of the conch shells from 3500 years BC, who based their diet on fish, iguana, turtle, crocodile and probably some birds, concentrating on simple hunts that did not require specialized instruments, but the use of fire as the main tool used to appropriate species for food or simply as a sporting practice (SEMARNAP, 1999). Currently, the inhabitants of REBIEN continue to use fire for hunting and commercialization of wildlife such as The green iguana (Iguana iguana rhinolopha), the casquito turtle (Kinosternon cruentatum scorpiodes) and the raccoon (Procyon lotor), the caiman (Caiman crococilus fuscus), The white-tailed deer (Odocoileus virginianus), which was abundant in the area a few decades ago, is now threatened or endangered.

In the buffer zones of the wetlands that make up the REBIEN polygon, the slash-and-burn system (RTQ) has traditionally been practiced. This is the way in which the inhabitants, in small scattered populations, clear the land for agricultural and/or cattle raising purposes, fulfilling an economic function, since it is a low-cost technique used to reduce the vegetation cover of the area to be cultivated. In this sense, fire is a good ally for producers in general, as long as it is used with caution so as not to become the source of a forest fire, since poorly managed fire tends to become a difficult problem to deal with. According to CONANP (2014), the practice of slash-and-burn, commonly called chaqueo, is an effective technique that provides immediate results, but when applied to large areas and in the long term, it is responsible for deforestation and soil impoverishment, since not always only the desired area is burned, but often the fire gets out of control and spreads to neighboring areas, covering large areas. Thus, there is a significant increase in the occurrence of forest fires originating in agricultural areas.

The use of fire is a practice that the region's producers are unlikely to replace with another. However, it is important to contribute to reducing the lack of fire control and the incidence of forest fires. The size and frequency of forest fires in REBIEN is a cause for concern. In the past, large fires occurred every ten years; now, due to the expansion of the agricultural and livestock frontier, new human settlements and climate change, the temporal regimes of occurrence of large events are occurring more frequently.

Use of fire: poaching vs. agricultural burning

In the La Encrucijada Biosphere Reserve, 51% of the main causes of forest fires are directly related to the plundering of fauna by poachers, mainly freshwater turtles such as Crucilla or Cruzalluchi (Staurotypus salvini), Sabanera (Rhinochlemys pulcherrima), Negra (Pseudodemys grayi) and Casquito Amarillo (Kinosternon scorpioides), as well as the Caiman (Caiman crocodylus acutus), the River Crocodile (Crocodylus acutus) and the Green Iguana (Iguana iguana). This practice, carried out by the inhabitants of the communities surrounding the municipalities of Acapetahua, Villa Comaltitlán, Pijijiapan and Huixtla, uses fire as a means of capturing fauna and supplying the regional market as part of a traditional custom of wildlife consumption.

La Encrucijada Biosphere Reserve's. Use of fire: poaching vs. agricultural burning /Author image.

Agricultural fires are the second most common cause of fires in REBIEN, with an incidence of 20%. In general, producers use fire during land preparation for planting, burning of land clearing residues and burning of pastures, which carelessly cause forest fires, and this is the least frequent cause in the reserve. There are undetermined causes (10%), smoking (9%), burning of garbage and plots (8%) and campfires (2%).

Fire management in REBIEN

One of the main objectives of the CONANP was to strengthen fire management, emphasizing permanent prevention activities, social participation and inter-institutional coordination, especially the promotion of the social sector in reforestation, fire prevention and firefighting programs. To this end, fire management strategies have been implemented to prevent, combat and control forest fires in the REBIEN (Table 1), in order to stop the occurrence of these fires and intervene in the probable catastrophic effects that they could cause.

Table 1. Actions implemented by CONANP to reduce and control forest fires in the REBIEN, Chiapas (SEMARNAP, 1999).

ACTION	TERM			LOCATION
	SHORT	MEDIUM	LONG	
Training of the protection and surveillance personnel in the basic techniques and knowledge of forest fire prevention, control and fire fighting.	✓	✓		The entire reserve.
Conducting training sessions for rural communities on forest fire prevention, control and suppression techniques.	✓	✓	✓	Reserve Communities
With the help of Geographic Information Systems (GIS), maps were created to identify the critical areas in the reserve where forest fires occur periodically.	✓	✓		The entire reserve.
Monthly management and overflights during fire season to locate fire-damaged areas.	✓	✓	✓	The entire reserve.
Coordinate the work of the three levels of government, especially with the forest authorities, to establish cooperation agreements for the prevention of forest fires.	✓	✓	✓	The entire reserve.

Rural communities have been made aware of forest fire prevention, control and suppression regulations.	✓	✓		Reserve Communities
Maintain institutional presence in areas at high risk of forest fires.	✓	✓	✓	Reserve Communities
Management of economic resources for training, purchase of tools and equipment to be used in the control and combat of forest fires.	✓	✓		The entire reserve.

