

# **Cultural Practices of Fire Management in Indigenous Communities with Forestry Resources and its Effects on the Economic-Ecological Environment**

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## **Abstract**

Fire is an element of nature that has influenced the development and evolution of human cultures and civilizations. Apart from the uses of fire for human survival, it has been attributed with magical and religious powers by many native cultures around the world. Many rural communities have developed natural resource management systems according to their surroundings, in which fire has played a relevant role. In some native cultures, natural resource management, associated with fire has produced important varieties of grains and fruits of international importance such as maize and chilli. Despite its destructive potential, fire will continue to be useful and important to rural communities as a means for subsistence. The social, economic and cultural context has changed at a global scale; affecting the rural economy and reducing it to a process of marginalization and environmental degradation, especially in highly populated areas, which coincide with areas of high biological richness.

Fire and its impacts on rural areas and communities at a local and global scale has become an international priority, recognized by governments, civil society and multilateral agencies. The problem surrounding fire must be handled as a part of an integrated vision which considers root causes and incorporates interests and needs of all sectors, specially of communities and indigenous groups. This should be translated into policies, which are suited to the reality of rural populations.

Strengthening capacities to fight wildfires and design new fire management approaches will require the sum of efforts and resources provided by international and national organizations, governments and communities. Rural communities must take responsibility and be empowered by governments to actively participate in the search for fire management alternatives and to fight the negative impacts of wildfires under safe and responsible conditions. Rural communities must transcend the role of victims to take a role of decision makers over their own lands in coordination with governments.

The Mexico Nature Conservation Fund has focused on wildfires through its Wildfire Prevention and Restoration Program, which received funding from the United States Agency for International Development (USAID) after the 1998 fire season. The program aims to foster community participation to prevent wildfires, produce local fire management plans and build capacity within civil society to participate within government programs. The results are encouraging and the WPRP has become an international model of cooperation between civil organizations, communities and governments in a joint search for better fire management alternatives.

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## **I.- Fire and Human Communities**

Since ancient times, mankind has dealt with fire as an element of nature and a tool to transform its surroundings.

The capacity of mankind to domesticate fire marked a historical moment that promoted the diversification of foraging practices, opened new alternatives for development and gave power to mankind to modify his environment in favour of food production.

Through history, cultures and rituals developed where fire was identified as a fundamental force of nature, strongly linked to the supernatural power of gods that influence the cycles of people's lives and their communities.

In Mexico, for example, nahua mythology speaks about the central role of fire in the creation of the world, which is born in association with the Sun that governs the lives of humans. One of the most important deities of the Teotihuacan and Aztec cultures since Pre-classic times (2000 years ago) was Huehuetēotl, the God of Fire.

Fire was also related to the occurrence of natural disasters, which mark the end of mythical cycles in pre-Columbian cultures in Mexico.

The relationship between fire and mankind is linked directly to the evolution of human cultures, their relationship with nature and their patterns of survival and reproduction.

Through history, fire has been a powerful tool to adapt nature to the needs and cycles of humans. As a result of the constant use of fire during thousands of years, men and women learned to modify ecosystems and reduce their effort to obtain goods and services, inventing more effective food production techniques.

Some ancient civilizations in Mexico were able to design natural resource management systems based on the use of fire. Rotating crops and alternating areas increased the land's productivity without endangering natural populations. In fact, these systems led to the domestication of species, some of which are now some of the world's most important feeding sources, such as maize, tomato, chilli, beans and cocoa, once exported from Mexico by the Spaniards after the conquest in the XVIth century.

In our days, some indigenous communities maintain traditional uses of fire to obtain food and renovate natural resources. Such is the case of the extinguishing lacandon community in southeast Mexico.

As civilizations evolved, populations shifted their productive activities from basic self-consumption to more massive marketing strategies. This increased the demand for goods and products, as well as the need for more land for agricultural production. During this process, fire became a powerful tool to clear new land for this purpose.

Unfortunately, the population has increased in rural areas, nature's productive capacity has been reduced and the peasant economy has been weakened. This has strongly altered the traditional uses of natural resources leading to a seemingly unstoppable spiral of destruction.

Natural and economic alterations are suffered at a local and global scale and are exemplified by climate change, where fire has become an issue of national and international concern. But, although fire is now recognized as a major threat to biodiversity and human survival, nations must acknowledge that because of the existing economic and technological limitations, rural communities will continue using it as a tool to face their pressing needs for subsistence.

