

## ***Interactive comment on “Major flood dominates 14 year sediment and nutrient budgets for two subtropical reservoirs” by K. R. O’Brien et al.***

**K. R. O’Brien et al.**

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Received and published: 16 June 2016

Author response: We thank the reviewer for their input. We agree with the reviewer’s general comments, and suggest the following title change to demonstrate the broader applicability of our findings: Sediment and nutrient budgets are inherently dynamic: evidence from a long-term study of two subtropical reservoirs

Specific Reviewer comments: Reviewer comment: Section 2.2: I’m wondering if some more information (or a reference) could be provided for the Source Catchments/WaterCAST modelling from the SEQ region? For example the model captures land uses soil type EMCs, however, later in the manuscript it is stated that river channel erosion is the main source of sediment inputs to the reservoirs – can the model account for this process?

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Author response: The following text and additional reference have been added: “The event mean concentrations (EMCs) used within the Source Catchments model were derived from event monitoring and continuous sampling within the catchments of interest (Thomson et al. 2013), and thus implicitly represent the range of sediment and nutrient generation processes present within the catchment. The EMCs are attributed to land uses rather than specific generation processes. This attribution is relatively consistent with the spatial characterisation of sediment generation within the catchment as quite often the generation processes are strongly tied to the land management of particular land activities (unpublished data). For channel erosion, denuded areas within the river reaches which are aligned to land uses such as horticulture and grazing where land clearing activities have been conducted to the channel edge. Further improvements in the model would require better data representing individual processes which currently doesn't exist for many parts of the catchment studied.”

Reviewer comment: Page 4 Lines 27-28: Some more information of the methods of analysis for TSS and in particular TN and TP would be helpful. Can a reference be provided on the analysis? E.g. What digestion was used; what instrument were the data measured etc. Also might be worth pointing out that there is uncertainty in the laboratory analysis as well!

Author response: The text on p4 has been modified as follows: Water samples were automatically collected using a refrigerated autosampler triggered by the change in height of the depth gauge above a base flow threshold. For TN and TP, whole samples were kept on ice until frozen in the laboratory. They were later analyzed using the persulfate digestion method and run through an autoanalyzer (Burford and O'Donohue, 2006; APHA, 1995). For TSS samples, a known volume was filtered onto a pre-weighed and combusted glass fibre filter, then dried and reweighed (APHA, 1995).

Author response: Furthermore the text on p6 has been modified as follows: Reviewer comment: Monthly monitoring data collected by Seqwater were available for surface and bottom concentrations of TSS, TN, TP, ammonium (NH<sub>4</sub>), nitrite plus ni-

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trate (NO<sub>2</sub>+NO<sub>3</sub>), dissolved inorganic P (DIP) at the dam wall of each reservoir from July 1997 to June 2011. Surface samples were taken using a 3 m depth-integrated sampler and bottom samples were taken using a van Dorn sampler. TN and TP samples were kept on ice until frozen in the laboratory. They were later analyzed using the persulfate digestion method and run through an autoanalyzer (Burford and O'Donohue, 2006; APHA, 1995). For dissolved nutrients, samples were filtered through 0.45 μm membrane filters in situ, and kept on ice until frozen in the laboratory. Samples were analyzed using standard colorimetric methods with an autoanalyzer (Burford and O'Donohue, 2006; APHA, 1995). For TSS samples, a known volume was filtered onto a pre-weighed and combusted glass fibre filter, then dried and reweighed (APHA, 1995).

Reviewer comment: Figure 8: Not sure if this figure adds too much to the manuscript?  
Author response: We agree: Figure 8 has been removed.

