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# Fire effects on reservoir water quality: lessons from the 2013 Sydney wildfires

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Unseasonally, early and severe forest fires burnt ca 10,000 ha of dry sclerophyl eucalypt forest in Oct. 2013 near Sydney (NSW, Australia). The fire affected parts of the Nepean catchment, which contributes to the greater Sydney water supply system. The spatial extent and severe nature of the burn raised concerns about the risk of water contamination from post-fire erosion. An investigation was launched with the aim to determine (i) the total loads of ash and loose charred topsoil that are particular susceptible to erosion, (ii) their chemical composition regarding constituents relevant to water quality, and (iii) the potential impacts of post-fire erosion events transferring some of this material into the reservoir.

Sampling was carried out at a ridge in the Nepean catchment with a relatively homogeneous vegetation species composition, fuel load and soil characteristics, but with a range of burn severities, resulting from wind-driven differences in fire behaviour. This allowed sampling of three replicate sites each, with 30 sampling points each, for extreme, moderate-severe, and low burn severities, including also soil and litter sampling at a long-unburned control site. Burn severity was determined using the differenced normalised burn ratio (dNBR) obtained from satellite images immediately before (1 day) and after (1 week) the fire, validated by on site determination of fuel consumption completeness. Between the fire and the sampling campaign, rainfall was very limited so that there had been no significant redistribution of ash and loose charred topsoil by water erosion.

The ash and loose charred topsoil were consistently wettable and the underlying uncharred soil highly water repellent at all sites and sampling points irrespective of burn severity. The total loads of ash and loose charred topsoil increased substantially with burn severity and changed in composition from comprising mainly charred litter and charcoal at low severity sites to charred litter, charcoal, mineral ash and charred mineral soil at extreme severity sites. Field sampling had just been completed at the time of producing this abstract. At the time of presentation, we expect to present (i) the total loads (t/ha) of ash and loose charred topsoil for each burn severity class; (ii) data on detailed chemical characterisation of the sampled materials including background values for litter and long-unburned soil; (iii) a spatially distributed estimation of ash and loose charred topsoil for the study catchment; and (iv) potential implications for water quality impacts based on a series of post-fire rainfall and erosion scenarios. Wider implications for water quality impacts in eucalypt forest catchments in relation to fuel loads and fire behaviour will also be discussed.