The ways in which native communities manipulate fire are varied and are associated to the diversity of needs and environmental conditions they face. Fire is used, for example, to:

- Promote land use change of native forests for agricultural purposes
- Increase short term agricultural and cattle production to meet market demand
- Eliminate competing plants and weeds, plagues and diseases of crops
- Reduce campesino labour costs

- Renew grasslands for cattle raising
- Establish property limits in conflictive areas
- Hunt wildlife
- Pressure governments to release wood extraction permits
- Obtain heat and light for peasant homes

There is no doubt that wildfires pose important threats to local communities. On the other hand, it must be recognized that fire plays a basic role in forest ecology because it permits forest renovation, species diversification and it reduces potential natural fuels. The question is not how to eliminate fire in nature but how to incorporate it in the management of ecosystems where local communities live and own lands.

Fire will continue to be an important ally of rural communities. Its importance can be illustrated by the fact that the world population which depends on firewood to meet energy requirements for heating and cooking, is estimated to be of two billion people. In Mexico, the fire dependent population is estimated to be of 30 million people. It is also estimated that 70% of the energy needs of rural Mexico is met through the use of firewood.

The absorption of peasant economies by global market trends generates enormous pressure on the land because of the marked reduction in the price of rural products with no manufacture and the increase in the demand of goods by industrialized nations. This means that with the same amount of work and investment into rural productivity, less benefits and income is generated for indigenous peoples. This circumstances, together with the loss of biodiversity and ecosystem productivity has led rural communities to a state of minimum subsistence.

In environmental terms, every year the world loses about 10 million ha of tropical forest, more than three times the size of Belgium. None of the land use systems that replace this natural forest can match, in terms of biodiversity, the richness and carbon storage potential of natural forests.

Through this scheme, local communities have no option but to open new land to agriculture and cattle raising through slash and burn practices, with very low economic and environmental returns and, in most cases, sacrificing natural ecosystems of high genetic, environmental and biodiversity value.

Within this pattern of “subsistence economy” and environmental degradation, fire will be maintained as a technological alternative and low cost tool to increase agricultural land for self-consumption, due to the lack of other productive alternatives, which are more environmentally friendly and better, suited to peasant needs.

The social and environmental costs of the inadequate use of fire are evident. At a local scale, indicators include water, land and air pollution, irreversible loss of forest coverage and environmental services, reduction of land productivity, destruction of peasant property and loss of human lives. This situation was sadly illustrated by the 1998 fire season that the world faced as the most intense of the century. In Mexico, 80 people died, all of them members of local communities fighting to stop the fires that threatened their natural heritage.

On a global scale, the evident increase in carbon that is released to the environment and its effect on climate change, the dissemination of smoke on a regional level, the propagation of wildfires across international boundaries, have positioned fire as a matter of national and international security. It is said that carbon emissions caused by wildfires in Indonesia during 1997 were equivalent to around 40% of the annual carbon emissions of the world produced by fossil fuel consumption (United Nations Forests Forum).

Wildfires have increased in the world in alarming proportions. It is estimated that 300 to 400 million hectares of tropical and temperate forests are burnt every year. The biggest losses have occurred during the “El Niño” atmospheric phenomenon, between 1997 and 1998, that affected and covered with smoke vast regions in the Amazon basin, Central America, Mexico and Southeast Asia (United Nations Forests Forum).

Because of the high environmental and human costs that the uncontrolled use of fire brings upon rural areas, governments and countries are now expressing their concern in the search for alternatives linked to fire management within rural economies. Unfortunately, efforts have not translated into strong government policies and effective programs. There is an urgent need to increase local communities’ awareness on the threats of fires. It is also urgent to increase their access to resources and alternatives that will positively modify the current use of fire in natural ecosystems.

It is evident that fire and rural communities is an issue that surpasses the local context. It is a social, economic, environmental and political issue to be dealt with at a national and international level. The use of fire and its relation with local and indigenous communities requires a new paradigm that integrates all the dimensions of the problem as well as the interests of all sectors involved.

We now face the opportunity to overcome past measures and approaches that are mainly aimed at pin-pointing the guilty parties, assigning blame and placing the highest responsibility on rural communities without true effective proposals. We need to modify past policies that are based on partial analyses of the problem that omit root causes. A need for an integral economically, socially and environmentally sound model is urgent and poses an immediate challenge for all organizations and individuals.

It is very important to point out that civil organizations and grassroots communities are now performing a fundamental role by building on past experiences in community management of natural resources and participating in public policy to influence conservation, production and land use practices.

The United Nations Forum on Forests has stated that attention needs to be brought on the “elaboration of models to fight wildfires that take into consideration the human causes of fires”. It has also pointed that the approach to the fires issue “must move hand in hand with better land use practices” and that the attention of the problem, from its root causes, only will be possible with true rural population and local authority involvement.

