SETTING CONSERVATION AND PROTECTION OBJECTIVES - CONFLICT FOR MANAGEMENT IN THE BLUE MOUNTAINS (1983-1986), A CASE STUDY

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SUMMARY

New South Wales legislation in the environmental field has imposed a set of often conflicting objectives of fire protection and conservation of natural and cultural resources on managers of National Parks. This paper examines a case study of the resolution of these potential conflicts in the Blue Mountains area in the period 1983 to 1986.

Over the three-year period examined in this paper significant improvements in fire management of the Blue Mountains region of New South Wales have occurred by means of strategic fire planning and the meeting of responsibilities under the Environmental Planning and Assessment Act (1979). This approach has replaced a traditional and reactive distrust between fire organisations. An improvement in co-operative arrangements between local fire authorities and an increasing awareness of the significance of the Blue Mountains natural resources also has resulted.

The approach adopted was based on the premises of an understanding of the resource to be managed, determination of various management options, and effective communication with other fire authorities about the Service's activities. This provided a better forum with other authorities in dealing with the local fire problem. This approach enabled important advances to be made in improving conservation and protection objectives in the Blue Mountains.

INTRODUCTION

Unlike neat and ordered scientific experiments with their conclusions and finite experimental settings, the management approach adopted represents a continuum of endeavour and evolution of new ideas of management. There are never any necessarily tidy outcomes or conclusions in the process of refinement of management approaches. As such, District management staff are still improving on the initial preparatory work laid down in that period.

The Blue Mountains Setting

The Blue Mountains are dominated by rugged sandstone cliffs, deep gorges and elongated plateau tops. Typically, this region contains woodlands and open forests, with some rainforest areas confined to the basalt caps and sheltered gorges. Smaller pockets of heaths, sedgelands, swamps and mallee woodlands occur sporadically throughout the Blue Mountains' environment.

The area is located 60-120 kilometres west of Sydney and extends north and south for over 200 kilometres. Conservation reserves including the Blue Mountains National Park, which surround the Blue Mountains city, the Kanangra Boyd National Park, the Wollemi National Park (partly administered by Blue Mountains district) and Pantoneys Crown Nature Reserve totalling some 430 000 hectares (Figure 1). Some 64 000 residents are found within the Blue Mountains city which extends as a series of ribbon developments along the Great Western Highway.

Towns are located on a dissected and tilted plateau which has its maximum altitudes to the west at about 1 100 metres, descending to about 100 metres in the east. During winter the area is typified by dry cold and strong westerly winds with mean monthly minimum temperatures between 3^{o} to 5^{o}. Moist easterly winds become more predominant in summer and autumn, and with the orographic uplift of the elevated plateaux, often sustain long periods of mist and rain. Mean monthly maximum temperatures vary between 20^{o} and 25^{o} and temperatures may occasionally reach 30^{o} or higher in the upper Mountains. Rainfall ranges between 800 mm and 1 500 mm per annum, depending on elevation.

Historically, the area has been subjected to intense bushfires, the most recent of which occurred in 1952, 1957, 1968, 1977 and 1982. Prior to 1982 these fires caused substantial property damage and loss of life. More than 400 bushfires have occurred in the Blue Mountains area in the past 28 years of accurate records.

Management Framework

Legislation

The Bushfires Act (1949) places an obligation on all management agencies to prevent the occurrence and spread of fire, while the Environmental Planning and Assessment Act (1979) requires any fire management activity to be assessed in relation to potential impact. The National Parks and Wildlife Act (1974) also requires the preparation of a plan of management for each National Park and Nature Reserve. The plan of management shall have regard to the following objectives that refer particularly to fire management:

(a) the conservation of wildlife;

(b) the preservation of each National Park, together with the protection of the special features of the park;

(c) the prevention of any works adversely affecting the natural condition or special feature of each National Park;

FIGURE 1
Map of Study Area

(d) the preservation of each National Park as a catchment area; and

(e) the protection of each National Park against fire and erosion.

In New South Wales the requirements of the above legislation provide conflicting ideas about fire management in National Parks such as the Blue Mountains. The core issue of this conflicting legislation is clear; that of weighing up the detrimental effects of bushfires with the overriding priority of protecting life and property.