Reviewer comment: Technical comments: Abstract: Suggest adding brackets for (TN) and (TP) where first defined. Author response: Agreed

Reviewer comment: Page 2 Line 13: Please spell out 'nitrogen' so reads '...and sometimes nitrogen (N)...' Author response: Agreed

Reviewer comment: Page 2 Line 29: 'This study' = new paragraph so needs tab space. Also note a few instances in the manuscript where the tab for new paragraph is needed – Page 3 Line 19, Page 3 Line 25, Page 4 Line 14, Page 4 Line 24 (starting with Uncertainty), Page 5 Line 8. Author response: Agreed

Reviewer comment: Page 3 Line 10: Please add '(SEQ)' after 'southeast Queensland' (then okay to use SEQ later on – e.g. Page 4 Line 11) Author response: Agreed  
Reviewer comment: General comment – please check spaces throughout the manuscript (e.g. Page 3 Line 15; Page 4 Line 4) Author response: Agreed  
Reviewer comment: Page 3 Line 26: Suggest adding 'catchment area' so will read '...within the Wivenhoe and Somerset catchment area..' Agreed  
Reviewer comment: General comment – 'data

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are plural' so e.g. Page 5 Line 27 'Monthly monitoring data were' (also check Page 6 Line 7; Page 7 Line 25; Page 9 Line 27; Page 10 Line 5). Author response: Agreed  
 Reviewer comment: Page 5 Line 28: Replace 'was completed by' with 'from'? Page 6 Line 27: (If keeping this section) delete 'be'. Page 9 Lines 15-16: Suggest replacing 'loads' in these two lines with 'water volume' (I was initially confused thinking that these were TSS and nutrient loads and the next sentences were repetitive). Author response: Agreed

Reviewer comment: General comment: From Page 9 Line 17, TSS, TN and TP are reported as [TSS], [TN] and [TP] – suggest being consistent throughout paper (unless there is a distinction between the two ways that I have missed?). Author response: TSS, TN and TP refers to total suspended solids, total nitrogen and total phosphorus respectively, whereas [TSS], [TN] and [TP] refer specifically to concentrations of these materials. This is widely accepted notation, but will be clarified from first usage of the square brackets on p9.

Reviewer comment: Page 10 Line 11: Suggest deleting 'retention' Author response: Agreed

Reviewer comment: Page 10 Line 13: 'TSS was retained in both reservoirs..... in all non-flood years' – already said two sentences before – so maybe delete? Agreed

Reviewer comment: Page 10 Lines 23-24: The way I read this is that 60% of catchment inflows in 2010 water year was from the upper Brisbane arm meaning that 40% is from Somerset discharge – but during the flood period would all the 40% be 'controlled release'? Author response: Yes  
 Reviewer comment: Page 11 Line 9: Not sure on this one should it be 'TSS inputs... were estimated' or 'TSS input.... was estimated'?  
 Author response: Agreed

Reviewer comment: Page 12 Line 23: replace 'than' with 'that' so reads '..clear that uncertainty...' Author response: Agreed

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Reviewer comment: Page 13 Line 1: do you mean Wivenhoe instead of Somerset here (for TP retention over study period)? Author response: Agreed

Reviewer comment: Page 13 Line 7: Suggest to reference Table 2 in here again. Author response: Agreed

Reviewer comment: Page 13 Line 15: Suggest to check through the references – seem how they are listed are a little inconsistent throughout (e.g. should it be Avnimelech et al. (2001)?) Author response: Agreed

Reviewer comment: Page 13 Line 20: suggest removing ‘however’ at end of sentence and add ‘for’ so will read ‘Direct measurement of reservoir volume is required for more accurate estimates of change in storage volume’. Author response: The sentence has been modified as follows“Direct measurement of reservoir volume is required for more accurate estimates of storage loss due to sedimentation.”

Reviewer comment: Page 14 Line 14: add ‘d’ so ‘dissolved inorganic N’. Author response: Agreed

References: Thomson, B., D. Orr, B. Ferguson, R. Gardiner, R. Turner, and M. S. J. Warne. 2013. South East Queensland Event Monitoring Program: Sediment and nutrient loads for 2011–2012. Department of Science, Information Technology, Innovation and the Arts, Brisbane.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-89, 2016.

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