Considering a scenario marked by the reduction of productive opportunities for communities and global environmental degradation, the following questions become relevant:

¿Who is responsible of identifying and implementing policies, strategies and actions related to wildfire prevention and fire management?

¿Who is responsible and what is the role in fire management that each sector of society should play? ¿Is it only a responsibility of the peasant family that burns to plant crops, the cattle rancher, the government of each country or of national and international conservation agencies?

¿What is required to innovate models and approaches to create shared responsibility in fire management in rural areas between communities, governments and nations?

¿What are the social, environmental and economic costs we are willing to pay in case we decide to continue operating under the present conditions?

¿Are we aware of the consequences and shortages we will inherit to future generations if the current trends continue?

These are only a few of the many questions in need of answer that are identifiable after revising the relationships between fire and rural communities, considering that fire has passed from being a local instrument for survival to an international threat to global nature and human populations.

We are convinced that we are still in time to modify the current trend and our expectations for the future. This will imply new visions, new dialogues among sectors and a continuing effort to promote an ecological approach to fire management that is socially, environmentally and economically viable.

## II.- The Search of New Alternatives for Fire Management

In order to modify the current trends of natural destruction and poverty, major involvement of many sectors of society is urgently needed. In his case, Mexico is no exception. The search for alternatives to deal with fires in rural areas requires major efforts of creative thinking and political will.

During the following part of this intervention, I would like to share with you a few experiences that have been built in Mexico in the recent past, with the involvement of civil and rural organizations and the support and participation of the government of Mexico and of the United States of America.

The Wildfires Prevention and Restoration Program (WPRP) of the Mexico Nature Conservation Fund.

The Mexico Nature Conservation Fund (MNCF) was created to conserve Mexico's biological diversity through sustained and long term economic support to strategic projects. The MNCF was established in 1994 as agreed during the Rio de Janeiro Earth Summit in 1992. The MNCF is nowadays the largest National Environmental Fund in Latin America and the Caribbean with a US\$70 million endowment. The MNCF manages endowment and sinking funds from a variety of funding sources such as the United States Agency for International Development (USAID), the government of Mexico, the Global Environment Facility (GEF), the World Bank, The David and Lucile Packard Foundation, the Hewlett Foundation and the Summit Foundation, among others.

The Wildfire Prevention and Restoration Program (WPRP) originated after the dramatic 1998 fire season Mexico experienced in the last 100 years. As a consequence of an exceptionally long dry period and extreme climatic conditions, several wildfires occurred which soon overrun the states and countries capacity to deal with the multiple wildfires occurring in several important natural areas.

During that year approximately 14,400 wildfires affected 850,000 hectares. Many of these had human origins related to agricultural and cattle raising activities performed by local peasant communities.

Based on the 15-year experience of collectively fighting wildfires, the US Forest Service, USAID and the Government of Mexico agreed to launch an international cooperative effort to fight the 1998 wildfire crisis. Through this mechanism, Mexico received financial assistance equivalent to US\$8 million plus technical assistance, that were applied in equipment, training and human coordination in a historical effort to fight wildfires at a bi-national scale.

After the crisis a report was written which analysed Mexico's capacity to face critical wildfire situations in rural areas. The report detected the following three key elements, among others:

- When extreme risk situations emerge simultaneously in disperse areas, practically no country has enough resources to fight fire emergencies;
- There is an increasing concern for the safety of fire fighters, whether from government institutions, the army, local communities and volunteers.
- The number of trained volunteers from ejidos and communities for fire fighting has increased, as has the number of casualties. Most of the deceased were peasants from villages close to wildfires.

As a result from the 1998 experience, the governments of Mexico and the US decided to create a specialized program to promote and strengthen local communities and civil organizations and their initiatives related to wildfire prevention and restoration of burnt areas. To this end, USAID provided US\$5.7 million, which were channeled through the MNCF.

This was the origin of the Wildfire Prevention and Restoration Program of the MNCF, which has risen as a unique alternative to provide financial support for projects, related to wildfire prevention, training, equipment acquisition and restoration of affected areas through local communities in 11 priority areas in Mexico.

The main objective of the WPRP is to create strong communities capable of playing a safe and significant role in fire management and to protect their communities and natural heritage from wildfire emergencies.

The WPRP has operated through calls for proposals which have promoted and supported 46 solid initiatives and cooperative agreements with 30 national civil and community organizations as well as with 2 international conservation organizations (Conservation International and The Nature Conservancy)

The WPRP's support has been aimed at three specific objectives:

- To prepare civil organizations, peasant communities and indigenous groups to safely participate in wildfire prevention and initial suppression.
- To develop environmental education activities and rural communication mechanisms to prevent wildfires and strengthen fire management within communities and
- To generate models and programs to evaluate damages within burnt areas and propose restoration alternatives.

