The Challenge of Wilderness Fire Stewardship in a Time of Change

A South African Perspective

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In keeping with the South African definition of wilderness (National Environmental Management: Protected Areas Act No. 57 of 2003), the policy is to preserve natural conditions by allowing natural ecological processes to operate without human interference. This policy presents managers with a dilemma for wilderness fire stewardship: What is the natural or historical fire regime, and is wilderness fire stewardship possible without human interference?

Although our wilderness areas are considered large enough for most natural processes to take their course, this does not hold true for fire. As a result of the ecological, social, and policy environments within which wilderness stewards operate, human interference is essential. Active fire management is required to maintain ecological processes, protect life and property, and to ensure that burning takes place within the prescribed legal framework.

Human interference can be used to simulate the natural or historical fire regime. However, in order to implement the natural fire regime, we need to know: (1) what the natural fire regime is, (2) whether it is still beneficial in our current context, and (3) whether it is even possible to implement in a landscape that is vastly different from the historical one. Lightning-caused ignitions are accepted as being the primary source of natural ignitions, but on a continent where fire has been used for centuries by indigenous people, these are often also considered natural ignitions (Hall 1984). As a result of these two sources of ignition, fire was probably more heterogeneous (patchy) in the past. The heterogeneity that used to occur at a regional level is, however, no longer possible. Decisions regarding wilderness fire stewardship can now only be implemented at a local level and are based on objectives and conservation targets of these areas and the social and political influences on them.

Fire Stewardship—Burning for Multiple Objectives

Southern Africa has a considerable body of fire research, which has been integrated into the management of natural areas. Fire stewardship plans for the grassland biome of the Drakensberg Mountains have recently been reviewed, and forms the focus of this article, with particular emphasis on fire stewardship within the uKhahlamba Drakensberg Park World Heritage Site (see figure 1).

The fire stewardship of the montane grassland biome was reviewed by the scientific community; first to determine the success of the existing fire management plan in meeting specific management objectives, and second to incorporate the results of recent fire research into a best-practice fire stewardship program (Uys et. al. in prep.). The review included the effects of fire on vegetation, vertebrates, invertebrates, water production, soil, wilderness values, and cultural heritage. The product of the partnership between scientists and managers is a practical fire stewardship program containing a set of defendable fire objectives and goals for nature conservation accompanied by relevant management actions.
The aim of reviewing fire stewardship programs is to constantly improve wilderness stewardship. An integral part of these reviews is the transfer of knowledge between regions and nations, which ensures improved decision making by incorporating expert opinion, applying ecological principles, and making sensible extrapolations. This adaptive management approach to wilderness fire stewardship is essential in an environment where changes in the ecological, social, and policy environments inform the fire stewardship program and provide a framework for the integrated management of the wilderness resource.

**Ecological Environment**

Increasing knowledge of the ecologically important role of fire has resulted in radical changes in fire stewardship programs over the years. Large sections of the Drakensberg were excluded from fire for several decades (Bainbridge 1999). Since this exclusion in the mid-1930s, however, ecologists have realized that the Drakensberg biome contains many species that are ecologically adapted to fire and that fire plays an important role in ecosystem functioning (Tainton 1981; Hall 1984).

The Drakensberg fire stewardship program recognizes that disturbance is a key feature of natural ecosystems essential to maintain biodiversity. A range of disturbances influence the environment, such as fire, grazing, drought, or geological forces. Of these, fire has the greatest potential in conservation areas for manipulation by management where the main objective is to maintain biodiversity and ecosystem functioning. Other fire stewardship objectives include maintaining the vigor of the grass layer, creating a heterogeneous mosaic of burned and unburned patches, alien plant control, protection of forest wilderness, and various species-specific objectives. An example of species-specific burning in the Drakensberg is an autumn burn, which provides a green flush required to sustain small antelope, such as the endangered oribi, Ourebia ourebi, through the winter period.