The Fire Management Setting in 1983

Many people in the local community have perceived the local park as the cause of the fire problems in the Blue Mountains. After each major fire event, there is a clamour for more fire trails and aerial burning in the more remote areas of the park, even when the cost-benefit of these programs has never been adequately evaluated. This was very evident after the 1968 fires which destroyed much life and property.

> "The 1968 fires burned for many weeks before emerging from the valleys under severe fire weather conditions and destroying homes. The park was seen by many as the cause of the fire problem. A good deal of advice was offered by established fire authorities seeking to control the problem. More fire trails and extensive aerial burning were the main suggestions. One Shire even advocated burning the bush wherever and whenever it would burn." (Weir 1978)
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> Analysis of the fire situation by the National Parks and Wildlife Service suggested otherwise, and in particular found that:
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> - "In 1968 fires burned unattended for many weeks.
> - The accepted method of fire suppression was to deal with only the hot spots emerging from the bushland.
> - In most places, the park was well removed from urban development.
> - No specific building requirements were in force to provide protection for home owners." (Weir 1978)

This perception that the park was a fire problem continued to be held, and after the 1982-83 fires pressures were again placed on staff of the National Parks and Wildlife Service for significant modification of the park's natural resources by extra fire trails and aerial ignition of remote areas of the park. Advances had been made in the planning guidelines of fire-prone areas in urban bushland settings, but there was little evidence that they had been vigorously implemented, despite the succession of fires since the advent of these planning provisions in 1979. Similarly, bushland within urban areas and between the park boundary and the urban areas had been overlooked by the advocates of more trails and burning the park. Clearly, marked differences in opinion prevailed in 1983 as to how fire protection of urban areas could best be achieved. The scene was therefore set in

1983 for District staff to show initiative and direction in integrating fire and conservation objectives.

Development of Conservation and Protection Objectives

Fire History

Fire history records were collated from various local sources, including National Parks and Wildlife Service, Metropolitan Water and Sewerage Drainage Board, Forestry Commission, local Councils and Shires, and individuals. Wherever possible these fires were mapped onto a series of overlays. A computer database of fire history was compiled and tables and graphs were prepared from this information. Figure 2 shows an example of a graph of areas burnt and number of fires per season since 1960.

Other general trends obtained from this analysis were that:

(a) less than half the fires in the study area started in the park;

(b) only five per cent of the fires started in the park burnt into adjacent property compared to the 87 per cent of fires starting outside the park burning into it;

(c) 18.5 per cent of all fires were caused by lightning strikes;

(d) 12.5 per cent of all fires were from escaped burn-offs;

(e) as a result of escaped burn-offs bushfires in September (17.4 per cent) rivalled the bushfire months of November (12.4 per cent), December (22 per cent), January (16 per cent) and February (16.3 per cent) in terms of the proportion of total fires;

(f) human-caused fires started much earlier in the fire season than those started by lightning, causing an extension of the fire season into the months of Spring (Figure 3).

Analysis of fire history provided for improved co-operative protection objectives by indicating where problem areas existed with respect to fire frequency. It also assisted in eliminating some of the historical myths about fire origins and causes that prevailed in the debate on fire issues.

Natural and Cultural Resources

There was little information in a usable form about the pattern and the distribution of natural and cultural resources for the Blue Mountains area prior to the start of the fire planning exercise. The design of the data collection and storage occurred at a time of important advances in the development of "PREPLAN"; the computer-based fire and natural resource management suite of models (Kessell, Good and Potter 1982). An area of 450 000 hectares was sampled at a 25 hectare (500 m x 500 m) grid cell size, with the immediate Blue Mountains City Council area being sampled at a 4 hectare grid cell size (200 m x 200 m).

