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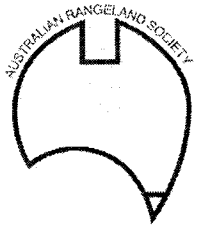

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THE POTENTIAL USE OF SIMULATION IN EARLY WARNING OF IMPENDING DROUGHT

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ABSTRACT

Drought is a major factor in a rangeland environment. It has major effects on rangeland resources, on productivity and thus influences financial and social aspects. Warning of incipient drought should aid management preparations. This paper details an approach based on the use of soil water balance data from a plant growth model (GRASP) to estimate the probability of rainfall adequate to fill the soil profile. Preliminary estimations from historical climatic data for Charleville indicate that the technique may provide some warning of the onset of drought, with the possibility of prediction on a monthly basis.

INTRODUCTION

Drought is a major factor in a rangeland environment. It has major effects on rangeland resources, on productivity and thus influences financial and social aspects (Pritchard and Mills 1986). Warning of incipient drought should aid management preparations to deal with its eventuality. There are other methods which attempt to provide these indications (e.g. long range weather predictions). The Rainman package uses a statistical approach based on historical rainfall data (Clarkson and Owens 1991). This paper details preliminary data from another approach using simulation.

METHODS

A plant growth simulation model (GRASP, McKeon *et al* 1990) has been tuned for sites in western Queensland (Meppem and Johnston 1988). It was run with historical climatic data for Charleville. Its predicted output of monthly available soil moisture was used to estimate the rainfall required to fill the soil profile. Probability of receiving this rainfall in the next and ensuing months was then calculated. The patterns generated were compared with periods of official drought declaration since 1960.

RESULTS

The patterns of total available soil moisture and probability of sufficient rainfall to refill the soil profile in the next month prior to and during periods of official drought declaration since 1960 have general similarities (**Fig. 1**).

DISCUSSION

The patterns of soil moisture and probability (**Fig. 1**) from this preliminary analysis suggest that there is potential to use this technique in a predictive manner. Other information generated by the model (e.g. plant growth data) appears to have potential for improving the interpretation and reducing the level of noise, but this has not yet been explored.

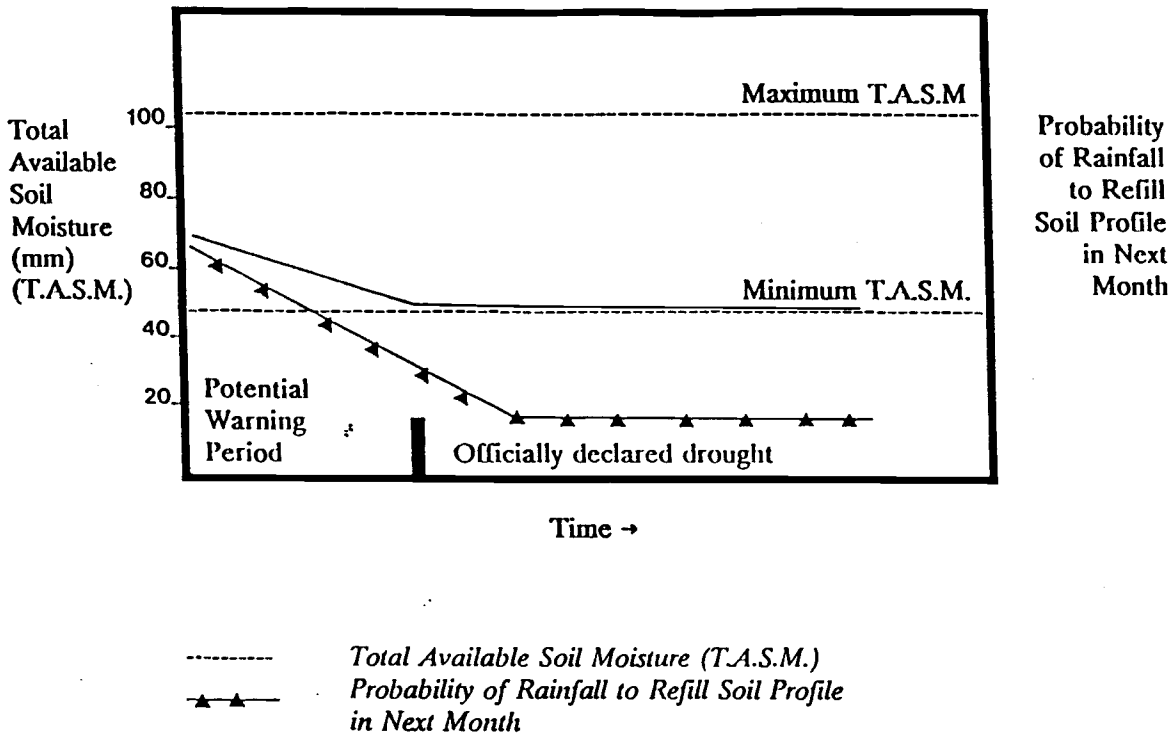

Figure 1. Generalised Pattern of Total Available Soil Moisture and Refill Probability in relation to Drought Declarations.

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