

Dear Reviewer #1,

Thank you very much for the constructive comments and suggestions. Please find below our point-by-point responses to all of the comments. We have added detailed discussions and corrected the language errors as you suggested. The page and line numbers in the following responses refer to the revised manuscript “Manuscript without annotation.”. We appreciate the time that you spent reviewing the manuscript.

Best regards,

Wenwu Zhao

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Point-by-point responses:

1. It is better to polish the language further.
Response: The language has been carefully checked.
2. Line 30-31, Please delete the detail soil properties in bracket “(e.g., soil texture, permeability and structural stability)”.
Response: The detailed soil properties in parentheses have been deleted. Please see line 30.
3. Line 34 Change “research” to “researches”
Response: The word “research” has been changed to “researches”. Please see line 33.
4. Line 40 Abbreviations should be added in the following of “the nomogram model and the modified nomogram model”
Response: Acronyms have been added following “the nomogram model and the modified nomogram model”. The sentence has been revised to “Some of the most common estimation models are the nomogram model (NOMO) and the modified nomogram model (M-NOMO), which were established by Wischmeier”. Please see lines 39-40.
5. Line 86-87 references about the classification of soil particles should be added.
Response: We have cited Wang et al. 2012 (Wang, D. C., Zhang, G. L., Pan, X. Z., Zhao, Y. G., Zhao, M. S., Wang, G. F.: Mapping soil texture of a plain area using fuzzy-c-means clustering method based on land surface diurnal temperature difference, *Pedosphere*, 22, 394-403, 2012) accordingly. Please see line 86 and lines 342-344.

6. Line 91-92 what is the meaning of “Soil erodibility thus has indirect relationship with the environmental factors.” ? Please rewrite it.

Response: The intended meaning of this sentence is that although environmental factors may not have direct influences on soil erodibility, they can affect soil erodibility by affecting soil particle size distribution and soil organic matter content. The text has been rewritten for clarity as follows: “Although soil erodibility does not directly depend on environmental factors, soil properties such as soil particle size distribution and soil organic matter can be affected by environmental factors; thus, environmental factors have indirect relationships with soil erodibility”. Please see lines 89-91.

7. Line 106 “rainfall erosion” or “rainfall erosivity”?

Response: The text “rainfall erosion” has been changed to “rainfall erosivity”. Please see line 105.

8. Line 154 Please change “P value >0.05” into “P > 0.05”.

Response: The text “P value >0.05” has been changed to “P > 0.05”. Please see line 152.

9. Part 3.2 Significant negative or positive correlations are in $P < 0.05$ or $P < 0.01$? Need be labelled in the following.

Response: The significance of each correlation ($P < 0.05$) has been added in section 3.2. Please see lines 179, 181, 183, 186, 190, 192, 193 and 195.

10. Line 202-203 One PC each for apple orchards, native grasslands, sea buckthorn, Caragana korshinskii and pasture grasslands. Why there is only 4 data of percentage in the following sentence. Please check it.

Response: Pasture grasslands had no variables with high factor loadings because it had no significant environmental variables except soil particle size and soil organic matter. Therefore, there are only 4 data of percentage listed. This information has been added to the revised manuscript. Please see lines 201-202.

11. Line 264 Soil erodibility has significant correlations with elevation? Please check it. If so, explain why.

Response: Soil erodibility showed significant correlations with elevation in this study. According to previous studies, elevation in certain areas might have relationships with factors such as soil and vegetation type; both had significant correlations with soil erodibility in this study. We have added the following to the manuscript accordingly: “Terrain factors have close relationships with soil properties. With changes of elevation and slope, the physical and chemical properties of soil (e.g., soil permeability, soil bulk density, and soil nutrients) and soil surface conditions (e.g., roughness, litter layer) change, leading to changes in soil particle size composition and soil erodibility...” Please see lines 258-261.

12. Line 267 What “soil surface conditions” refer to? Please give some examples.

Response: Soil surface conditions are the result of many factors such as surface roughness and vegetation coverage. We have added “soil surface conditions (e.g., roughness, litter layer)” to the manuscript. Please see lines 260.

13. Line 277-278 What is the meaning of “Because all these vegetation types are more or less affected by human activities, soil erodibility can also indirectly be affected by vegetation recovery and land cover change.”? Please rewrite it to make it easy to be understand.

Response: We apologize for the unclear writing; we have revised the text for clarity. The sentences state that human activities affect vegetation recovery and land cover change and that changes in vegetation type may influence soil erodibility. The revised text is as follows: “Human activities (e.g., pruning) affect vegetation recovery and land cover change. These changes may then influence vegetation properties and thereby impact soil erodibility.” Please see lines 271-272.

