

## SPECIAL ISSUE

### 4<sup>TH</sup> INTERNATIONAL FIRE CONGRESS: FIRE AS A GLOBAL PROCESS

Debates about the scale, ecological effects, and motivations of pre-scientific anthropogenic burning have been present since the inception of the scientific study of landscape fires as the following quotations show. Local communities have in many places burned the land for centuries. Because many of these communities were part of larger cultural systems in which there was either no opportunity, reason, or desire to transmit knowledge through writing, much of their traditional ecological knowledge remained diffuse, embedded in oral tradition, ritual, or other forms of cultural or symbolic communication alien to the scientific mindset. However, as any contemporary fire researcher with field work experience in areas where local communities still exist knows, there exists a wealth of site-specific, detailed, and often reasoned as well as articulate, unwritten knowledge about the use of fire for ecosystem management among local communities of the type exhibited in the second quotation appearing below.

*It would be difficult to find a reason why the Indians should care one way or another if the forest burned. It is quite something else again to contend that the Indian used fire systematically to 'improve' the forest... yet this fantastic idea has been and still is put forth time and again. (Clar 1959)*

*The best time to burn the shrublands in Peña Mayor is usually around mid-March. At that time the snow has melted. This thaw is usually followed by at least a week of frost. This is the adequate moment to burn because the weight of the snow has packed the shrubs and the frost dried them out so you can set a fire that produces a short low flame that can travel for long distances. When the Spring rains come along in April and May the ashes then fertilize a rich pasture for the livestock. (Anonymous Asturian peasant 2008)*

*If we find controlled burning valuable we are not required to look to the Indians for precedent to justify its use—it will stand or fall on its own merits. It must be applied by us in the light of findings of modern research, and through understanding of ecological processes, not on the basis of traditions that stand in the dim past. Range men and foresters of today are much more capable of appraising the worth of planned burning as a management practice—in our times and under our conditions—than were the California Indians. (Burcham 1960)*

Fire-prone flammable ecosystems cover about 40% of the Earth's land surface, including some of the most biologically diverse ecosystems on the planet (Bond *et al.* 2005). Over the last quarter of a million years, some, and in many cases all, of the fires affecting ecosystem structure and composition in these flammable ecosystems have been ignited by humans. Initially, fire served a crude function. It provided hominids with heat, protection against wild beasts, and the ability to cook. Over time, however, human beings developed a highly sophisticated understanding of fire behavior and effects that enabled them to mold ecosystems and landscapes to serve their needs. Extensive farming and animal husbandry would have been impossible in pre-industrial times without fire, and civilization would have never arisen without it. The continued millennial use of fire by humans resulted, in many cases, in an oral tradition that unveiled, throughout the world, a sophisticated level of understanding of fire effects by indigenous peoples. A number of authors have documented numerous specific reasons for indigenous peoples to intentionally burn in order

to provoke a favorable ecosystem response. Though many traditional indigenous fire management practices may now be inefficient or useless, or even ecologically deleterious given the evolution of human societies, many others may still be as efficient and relevant today as they were thousands of years ago. Unfortunately, the traditional ecological knowledge embedded in these ancestral fire uses has not always been appreciated by contemporary ecosystem managers, and it is only recently that fire ecologists have recognized the level of fire ecology understanding exhibited by indigenous peoples.

While the appreciation for traditional ecological knowledge concerning fire has increased tremendously in Canada, the United States, and Australia, this has not necessarily been the case in other parts of the globe. In many countries, both in the developed and in the developing world, there is still a significant dichotomy between the traditional and the contemporary science-based paradigm on fire use for ecological management. This dichotomy can be traced in most cases to either the aftermath of the decolonization process (e.g., Algeria, Morocco, South Africa, India, Australia, Madagascar, etc.) or the disappearance of both right and left wing authoritarian regimes (e.g., Spain, Portugal, Greece, the former Yugoslavia, Mongolia, Russia, etc.). There is also a new emerging bias, not so much against traditional ecological knowledge about fire, but against the traditional use of fire by local communities, particularly in tropical and subtropical biomes. This new attitude has its roots in the burgeoning field of climate science, especially global carbon cycling, where political concerns for fire emissions outweigh fire dependence and use.

The 4<sup>th</sup> International Fire Congress, held in Savannah, Georgia, between 30 November and 5 December 2009, had as its conference theme: “Fire as a Global Process.” The intent of the organizers was to weave this theme throughout the conference, primarily through the contributions of the daily plenary presentations. Each day a region of the globe was represented by two speakers. For example, one day the plenary speakers addressed the temperate ecosystems of the steppe in Central Asia and another covered the tropical and subtropical ecosystems of southeast Asia and Australia. Plenary speakers were encouraged by the Fire Congress organizers to discuss the dichotomies existing between traditional and indigenous burning, and modern use and understanding of fire in their particular geographic regions of expertise. It was recognized that, in many indigenous cultures, daily survival and a sophisticated knowledge of fire were closely related. Many contemporary societies worldwide, however, still consider fire an enemy, and expend considerable human and financial resources in its suppression regardless of the ultimate environmental futility of such a strategy. Specifically, the invitation to plenary speakers was comprised of two requests: 1) compare indigenous and scientific fire paradigms in the plenary speaker’s geographic region of expertise; and 2) discuss where that relationship is heading—whether and if both the traditional and the scientific paradigms of ecosystem management through fire are converging or moving apart.

