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Problems with control burning

This view on the effects of fire is condensed from a more detailed article prepared two years ago.

Control burning is carried out principally to reduce the dry fuel on the forest floor. Most Australian forests have a dry forest floor, if there is moisture present it is either only in the deep litter layer, already part broken down, which is in immediate contact with the soil or due to the temporary diurnal pattern of moistening from dew.

In sclerophyll forests and woodlands dry litter is broken down by macro-invertebrates. Some macro-invertebrates, and all micro-invertebrates, fungi and bacteria only become important in moist litter. Almost all studies of litter breakdown have concentrated on the fauna of moist litter and have little relevance to the normal Australian situation. This is partly because many studies have employed a European-developed technique in which dry litter is discarded together with large and almost complete leaves, and only mostly broken down leaves are retained.

This technique is no use in Australia, except in rainforest, where the largely unsampled macro-invertebrate fauna feeds on the whole or largely intact dry leaves in the surface layers of leaf litter. It consists (at least) of nymphs of grasshoppers (a few) and larvae of beetles (a few) and moths (many), and is almost completely unstudied.

Fire kills all

What is relevant to the control burning method of managing forests and woodlands is that the macro-invertebrates, micro-invertebrates and the rest that are essential in leaf litter breakdown in Australian forests are entirely vulnerable to fire. Fire kills them all.

The normal way that these invertebrates deal with fire is to repopulate from unburnt refuges following the fire. This is the basis of the recommendation that if control burning is essential (for political reasons) then a micro-mosaic burn is preferable over the large-scale very hit-and-miss practices currently used.

As an example of what is meant by hit-and-miss, the airdrop of incendiaries may be claimed to produce a burn of 30 per cent of the forest floor. But usually the fire either fizzles or escapes, and the figure aimed at is not even remotely met. Further, does 30 per cent mean 90 per cent of northern slopes and 10 per cent of southern slopes or 100 per cent of hill tops and 0 per cent of creek banks, or some other unknown combination?

Control without fire

Biological agents are able to control litter without fire [italics added, Ed.]. There are numerous sites which may be cited, without fire for 50 years, which have no excessive litter build up. Unfortunately some studies of litter build up after fire have had no adequate controls where a genuinely unburnt treatment was part of the experiment. Most have had an "unburnt" treatment which has had less than a decade to recover and no cognizance was taken of the possible proximity of refugia.

There have been no adequate studies on the effect of control burning on biodiversity. Such studies as have been done selected one or two groups to study and ignored the vast remainder of species affected. Often these groups were chosen inadvisedly: for example, ants were chosen because they were ubiquitous, common and comparatively easily identified. But ants are only one family, have a fairly standard biology, nest in protected places and are largely carnivorous or nectar feeders and can switch between numerous food sources.

Biodiversity studies are notoriously difficult. As a retired Lepidoptera taxonomist (and there is only one full time working Lepidoptera taxonomist in Australia), I know that no even vaguely complete inventory of moths for any site has ever been attempted in Australia and Australia's Oecophoridae moths are probably a major contributor to dry leaf litter breakdown. Attenborough says with some justification (*Life in the Undergrowth*) that if a virus wiped out all vertebrates the natural plant communities as we know them would hardly change but if the invertebrates were wiped out the world would change dramatically. Yet vertebrates are studied to exhaustion and invertebrates ignored.

Recycling nutrients

Biological breakdown of the litter results in recycling of the nutrients with little loss of nutrients to the forest. Burning results in vast nutrient loss to the forest. Loss of nutrients due to control burning is of major concern.

Repeated control burning will result in artificial selection within and between plant communities such as to favour rapidly growing, short-lived plants. In other words the forest would change towards a weedscape or grassland. It means that control burning, just from this effect, will become less effective year by year as plants which rapidly regrow and die are selected for.

Control burning is carried out at a season when wildfires are unlikely. In other words, it is done at a season when the flora is most definitely not adapted to fire.

There is a lot of very dubious information about Aboriginal burning and plant adaptation to fire. Aborigines had everything to lose and nothing to gain by extensive burning. Their gain was in accessibility to country and in concentrating game.

There is also a major inconsistency in the stories of flora adapted to fire. Up to a point it is true that eucalypts and many other plants survive fire well. But the plants' adaptations have happened on a timescale quite different to the Aboriginal timescale. The genera *Hakea* and *Banksia* are millions of years old while Aboriginal burning regimes have been imposed only within the last 50 000 years. *Hakea* and *Banksia* are said to be adapted to fire because they drop seeds after fire. But they also drop seeds when they die. Fire may stimulate germination but how many would germinate anyhow given enough time?

Some people say many rare plants pop up after fires. This may be true and it does mean the plants (herbs, forbs) can take advantage of an opening up of a plant community by fire but it may be taking the observation too far to imply that these plants would disappear without fires.

These plants may exist at a low density in a natural unfired community. In certain situations the opening up of plant communities is performed by invertebrates. An instance is the mixed grasslands and herb fields of alpine areas in Kosciuszko National Park where the larval feeding of the hepialid moth *Oncopera alpina* opens the grasslands to become herb fields which will gradually revert to grasslands and so a cycle without fire involvement is established.

Ted Edwards

The article above, and that on the facing page, are valuable contributions to our ongoing debate about "bushfire management," which should be more appropriately called "bushfire risk management". Ed.