

Interactive comment on “Reviews and syntheses: Dams, water quality and tropical reservoir stratification” by R. Scott Winton et al.

Anonymous Referee #2

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General Comment The review is very timely as the number of both large and small dams increase, and more planned, in lower latitudes. Knowledge on impacts are currently skewed to that of higher latitudes. The focus on specific mechanisms relating to effects of dams on water quality is a particular strength of the paper. This provides both insight to general effects of e.g stratification as well as how this might differ in tropical compared with temperate climates. A good use of the more limited information on tropical systems, and resisting the temptation of drifting into too many temperature examples will likely help the reader keep attention on the topic and make the paper a highly relevant resource. Following the general review, the paper makes a further important step in comparing some traditional held beliefs on the effect of tropical reservoirs on water quality with more recent ideas supported by physical models. This is a

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key contribution as it separates conjecture from evidence based conclusions for dams holding back the largest volumes of water in the tropics. Collectively, the general review and the application of models to existing large dams enables the paper to review existing knowledge and its application, and present ideas for future work.

Specific comments. Page 6, line 6. I don't see the need for the sentences “The Colorado River. . .Glen canyon Dam (Holden and Stalnaker)” as the focus is on tropical systems and not convinced that this example adds anything to the general message of the paper. If this change is adopted, then close up the next paragraph, starting with “Several case studies exist”. Page 8, line 28. Term “hungry river” seems a little too idiosyncratic and suggest a clearer phrase and brief description provided as to what this means. Page 9, line 20. Seems that the crucial point here is the balance between sediment/nutrient supply and loss against a background of possible intensification of land and loss of forest cover. This leads to a net effect of nutrient gain or loss. Page 10, line. See above comment as surely even if there is sediment input from tributaries downstream, unless this is very high from erosion in the sub-catchments, the issue of net sediment depletion remains. Page 15, line 19. The consideration of mitigation measures also raises the important issue of local individual and institutional capacity development to aid decision making. It would be useful to address this general point in the Discussion.

Page 16, line 27. The term “would help” seems very mild as a recommendation. Surely given the scale of the issues and future importance, more extensive and, where required, intensive monitoring is a basic need. While there are current financial and (related) capacity limitations given the very high finances involved in dam construction and the critical importance in general for attempting to optimise water management, developing financial and (then) capacity mechanisms for better monitoring would seem an obvious consideration. This is mentioned in the Conclusions, but not in a very strong way Page 17, line 4. While the smaller schemes were not the focus of the review, an obvious recommendation is the need to better understand their impact. Page 18, line.

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This is repetition of first point made in the Conclusions. Page 18, line 11. This would seem a good place to mention the need for Environmental Impact Assessments for all new dams, combined with follow up monitoring to inform Strategic Environmental Assessment. Technical corrections. Includes mainly suggestions for improvement to be considered by the authors. Page 1, line 11. The term “context” is not very precise and can normally simply be omitted by a small adjustment if the sentence. Here simply add an “s” after “latitude” and delete “contexts”. Page 1, line 18. Replace “efficiently trapping sediments” with “efficient trapping of sediments”. Page 1, line 19. Replace “which alters” with “altering”, replace “causes losses” with “loss”. Page 1, line 23. Delete “the worlds” and “systems”, and add “s” after “river”. Following sentence replace “The.impacts” with “These changes, and associated environmental impacts, “. The following phrase “could be better understood” could be stronger but e.g. replacing with “need”. Page 1, line 24. Suggest that the final paragraph of Abstract has a small addition of e.g. “to both mitigate existing, and future potential, impacts. Page 1, line 29. Replace “drastically altered” with “altered drastically”. Page 1, line 29. Replace “quality” with “sufficient quality of”. Page 1, line 30. Add a comma after “UNEP 2016) and then delete following “and” and “relationship”. Page 1, line 32. Delete comma after “quality” and change “dam impacts” to “impacts of dams”. Page 2, line 3. Add full stop before and then change “and therefore not delivering on” to “Such impacts act against”. Page 2, line 7. Delete “contexts”. Page 2, line 9. Replace “Certainly” with “While” and delete “but”. Page 2, line 14. Delete “ground has been broken on”. Page 2, line 15. After “reservoirs” insert “have occurred”. Page 3, line 2. I suggest changing “context” to “biomes”. Page 4, line 6. Replace “import” with “important”. Page 4, line 22. Add comma after the brackets and delete “efforts”. Page 5, line 12. Delete comma and “exerting”. Page 5, line 13. After “pronounced”, insert “than temperate climates, Page 5, line 14. Delete “patterns which comprise”, the inverted commas and add an “s” after “regime”. Page 5, line 17. Sentence would seem to merit a reference or two, maybe from some review paper or book. Page 6, line 2. Replace “threshold requirements” with “thresholds required”. Page 6, line 5. The sentence “When. . . .will shift” requires

