

Interactive comment on “Determination of the Optimal Lake-Marsh Pattern in the Lake-Marsh Wetland System based on Ecological Land Use and Ecological Water Use” by Wuxia Bi et al.

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The authors thank Reviewer 1 for taking the time to review our manuscript, and provide useful feedback. Our responses to each review comment are given **in bold** below.

The paper presents an assessment of the combined use of water by a marsh and lake system in China. The authors estimate the best combination of marsh and lake system water use in order to maximise ecological outcomes given a number of restrictions due to the lake operation. While the subject is of potential interest to the readers of HESS, the methods and analysis presented are extremely basic and with

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very little innovative content. More detailed comments follow.

Response: Thank you for your comments. The methods and analysis seem to be basic, however, our main innovation focuses on the concept and problem-solving approaches. In the context of land use and water resources competitions, how to ensure the minimum water shortage and the maximum ecological services values, is the dilemma we want to solve. It is also a problem that may be encountered in the current ecological protection process. We will improve our manuscript based on your suggestions. Hope to meet with approval.

Introduction: the introduction is too long for its content, due to excessive repetition of ideas. There is also insufficient references to optimization methods applied to water resources, which is an important aspect of the manuscript objectives.

Response: Thank you for your suggestion. We agree with the introduction is long as we may emphasize too much on the concept. We will refine the introduction in the revised manuscript. We will follow your suggestion to add relevant references about optimization methods applied to water resources.

Methods: The equations presented in the methods are extremely simple and consist essentially of basic water mass balances. These mass balance equations are combined with ecological service evaluation equations (Table 2) taken from the literature in order to maximise ecosystem services and minimize water shortage. The optimization procedure is not described anywhere, only pointing out to the use of the GAMS software package. No description of optimization method used and criteria for selection.

Response: Thank you for your comments. The calculation and optimization procedure in details can be concluded as: First, we calculated the ecological services values and water shortage amount with different area ratio of lake and marsh in a specific water level. The area ratio changed from 0.999:0.001 to 0.001:0.999, with a step of 0.001. The range of water level is from 87.3 m to

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87.8 m, the calculation step is 0.01 m. Then, under each specific water level condition, we chose the optimal area ratio. The unit ecological services values of marsh is much more greater than lake, also the water shortage amount increases much with increased marsh area. To ensure the total water demand of the system, the optimal lake-marsh pattern considers minimum water shortage amount in priority. Finally, we compared the ecological services values and water shortage amount in all water level conditions, considering the minimum marsh area for wildlife habitat, then chose the optimal pattern. The details will be added in the revised manuscript.

Results: There is very critical analysis of the results, the results section is essentially an enumeration of the model outputs on an annual and monthly basis. There is not much analysis of what would happen if some of the restrictions are relaxed, for example.

Response: Thank you for your advice. We will follow your advice to analyze what would happen and propose some allocation plans if some of the restrictions are relaxed.

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