

A Collaborative Effort To Tangibly Reduce The Conservation Threat Of Altered Fire Regimes Around The Globe: The Nature Conservancy's Global Fire Initiative

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Abstract

Large, destructive wildfires—like those that burned millions of hectares of forests, savannas and grasslands in Brazil, Central America, Mexico, Russia, Indonesia, China, Europe, Africa and the United States (U.S.) from 1997 through 2000—captured the attention of the world and increased awareness among decision-makers. However, despite several global commissions and many studies, only moderate progress has been made. The causes of altered fire regimes—that is, too much, too little or the wrong kind of fire—are complex and multifold, ranging from escaped fires set by local agriculturists that burn vast areas of tropical forests during droughts, to national fire policies that favor active suppression of even beneficial wildfires and traditional fire uses. The conservation implications of altered fire regimes at the global scale are unknown, but regional and local studies are unambiguous; the threat appears both severe and vast. In recognition of this, The Nature Conservancy (TNC) established a Global Fire Initiative in 2002 to work with a wide variety of partners around the world to make tangible progress. Over the next five years, TNC will target some 200 large landscape-scale projects around the world that will represent up to 500,000 km² of representative ecosystems where altered fire regimes pose risks to both ecological health and community values. We are already working with managers and communities at 75 places to assess needs, build capacity, establish a solid scientific foundation, and find sustainable solutions. At the same time, we will leverage these site-level investments by means of 5-10 “fire learning networks,” each with the goal of rapidly disseminating innovations and lessons learned among community practitioners and managers, increasing awareness among decision-makers of the costs, benefits and consequences of fire, and building constituencies of informed and influential partners. We currently are working with a variety of sponsors on networks in the U.S., Mexico, Caribbean and Central America. In recognition of the importance of government, regional and multi-lateral organization policies and programs, we also are joining forces with The World Conservation Union (IUCN) and the World Wide Fund for Nature (WWF) on a joint project to build and sustain awareness among policy makers of the conservation challenges and needs. In many parts of the world, lack of a solid scientific foundation is a barrier and we are partnering with scientists to identify and fill critical gaps in understanding, including for example working with U.S. government agencies on regional fuels mapping. Lastly, lack of training has been identified by a number of studies as a barrier to implementation and we are partnering with national governments and local partners to sponsor training programs and establish exchange programs.

The Nature Conservancy's Global Fire Initiative. Large, unnatural and destructive wildfires that burned millions of hectares of forests, savannas and grasslands across the world over the past five years have captured the attention of the world and increased awareness

among decision-makers. However, despite several global commissions and many studies, only moderate progress has been made (Nasi et al. 2002). The causes of altered fire regimes are complex and multifold, ranging from escaped fires set by local agriculturists that burn vast areas of tropical forests during droughts, to national fire policies that favor active suppression of even beneficial wildfires and traditional fire uses. The full conservation implications of altered fire regimes at the global scale are currently unknown, but a number of regional and local studies are unambiguous; the threat appears both significant and far reaching (e.g., Cochrane 2003, Nasi et al. 2002, Goldammer and Mutch 2001).

In recognition of the scope and apparent scale of the threat, The Nature Conservancy (TNC) launched a Global Fire Initiative (GFI) in 2002 to coordinate and increase the effectiveness of their fire-related efforts, including working with a wider variety of partners around the world. The GFI is one of just five TNC-wide conservation initiatives (along with climate change, invasive non-native species, freshwater conservation and marine conservation). The Nature Conservancy's mission is the conservation of biodiversity, using a science-based, collaborative approach focused on finding ecologically and socially acceptable solutions to the global challenge of biodiversity loss. The Conservancy is a non-profit international conservation organization headquartered in the U.S. and operating in 30 countries, with more than 3,200 employees. Nature Conservancy staff have been leaders in innovative ecologically based fire management for more than 40 years and TNC supports a trained cadre of fire professionals and ecologists.

The global threat of altered fire regimes to biological diversity. Across the globe today, natural fire regimes are significantly “altered,” posing a variety of direct and indirect threats to biodiversity. The interrelationships among fire, people and ecosystems are as longstanding as they are complex, but the historical role of fire in shaping and maintaining ecosystems is changing. Humans have introduced fire to areas that historically have not experienced extensive burning—perhaps 90% of all current fires are human caused (UNEP 1999)—and are excluding fires from ecosystems that have regularly burned in the past (e.g., Cochrane 2003, Rowell and Moore 1999).