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revision. I suggest “Altered thermal regimes can shift species distribution”. Page 6, line 21-22. Replace “monitored” with “monitoring”, and later in line delete the “and” after “river” and “were effective at” and replace “promoting” with “promoted”. Page 6, line 22-23. Delete “to emigrate. . . .downstream ecosystems”. The reference of “(King et al., 1998)” can be retained. Page 6, line 28 and 29. Delete “levels”. Page 7, line 4. Add comma after L-1, and delete “(the rule varies” and “context” and insert bracket before “Higgins”. Page 7, line 6. Here and in general replace “to” with “with”. Page 7, line 14. Add full stop after “macronutrient”, delete “and” and continue with capital “T”. Delete “the”. Page 7, line 15. Replace “productivity” with “eutrophication”. Page 7, line 16. Delete “a process called eutrophication”. Page 7, line 24. Replace “cause eutrophication and algal blooms” with “stimulate algal and other submerged plant growth”. Page 7, line 28. Replace “at” with “in”. Page 8, line 5. Replace “to” with “with”. Page 8, line 19. Insert comma after “stresses” and “sustained”, replace “and” with “which” and “lead to the expiration of” with “be lethal to”. Page 8, line 24. After “chemical” suggest replace colon with semi-colon (editor to view). Page 9, line 4. Suggest restructuring line as “disruption of the flood-pulse, affecting the ecological functioning of floodplains (Junk et al., 1989). Page 9, line 11. Add “many” after “of” and replace “appears to be” with “is”. Page 9, line 14. Add “also” after “can”. Page 9, line 25. Rephrase first part of the sentence as “The attention to the importance of phosphorus and nitrogen can obscure the importance of other nutrients and their ratios. Silicon efficiently. . . . Page 10, line 2. I suggest “variable” is used rather than “parameter” for the intended meaning here. Page 10, line 5. Delete “be” and replace “dependent” with “depend”. Page 10, line 6. Replace “be fed. . . .predictions” with “provide input to predictive models”. Page 10, line 8. Delete “In contexts”. Page 10, line 17. Delete “as a necessary pre-condition”. Page 10, line 18. Delete “these”. Page 11, line 13. Delete full stop after “. . . .per year)” and replace “but upon” with “on”. Page 11, line 28. Delete “be”. Page 11, line 33. Suggest to replace “lines dividing the different” with “boundaries of difference”. Page 14, line 4. Delete first use of “depth” and “replace “max” with “maximum”. Page 14, line 9 & 10. Replace “stopping hererecall that” with “reflecting that”. Page 14,

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line 27. Replace “parameters” with “variables”. Page 14, line 9. Delete “do” and “in contexts”, replace “they” with “these” and delete following “these”. Page 16, line 14. See earlier comments on the use of “hungry water”. Page 16, line 29. Replace “Compared to” with “Compared with”. Page 17, line 6. Delete “have been”. Page 17, line 10. Replace “compared to” with “compared with”. Page 17, line 22. Delete “and repurposed”. Page 18, line 3. Insert “to” after “difficult”. Page 18, line 6. Move comma after “value” to after “which”. Page 18, line 9. Delete “does the”. Page 18, line 10. Replace “some contexts” with “places”.

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