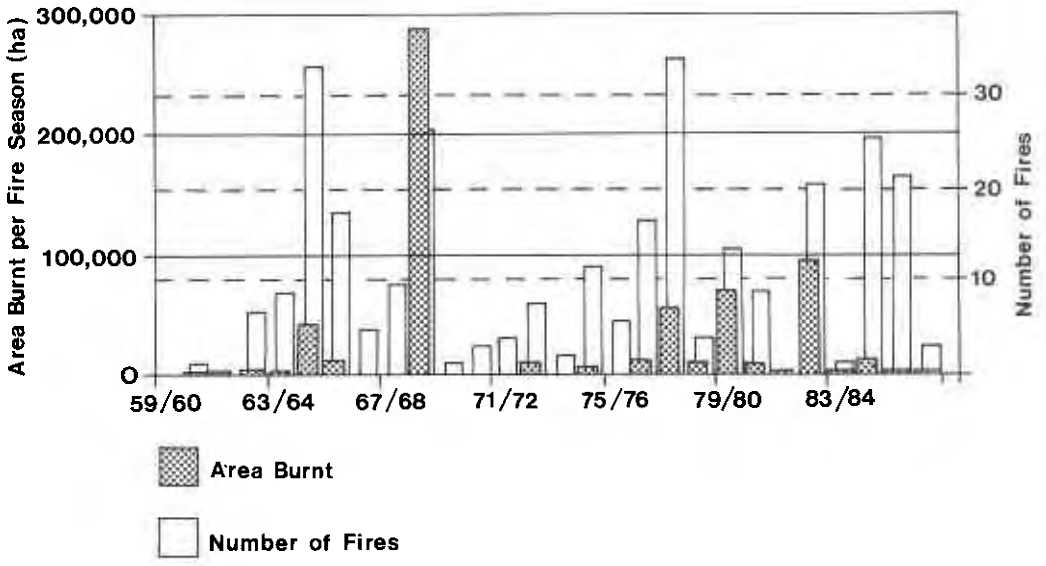

FIGURE 2
Pattern of area burnt and number of fires per fire season in the Blue Mountains (1959-1987)

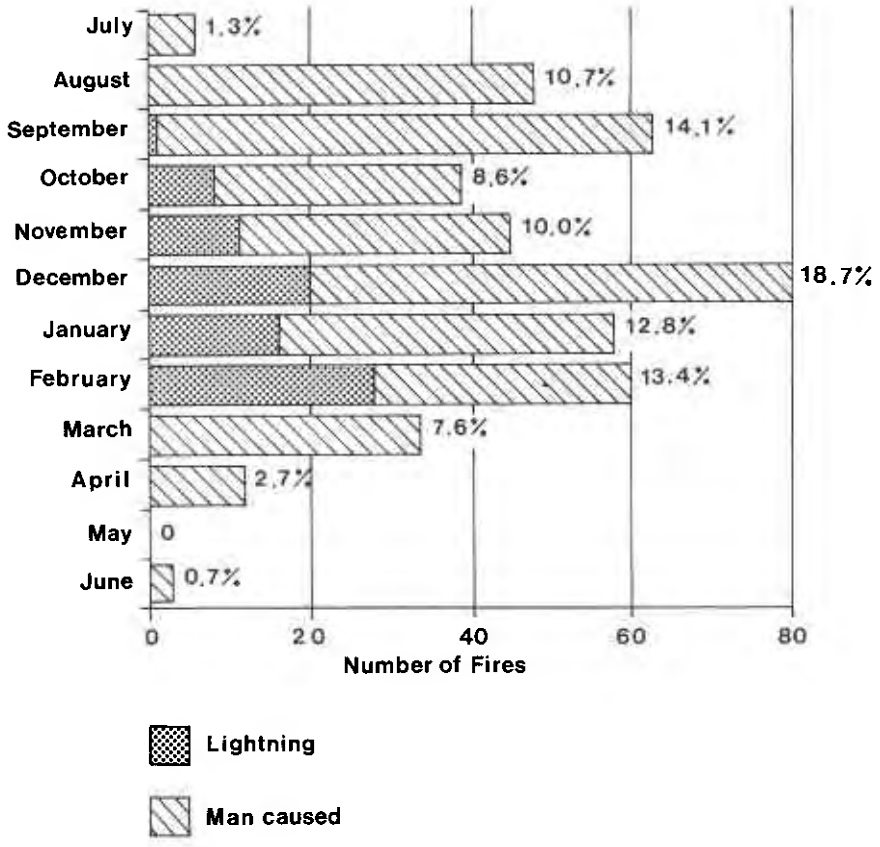

FIGURE 3
Seasonal occurrence of lightning and man-caused fires in the Blue Mountains (1959-1987)

Vegetation for the entire area was mapped, and a program of fuel and vegetation surveys implemented. All known cultural resources were recorded and all records of fauna collected from Museum and local records.

