

CHANGE DETECTION: THE EFFECT OF FIRE ON THE WATER QUALITY OF FORESTED CATCHMENTS



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Study Area & Input Data

The study area is located in the catchment area of Lake Burragorang, which is impounded by Warragamba Dam, provides 80% of Sydney's drinking water. The water quality of this catchment is monitored by Sydney Catchment Authority. The area was effected by a bushfire during December 3rd 2001 and January 14th 2002. Seven sub catchments, three control, four burnt, were selected in this study as they have adequate water quality data pre- and post-fire, and extensive forest cover. Their locations are showed in Figure 1. 10 years pre-fire and 10 years post-fire discharge and water quality data were provided by SCA. Flow values that exceed the 90th percentile of stream discharge were defined as event-flow.

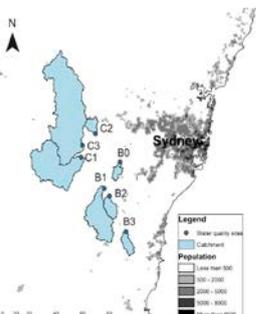
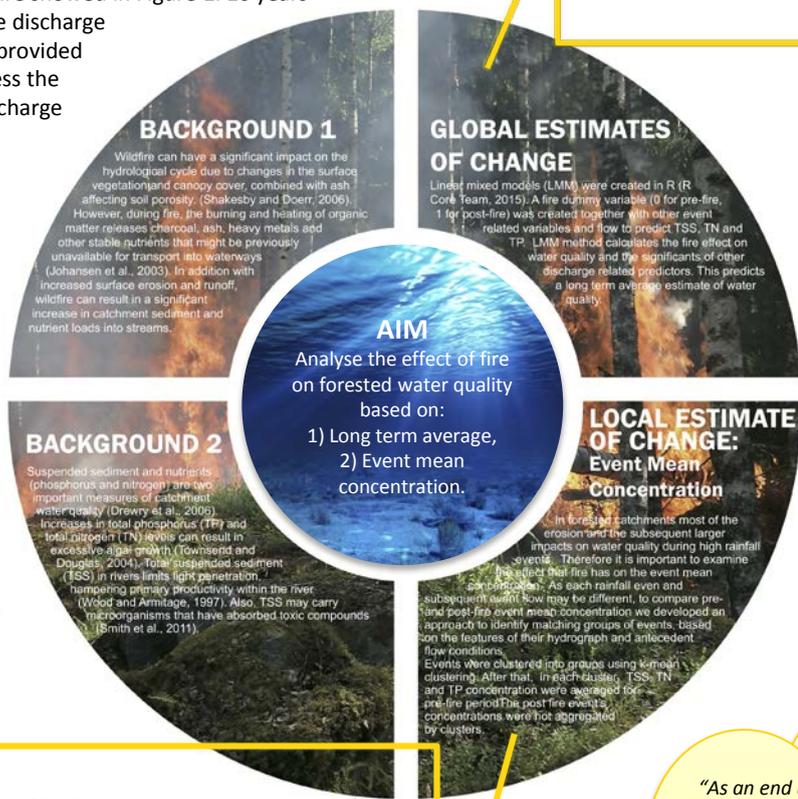


Figure 1 Catchment boundaries and stream gauging stations



Result 1

- All LMMs found discharge to be a significant predictor for predicting water quality.
- Models for predicting TSS were generally found to include by event related predictors.
- The back transformed coefficient of the "fire" dummy variables in each model present the predicted fire effect to each catchment in the 10 years post-fire period (Table 1).

	TSS	TN	TP
C3	1.46	X	X
C1	X	X	X
C2	X	0.37	0.1
B1	1.84	2.88	2.45
B2	X	0.7	1.13
B0	3.32	1.35	X
B3	1.32	X	X
Average control	1.23	1	1
Average burned	1.87	1.48	1.40
Net change	0.64	0.48	0.40

Table 1 LMM coefficients

Result 2

- Burnt catchments showed an 49.98 times increase during post fire period for TSS, 6.01 times increase in TN and 11.32 times increase in TP.
- Catchment B1 is the most significantly affected catchment followed by B0.
- B1: Four events were found, First post-fire event during April 2002 (04/02) showed a 436.5 times increase in TSS concentration in the post fire period, 24.54 times increase in TN and 89.94 times increase in TP, an event in 2005 showed a decrease in the measured concentration of TSS, TN and TP concentration.
- B0: First post fire event (04/02) showed 343 times increase in TSS, 5.14 times increase in TN and 6.77 times increase in TP. Second event (04/03) in this catchment observed a 21 times increase in TSS, 3.33 increases in TN and 8.46 increases in TP. This catchment is observed to have a longer catchment recovery time.

"As an end user, suspended sediment and nutrient after fire can cause serious water quality issues and being able to measure and predict post-fire loads is important. This work helps to predict water quality for gauged and ungauged catchments. Comparing these measurement and prediction methods helps determine the best use of data in planning efficient and effective catchment management."

-- Craig Brown Melbourne Water

Reference
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