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Modelling the long term water yield impact of fire in Eucalypt forests

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Disturbance of forested catchments by fire, logging, or other natural or human induced events that alter the evapotranspiration regime may be a substantial threat to domestic, environmental and industrial water supplies. This study involves physically-based modelling of the long term changes in water yield from two wild fire affected catchments in north-eastern Victoria, Australia, and of fire and climate change scenarios in Melbourne's principal water supply catchment. The effect of scale, data availability and quality, and of forest species parameterisation are explored. The modelling demonstrates the importance of precipitation inputs, with Nash and Sutcliffe Coefficients of Efficiency of predicted versus observed monthly flows increasing from 0.5 to 0.8 with a higher density of rainfall stations, and where forest types are well parameterised. Total predicted flow volumes for the calibrations were within 1% of the observed for the Mitta Mitta River catchment and <4 % for the Thomson River, but almost -10% for the less well parameterised Tambo River. Despite the issues of data availability simulations demonstrated the potential for significant impacts to water supply in SE Australia from wildfire and climate change. For example, for the catchments modelled the moderate climate change impact on water yield was more pronounced than the worst fire scenario. Both modelled cases resulted in long term water yield declines exceeding 20%, with the climate change impact nearing 30%. A simulation using observed data for the first four post-fire years at the Mitta Mitta River catchment showed Macaque was able to accurately predict total flow.