The articles appearing in this issue of *Fire Ecology* are the end result of the task entrusted by the 4<sup>th</sup> Fire Congress organizers to the plenary speakers. Each speaker was asked to relate their personal experience to the changing attitudes toward indigenous peoples’ use of fire. In his piece, Bowman calls for the framing of the dichotomy between traditional and contemporary paradigms of fire in the context of the emerging field of pyrogeography. Pyrogeography is an integrative, multidisciplinary perspective on landscape fire that takes into account both its ecological effects and its relationships with human societies. He illustrates this approach by encouraging fire ecolo-

gists to consider the pyrogeography of Australia. In his article, Bowman demonstrates how a long history of fire has had a pervasive influence on the continent's biota. While Aborigines co-existed with flammable landscapes for millennia, contemporary Australian society is still learning to live in a land of fire.

Medler travels farther back in his exploration of mankind's relationship with fire. He argues for a synthesis of the two main theories seeking to explain early pre-historic uses of fire by hominins. He proposes that, for millions of years, active lava flows in the African Rift provided consistent but isolated sources of fire, providing very specific adaptive pressures and opportunities to small isolated groups of hominins. This allowed these groups to develop many fire-specific adaptations, such as bipedalism, smaller teeth and mouths, shorter intestines, larger brains, and perhaps a host of social adaptations. He supports his hypothesis with recent evidence obtained from geologic field work in Olduvai Gorge, Africa.

In her article, Pivello discusses the issue with regard to Brazil, perhaps one of the most contentious regions of the world in terms of fire use by humans and its implications for global carbon cycling and climate change. Anthropogenic fires are common in both of Brazil's largest biomes, the savanna-like "cerrado" and the tropical rainforests of the Amazon. Research into the traditional uses of fire by indigenous groups in these biomes, however, is highly fragmented though highly informative and relevant for contemporary fire managers. Actions to reduce biodiversity loss and environmental deterioration due to inadequate fire management are necessary in both biomes, though they should be significantly distinct. In the Amazon, they would include the development of policies to stimulate fire-free, small-scale agricultural projects. In cerrado, sustainable use of fire for cattle ranching is possible, but the anthropogenic fire regimes should be fitted to local specific features in order to avoid land degradation.

Rodriguez-Trejo *et al.*, like Pivello, center their analysis in the Americas, though in a very different ecological region: Central America, the Caribbean, and Mexico. Speaking of the situation in Mexico, Rodriguez-Trejo *et al.* point to how, in many cases, traditional fire use is highly sophisticated and sustainable, harmonizing both food supply and environmental concerns. In the past couple of decades, there has been a trend on the part of federal government agencies to incorporate both fire ecology and the rural community use of fire to contemporary fire management in order to conform to what they call integral fire management.

In his article, Trollope considers the dichotomy between indigenous and scientific fire paradigms in Africa, which he aptly names the "Fire Continent." In African savannas, he argues, the indigenous and contemporary paradigms have converged to form a single fire-management approach since the reasons for burning on the part of traditional and contemporary societies are the same: namely, burning for domestic livestock and wildlife management systems. However, he suggests that contemporary fire managers can still learn a lot from traditional indigenous fire practices, and suggests that indigenous prescribed burning for tick control may be yet another traditional technique that can be incorporated into contemporary fire-management practices.

White *et al.* place the discussion in the Canadian context. In their article, they describe current efforts on the part of Canadian park managers to restore historical low intensity, human-provoked ignitions within the larger matrix of high-intensity, drought-driven, large fires in boreal forests.

White *et al.* conclude that recognizing long-term human roles not only as fire managers, but also as hunters, gatherers, and cultivators, is critical in restoration programs, and that the historic patterns of fire management used by past peoples in these ecosystems often present a reasonable course for our modern culture to take in the future, even outside of parks.

Finally, Wade, in his article on fire management in the United States of America, attempts to translate the general mood of the attendees and overall conference atmosphere into a provocative message that will inspire managers and researchers to improve their *modus operandi* and motivate them to expand their fire management activities.

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Francisco Seijo  
C.V. Starr-Middlebury College  
C/Prim, 19 – 1a Planta  
28004 Madrid, Spain

Robert W. Gray  
R.W. Gray Consulting, Ltd.  
6311 Silverthorne Road  
Chilliwack, British Columbia, Canada, V2R 2N2

Sandra Rideout-Hanzak  
Caesar Kleberg Wildlife Research Institute  
700 University Boulevard, MSC 218  
Texas A&M University, Kingsville , Texas 78363, USA