

Interactive comment on “Assessing the hydrological effect of the check dams in the Loess Plateau, China by model simulations” by Y. D. Xu et al.

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Comment 1): Do you have the data of check dam quantity or density in the Yanhe Watershed in different periods? If you have such data, can you give the check dam densities in the main text and abstract? Can you analyze the varying efficiency of check dams in regulating runoff and sediment with increasing density of check dams? Then the value of this paper will be greatly increased.

Answer: There has been little detailed data of check dams in the Yanhe Watershed. The only data appeared in a section of an edited book (Hui, Y. Y., Ji, W. H., and Liu, T.

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Interactive Discussion

Discussion Paper



H.: Study on the variation and trend of the runoff and sediment in the Yanhe watershed, in: Wang G and Fan Z: Study on the variation of the runoff and sediment in the Yellow River watershed (Volume 1), Yellow River Water Conservancy Press, Zhengzhou, 717-736 pp., 2002.). The author reported that the amount of check dams in the Yanhe Watershed by the end of 2002 was 6572. This datum had been mentioned in “2.1 Study area”. It was added in the abstract in the revised manuscript. It’s for sure that the construction of check dams in the Loess Plateau exploded from 1970s. During the two periods of the check dams’ effects assessment(1980s and 2000s), the check dams increased. The regulation effects of the check dams on runoff and sediment were different in the two periods. Detailed analysis had been done in the “Discussion” section.

Comment 2): P13494, L13-16: How Ran (2008) calculated the area percentage of check dams? Do you mean the area covered by check dam (pond)? or the basin area above check dam(s)?

Answer: The basin area above check dams was used to calculate the percentage. The sentence was modified in the revised manuscript.

Comment 3): P13497, L6-10: How you get the areal parameters of meteorology, such as precipitation from only two stations? or did you use them directly as the areal data? In addition, the meteorological station of Wuqi should be marked in Fig. 3.

Answer: Totally, the data of 39 precipitation stations and 2 meteorological stations were used in our study. All the data were imported into ArcSWAT, in which the data would be processed and interpolated automatically. The amount of precipitation stations (39) was added in the text and the Wuqi meteorological station was marked in Fig. 3 in the revised manuscript.

Comment 4): For making an easier use of this paper results by readers, can you also discuss the absolute difference in runoff and sediment yield caused by check dams, rather than only the percentage change?

Answer: The absolute numbers were added in the revised manuscript and the percentage changes were put in the parenthesis.

Comment 5): P13499, L9-10: The first sentence here is a repeat of earlier description. Please delete this.

Answer: The sentence was deleted in the revised manuscript.

Comment 6): P13502, L9-15: Can you estimate the optimal check dam density or its rough range based on your study and data available? If you can do this, it will bring more practical guidance.

Answer: For the lack of the available data, the optimal check dam density could not be estimated in this article. It's deduced that "there was a threshold of the check dams' amount, before which the lateral flow and return flow increased, and after which decreased" (P13502, L13-15). For determining the threshold (the optimal check dam density), long term simulation was essential. It's needed to collect more meteorological data, hydrological data and check dam density data. However, the check dams in the studied watershed had been rarely surveyed, which was a major block for the above method. Another method was a mechanism model which includes a module of check dam effect. In such a model, the change of hydrological processes with the increased check dam density could be simulated, and the optimal density could be estimated. By the model, the effect of the check dams would be assessed thoroughly, and could be applied in other watersheds. However, a detailed survey of the amounts, locations and characteristics of the check dams was needed. It's also why we put the last sentence of the article as "For thorough assessment of the impacts of the check dams, a detailed survey of the amounts, locations and characteristics of the check dams are needed, though it's a difficult task in the Loess Plateau, China."

Other comments marked in the supplement pdf file were accepted and corrected in the revised manuscript.

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