Fire regimes need to be managed in order to maintain habitat heterogeneity and at least the existing plant and animal community composition, structure, and distribution at the local level. In the Drakensberg, these objectives are achieved by manipulating the fire frequency, fire intensity, the season of burn, and the type of fire by burning either with or against the wind. The fire stewardship program of the uKhalamba Drakensberg Park takes into account the effects of fire on the globally significant biological and cultural diversity of the park and its importance as a water catchment area in the development of a best-practice strategy (Uys et al. in prep.). This strategy is adopted in order to achieve the objective of ensuring that those natural processes responsible for generating and maintaining biodiversity and life support systems continue to function at a local level.

Water and soil conservation is an ecological challenge to wilderness stewards in the mountain catchment areas. Management actions need to ensure that a sustained yield of good quality water is maintained. Results from long-term research in several Drakensberg catchments indicate that fire has little influence on water production and soil erosion (Everson 1985). Fire, however, determines canopy and basal cover of the grass sward, which is responsible for maintaining water production (Tainton and Mentis 1984). In a country that is largely semi-arid, water is likely to become the national priority as urban and agricultural demands increase. Since the Maloti-Drakensberg Mountains produce approximately 25% of southern Africa’s water, it is vitally important that we maintain the long-term security of this resource through proper fire management (see figure 2).

**Cultural Environment**

Managing cultural heritage risk presents another fire stewardship challenge. Cultural heritage is our legacy and because of its irreplaceability, it has always been well protected...
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by legislation in South Africa. Some cultural features, such as San rock art sites (painted shelters) and archaeological artifacts, can be damaged or altered by fire and justify some management intervention if they are to remain undamaged. Fire may also be a concern for some features of living heritage, for example historically important trees and grave sites within protected areas.

Previously, the focus of fire management in the Drakensberg has been water production and biodiversity conservation (Bainbridge 1999). The proclamation of the uKhahlamba Drakensberg Park as a World Heritage Site for its cultural values, however, has made reserve managers more aware of the impacts of burning practices on cultural resources. The impact of fire on cultural resources was thus taken into account as part of the review of the fire stewardship program of the park (Uys et. al. in prep.).

A provincial heritage agency is responsible for cultural resource management, and the local community is responsible for maintaining ancestral graves and living heritage sites. The conservation authority, however, as the custodians of the land, need to take cultural resources into account in their fire stewardship program and collaborate with the heritage agency and local community to resolve responsibilities for these resources and to prevent the degradation or destruction of nonrenewable features of cultural heritage.

Social Environment
Wildfire poses serious risks to life and property. For this reason, the extensive fires of the past cannot be simulated in the current landscape. Changes in the social environment have resulted in a reduction in the extent and connectivity of natural areas and an increase in the number of developments near wilderness areas, such as large-scale land transformation and residential developments. As a result, maintaining natural processes such as fire is no longer possible on a large scale. Controlled fire management is therefore necessary at a local scale to reduce the risk of disaster caused by unplanned fires.

Wilderness areas also face the threat of deliberately set arson fires and unplanned invasive fires from communities living and grazing their stock along the boundary of protected areas. These fires impact negatively on biodiversity, the security of visitors, and on the wilderness user’s experience. Similarly, prescribed burns in wilderness, such as the straight, parallel lines of firebreaks, form a significant visual intrusion. To counter this, wilderness stewards attempt to burn large blocks rather than rigid firebreaks to create a more “natural” appearance and avoid prescribed burns that result in artificially shaped edges. These aesthetic impacts compromise the objective of maintaining the natural character of the wilderness areas.

Wilderness areas in South Africa contain numerous globally significant biological and cultural resources, including environmental services. The Drakensberg in particular contributes significantly to effective mountain catchment management, ensuring an optimal flow of good quality water in one of the major water catchment areas of South Africa. Although people depend on these resources for their livelihoods, current land-use practices outside protected areas are neither conducive to conservation ideals nor to the sustainable use of resources from the region. This is particularly true for fire management. Increased commercialization and human populations place pressure on natural resources, which are limited as a result of the reduction in the number and size of protected areas over the years.