With particular reference to fire management and the objectives of conservation and protection, the information provided:

(a) An understanding of the complexity and diversity of the Blue Mountains flora with 90 distinctive vegetation types being mapped.

(b) The distribution and abundance of each of the vegetation types, and their conservation status.

(c) The location of rare and endangered flora species and an appreciation of the sensitivity of some critical resources to fire and other disturbance factors.

(d) An understanding of the spatial pattern of the vegetation units.

(e) An assessment of the fuel levels within each vegetation type. (This sampling was initially designed to accommodate the MacArthur fire behaviour models, but was later revised to provide information for the Rothermel fire behaviour models.)

(f) Fuel accumulation curves which were derived from data collected on fuel surveys in different vegetation and fire history classes.

(g) The presence and absence of fauna and the extent of local extinction of species.

(h) The pattern of species movement for some species, particularly birds in late winter and spring.

(i) The location of historical or cultural resources, including the possible risk of impact from a particular fire event.

Fire Weather

Historical weather data were analysed and the Soil Dryness Index (SDI; Mount 1972) was introduced. This was found to be a more accurate drought index in the more permeable sandstone soils than the Keetch-Byram drought index.

An analysis of the historic records identified the following:

(a) Wildfires that caused significant damage only occurred during periods when the soil dryness index was at a very high level.

(b) Property loss occurred in the major fires during periods of high fire danger index but extremely high soil dryness.

(c) Potential opportunities for prescription burning in autumn were identified on a monthly basis by averaging the available "window" of conditions suitable for prescription burning.

(d) Patterns of unusually high soil dryness through winter could be linked to risky conditions for burning in the following spring.

Appreciation of Fire Behaviour

Analysis of the natural resource, the fire history, and the fire weather information contributed to an improved understanding of the behaviour of the fires in the Blue Mountain area in the following ways:

(a) Wildfires occurred regularly during the fire season and were generally associated with mild and stable weather patterns which allowed rapid fire suppression.

(b) Serious fires in extreme conditions occurred on a nine to thirteen year cycle and only in a narrow window of probability of two days in every 200 days during a six month fire season.

(c) Fires travelling from west to east under the prevailing westerly winds would burn into areas at lower elevations and hence into areas of higher temperatures, lower relative humidities and higher levels of soil dryness. The same fire fronts would tend to cut across the fingers and clusters of urban development which paralleled the sinuous Great Western Highway.

(d) Fires did not respect boundaries, and were a community responsibility requiring a co-operative effort.

(e) Natural areas of bushland which occurred within and adjacent to the Blue Mountains city needed fuel reduction, since these maintained the momentum of fires within urban areas.

(f) Given the opportunities to use remote area fire fighting techniques in the more distant parts of the park, the most dangerous fires tended to be those which started close to urban areas.

Improved Conservation and Protection Objectives

Some of the key conservation concerns held by local District management were the frequent intense wildfires started by human causes mostly of deliberate origin; the use of bulldozers in creating new trails in the highly erodible sandstone derived soils; and the fire effects of large scale backburning operations on the vegetation and wildlife habitat. The simplistic notion of "fire protection" in isolation needed revision in the light of environmental objectives and better knowledge of fire behaviour and fire effects.

Minimising the risk of major wildfires occurring

This simple objective was important given that the majority of wildfires were of human origin, and that the objective was consistent with both protection and conservation endeavour. Management objectives arising from the Service's resource data collection and analysis were:

(a) The policy of autumn burning only by the Service was reinforced, which minimised the potential for "September escapes", and provided protection for the native flora and fauna during the biologically active spring period. Other agencies were encouraged to follow this practice.

(b) The weekly Soil Dryness readings were provided to other fire management authorities, which allowed the authorities to independently assess the danger of burning-off or of wildfires.

(c) Fire readiness was determined by the Soil Dryness readings. The predicted weather conditions, together with the period of the fire season, refined this readiness in terms of staff and equipment availability at strategic locations.

(d) Advice to the public about the fire danger, including fire restrictions in popular camping destinations, was determined from Soil Dryness readings. These restrictions, if imposed, were in addition to the Total Fire Bans issued by the minister for Emergency Services. The fire source data provided information to the historical problem locations of campfire escapes.

