THE ROLE OF FIRE ECOLOGY IN WEST AUSTRALIAN FORESTS

by

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Ecology is a new name for a very old subject. It is simply scientific natural history. The name is derived from two Greek words, oikos – meaning bouse, and logos – discourse. It is then, the 'discourse', discussion or study of plants and animals in their 'house', habitat or immediate environment. Fire ecology is the study of the effects of fire on plants and animals in their natural environment.

The discoveries of Charles Darwin in the middle nineteenth century gave tremendous impetus to the studies of species and their classification. Since it is a great deal easier to study the taxonomy and morphology of individual species, and this incidentally needed to be done, it tended to drive botanists and zoologists into Herbaria, Museums and Laboratories from whence they have only recently emerged. Currently it is being realized that species cannot be dealt with individually but have to be studied in relation to their physical and biotic environment. The study, protection and preservation of the environment has recently received so much impetus that word ecology might be said to enjoy the rather doubtful status of being one of the 'in' words of this decade.

How does all this concern us as foresters? In the past we could doze contentedly behind the shielding maxim "multiple use", deluding ourselves that because of the all embracing nature of the term, its mere utterance absolved us of all further responsibility. Then it was sufficient if we could demonstrate that the nation's timber resources and water catchments were adequately managed and protected. Now it is no longer sufficient that the trees are growing and the scrub looks green. People want to know whether everything is being adequately protected and preserved. Are all the species of plants still there? Where is the fauna that roamed the bush? How are our activities, logging, burning, etc. affecting the environment?

In the past only those species of plant or animal that provided food, shelter or tools etc. were considered of importance to man. With our increasing knowledge we are becoming more aware that we are part of the scheme of things, and that our wellbeing is dependent on how we treat all the living things around us. Also, modern advances in technology enable the utilization of an ever increasing range of plants and animals. A host of so called uncommercial species play vital roles in many of the newer branches of science. Cytology – the study of cells, Biochemistry – the study of enzymes, vitamins, fermentation, hormones etc. Biophysics – the study of nerve signals, muscle contraction etc. Photochemistry – the kinetics of reactions influenced by light. Genetics – the study of the mechanism of inheritance and of course, Ecology – the study of the physical and biotic environment of plants and animals.

A small fruit fly for instance, Drosophila melanogaster has contributed immeasurably to our knowledge of genetics. Live animals are used for a variety of purposes ranging from that of pets to studies in sociological problems, psychological problems and the Moon project. Early advances in the field of pharmacology were dependent on plant and animal products. Take Quinine the anti malarial drug derived from the bark of a South American oak. Penicillin the product of a fungus, and a host of other products. Plants and animals of all kinds have contributed and are contributing to just about every field of human knowledge ranging from such obvious fields as agriculture to psychology and space exploration. Let us not delude ourselves, the more advanced our technology becomes the more dependent we ourselves become on the plant and animal kingdom.

Thus perhaps the most important value of any single species, apart from its own role in the scheme of things, is its possible latent scientific or economic potential. It is impossible to state this in terms of hard currency. Take the two examples given earlier, Penicillin and Quinine; how does one evaluate the countless thousands of lives these two drugs alone have saved? Who is to say what fantastic secrets may lie hidden awaiting discovery in even the most insignificant species? Each species of plant or animal is unique, it possesses its own genetic make-up which sets it apart from all other life forms. Once lost, no species of plant or animal can ever be recovered, it is irreplacable.

We may turn now to our own particular case. I quote from Royce, R.D. and Aplin, T.E.H. of the W.A. Herbarium – "The flora of W.A. comprises over 6,500 Angiosperms (flowering plants), some fifty ferns and over 400 marine algae, as well as many mosses, lichens and liverworts which have never been completely listed.

It is one of the most interesting floras of the world, due to its high degree of endemism, i.e. the large number of species which are entirely restricted to the region. This is especially noticeable in the South Western Vegetation Province, which extends from Shark Bay at its northern extremity to Israelite Bay on the south coast, and has an eastern boundary approximating closely to the 10 inch isohyet.

"It has been estimated that the endemism of the South West is as high as 75%. When compared with island floras, this may not of course, appear to be a very impressive total. The Hawaiian Islands for instance, record an endemism of 90% and more, but the number of species and actual area of land involved are not very great. When considered as a portion of a continent, however, the figure for the South-West flora is a particularly high one and is possibly only exceeded by the Cape Province of South Africa and some areas of the South American Continent".

