We thank you for considering our manuscript "Evolution of the human–water relationships in Heihe River basin in the past 2000 years" **(**Submission Reference: hess-2014-560) and our response (in red) to your comments (in black) are provided below.

1. Comment: How the past 2000 years were divided into several different periods is not entirely clear. First, Table 1 provides vague timelines for the different dynasties; it would be much better if the authors provided start and end years to these periods. It would also help the reader understand whether these were successive contiguous periods. Second, it is mentioned in Section 2.3.1 that the authors used "precipitation in each historical period reconstructed by Ren et al. (2010)". Are Ren et al. (2010)'s historical periods the same as the seven dynastic periods chosen in this study? If not, how different are Ren et al.'s divisions of the historical period?

Thanks for this point. We will list the start and end years of all dynasties in the past 2000 years in our revised manuscript. The reason why we selected seven periods, not seven whole dynasties, was because the data of reconstructed land use and land cover were only available during these periods (Xie, 2013; Xie et al., 2013). Ren et al. (2010) reconstructed a complete precipitation sequence spanning 2000 years with a resolution of 50 years, so the precipitation of the seven chosen periods in this study were directly extracted from Ren et al. (2010).

2. Comment: In Section 2.3.3, three land use types are considered: cultivated oases, natural oases, and unused land. Equation 4 provides how the P (water supply) in the first two land use types was estimated, to be used in equations 2 and 3. However, for the unused land, was precipitation the only water supply considered? If yes, please state it explicitly; if not, please explain how water supply was calculated for unused land.

Yes. Precipitation is only water considered for the unused land. We will state this in our revised manuscript.

3. Comment: Sticking with Section 2.3.3, in equation 4, the groundwater irrigation I is kept constant at 500 mm throughout the entire historical period. This assumes that the types of crops cultivated in this basin did not change over 2000 years, and does not take into account the evolution in agricultural technology. Moreover, it directly contradicts the statements made in Section 3.6, such as "In the middle of the Qing Dynasty, the Hexi corridor was politically stable and free from wars and innovative farming and engineering methods were introduced, such as better seeds, new crops, and the steel farm implements".

We fully agree with your comment. We will investigate more historical documents on irrigation development in this region to see if we could derive different data on the irrigation in different historical periods. If not, we will discuss this issue as a limitation of this manuscript in Section Discussions and Conclusions.

4. Comment: I think Section 4 of the paper needs to include a paragraph or two on the limitations/assumptions/caveats of the methods used. Historical reconstruction of annual water fluxes over such a long period will most definitely involve huge uncertainties and assumptions (one example pointed out in my point 3 above). These need to be mentioned and discussed in this section.

Thanks for this point. We agree. Several points on key limitations/ assumptions/ caveats of the methods have been raised above and we will use those, plus a careful consideration of other limitations to develop a more detailed discussion of these in 1-2 additional paragraphs in our revised manuscript.

5. Comment: What is k in Figure 6? I did not find any explanation in the article text.

Thanks for this point. k is the change rate of the factors and it was estimated by dividing the difference between the values at the start and end of the period to the years of the period. We explained it in lines 19-21 on page 12 of the Method Section, but we did not express it as k. We will go through the whole text and give a proper explanation of k where it is necessary in our revised manuscript. For the readers' convenience, we will also include the explanation of k in Figure 6.

Additional references:

Xie, Y.: Dataset of cultivated oasis distribution in the Heihe River Basin during the historical period. Heihe Plan Science Data Center, DOI: 10.3972/heihe.092.2013.db, 2013.

Xie, Y., Wang, X., Wang, G., and Yu, L.: Cultivated land distribution simulation based on grid in middle reaches of Heihe River basin in the historical periods, Advances in Earth Science, 28, 71-78, 2013.

Ren, Z., Lu, Y., and Yang, D.: Drought and flood disasters and rebuilding of precipitation sequence in Heihe River basin in the past 2000 years, Journal of Arid Land Resource and Environment, 24, 91-95, 2010.