To reach these objectives the following strategies have been implemented in the field:

- Strengthen NGO and community involvement in wildfire prevention related tasks.
- Promote and support local planning processes to deal with wildfires from a regional perspective.
- To accomplish the incorporation of trained peasant brigades in wildfire prevention, initial suppression and restoration of burnt areas under a safety first principle.
- Stimulate the creation of rural communication mechanisms to promote a change in attitude and increase peasant participation in responsible fire management practices.

- Promote the training and formation of peasant technicians, specialized in wildfire management and restoration to induce major involvement of local communities in the fires problem.
- Articulate NGO and community initiatives with government programs and emergency response mechanisms.
- Incorporate concepts of ecological fire management and the development of fire management plans for priority areas. This includes fuel evaluation and prescribed fires under a new perspective for the country.

Following is a brief summary of the results achieved by the WPRP through these past 4 years:

- Implementation with the National Commission for Knowledge and Use of Biodiversity and the Environment Ministry of Mexico of the first national hot spot satellite detection system to detect and monitor wildfire occurrence in the country.
- Creation and permanent operation of over 80 community fire brigades.
- Protection activities within 11 priority natural areas including 9 biosphere reserves and 1 state park.
- Creation and maintenance of 1,500 km. of fire breaks.
- Installation of 8 fire detection towers in critical areas.
- Restoration activities and production of 2 million native plants to be introduced in approximately 1,500 hectares of degraded land.
- Support for the operation of 9 nurseries for plant production.
- Nearly 200 training courses with the participation of 153 local communities and 4,500 persons.
- 5 national courses, the first in Mexico, for NGOs, peasant communities and protected area staff on protection against fires, restoration of burnt areas and fire behavior.
- 14 environmental education campaigns through printed and visual materials and media, aimed at 2,400 persons in rural communities.
- Implementation of the first wildfire prevention and restoration learning community with its own web site.
- Agreements with the US Forest Service, the Canada Forest Service and The Nature Conservancy to promote training activities and technological transfer related to fire management.

The WPRP has promoted these strategies and results as a part of the overall work of the MNCF. The Mexico Fund's Conservation and Natural Protected Areas programs also promote better alternatives to use natural resources and manage priority areas with community participation. The MNCF also channels resources to mitigate the effects of natural disasters such as wildfires and hurricanes in coordination with state and federal government and with the participation of local civil organizations. Every year, the MNCF

channels around US\$5 million to civil organizations and communities working in conservation, sustainable use and restoration projects in and out of natural protected areas.

#### Conclusions:

- Fire is an element of nature that has influenced the development and evolution of human cultures and civilizations.
- Apart from the uses of fire for human survival, it has been attributed with magical and religious powers by many native cultures around the world.
- Rural communities have developed natural resource management systems according to their surroundings, in which fire has played a relevant role.
- Fire will continue to be useful and important to rural communities as a means for subsistence.
- The social and cultural context has changed affecting the once adequate rural economy that is nowadays reduced to a process of marginalisation and environmental degradation.
- Fire and its impacts on rural areas and communities at a local and global scale has become an international priority, recognized by governments, civil society and multilateral agencies.
- The problem surrounding fire in nature must be handled as a part of an integrated vision which considers root causes and incorporates interests and needs of all sectors, specially of communities and indigenous groups.
- The participation of civil organizations and communities in the design process of management plans and the search for alternative uses of fire, has promoted the creation of new mechanisms and strategies according to the needs of specific regions and countries.
- In a changing environment it is crucial to share experiences and lessons learned taking into account the efforts and programs of different regions and countries related to fire management.
- Without any doubt, the incorporation of civil society and rural communities in the search for new alternatives and in the fight against the destructive aspects of fire opens new possibilities for governments to find viable rural development programs.
- Strengthening capacities to fight wildfires and design new fire management approaches will require the sum of efforts and resources provided by international and national organizations, governments and communities. Such has been the experience of the MNCF and the WPRP in the search for better alternatives in Mexico.
- Rural communities must take responsibility and be empowered by governments to actively participate in the search for fire management alternatives and to fight the negative impacts of wildfires under safe and responsible conditions. Rural communities must transcend the role of victims to take a role of decision makers over their own lands in coordination with governments.
- Protected natural areas under the Biosphere Reserve model are good laboratories in the search for fire alternatives because they provide government support and the



opportunity to match resources and initiatives where rural communities live and own lands.

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