

Dear HESS Editorial Board,

We would like to submit Author Comments of our manuscript entitled " Accounting for environmental flow requirements in global water assessments [Doi:10.5194/hessd-10-14987-2013]" submitted to Hydrology and Earth System Sciences. "

First of all, we would like to express here our deep gratitude for the suggestions that were helpful for us to revise our manuscript. We apologize for the fact some parts of our manuscript that were confusing.

Please find below a detailed response to the Editor. We have revised our manuscript according to the direction given by the Editorial board. After this, we sincerely believe that the new version is up to satisfying the comments of both referees.

Again, our gratitude to you and all referees.

Sincerely yours,

Amandine PASTOR (On behalf of all authors)

Response to the Editor

We would like to express our gratitude for the positive comments, but also for the critics, and suggestions that has helped us to improve our manuscript to the Editor Dr. Stacey Archfield. Our responses (in blue) are provided here together with the original comments (in black).

To comply with the Editor requirements and suggestions, the manuscript has been re-organized to show more clarity and consistency than with the previous version especially in the section 3, 4 and 5. The manuscript has also been proof-read for the use of the English language by Kathryn Platzer. The manuscript follows the Textual and Visual Conventions: http://www.hydrology-and-earth-system-sciences.net/submission/manuscript_preparation.html.

1. Use of quotes around the names of the flow methods is not necessary. For example, in the abstract (line 4) and Section 2.1 (p. 5, line 7). Please remove.

The use of quote has been removed from the manuscript (page 2, line 4; page 5 line 17-35).

2. Clarify the difference between ER and EFR in the text. They appear to be used interchangeably and this makes the manuscript confusing to read. Either choose one term or make explicit note as to the differences in meaning between the two terms.

EFRs or Environmental flow requirements are the result of the quantification of water necessary to sustain riverine ecosystem by the mean of an environmental flow method.

Footnotes were included in the abstract:

1. EFRs and EF are used for different purposes: Environmental flow requirements (EFRs) are the result of the quantification of water necessary to sustain riverine ecosystem which is calculated by the mean of an environmental flow (EF) method.

2. An environmental flow (EF) method allows the calculation of EFRs.

3. When referring to the environmental flow methods later in the text, be consistent in the usage of the categories described in Section 2. This adds confusion to the reader in the later sections about how the various hydrological methods and locally calculated methods are different. Why not organize section 2 into sections titled “Hydrological methods” and “Locally-calculated methods”? You say you are going to use hydrological methods but then in Section 3.1, you state that, in the case studies, you use habitat simulation models or a holistic model, which are in different sub-sections of Section 2 than hydrologic models. This is very confusing for the reader.

We re-organized section 2 into:

2 Review of environmental flow methods

 2.1 Locally-calculated methods

 2.2 Global environmental flow methods

4. In some cases you choose to create abbreviations for site names or methods and in other cases you do not. Be consistent. For example, Section 2.4, you define the acronym DRIFT but do not use one for

the Building Block Model or Desktop Reserve Model. Similarly, in Section 3.4, the Bill Williams River is abbreviated BWR but the Sharh Chai River is not. Be consistent.

Abbreviations of methods such as DRM or DRIFT were removed and abbreviations of river names as well.

5. Equations 1 and 2 are not in the proper format required by HESS.

Equation 1 and 2 were changed to HESS format.

6. You need to make a stronger case for why you are comparing local EFRs to global. One way to do this is to explicitly state the assumption in the earlier sections that you are assuming the local EFRs are the best estimate of the ecological needs of the river and using that best estimate to compare against the global EFRs. This connection is very difficult to see in the current version of the manuscript.

We included in sections 1,2,3 “we assume that locally-calculated EFRs are the best estimates of EFRs and therefore we used them to validate our global EF methods”.

7. You seem to contradict yourself in Section 3.6.2. You state that it is “essential to define EFRs at shorter timescales than annual timescales...” (lines 29-31) but then later state that you use a method based on annual quantiles (line 5). This is quite confusing. Also, the use of “should” needs to be removed. State what you did for your analysis and why you did it; do not make a blanket statement about what should or should not be done outside of this analysis.

We remove from the text that it is necessary to define EFRs at shorter timescales and we explained that all the methods based on monthly or annual time-step were adjusted to monthly time-step by including intra-annual variability with dividing the river hydrograph into low-flow and high-flow months. Therefore, for each seasonal period a different algorithm was assigned even for method based on annual thresholds.

The choice of designing another method based on flow quantile (Q90_Q50) was to make a purely non-parametric method based on monthly long-term average flows in order to compare it with the Smakhtin method which is semi-parametric (this study). Q90_Q50 is an improved method compared to flow methods which only allocates a baseflow based on low-flow-period such as Q90 or 7Q10, the innovation here is that Q50 is allocated during high-flow period instead of Q90.

We rewrote 3.5 section according to the editor recommendation.

8. In Section 3.6.1, when assigning all rivers as “fair” does this mean that you used the corresponding Q values that Smakhtin et al 2004 used?

We rephrased how the selection of method was done and what was the desired ecological status of each method (section 3.7). In the case of Smakhtin method, we actually used the same desired ecological status as in his study (fair status) which corresponds to the allocation of Q90 during low flows and Q90 + a percentage of MAF during high flows (see table 2). Q90_Q50 and VMF methods were also defined to achieve “fair” ecological status. Tessmann method did not have any description of desired ecological status in the literature so we considered it to be “fair” although no withdrawals are allowed during low flows.

9. Please proofread carefully. There were grammatical errors throughout the manuscript.

The manuscript was proof-read of the use of the English language by a professional editor.