

# ***Interactive comment on “Hydrological threats for riparian wetlands of international importance – a global quantitative and qualitative analysis” by Christof Schneider et al.***

**Anonymous Referee #2**

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Review of Schneider et al “Hydrological threats for riparian wetlands of international importance – a global quantitative and qualitative analysis”

Through data synthesis and model interpretations of RAMSAR wetland sites across the world, this paper addresses the issue of past to expected future adverse effects on riparian wetlands from pressures such as climate change and water regulation. In particular the focus is on the available flooding volume - how it has been modified today and how it may change in the future due to these pressures. The magnitude of these changes are taken as a measure of potential ecological impacts.

The authors combine and use multiple methods (e.g. to simulate impact of flow regulation of various dam types etc), many of which have been thoroughly developed in

previous work. Although results are associated with considerable uncertainties, the approach is quite reasonable and the outcome is logically synthesised and presented as maps showing e.g. the magnitude of flow alteration impact. Such global state-of-the-art syntheses is certainly of scientific interest; I would recommend publication of the work if main shortcomings (see below) can be addressed, which is likely to require at least moderate revisions.

In summary, these shortcomings are (1) lack of clarifications regarding novel aspects of the present study, apart from the novel global synthesis perspective, (2) partial lack of information regarding past experiences of the proposed methods, (3) language issues, (4) lack of sufficient results comparison to previous studies, and (5) unfocused conclusions. Overall, this study has high potential and I hope that the detailed comments below can be useful in addressing the current concerns.

1. Presently, the focus of the introduction is on the relevance of the topic, including what is known about vital ecosystem services of floodplain wetlands, effects of dams in a more general sense, and the need for maintaining flow variability etc. This description is on the lengthy side and could probably be condensed. However, more concrete (state-of-the art) regional examples that presumably exist in the scientific literature regarding today's impacts (or expected future impacts) on floodplain wetlands are essentially missing. Such examples should be included in the introduction, such that the readers can understand what is novel about the presented result-maps, in addition to the novel global synthesis perspective. In other words: which previous indications exist in the scientific literature regarding key results, such as the result showing that the degree of overbank flow alteration due to current management is very low in Europe (essentially green in Figure 1) whereas Australia comes out as seriously altered (or other results that are the authors think is important). I would recommend the authors to go through what they consider to be the main results of their study and make sure that the introduction informs sufficiently about the current knowledge. This would provide a necessary basis for enhancing the discussion (see bullet point 4)

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2. It is stated in the introduction (p. 2, line 26) that a new approach is needed to water resources management, which among other things should allow for sufficiently high flows for sustaining floodplain wetlands. However, in line with comments of bullet point 1 (above), this proposed novelty remains unclear to the reader. For example, haven't we gained some relevant knowledge from regulation schemes applied to the principal Colorado River in the US (Stevens et al., 2001; Stromberg et al., 2007; Cross et al., 2011)? These schemes have included controlled floods as part of the strategy to minimise adverse impacts to downstream ecosystems. Perhaps there other relevant examples.

3. The language of the manuscript is overall good. There are some exceptions though, including the introduction. In particular, the research questions and the related text include awkward formulations (e.g., multiple sentences starting with Thereby.../ Therefore...), please check.

4. There is a lack of results comparison to previous studies in the discussion section, which should be addressed before publication. The now included references do mainly not relate to the results (study outcomes) and need therefore to be complemented. For instance, are the results regarding impacts on the 93 Ramsar wetlands in different world regions (p. 17, lines 3-11) consistent with previously reported results for these regions? Alternatively, do the results partly contradict or point to new and previously unnoticed aspects? (Also, the reader is not well informed about the existence or absence of similar studies, see bullet point 2 above regarding the introduction). The same questions can be asked for other key results, such as impacts of climate change and the related identified hotspots (p. 17, line 12-15), and competition of water (p. 17, lines 31-32). Overall, the discussion section is rather general and would benefit from an extended discussion of results. The aims of the study need not to be reiterated in the beginning of the discussion section.

5. The main conclusions of the paper are not clearly presented. Maybe a separate conclusion section could help?

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Cross, W. F., Baxter, C. V., Donner, K. C., Rosi-Marshall, E. J., Kennedy, T. A., Hall, R. O., ... & Rogers, R. S. (2011). Ecosystem ecology meets adaptive management: food web response to a controlled flood on the Colorado River, Glen Canyon. *Ecological Applications*, 21(6), 2016-2033.

Stevens, L. E., Ayers, T. J., Bennett, J. B., Christensen, K., Kearsley, M. J., Meretsky, V. J., ... & Springer, A. E. (2001). Planned flooding and Colorado river riparian trade-offs downstream from Glen Canyon dam, Arizona. *Ecological Applications*, 11(3), 701-710.

Stromberg, J. C., Beauchamp, V. B., Dixon, M. D., Lite, S. J., & Paradzick, C. (2007). Importance of low-flow and high-flow characteristics to restoration of riparian vegetation along rivers in arid southwestern United States. *Freshwater Biology*, 52(4), 651-679.

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