

# ***Interactive comment on “Socio-hydrologic perspectives of the co-evolution of humans and water in the Tarim River Basin, Western China: the Taiji–Tire Model” by Y. Liu et al.***

## **Anonymous Referee #1**

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### General Comments

This paper is a well-researched paper discussing the history of socio-hydrological evolution over the past 2000 years in the Tarim River Basin, located in northwest China. It concludes using a model called Taiji-Tire intended to frame the discussion. I needed to read the paper several times in order to take in its considerable content. I would suggest some significant reorganization and stream-lining to help future readers who may not read it multiple times, in order that they have an easier time the first. Most importantly, the Taiji-Tire model as currently presented comes across as an afterthought-it is mentioned late in both the abstract and main paper. If intended as a framing model

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meant to help the reader understand the content of the paper, it should be introduced much earlier and integrated with the rest of the text. As it presented now, the model does not add value to the paper in terms of presenting its arguments more thoroughly or holistically. Also, the paper could be revised for improved flow if it adhered more strictly to the organization of 3 time periods and 4 spatial SHS types as laid out in the abstract. As a major example, much of the historical overview of Section 2 should be instead incorporated into the subsequent sections that are devoted to specific time period, rather than going back and forth through time as the paper does now. The 4 spatial SHS types are more sporadically referenced, but consistent referencing of them within the different sections for time periods would also improve flow. Finally, I believe the conclusion section should be reworked to be specific to the TRB and future research directions for this and other contexts.

### Specific comments

Abstract - p. 12754 Line 17: Awkward construction: how is an eco-hydrological system populated? Line 26: Introduce concept of Taiji-Tire Model sooner?

1. Introduction – p. 12755 Line 22: Run-on sentence, consider shortening. 1. Introduction – p. 12756 Line 7: Seems unqualified to say that “water dominates the dynamics of the eco-environmental system” without being more specific. Lines 6 & 9: Basin is referred to as “arid” and “hyper-arid” in close proximity. Choose one? Line 13: Confused, what is “star-studded pattern of oases”? Line 22: Can you please be more specific with “advancement of social productive forces”? What are the “social productive forces”? This language comes up several times throughout paper. 1. Introduction – p. 12757 Line 11: After reading the full paper, I don’t follow how the general framework proposed stems from the specific observations of this paper, as indicated by “On the basis of these observations. . .” Line 14: “Perspectives on possible future research” are not ultimately discussed.

2. Study Area – p. 12759 Line 20: Instead of “picking”, use “gathering”? Also occurs

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later in paper. Line 9: This paragraph and the following on the next page set-up the major structural features of the paper, their topics are referenced in the abstract, yet they are buried here. This content should come sooner.

3. Natural stage – p. 12761 Section 3.1 Why is this section titled “the mathematics of development? Line 10: Why is “LI” in all-caps? Line 25: Why is “ZHANG” in all-caps? Also occurs later in paper. Section 3.2 – p. 12763 Line 24: awkward phrasing “mixed area”, instead something like “more diverse”? Section 3.3 – p.12766

Section 4.1 – p. 12769 Line 10: Who introduced innovative farming and engineering methods, was this part of tax reforms just mentioned? Line 29: Confused how this period (late 19th to mid-20th century) belongs in this section (titled “expansion of traditional agriculture. . .”) because it says here that “expansion of farmland ceased and some farmland retrogressed back to natural landscapes of grassland”. But later on next page we get into floating population, a reclamation campaign and expansion of farmland. The segue to floating population and nature of reclamation campaign (what was reclaimed, by whom, and why did this influence farmland) need to be clarified. Section 4.1-p. 12770 Line 12: “A remarkable feature of the SHS. . . enlarged” . This paragraph awkward as written. Main point seems to be buried in last sentence – that the formerly isolated SHS’s merged.

5. Degradation. . . - p. 12773 Line 14: Specify what “special human intervention” means

6. Taiji-Tire - p. 12774 See general comments. This section is very general as written. It should come sooner, be written more concisely, and frame the remainder of the discussion. Specific references to components of the model should be embedded in the other sections.

7. Summary – p. 12777 Line 10: “Accordingly” misplaced. If the classification of SHS’s follows the model, then the model needs to come first in the text. Section 7.4 – p. 12779 The title of this section explicitly references the TRB, but its content is mainly about other places. Where are future directions discussed?

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Figure 2: Please label inset maps clearly. Lower left is the Xinjiang province? Need to say so. Need basin boundaries on right panel. Figure 6. Y-axis mis-spelled. Should read “Population (x 10,000)” Figure 8. Include only left-most content (a). Side (b) and the symbol in the middle are unnecessary. Also (a) and (b) are not labeled in the caption. If you leave the content as is this should be addressed.

Technical corrections

Abstract Line 8: word missing between “then” and “punctuated”? Line 20: Word missing or mis-specified: “of traditional development pattern”- need either “the traditional” or “patterns”

3. Natural stage Section 3.2 Line 12: change “week” to “weak”

7. Summary – p. 12777 Line 4: “Coevolution” or “co-evolution” as in title?

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