Wildfire plus climate change–type drought: how much can a forest stand?

Mr Lewis Walden[1], Dr Joseph Fontaine[1], Dr Katinka Ruthrof[1,2], Dr George Matusick[1], Prof Richard Harper[1]
[1]Murdoch University, Murdoch, Australia, [2]Kings Park Science, Kings Park, Australia

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Biography:
Lewis Walden is a PhD student researching the double disturbance effects of drought and fire on forest stand structure. Disturbance ecology and fire ecology are his main interests, particularly plant community response to the impacts of multiple stressors.

Forest disturbance events have become more prevalent and are predicted to increase in frequency and severity with a changing climate. These events can have profound impacts on forest stand structure and function. While the impact of single disturbance events has been well documented, the combined effect of drought + fire, and how they may interact, remains a pressing, yet largely unanswered question, particularly for non-coniferous forests.

A factorial design of plots in eucalyptus–dominated forest in southwestern Australia was established following a 2016 wildfire. There had been previous episodes of drought in this forest. Thirty-six plots were split across two levels of pre-fire drought impact (high and low) and two levels of fire severity (canopy scorched and canopy consumed). Data were collected on tree and shrub survival, regeneration, woody debris, stumps and soil carbon.

Preliminary results suggest that the largest tree mortality occurred in areas of high drought impact plus high severity fire. Forest experiencing lower fire severity and drought impacts resprouted more vigorously than the high severity plus drought affected sites. These lower disturbance severity sites also had many more seedlings and resprouts than higher severity sites.

Mediterranean-type eucalypt forests, long regarded as strongly fire resilient, may be undergoing significant changes in stand structure due to multiple, interacting stressors of varying severities such as drought and wildfire. Given the prediction of more frequent and more intensive fires and droughts, the results from the study may provide an insight into how the forest may respond under a changing climate.

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