

Interactive comment on “A framework for the quantitative assessment of climate change impacts on water-related activities at the basin scale” by D. Anghileri et al.

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We wish to thank the reviewer for his/her comments and suggestions. Below is a list of specific reply and comments on the issues raised by the reviewer.

1. A valuable contribution of this paper is...

Reply: We agree that the sentence "An uncertainty analysis..." in the abstract may be misleading. We may replace it by: "We discuss the robustness of the estimated impacts to the climate natural variability and the approximations in modeling the physical system and the socio-economic system, and perform an uncertainty analysis

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of several sources of uncertainty."

2. The authors have stated on several occasions...

Reply: In the cited research project, a representative person for each stakeholder group was identified. These are: the managers of the hydropower companies; the leaders of the irrigation consortia (representative for the farmers); officials from Como city and other towns along the lake shores (representative for the flooding, navigation, fishing and tourism issues); the manager of the Nature Park located along the lake effluent river. The indicators were identified by structured interviews repeated at different meetings, including a final interview aimed at validation: stakeholder representatives were asked to rank different situations and checking that her/his ranking was consistent with the one determined by the indicators. We can insert this short description in section 3.4.

3. More generally, the actual stakeholders...

Reply: In the case study area, most of the stakeholders were already organized into associations (e.g. farmers into the irrigation consortia; the irrigation consortia, the power companies and the Como city officials into the lake regulation panel authority) with long-established procedures for selecting their delegates and resolving disputes (or at least trying!). This was a clear advantage in developing our study. When stakeholders are fragmented and/or the analysis also includes issues where perceptions of individual stakeholders may be strongly different (like landscape changes or ecology), we agree that more sophisticated tools and spatial analysis should be considered. We can highlight this in the conclusions.

4. Also in relation to the previous comment...

Reply: Yes, we believe that when dealing with multi-objective problems, modelling and optimization should be aimed at providing the knowledge base for political discussion and decision-making, not at replacing it. The role of uncertainty analysis (UA) in

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this process is very delicate. In fact, from the modeler standpoint, UA enhances the robustness of the assessment results, while for political decision-makers it may be perceived as undermining their trustability. Communicating the information contained in a graph like Figure 7 in our paper is difficult and time consuming. It requires the decision-makers to make an effort towards understanding at least the general principles of the underlying assessment methodology; and the willingness to assimilate a sophisticated message rather than simple answers. On the other hand, researchers should focus on finding new effective ways for communicating UA results, as we stressed in our conclusions.

5. *Figures 3b and 3c...*

Reply: Yes, labels in the paper are wrong. Units of measurements are (a) Celsius degrees, (b) mm per month, (c) mm from the beginning of the year (ranging from 0 to 1200, and not from 0 to 35,000). See corrected figure 1 below.

6. *Pages 7-8 (section 3.2). The hydrological rainfall-runoff model...*

REPLY: See our Reply to Referee 1 (5th reply: *Page 595, Line 11: Please give a brief explanation on your model selection...*)

As for the glacier model, the sentence in the paper is probably misleading. We do not think that neglecting glacier dynamics is the reason for reduced accuracy over the historical period (we agree that this is minor error with respect to many other simplifications) but rather that, if temperature will actually raise, glacier melting will become significant in the future (and our model is not able to account for this). We may replace the mentioned sentence by the following:

“Note that in this study we did not include a model of the glacier dynamics. At present, the contribution of glacier melting is usually negligible but for extremely hot and dry summer periods, as for instance the 2003 drought. However, under future climate scenario of increased temperature, glacier melting may become relevant. Also, there

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exist multiple evidences of a constant glacier reduction since from the beginning of the 20th century [Smiraglia 2006], which means that glacier melting may give a positive contribution to flow in the middle-term while disappearing in the long run.”

As for the HBV model parameters, see the 7th reply to Referee 1 (*Page 595, last paragraph: Please list the parameters...* and Table 1 in there.

7. *Pages 9-10 (lines 332-354)*

REPLY: See our Reply to Referee 1 (10th Reply: *Page 600, Line 2 and Line 20: How were the different simulation horizons of 10 or 14 years alternatives selected...*)

8. *On several occasions the authors give reference to...*

REPLY: we may replace this reference by an already published technical report.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 585, 2011.

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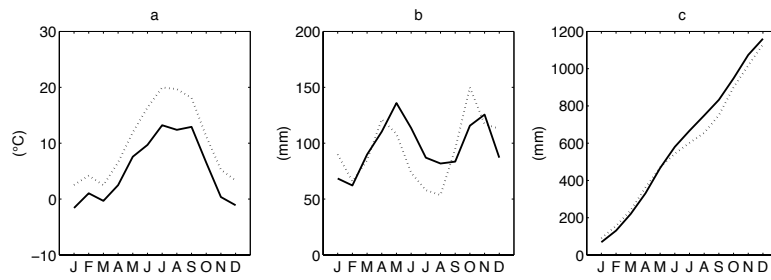


Fig. 1. Mean monthly temperature in the backcast (solid) and forecast (dotted) scenario (a); total monthly precipitation (b); and cumulate precipitation over the year (c) with downscaled RACMO RCM.