

Replies to the comments and suggestions

Dear editor and Anonymous Referee #2:

Thank you for your letter and for the reviewers' comments concerning our manuscript entitled "Recognition of spatial framework for water quality and its relation with land use/cover types from a new perspective: A case study of Jinghe Oasis in Xinjiang, China". Those comments are all valuable and very helpful for revising and improving our paper, as well as important guiding sense to our researches. The authors have studied comments carefully and have made correction which we hope meet with approval. Revised portions are marked in red in the paper and authors have tried our best to revise the manuscript based on their suggestions. The point-by-point responses to each of the comments are presented as follows.

Anonymous Referee #2

This manuscript conducted a very detailed work on investigating the water quality and its relation with land use/cover types. While the data and samples have been processed carefully and rigorously, the results look reasonable and trustful. However, I have several major concerns regarding to this work.

Reply: Thank you for your positive evaluation and encouragement. We have carefully revised the paper according to your comments and suggestions. The responses to the specific comments are presented below

Q: There are two key words in the title that I cannot find strong evidence from the context to support, the "spatial" and "a new perspective". I cannot see how the authors make their findings 'spatial', since there is nothing that has been shown as a map, except for the study area (Figure 1) and land cover (Figure 6). From the Introduction, I also cannot see why the authors labeled their work as "a new perspective"? It is new because of what? This should be made clear in the Introduction.

Reply: Thanks to Reviewers for their suggestions in improving the manuscript, based on reviewer 1, the title is revised; 'spatial' is changed "spatial pattern". "a new perspective" is deleted by authors.

The title has changed into "Recognizing spatial patterns in water quality and their relation with land use/cover types: A case study of the Jinghe Oasis in Xinjiang, China"

Q: I am also unclear about the role that remote sensing data played in this study. What was it for, only for revealing the land use/cover types of each sample? How was it used? It was said there was a 1km buffer zone established for each sample. Then how? And why 1km? Besides, in line 246, there is the accuracy of land use/cover classification. I am wondering how these accuracy numbers were derived? Using what as reference

(ground truth)?

Reply: In order to extract the area of land use/cover types, therefore, remote sensing data is selected in this study.

1km buffer zone established for each sample in this study, based on most research (Wang et al., 2016; wang et al., 2017) and regional natural situation, Wang et al., (2016) reports a correlation between croplands areas and water quality in rivers, but this correlation isn't significant in 500 m. Wang et al., (2017) reports a significant correlation between land use and cover areas and water quality in kilometer scale in rivers. Because the study area is located in the arid areas of Xinjiang, desert dust and salt dust are major environmental hazards in this study area. Desert dust and salt dust seriously affect the atmosphere and water quality and accelerate the degradation of vegetation and threaten ecological security in the oasis. However, with economic development of and population growth, human improvement of desert land and saline land increases the area of croplands (Yu et al., 2017), and small changed in landscape. Therefore, 1km buffer zone established for each sample in this study.

The accuracy of land use/cover classification is required by confusion matrix, historical data, high-resolution Google Earth images, and field survey data, selected to verify that more than 100 pixels of each land cover type were used for the training data, and the confusion matrix to verify the classification results. From the classification results obtained in May and October 2015 (Figure 6), precision has increased to 89.9750% and 86.2848%, and the kappa coefficients are 0.8681 and 0.8184, respectively by confusion matrix (Table 2). Please see the article on page 6-7, lines to246-250 in revised manuscript with obviously marked as follows:

In this study, historical data, high-resolution Google Earth images, and field survey data were selected to verify that more than 100 pixels of each land cover types were used for the training data, and the confusion matrix was used to verify the classification results. For the classification results obtained in May and October 2015 (Figure 6), precision increased to 89.9750% and 86.2848%, respectively, and the kappa coefficients were 0.8681 and 0.8184, respectively, based on the confusion matrix (Table 2),

Table 2 The calculation of a confusion matrix by a maximum likelihood supervised classification

LULC	Water body	Saline land	Farmland	Forest grassland	Other land	Total	User's accuracy (%)
Water body	144	0	0	0	0	144	100
Saline land	0	77	0	0	16	93	82.79
Farmland	0	36	101	0	0	137	73.72
Forest-Grass land	0	36	0	101	0	137	73.72
Other land types	1	0	0	0	87	88	98.96
Total	145	149	101	101	103	Overall=89.9750%	
Producer's accuracy (%)	99.31	51.67	100	100	84.46	Kappa=0.8681	

