Predicting fire in rainforest

by

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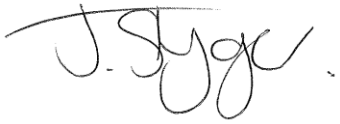

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Abstract

Cool-temperate rainforest occurs widely within south-west and western Tasmania, where it occurs interspersed with buttongrass moorlands. Rainforest is considered to be a climax vegetation, capable of regenerating in the absence of a major disturbance event, such as fire. Rainforest is also considered to be a fire sensitive community, as many rainforest species are incapable of surviving a fire event. Although fire in rainforest is rare, large rainforest fires have occurred in the past. These fire events are likely to increase with future climate change, which may result in a substantial loss of rainforest communities. It is important to understand the conditions under which fire will sustain and spread within rainforest as this will aid in protective measures, such as hazard-reduction burning, and the allocation of resources during a wildfire.

In this study, I ask, under what conditions it would be likely that a fire would sustain and spread within rainforest. In order to do this the flammability and microclimate of a callidendrous rainforest, implicate rainforest and deciduous beech montane rainforest were characterised. The canopy structure and rainfall distribution of the callidendrous rainforest were also examined. There was very little difference in the flammability of live leaf and litter components between the three rainforest communities and adjacent fire tolerant communities, with the exception of the bark component from a *Eucalyptus coccifera* woodland. Callidendrous and implicate rainforests were cooler, more humid and less windy than adjacent open areas. There was very little difference in temperature and vapour pressure deficit between the deciduous beech forest and the adjacent open area. The distribution of rainfall within a callidendrous rainforest was found to be heterogeneous. Two millimetres of rain was required to saturate the rainforest canopy. On average, 20% of rainfall was intercepted.

The Soil Dryness Index (SDI) is a tool used by fire managers to provide an indication of drought conditions and is also a component of the McArthur Forest Fire Danger Index (FFDI) in Tasmania. Many fire managers believe that the SDI does not perform effectively in south-west and western Tasmania. As a result, the performance of the SDI was looked at in this region, by examining the canopy intercept factor used to calculate rainforest and the relative performance of the SDI between mineral and organic soils. It was found that the canopy intercept factor designated for rainforest within the SDI performed well, and the SDI for rainforest could not be improved by using the canopy intercept rule determined for callidendrous rainforest earlier in this study. It was also found that there was no difference in the way the SDI performed between mineral and organic soils. It was therefore thought that the observed poor performance of the

SDI in south-west and western Tasmania is likely to be the result of a poor representation of weather stations in a topographically complex environment.

Twelve historical fires that either burned into, or stopped at rainforest boundaries, were examined. The rainfall in the past 10, 20, 30, 60, 100 and 365 days, as well as SDI, Drought Factor, temperature, relative humidity, wind speed and FFDI were determined for each fire to establish the best predictor of rainforest fire. It was found that the drought related variables were more important in predicting rainforest fire than the weather variables, with rainfall in the last 30 days above or below 50 mm being the most significant predictor of rainforest fire.

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