A significant portion of the earth burns every year. Scientists estimate that as much as 560 million hectares, ranging from tundra to tropical forests burns annually (e.g., Nasi et al. 2002, Goldammer and Mutch 2001)—an area greater than half the size of China. Up to 45% of greenhouse gases may originate from all sources of biomass burning (NASA 2003). The World Health Organization estimated that the 1997-98 El Nino-induced global fire outbreak adversely affected the health of more than 130 million people and caused billions of dollars in economic losses (UNEP 1999).

When fires occur outside their range of historical or natural variability—too much, too little or of the wrong kind—ecosystems often undergo wholesale changes, including loss of biodiversity at several levels. “Fire-adapted” ecosystems possess a structure, composition and function resilient over time to repeated fire, and include many native fire-dependent species. When fire is excluded, vegetative succession favors fire intolerant species. Unnaturally high fuel loads may accumulate, resulting in large and destructive wildfires, for example, like those that have recently occurred in many ecosystems formerly characterized by high frequency, low severity fires in the western U.S. (GAO 1999).

In contrast, “fire-sensitive” ecosystems rarely experience natural fire. In these ecosystems, large, intense wildfires lead to dramatic reductions in native biodiversity and conversion of

plant communities. For example, large and repeated human-caused wildfires have converted tropical lowland moist forests to exotics-dominated and fire-adapted agricultural grasslands during times of drought (Cochrane 2003).

Fire—as an ecologically beneficial or harmful *process*—is a local phenomenon, occurring at the scale of landscapes and individual land ownerships. The *sources* of fire-related threats, however, originate at local, as well as regional and global scales, including trends in politics, economics and wet/drought cycles. Threats are of two primary types:

- Fire exclusion in fire-adapted ecosystems. Leading causes include: National or local suppression policies geared toward protecting property; incompatible grazing and forestry practices that alter fuels; landscape-level fragmentation that hinders fire spread; escalating encroachment of humans and human infrastructure into wildlands; misperceptions about the benefits of fire; and lack of prescribed fire capability.
- Indiscriminate burning in fire-sensitive ecosystems. Leading causes include: Escaped agricultural fires; fires set to clear forests or burn logging slash (legal and illegal); invasion by non-native fire-adapted plants; lack of policy or enforcement; civil unrest; lack of understanding and knowledge; and lack of suppression capability.

Decision-makers around the world have only recently begun to view fire as a central environmental, social and economic issue. Increasingly catastrophic wildfires and mounting scientific evidence supports this concern. Very large and destructive wildfires—like those that occurred in Brazil, Central America, Mexico, Indonesia, Russia, Europe, China, and the U.S. from 1997-2000—are primarily the result of accidental or intentional fires set by people during drought conditions where ecosystems often are already under stress. At the same time, in many parts of the world, fire-adapted ecosystems are at risk from too little fire. When added together, these ecosystem stresses are suspected to have serious consequences for both people and nature (e.g., Nasi et al. 2002). Examples include:

- 1997-98 fires in SE Asia burned >9.7 million hectares, resulted in \$10 billion (USD) in economic losses, severely damaged many fire-sensitive tropical forests in protected areas, elevated Indonesia to the upper tier of global greenhouse gas producers, and affected the health of more than a 100 million people.
- Large fires in the U.S. in 2000 resulted in property losses of more than \$9 billion and suppression costs of \$3 billion. Scientists estimate that as much as 509,900 km² of U.S. federal lands containing fire-adapted ecosystems are at high risk of losing key ecosystem components because of past fire exclusion (GAO 1999). Yet, in 2001 the agencies treated less than 1% of the total acreage requiring restoration.

At present, scientists cannot accurately assess the global scale of the biodiversity threat posed by altered fire regimes. TNC staff and partners lack foundational assessments in most of the world, and organizations with some assessment capacity have only recently initiated comprehensive efforts (e.g., Global Fire Monitoring Program, European Commission).

In the U.S., where TNC does have adequate information, we know that:

- At least 43% of the total area (>433,000 km²) of sites considered important for biodiversity conservation is moderately to severely at risk of significant degradation due to fire exclusion or the threat of unnaturally severe wildfires;

- More than 1,900 of the above sites appear to be comprised almost entirely (>95% area) of degraded fire-adapted ecosystems;
- Fire exclusion was cited as a major threat in 43% of TNC site conservation plans and human-induced wildfire was cited as a threat in an additional 13%;
- The ecological window of opportunity may be as little as 10-25 years before irreversible change has occurred.

