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Hydrology and Earth System Sciences Discussions

Interactive comment on "Effects of vegetation patterns on yields of the surface andsubsurface waters in the Heishui Alpine Valley in west China" *by* Y. Liu et al.

Y. Liu et al.

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Thank you very much for your constructive comments. We will revise the paper based on your comments in the further manuscript.

Q1 Any lack of climate data and other associated data such as geology of watersheds will make it difficult to accept the conclusions on vegetation effects. I have not been convinced that the watersheds have similar physical parameters other than vegetation compositions. An analysis is needed since this is not a 'paired watershed' study.

R:

Climate data, especially, precipitation and AET are indeed important factors in this

study, which were given by the figure 2 (spatial distribution AET and Precipitation in Heishui Valley) as the background in the first revision, but their complicated effect need lots of further work to be clarified. About physical parameters, we considered that the relationship between vegetation patterns and water yield not only depended on vegetation coverage, but also depended on the changes in infiltration and evapotranspiration, the available water storage capacity of the soil and topography; we had tried to clarify the complex relationship between vegetation and water yields in our discussion.

Q2 The response stated that 'spatial distribution AET and Precipitation are similar for the seven watersheds according to Jiang et al'. I was unclear how this info was derived. If AET, and P are similar for all the watersheds, the stream flow should be similar, so, why did the researchers conclude there are differences in water yield among them.

R:

Sorry, we explained the spatial distribution of Precipitation and AET unclearly in the first response. We got the values through modifying Figures 7 and 8 (spatial distribution of Precipitation and AET in Mingjiang Valley, respectively, in the paper published by Jiang et al., 2004).

Firstly, we overlapped the boundary lines of seven watersheds on the Figure 7, secondly, we computed the mean through the area-weighting in GIS and finally we got the mean, max, and min values within every watershed. The annual precipitation results (mm) are: catchments A (mean 696, max 720, min 640), B (mean 700, max 720, min 680), E (mean 715, max, 800, min 680), F (mean 717, max 800, min 680), H (mean 684, max 760, min 640), I (mean 692, max 720, min 640), K (mean 665, max 720, min 640).

The same method was applied to AET (based on Figure 8 in the paper by Jiang et al., 2004), the AET results (mm)are: catchments A (mean 500, max 500, min 500), B (mean 500, max 500, min 500), E (mean 496, max 500, min 480), F (mean 500, max 500, min 500), H (mean 476, max 480, min 420), I (mean 431, max 480, min <400), K

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(mean 500, max 500, min 500).

Based on the calculated values, we found the max difference percentage among seven watersheds was 8

Differences in water yield among the seven watersheds not only depended on vegetation coverage, but also depended on the changes in infiltration and evapotranspiration, topography and the available water storage capacity of the soil except for climate effects.

Q3 I do not believe sampling base flow (no rain days) will assure the stream flow was not affected by previous rainfall events. For large watersheds, rainfall can have long period of influences on stream flow.

R:

Generally, we agree to your comments. But, the elevation fall from mountaintop to outlet (122 km long) of Heishui River is more than 2000 m, and the river water flow quickly; our record of flood water showed event rainfall disappeared after eight hours. Former study also showed the results. However, we think it is still difficult to assure the stream flow was not affected by previous rainfall events, and further study on the detailed effect is needed.

Q4 The authors stated uncertainties on vegetation-flow relations for different size of watersheds - the scale issues. This uncertainty may be caused only by the uncertainty of climate. I understand the difficulty to get climate data for large watersheds. This is the challenge for large basin hydrology study. I hope the authors can address this and derive conclusions accordingly.

R:

Thanks again. We have a similar idea, will discuss the effect in the manuscript and try to derive the conclusion accordingly; although It is a big challenge for us.

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