Among the main objectives of the CONANP (2011) for integrated fire management to prevent forest fires are the following:

a) reduce the incidence of forest fires by strengthening prevention campaigns, promoting social participation and inter-institutional coordination for the protection and conservation of natural resources;

b) reduce the number and area affected by forest fires for the area;

c) to involve the social sector in the prevention, control and management of forest fires;

d) implement a monitoring program of biotic and socio-economic factors (indicators) within the area and zone of influence of the use of fire for different activities;

e) to create the necessary conditions for a precise understanding of the biological, climatological and hydrological characteristics and trends of the ecosystems, in order to provide guidelines for the use, management and conservation of natural resources through integrated fire management, which will allow the implementation of measures to prevent and control fire threats that affect the Reserve;

f) the socio-economic monitoring will allow us to identify human activities and the needs of the public, private and social sectors in order to achieve a sustainable use of natural resources without the need to use fire for productive activities in the communities that are part of the polygon of the reserve;

g) periodically disseminate the results of the fire monitoring activities to all the institutions operating in the area and to the local population, in order to carry out joint actions with the communities for the restoration, prevention and conservation of the ecosystems.

Integrated Fire Management: A New Management Approach

Integrated fire management involves the development of strategies that provide valuable information for planning and managing fire in any ecosystem, and determining the relative risk of severe wildfire is the first step in a fire prevention analysis that includes the social element (Haight et al., 2004).

In the case of natural protected areas, and in particular in coastal wetlands, the principle of fire management should take into account three main dimensions:

a) Fire ecology, the effects and relationships of fire on ecosystems and species.

b) The culture of fire use: how different stakeholders perceive communities and the use of fire, and how this culture can inform management.

c) Fire regime: the frequency and intensity of forest fires in an ecosystem or group of ecosystems.

Jardel (2008) proposes three types of interventions to achieve fire management: 1) technical interventions: physical prevention, suppression and restoration of burned areas; 2) institutional interventions: participatory planning and evaluation of fire management, prevention organization; 3) communicative interventions: environmental education campaigns, dissemination of results and information and monitoring systems; and 4) communication interventions: environmental education campaigns, dissemination of results and information and monitoring systems.

In this framework, the principle of fire management in protected areas has as central elements to achieve the conservation of ecosystems and their biodiversity, through the restoration of the ecological role of fire and the use of fire suppression activities necessary to maintain the ecological integrity of protected areas and their economic and cultural values.

La Encrucijada Biosphere Reserve's / Unesco.org image.

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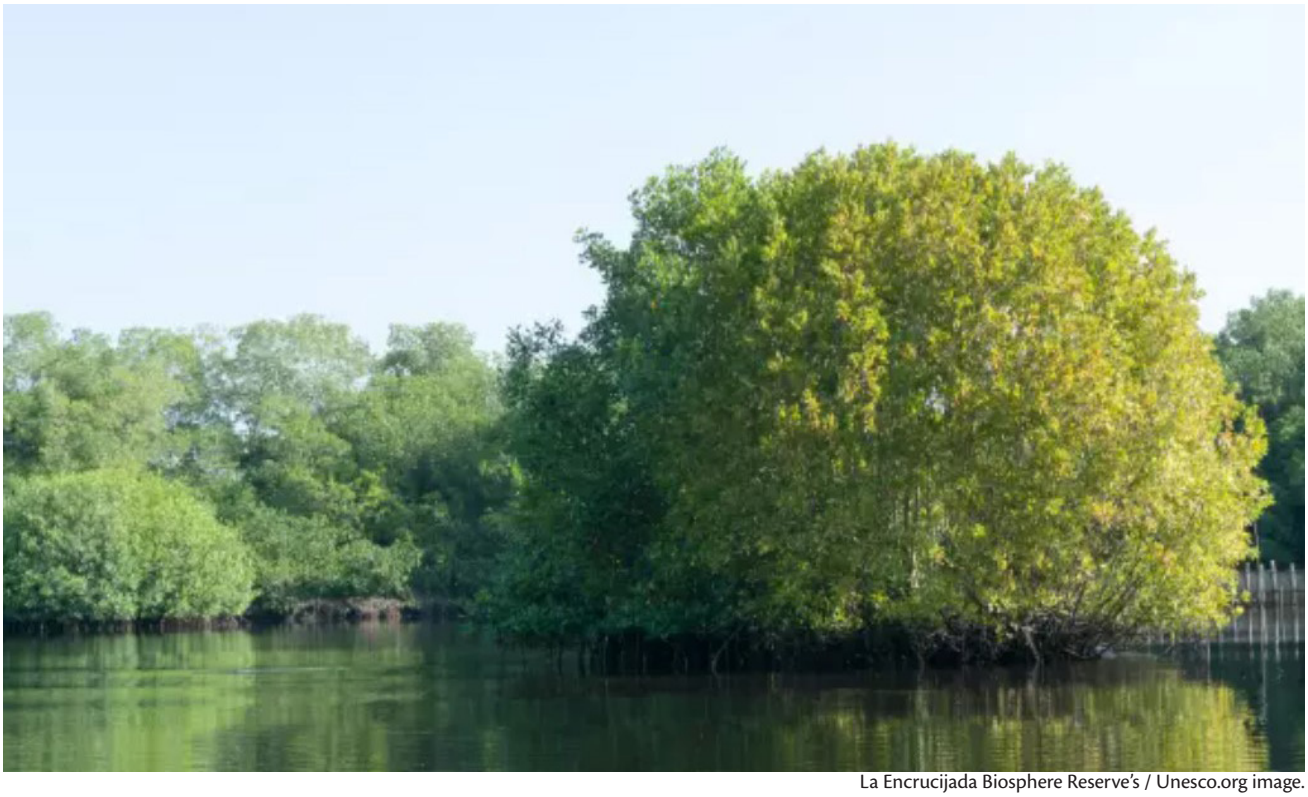

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