Examples of how The Nature Conservancy's Global Fire Initiative will be working with partners to abate the global threat of altered fire regimes to biodiversity

Platform projects and learning networks. Over the next five years, TNC will target some 200 landscape-scale “platform projects” around the world that will include up to 500,000 km² of representative ecosystems where altered fire regimes pose risks to both ecological health and community values. We are currently working in collaboration with managers, scientists and community groups at >75 platform projects in the U.S., Mexico, the Caribbean and Central America, where we are assisting local communities in assessing needs, building capacity, establishing a solid scientific foundation, crafting solutions, taking appropriate action, and measuring progress.

However, individual projects, by themselves, will not have significant global impact. Thus, we are seeking to leverage the impact of these site-level investments by means of “fire learning networks.” Networks are comprised of 10-25 platform project teams brought together in a series of facilitated problem solving workshops organized around similar ecosystems and conservation challenges (e.g., dry pine forests in the western U.S. where historical fire suppression is now resulting in unnaturally severe fire behavior and reduced ecosystem integrity). Learning networks are one means of bringing together otherwise isolated practitioners, a need identified in several assessments (e.g., Goldammer and Mutch 2001). They also foster peer to peer learning; facilitate rapid development and dissemination of strategies, innovations and lessons learned; build awareness among decision-makers of the costs, benefits and consequences of fire; and help create constituencies of informed stakeholders. We currently are co-sponsoring networks with more than 250 partners in the U.S., Mexico, Caribbean and Central America, and plan to expand learning networks, for example to South America and Southeast Asia, within the next two years. (For a detailed explanation and example of learning networks in a U.S. context, see in these proceedings: A. Shlisky, et al., A collaborative, multi-scale approach to abating the threats of altered fire regimes across the United States.)

Global partnership with World Wide Fund for Nature and The World Conservation Union. In recognition of the importance of government, regional and multi-lateral organization policies and programs, we also are joining forces with The World Conservation Union (IUCN) and the World Wide Fund for Nature (WWF) on a joint project to build and sustain awareness among policy makers of the conservation implications of, and needs related to, altered fire regimes. Our initial collaboration will focus global summary of the threats to biodiversity and the capacities and needs of governments and the private sector. We also will be providing a synthesis of the scientific evidence for interactions between climate change and fire, and invasive non-native species and fire, with related policy implications. Lastly, the partners plan to collaborate much more closely at the local project level, most likely through vehicles such as joint sponsorship of regional learning networks and workshops.

Buttressing the scientific foundation. In many parts of the world, lack of a solid ecological foundation and appreciation of the role of fire in ecosystems is a significant barrier to crafting appropriate responses to fires. For example, a number of governments are investing in fire suppression policies and increased capacity, which may be appropriate for fire-sensitive ecosystems such as tropical moist forests, but may exacerbate or create new problems in currently healthy fire-adapted ecosystems, such as tropical savannas and grasslands. In Mexico, for example, TNC has worked with a variety of partners over the past two years to sponsor a national-level dialogue on the ecological role of fire, including bringing together government and NGO representatives from 27 critical protected areas. In the U.S., TNC is collaborating with Forest Service scientists on an improved, ecologically based and spatially explicit national-level “fire risk assessment” that will allow the U.S. Congress and land management agencies to better set priorities and allocate resources to the most at-risk communities and ecosystems, the need for which has been identified in several studies (GAO 1999).

Filling the training gap. Lack of training has been identified in a number of studies (e.g., Goldammer and Mutch 2001) as a barrier to implementing considered fire strategies at the local and regional levels. The Conservancy is partnering with national governments and local partners to sponsor training and establish expert exchange programs. For example, as part of the multi-partner Central America Fire Management Network, TNC recently offered an ecological fire management training course in Belize that drew participants from across Central America and as far away as Brazil. In the U.S., TNC has signed a multi-year cooperative agreement with the government including joint sponsorship of training courses with five federal land management agencies (Forest Service, Bureau of Land Management, Park Service, Fish and Wildlife Service and Bureau of Indian Affairs). The Conservancy also plays an important role in the National Interagency Prescribed Fire Training Center.

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