

**THE SIGNIFICANCE OF VEGETATION, FIRE AND MAN IN THE
STABILISATION OF SAND DUNES NEAR THE WARBURTON RANGES,
CENTRAL AUSTRALIA**

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Abstract

The vegetation cover of sand dunes and sandplain country in a part of Central Australia is aperiodically destroyed by fire, caused by lightning and Aboriginal activities. Subsequent mobilisation, transportation and redeposition of sand by wind suggests that these vegetated sand dunes are currently unstable.

The aims of this paper are threefold: to suggest that the vegetated sand dunes and sandplains around the Warburton Ranges in Western Australia are in the process of active development; to outline the causes of vegetation removal; and, by implication, to suggest that other sand dune and sandplain areas in Central Australia commonly regarded as stable may also be unstable due to similar causes.

The idea that sand dunes in arid Australia are largely stable, though often with an active crest, recurs throughout the literature (refer Dury's 1968 review; and Mabbutt, 1968, for recent examples). It is considered by these and other writers that the dunes were formed during an earlier, more arid phase or phases. Since there is little positive evidence of changes in wind directions, strengths and/or frequencies (such evidence would, admittedly, be very difficult to obtain), the apparent stabilisation of the sand dunes is generally attributed to an increase in vegetative cover following a decrease in aridity. Yet the vegetative cover in an extensive area — mostly Aboriginal reserve — around the Warburton mission is by no means permanent under contemporary conditions.

Whilst drought undoubtedly plays a part in reducing the effectiveness of vegetation as a barrier to wind erosion, by far the most important destructive agent is fire. The two major causes of fire are lightning and Aboriginal activity. Of these two causes, little needs to be said of the former. Thunderstorms are common in the area, sometimes unaccompanied by rain, and lightning-induced fires have been observed. Clearly this process is very much a part of the natural environment of this area.

Aboriginal activity has increased the 'natural' incidence of fires [it should be noted that the Western Desert people studied (refer Acknowledgement) — apart from the few living at the mission — exist as close to their natural conditions as will be found anywhere in Australia; indeed, one group of ten people was first contacted by Europeans only late in 1969, living approximately 350 miles north-west of Warburton]; yet the literature on the geomorphology of arid Australia

generally does not refer to the effects of Aboriginal-induced fires on the vegetation, and hence on aeolian sand movement. Fire is used by the Western Desert Aborigines for numerous purposes, and only a few of these are mentioned here: cooking — often near the site of a kill; hunting — to drive game towards a pre-selected hide; light — clumps of spinifex are commonly ignited for this purpose should an Aborigine wish to move around at night; warmth — not restricted to campsites, and the progress of a group on the move in winter is sometimes marked by a series of such fires; tree-felling; signalling — a recently-witnessed attempt to signal to an Aborigine by setting fire to the spinifex resulted in the complete destruction of an estimated 5000 acres of vegetation; tool-making — the preparation of spinifex gum; and many others. Thus the use of fire is extremely common for a wide variety of sometimes quite casual purposes; moreover many of these fires are not restricted to relatively permanent sites. Most significantly, the Aborigines make no attempt to douse their fires. It is clear from direct observations (extending back to the 1930's when the mission was first established) that large-scale sand movement by wind action can and does occur on burnt areas before vegetation becomes re-established. One area near the mission burnt during a hunt in 1966 was still completely bare when observed again in January 1970. (A digression here concerns the ecological effect of fires. It appears that the climax spinifex is not immediately re-established but that a much wider variety of species appears after burning. Since some of these produce edible components it has been suggested that burning by Aborigines is carried out deliberately for this specific purpose. No conclusive evidence was found in the Warburton area to support this suggestion.)

Whilst vegetation destruction covers only a small proportion of the total area at any given time, the continual movement of the Aborigines and their firing of vegetation will have affected the entire area many times over a long period. One carbon date (the only one available at present) from an archaeological excavation near Warburton shows Aboriginal habitation dating back to 6,800 years B.P. (Gould, 1968); and the position of the sample in the site suggests the possibility of habitation extending back to 10,000 years B.P. or more. Moreover, the archaeological evidence strongly suggests that the historical groups were similar to those living in the area today, and that they engaged in similar practices.

It appears therefore that Aboriginal activity has accelerated — not altered — the natural process of aperiodic destruction of vegetation; and that the area as a whole, over a period, must be regarded as geomorphologically unstable. With the alliance of aperiodic drought (in this context meaning years without rain), it is tempting to go further and argue that there is no need to postulate a drier climate to explain the sand dunes in the vicinity of the Warburton ranges. This does not mean that there were no earlier more arid climates; but it does mean that evidence for such earlier periods of greater aridity than at present must be other than geomorphic, since the explanation of the present-day geomorphology of the sandplain and sand dune country can be made in terms of contemporary processes.

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