	Water body	144	0	0	0	0	144	100
	Saline land	0	57	0	0	26	83	86.67
	Farmland	0	16	101	0	0	117	86.32
October	Forest-Grass land	4	16	0	101	0	117	86.32
	Other land types	0	0	0	0	77	77	100
	Total	148	89	101	101	103	Overall=86.2848%	
	Producer's accuracy (%)	97.29	64	100	100	74.75	Kappa=0.8184	

Reference

Wang XP, Zhang F, Li XH, Cao C, Guo M. 2017. Correlation analysis between the spatial characteristics of land use/cover-landscape pattern and surface-water quality in the Ebinur Lake area. *Acta Ecologica sinica*, 2017, 37(22):7438~7452

Wang J, Zhang F, Zhang Y, Ren Y, Yu HY, 2016. Correlation between the spatial water quality and land use/cover in the Ebinur Lake area *Acta Ecologica sinica*, 2016,36(24):7971~7980.

Yu, H., Zhang, F., Kung, H. T., Johnson, V. C., Bane, C. S., & Wang, J., et al. 2017. Analysis of land cover and landscape change patterns in ebinur lake wetland national nature reserve, china from 1972 to 2013. *Wetlands Ecology & Management*(3), 1-19.

Q: The grammar and usage have pervasive problems. It needs to be comprehensively edited by someone with strong English language skills before publication. There are some words, such as 'framework' in the title, and 'layers' in line 19, that are very confused to me. I have no idea what they are referring to.

Reply: Thanks to Reviewers for their suggestions in improving the manuscript, based on reviewer 1, the title is revised, 'spatial framework' is changed "'spatial pattern'". But then Professor **Hsiang-te Kung (University of Memphis)** has helped us improve the grammar and edit the manuscript carefully. Please see the revised version of the paper.

Q: Line 132, Davies-Bouldin index just comes out suddenly. What is this? What is the reference for it? What do you mean by "Through the K-means :"? These content needs to be rewritten.

Reply: The Davies-Bouldin clustering index was used to determine the optimal number of the clusters for a dataset. The sections of about Davies-Bouldin clustering index is rewritten by authors. Please see the article on page 4, lines to 129-133 in revised manuscript with obviously marked. As follows:

The Davies-Bouldin clustering index was used to determine the optimal number of clusters for the dataset (An et al., 2016; Park et al., 2014). The lower the Davies–Bouldin index value is, the better the clusters are

differentiated. The K-means cluster analysis was combined with the Davies–Bouldin index (DBI) to select the clustering number. (Zhou et al., 2016).

Reference

An, Y., Zou, Z., & Li, R. 2016. Descriptive characteristics of surface water quality in hong kong by a self-organising map. *International Journal of Environmental Research & Public Health*, 13(1):115.

Park, Y. S., Kwon, Y. S., Hwang, S. J., & Park, S. 2014. Characterizing effects of landscape and morphometric factors on water quality of reservoirs using a self-organizing map. *Environmental Modelling & Software*, 55(5):214-221.

Q: What is the DCA gradient axis in line 163? Why do you say “Therefore, the redundancy analysis (RDA) method was applied to”. I cannot see connections between the sentences before the word ‘Therefore’ and those after it.

Reply: The section is revised by authors. Please see the article on page 4, lines to 161-165 in revised manuscript with obviously marked. As follows:

The results showed that the DCA gradient shaft length was less than 3. Based on the results of Wang et al (2017), when the DCA gradient shaft length is less than 3, the redundancy analysis (RDA) method can explore the relationship; therefore, the redundancy analysis (RDA) method was applied to determine the influence trend of land use/cover changes on the water quality within the Ebinur Lake buffer area.

Reference

Wang XP, Zhang F, Li XH, Cao C, Guo M. 2017. Correlation analysis between the spatial characteristics of land use/cover-landscape pattern and surface-water quality in the Ebinur Lake area. *Acta Ecologica sinica* 2017,37(22):7438~7452

Q: Sentence in line184-185 needs to be rewritten.

Reply: Thanks to Reviewers for their suggestions in improving the manuscript, the sentence is rewritten, Please see the article on page 5, lines to 183-184 in revised manuscript with obviously marked. As follows:

Six clusters were formed according to the DBI, where minimal value is at six clusters as Figure 3a.

In addition, authors have revised the figures and tables as well as words expression in the entire manuscript, please see the text.

Authors tried our best to improve the manuscript and made some changes in the manuscript. Authors appreciate for Editors/Reviewers’ warm work earnestly, and hope that the correction will meet with approval. Once again, thank you very much for your comments and suggestions.

All in all, if you have any questions about our paper, please contact with me as follow address:

E-mail:zhangfei3s@163.com

Thanks very much.

Best wishes and warmly regards for you.

Sincerely yours Fei ZHANG

11th, Jan., 2017