Climatic and soil factors have resulted in the distribution of vegetation types into general provinces and within these are different vegetation formations, e.g. Jarrah forest, Karri forest, etc. Each of those formations provide food and shelter for a rich and varied fauna. This fauna also has many species endemic to W.A. e.g. the Quokka, the Western Brush Wallaby, Honey Possum or Noolbenger and the Dibbler to name but a few of the better known species.

The State forest area is situated more or less in the centre of the South-West where many of the endemic species occur. We have an obligation to the community who entrusted this part of our State to our care to see that these species are protected and preserved for future generations.

Besides the reasons for preservation already outlined above, there are a number of others, nonetheless vital, but perhaps more tangible reasons for protecting and preserving the natural state of our forests. Places for recreation are assuming an increasing role as population expands. State forest areas are one of the largest potential recreational areas in this State close to major population centres. Here people can come for a short respite from the rush of city life and enjoy a day or longer in the peace and quiet of the country. We are the wildflower State and not only do our forest areas attract "local" tourists but they come from the other States as well as from abroad to see the wildflower display in Spring.

If we should prove incapable of protecting both the flora and the fauna entrusted to our care, we stand a good chance of this responsibility being taken out of our hands and thereby losing one of the more rewarding aspects of forestry. In 1969, the editor of "The New Zealand Journal of Forestry" in reviewing the report of a wildlife inquiry foresaw their foresters becoming relegated to

manage purely exotic plantations, unless they could prove their ability and intention of safeguarding wildlife interests.

Our operations affect both flora and fauna. Logging operations result in opening up the forest canopy which may have a profound influence on the vegetation. However, the main single ecological factor in W.A. State forests is undoubtedly fire. We have demonstrated beyond reasonable doubt that fire is a part of the environment, and that its use is in the best interests of both the public and their timber resources. However, we have not shown what effect the present system of controlled burning has on the flora and fauna, and only the foolish or ignorant would argue that it has no effect.

At the present time there is only a limited amount of knowledge available on this subject. However, it appears that fire can be both harmful and beneficial. Karri requires fire to stimulate opening of the capsules, and to provide suitable conditions for germination and early establishment. Such species of wildflowers as Boronia megastigma may also need fire to release them from the competition of other species and allow the seed to germinate. Leadbeater's Possum in Victoria is only found in areas where Mountain Ash has been killed by fire and new growth has sprung up. The Tammar finds shelter in thickets formed from the early regeneration stages of Casuarina sp. until it becomes too tall. There is evidence from the recent fauna survey carried out by the Department, that the Western Grey Kangaroo is attracted to recently burned areas of forest. A study in the forests of Daylesford and Trentham, Victoria, revealed that controlled burning had little apparent effect on the population of the Bush Rat (Rattus fuscipes) and the Brown Phascogale (Antechinus stuartis), whereas wildfires seriously depleted microfauna and small mammals.

It is also known that too frequent burning will eliminate Acacia sp., and low intensity fires can markedly change the habitat by changing the species composition of the understorey as has been described by Dr. Ashton.

Thus the effects of controlled burning on flora and fauna is a relatively untouched field and little is yet known. The Department has already established itself as one of the leaders in the use of fire for protection purposes. Not only do we possess the necessary resources, but it is clearly also our duty to investigate the results of our own policies. With the necessary basic knowledge fire can be used not only for protection purposes but also for the safeguarding of the flora and fauna species entrusted to our care.

The concept of fire as a fauna management tool is not new. The Kenai National Moose Range in the U.S.A. is burnt at regular intervals to extend the browse production by reducing the growth of spruce and allowing a higher population of moose. Too frequent burning favours grass and herbs, eliminates browse and greatly reduces the moose population. The National Parks in Africa use fire extensively. The Kruger National Park authorities burn the grassland every two or three years.

To adequately protect and preserve the infinite variety of flora and fauna within State forests a thorough knowledge of the special requirements of each species is necessary. This means a programme of investigations into the fire ecology of both flora and fauna species. The Department already has such a programme under way and a start is being made on investigations of the fire ecology of some wildflower species and also certain major scrub types. Fauna studies are not a major part of the programme at this stage, but it is hoped that there will be expansion in this field as flora and fauna are not easily studied separately.

For instance very hot fires encourage Acacias. Very cool or very frequent fires may eliminate them altogether. The Bronzewing Pigeon feeds on Acacia seed and is thus also affected by any change in the abundance of this species.

This knowledge is required so that the requirements of each species is realized and steps can be taken so that it is preserved. Once the necessary knowledge is available it will be possible to burn specific areas at predetermined frequency and intensity so as to maintain a wide range of habitat type.

The tremendous problem facing us is that we should preserve and encourage everything that lives and grows in the forest. The proper use of fire allows us to maintain the large variety of habitats necessary to achieve this.