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Hydrology and Earth System Sciences Discussions

Interactive comment on "Supplemental irrigation potential and impact on downstream flow of Karkheh River Basin of Iran" *by* B. Hessari et al.

Anonymous Referee #2

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Reviewer Comment on research paper entitled "Supplemental irrigation potential and impact on downstream flow of Karkheh river basin of Iran" by Hessari et al. The paper presents a GIS based methodology to estimate the potential rainfed areas that could be brought under supplemental irrigation. Various scenarios are tested and the impact on mean annual flows for the downstream Karkheh dam is evaluated. The study concludes that an area in the range of 1000-2000 km2 could be brought under supplemental irrigation depending upon the flow conditions (normal or drought). The study recommends that the implementation of the supplemental irrigation in the Karkheh Basin does not substantially reduce average annual flow to the Karkheh reservoir, and indeed will contribute considerable increase in yield and water productivity. The findings are very useful for the policy makers and water managers in Iran. Methodology

is also instructive for other rainfed regions. In general, paper is very well structured. The results are summarized well and writing is good. The paper is recommended for publication after minor revisions. The following comments will help improving the manuscript, which authors may include in the revised manuscript. 1) Methodology section could be improved with more information and justification (also giving appropriate references), in particular on the estimation of environmental flow requirements, and the methods used in downstream routing of flow (e.g. simple spreadsheet or hydrological model). 2) Another main point is the downstream impacts are only compared at annual level. It is suggested to show the monthly impacts as well, in particular for the months when supplemental irrigation was applied (e.g. October, November, May, June). If a hydrological model is used than affect on couple of following months could also be shown. 3) On page 6 line 4, author used 15% of the mean annual runoff as environmental flow requirement. Would be good to add more on justifying this choice with references from the literature. 4) On page 8, line 1, the sentence on comparison of findings with other study could be revised. The part saying, that the other study by Masih et al. (2011) did not specify the exact criteria used in their study could be deleted, as the authors do present how they delineated the potential rainfed areas using GIS based approach within the SWAT model environment. 5) On page 9, line 20, the sentence on artificial groundwater recharge could be deleted or explained and supported through references. 6) On page 10, lines 9-11, the sentence on further refinement could also include the better representation of hydrological processes and estimation of downstream demands for environment and other sectors of water use (irrigation, hydropower).

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