Water Quality Modelling with *eWater* Source in Latrobe Catchment, Victoria

Gabriela Raducan, David Silcock, Colin Arrowsmith
RMIT University, School of Mathematical and Geospatial Sciences, Melbourne, VIC, Australia

ABSTRACT

This research is designed to develop a spatial approach to support the planning of the water quality in the areas subjected to bushfires, using a case study from the State of Victoria. In particular, this research involved the implementation of a hydrological model in order to predict the river water quality, to assist in the decision-making process.

The impact of bushfires on water quality can be highly variable being caused by landscape influences and climatic factors, most notably rainfall. High magnitude and intense rainfall events soon after fire generate the largest impacts on water quality and sometimes provoke extreme erosion events.

There is very little information about the water quality parameters especially after bushfires, which makes it difficult to draw conclusions about bushfire impacts. The monitoring campaigns are very expensive, and better options are the modelling tools.

The research area is Latrobe catchment, situated in West Gippsland. The model used in this research is *eWater*, developed by eWater CRC, Australia. It is designed to simulate all aspects of water resource systems to support integrated planning, operations and governance from urban, catchment to river basin scales including human and ecological influences.

The model integrates rainfall runoff, constituent generation and filter models, which can be parameterised. The user must find the best set of parameters that is suitable for the catchment. After calibration and validation, the model can be used in the same catchment for any period of time, and it will be able to predict the pollution levels in the catchment, with a very good accuracy.

RESEARCH QUESTIONS

What information is required to establish the water quality and what are the gaps in existing local water quality databases?

How can a hydrological model be used to integrate datasets, to provide missing information in existing water quality database?

Which pollutants are affected by fire and by how much?

How can we predict future impacts?

Figure 1. La Trobe River – January 2017

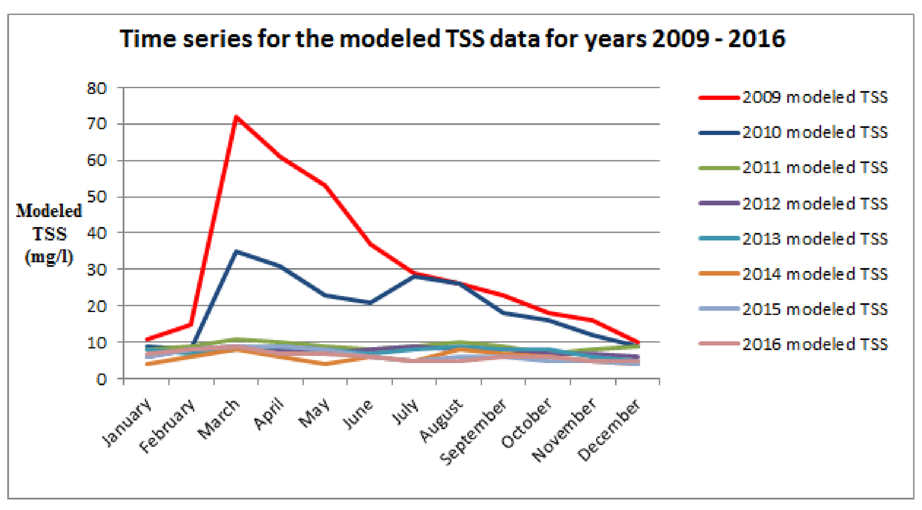

Figure 2. Time series of TSS modeled data for 2009-2016

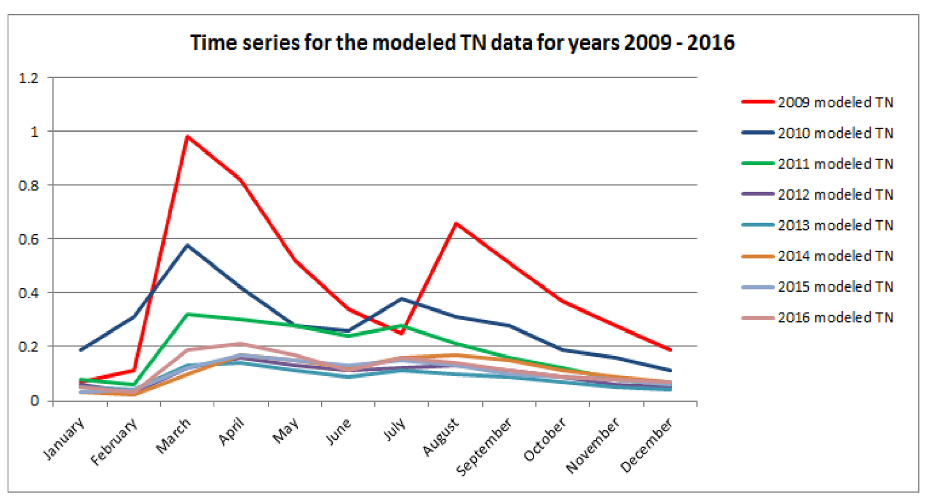

Figure 3. Time series of TN modeled data, for 2009-2016

SUMMARY OF FINDINGS

The outputs of the model are very well correlated with the measured data, and show higher concentrations of total suspended sediment (TSS) and Total Nitrogen (TN) after bushfires followed by rain.

The highest levels of pollution were predicted in 2009, when the bushfires took place. The pollution levels became normal after 2 years for TSS, and after 3 years for TN.

The findings of this research can be used by the authorities for the catchment management plan, for the remediation initiatives, as well as to identify the status and trends of water quality in that catchment.

The model can be used in any other catchment, if the user follows the steps to parameterize, calibrate and validate it.

END USER: Craige Brown from Melbourne Water: This work models post-fire pollutants which can cause serious water quality issues. Better understanding of which pollutants are affected and the ability to model these pollutants will help predict post-fire effects. This will assist with developing programs to mitigate the effects of fire on water quality.

ACKNOWLEDGEMENTS

The authors would like to thank to RMIT University for research support, to the Australian Government for the scholarships provided and to Bushfire and Natural Hazards CRC, Melbourne Water and SA Water Corporation for the top-up scholarship provided.

Australian Government Department of Industry, Innovation and Science | Business Cooperative Research Centres Programme

RMIT UNIVERSITY