Maximising the protection of property

It was clear that there needed to be a firm inter-relationship between town planning, knowledge of fire hazards and appropriate fire protection measures for property. The following approaches were adopted:

(a) The Service prepared an annual fire behaviour potential map under set weather conditions, which was provided to fire management authorities. The Service developed its annual program of fuel reduction based on the predicted high fire potential areas in the boundary areas of the park.

(b) A co-operative venture with the town planning department of the Blue Mountain City Council developed a computer-based land capability analysis, which included fire hazard assessment. The assessment of the remaining rural lands of the city allows the Council to recognise classes of bushfire hazard in these areas prior to planning further subdivisions.

(c) A co-operative planning effort with fire control and town planning sections of the Council, and supported by the Blue Mountains Bushfire Prevention Assocation, determined the strategic fire protection advantages available on the northern side of the city. This planning included the careful assessment of sensitive natural environments, as well as locating natural and cultural fire boundaries.

(d) The Service became involved with co-operative fuel reduction works with the local brigades in the complex boundary areas adjacent to the park.

(e) The Service placed emphasis on co-operative fire management through the local committee.

Minimising the negative effects of wildfires

The decision to suppress a wildfire may arise as a consequent of proximity to property (and therefore a threat); potential impact of the natural resources; impact on catchment values; and lack of suitable control lines prior to fire reaching property. The operational sequence undertaken to manage fire included:

(a) analysis of potential fire behaviour and of the proximity of sensitive natural environments and natural fire control advantages;

(b) where wildfires were close to urban areas, using co-operative fire suppression techniques, and making use of the combined existence of tracks, rakehoe lines and subdivision perimeters; and

(c) where wildfires were in remote locations and still small in size, using remote area attack of fires, supported by helicopters for field reconnaissance, crew transport, water bombing, and aerial burning.

Before committing personnel on these fires the following guidelines were used:

(a) extensive use of fire simulations for determining fire perimeters under sets of fire weather conditions;

(b) assessment of the effectiveness of natural barriers;

(c) determination of the safety of field personnel under different fire behaviour conditions; and

(d) continuous monitoring of fire weather at the base and in the field.

Minimising the negative effects of fire management practices

In the management of both wildfires and prescription burns, an attempt was always made to minimise the impact of the management operation. This included:

(a) undertaking a review of environmental factors for prescription burning;

(b) planning the prescription burns in detail, which involved determining the pattern and intensity of the fires over the prescribed areas, and where possible, excluding important conservation resources such as regenerating areas, swamps, heath and rainforest from burning;

(c) where possible, using fire control lines such as rakehoe lines and natural boundaries as fire perimeters;

(d) encouraging the full application of the Environmental Planning and Assessment Act for major (non emergency) developments (eg roads) near parks;

(e) changing the season of burn to avoid burning during the breeding season of small mammals and birds, or to achieve more effective burns on basalt areas such as Mount Wilson; and

(f) devising fire control strategies that took into account both protection objectives (fuel reduction near urban areas) and conservation objectives (locating permanent fire perimeters to avoid critical habitat areas).

Maximising protection for conservation resources

Protection of the conservation resource improved as a result of (a) vegetation, fuel and fauna surveys which allows a better understanding of the nature conservation resource present in the Blue Mountains; (b) the recognition of important flora and fauna habitat areas, as well as a better knowledge of fire effects on key flora and fauna; (c) careful application of fire in remote areas; and (d) careful use of fire in catchment areas.

CONCLUSION

Fire management conflicts had arisen between fire management authorities because of deep-seated views about broad area burning, firetrails, and disputes over fire control authority in National Parks. However to their credit, the local fire management authorities have accepted the requirements of the Environmental Planning and Assessment Act. Protection and conservation issues have been addressed in forums which had previously been more singular in their objectives. The benefits of objective resource information gathering presented at these forums has been better decisions and less time wasted in resolving complex issues.

In all, this approach will serve to improve the chances of retaining both the cultural and natural heritage while improving property protection. Large fires will still occur in the future and will make the dual responsibility difficult to achieve at times. Fire authorities will need close co-operation and liaison to achieve optimum protection while planning protection and fire management strategies.

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