The threats to wilderness from inadequate fire management in the buffer zones can be attributed to a lack of understanding of the impacts of fire and its correct use. Incorrect burning results in reduced grazing capacity and soil erosion. The misuse of fire is also a direct result of many communally owned areas bordering protected areas that no longer have a strong traditional leadership. Fire management at a community level is therefore not being coordinated.

Wilderness stewards face the challenge of finding ways in which to preserve the wilderness resource while ensuring that the needs of the local population are met in a sustainable manner. A process of knowledge transfer from conservation agencies to local communities will improve their understanding of the impacts of fire and the correct application of fire. In the long term, a focused environmental awareness program will result in responsible fire stewardship in communally owned areas also.

Policy Environment
The mitigation of the above-mentioned ecological and social risks is overseen by a body of legislation aimed at regulating burning activities in South Africa. Of the various sets of legislation that regulate fire management, the National Veld and Forest Fire Act No. 101 of 1998 represents the most important framework in which all fire activities
must be conducted. The purpose of this act is to prevent and combat veld (rangeland), forest, and mountain fires throughout the Republic. The act provides for the prevention of fires by requiring citizens to heed a fire danger rating system, burn firebreaks, acquire equipment, and have available personnel to fight fires.

South Africa is fortunate in that the national legislation has remained relatively constant over the years. Recent revisions of fire-related legislation indicate a transition to a new legal order in veldfire (rangeland fire) management and control in the country, proof that the government considers fire management a priority. For example, the National Veld and Forest Fire Act of 1998 repeals certain provisions of the Forest Act of 1984 and reforms the law on veld and forest fires. The act also makes provision for the establishment of Fire Protection Associations (see below).

Past fire policies were dictated by the exotic plantation forestry industry and the agricultural sector. The policies focused on reducing the risk of fires to timber plantations, and maximizing the production potential of agricultural land. Although the agricultural regimes generally did not favor biodiversity, conservation agencies could apply for exemption from burning restrictions in order to achieve biodiversity objectives in their fire stewardship program. The new Protected Areas Act No. 57 of 2003 benefits wilderness stewards where there is a conflict between any local or national legislation. The Protected Areas Act prevails if the conflict concerns the management or development of protected areas, which includes fire management.

The conflict between the objectives of plantation forestry companies, the agricultural sector, and conservation agencies will be addressed by the Fire Protection Associations. The associations will deal with all aspects of veldfire prevention and firefighting, and are required to develop and apply a veldfire management strategy for a particular area. The strategy of the Fire Protection Associations will be developed according to the management objectives of the representatives of the association within its area of responsibility. This forum ensures public participation in fire stewardship decisions and provides a platform for knowledge transfer at a local level between conservation agencies and local communities.

A political challenge facing scientists and managers is one of insufficient resources to maintain existing long-term burning trials and establish new ones. Four long-term burning trials exist within the uKhahlamba Drakensberg Park, totaling more than 120 years of fire-related research. These trials are the most important in the country, providing invaluable information regarding fire impacts on biodiversity. There are insufficient of these long-term experiments within the country at present, representative of the various biomes, and those that exist are poorly resourced. It is these experiments, together with the information obtained from monitoring the actual fire regime, that provide the information required to better inform management decisions and formulate fire stewardship objectives when reviewing fire stewardship programs.

Conclusion

Examples from the Drakensberg indicate that wilderness fire stewardship in South Africa requires human intervention to develop clear objectives and targets for application within the current ecological, social, and policy environments. The collection of existing information and knowledge ensures that a fire regime is implemented that is appropriate in terms of the management constraints, legal constraints, and risk-management factors.

Fire stewardship is a dynamic process requiring regular review in the face of a dynamic environment. It is, however, essential that knowledge transfer take place from the conservation agencies to the neighboring communities. These communities depend on various natural resources for their basic needs. These resources are negatively affected by the burning practices employed by the communities, who do not understand the impacts of their practices on social, ecological, cultural, and wilderness resources. South Africa could also add value to, and benefit from, a knowledge transfer process through the exchange of wilderness fire stewardship models on an international scale.

REFERENCES


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