

## ***Interactive comment on “Comparative analysis of trade-offs and synergies in ecosystem services between Guanzhong Basin and Hanzhong Basin in China” by Bo-Yan Li et al.***

### **Anonymous Referee #3**

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Li and others study synergies and trade-offs amongst ecosystem services in two different watersheds in China. The justification of the choice of the two watersheds should be improved in the Introduction do describe how studying contrasting basins can benefit the theory and practice of ecosystem service science. The Discussion is a huge missed opportunity and doesn't describe the major findings and how they may apply to ecosystem service science and practice. It needs to be entirely re-written. English usage is largely good but the text can be more efficient and powerful. For example, in the abstract, “An important feature of the relationships among ecosystem services (ES) is they have temporal and spatial patterns” could be “Ecosystem services (ES) and relationships among them have temporal and spatial patterns that need to be un-

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derstood.” The paper makes many good points, but needs considerable revision before it is acceptable. Minor comments follow.

P 1 L 15: A ‘good ecological environment’ could mean different things to different people.

The sentence beginning P 1 L 13 is 6 lines long. And why choose these approaches? Also, there are far more than 4 types of ecosystem services. See Costanza 1997 for a primer.

P 1 line 30 is far too wordy.

P 2 L 1 what are ‘life materials’?

P 2 L 3 start a new sentence.

P 2 L 6 what is a ‘banned slope’?

Odd transition on P 2 L 12: no relationship between ES, which is how the previous sentence ends, need not be a dynamic change that threatens the world.

P 2 L 17 don't specify in a journal that a certain paper is published in Nature.

At the end of the Introduction, the justification for using the two study basins is poorly developed.

P 3 L 10: have not been given sufficient what? The arguments need to be presented more logically. The Introduction is mostly centered around what other studies haven't done to date rather than why the study of these two basins may be interesting and useful other than to state one has a ‘good ecological environment’, whatever that means.

‘approximately 39064.5 square kilometres’ is extremely specific! A number with six significant digits isn't approximate.

Figure 1 doesn't make sense. ES1...n is unnecessary, datasets can be died more clearly to the models, and the flow should be adjusted from top to bottom (or left to

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right) highlighting the work flow.

Many readers are unlikely to know what "Chiangnan" refers to and why this is important. The fact that the basins are "famous" is immaterial. Many fonts in figure 2 are too small to be readable.

2.2: were there differences between Landsat 5, 7, and 8? Did the change from one to another induce artificial temporal patterns amongst variables? How were the decision trees implemented? I see later that it was eCognition. Describe this above when decision trees are first mentioned.

"A spatial resolution of 30 meters met the requirements of regional scale" doesn't make sense and at any rate would not be a statement for the methods section. Show the reader why, don't tell them.

Why are June and September the focus?

How did Google Earth provide verification and on what basis is it precise? Why not just use Google Earth if it's precise and verified?

It appears that the June and September deliniations perhaps have something to do with water bodies?

P 6 L 14: a few ecosystem models that interact with remote sensing (CLM if I'm not mistaken) include plant water capacity.

In Table 1, please use the multiplication sign instead of dots for the equation for SC.

P 6, "Carnegie", "Ames", and "Stanford" are all proper nouns and should be capitalized.

'The paper use' on page 7 L 5 is one of many examples of English usage that could benefit from improvement.

Table 2 and elsewhere: are the quantities (e.g. "FP") unitless? From the equations it appears that they should have units although it is correct that the corresponding

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correlation coefficients wouldn't. A comparison amongst the basins of the quantities in Table 2 would be informative.

Avoid superlatives like 'powerful numerical calculation function' on page 10. Parts of section 3.3 is largely Methods and not Results as written.

Re-think this passage: The relationships among ES were complex (Wang et al., 2017) and were mainly for trade-offs, synergies and no relationships. It just means that relationships in all directions (positive, negative, and no relationship) was found.

'seriously damaged because of forests damages' needs to be re-worded.

The Discussion is mainly a discussion of limitations in the manuscript. Keep the important points about limitations, but also discuss what you found and what it means. In the conclusion for example this pops out, "We also found that the synergies between ES rarely occurred in woodlands, a result that is inconsistent with the results of previous studies." What other studies? The Discussion section is a huge missed opportunity to discuss what the study means in context and how it may improve theory and management of ecosystem services in these regions.

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