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Hydrology and Earth System Sciences Discussions



# *Interactive comment on* "Detecting the long-term impacts from climate variability and increasing water consumption on runoff in the Krishna river basin (India)" *by* L. M. Bouwer et al.

**L. M. Bouwer et al.**

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General comments

We thank the referee for the compliments. Below we respond to the detailed comments.

Detailed comments

1) We agree, and we have added "annual" in the revised text.

2) We have deleted "natural" in the revised text.

3) We assume that this comment refers to the final sentence of the abstract. We have rewritten the final sentence as follows, in order to avoid confusion: "Variation in runoff under climate variability only would have decreased over the period under study, but we



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estimate that increasing water consumption has caused runoff variability that is three times higher".

4) We have started a new sentence here with "In particular Ě".

5) We have replaced "on" with "of" here.

6) We do not agree; in this paper we describe research that took place in the past, and therefore we use the past tense.

7) Indeed, apart from increasing evaporation from reservoirs, hydropower does not consume water. We have added the line "evaporation losses from water storage for hydropower production".

8) We agree, we have replaced "are" by "is".

9) Agree, we have replaced "equalled" by "was equal to".

10) Areal flux is not a term used frequently in hydrology. We have remained with the wording as it is, and we have added "per month", in order to keep dimensions equal.

11) We come to this point later in our paper, it may to early to point out this fact.

12) Indeed, we have corrected "be" to "been".

13) Indeed, this is unclear. We have changed this sentence into "and what difference between present and a hypothetical pristine situation in monthly and seasonal river runoff can be detected".

14) Indeed, we have started a new sentence here.

15) We agree and have changed "to" into "for".

16) Indeed, we have added the comment that the other input data has a finer resolution, between 1 and 3.5 square kilometre.

17) We chose this period of 15 years, as this leaves the possibility open to test the



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model for a number of other periods before the 1960s (after which major reservoirs were built) and to provide a proper validation. We have added a comment in the paper on this.

18) We agree, and have changed “can be” to “was”.

19) Yes, also before 1901, many (small) reservoirs are present in the basin; we have added a comment on this.

20) We agreed, we have changed “Monthly maximum runoff” with “Annual maximum monthly runoff”.

21) We agree, and have changed “parameters” into “variables”.

22) We have changed this sentence as suggested by the referee.

23) We agree that we must suppose reasons for this discrepancy, we have added a comment on this.

24) We agree, and have used the abbreviation CV during the remainder of the paper.

25) We have rephrased this sentence in the revised paper.

26) We have deleted “residual”.

27) We have changed “normalised” to “relative”.

28) We used the Equations 2 and 3 to subtract a particular amount from the runoff as simulated by the water balance model. We did not chose to change the evaporation equation, as water is not captured and stored at every location in the river basin, but rather at particular locations throughout the river basins along the tributaries (see Fig. 1). We chose to subtract amounts that are stored in reservoirs and used for irrigation at the river basin end. We will have now reflected this in the revised text.

29) We have added “annual” where millimetre changes are noted in Section 6.

30) We have added a comment in the revised paper that these estimates were obtained



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using a model simulation without including reservoirs.

31) We have increased the line thickness of the smoothed curves of Fig. 2 and Fig. 4 in the revised paper.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1249, 2006.