Other changes:

We have revised the manuscript carefully and made some additional changes (especially regarding English language issues) in the manuscript. These changes do not influence the content or framework of the paper. All the changes to the manuscript are marked by the track changes feature of Word.

Dear Reviewer #2,

We thank you for the constructive comments and suggestions. Please find below our point-by-point responses to all of the comments. We have ensured that all abbreviation, tables and figures are accurately referenced in the manuscript, and we have corrected the language errors as you suggested. The page and line numbers in the following responses refer to the revised manuscript “Manuscript without annotation”. We appreciate the time that you spent reviewing the manuscript.

Best regards,

Wenwu Zhao

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Point-by-point responses:

1. Abstract. Hardly any quantitative result is found in the abstract.

Reply: We thank you for the comment. We have added the following quantitative results to the abstract: “(1) K values in the Ansai watershed ranged between 0.009 and 0.092 $t \cdot hm^2 \cdot hr / (MJ \cdot mm \cdot hm^2)$, and the maximum values were 1.872-7.333 times larger than the corresponding minimum values, and the Shirazi and Torri models were considered the optimal models for the Ansai watershed. (2) Different land use types had different levels of importance; PC one accounted for 100% (native grassland), 48.88% (sea buckthorn), 62.05% (*Caragana korshinskii*) and 53.61% (pasture grassland) of the variance in soil erodibility.” Please see lines 14-19.

2. Results. Sections 3.2 and 3.3: where is Tables S1–S5? I try to find the relationships of the text with Tables 1-4, but I am failed. I am sure some tables have been lost in the manuscript.

Reply: We apologize for the oversight. Tables S1–S5 and the new Table S6 have been submitted as Supporting Information. In addition, we have referenced these tables clearly in the manuscript as you suggested. Please see the file named Supporting Information.

3. Lines220-222, Page 11: Table 3 in page 22 presents the Principal component analysis (PCA) of environmental attributes, instead of the MDS of the soil erodibility.

Reply: We apologize for the oversight. We have corrected the information in Table S1-S3 in the Supporting Information. We also have checked all of the references to tables and figures in the manuscript. Please see the file named Supporting Information.

4. Some of the tables have been published in a Chinese journal. For example, Figure 2 in the manuscript is similar to Figure 3 in Reference (Zhao et al., 2017). I have uploaded the published paper together with the comments.

Reply: The reference you mention (Zhao et al., 2017) is “Wei, H., Zhao, W. W., Wang, J.: The optimal estimation method for K value of soil erodibility: A case study in Ansai Watershed, Science of Soil and Water Conservation, 15, 52-62, 2017b. (in Chinese with English abstract)”. We acknowledge that this paper and our manuscript use the same data on soil erodibility. However, the topics and analyses fully differ between these two papers. We have removed Fig. 2 from the current manuscript and have cited the previous paper when mentioning these data. The relevant sentence has been revised to “To clarify the form of the distribution, we collected the frequency distribution figures of soil erodibility for each model (Wei et al., 2017a, b).” Please see lines 150-151.

5. Too many abbreviations have been found in the manuscript. I think you may make a list for the abbreviations as an accessory of the paper. Moreover, some of the abbreviations are not needed, e.g., the words skewness and kurtosis in Table 2.

Reply: A list of abbreviations has been added, and unnecessary abbreviations have been removed from the manuscript. The abbreviations in the list are presented in alphabetical order. Please see List 1 in the file named Supporting Information.

6. Errors exist in the annotations. Some of the annotations followed with the tables are duplicated, e.g., the annotations in Tables 1 and 3. I suggest the parameters in the may be emerge according to their order in the table. I am sorry I could not find SP and SS in Table 1, although the terms have been explained in the annotation.

Reply: We apologize for the oversight. SP and SS have been deleted from the annotation of Table 1. All of the annotations have been reviewed and corrected according to their order in the table to ensure that all of the abbreviations and labels are addressed in the annotations. Please see lines 398-417.

7. English writing of the manuscript is readable. Nevertheless, many language errors exist. I strongly suggest you ask a soil scientist whose native language is English to polish the whole manuscript.

Reply: We thank you for the suggestion, and we have checked the manuscript carefully and corrected the errors.

Other changes:

We have revised the manuscript carefully and made some additional changes (especially regarding English language issues) in the manuscript. These changes do not influence the content or framework of the paper. All the changes to the manuscript are marked by the track changes feature in Word.