



Spatial-temporal variation assessment of the water quality in the Baiyangdian Lake of North China for the period of 2006 to 2016

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Baiyangdian Lake is the largest freshwater lake in the North China Plain. In order to examine the driving mechanisms of changes on the lake's water quality, an improved Water Quality Index (WQI) method and multivariate statistical techniques were applied to analyze water quality in this study. Water quality data from six monitoring stations for the period of 2006 to 2016 were used. The calculation of the annual WQI indicated an improvement in lake's water quality over the past decade. Cluster analysis classified 12 months and the six monitoring stations into two clusters (dry-wet period and western-eastern part), respectively. Discriminant analysis provided fewer effective variable with only two parameters and six parameters to afford 96.0% and 93.8% correct assignments in the temporal and spatial clusters. Principal component analysis and factor analysis detected similar varifactors in the two temporal clusters, interpreting more variance related human activities in the water quality variation than the ones representing natural factors. The different varifactors related to pollution source were evaluated in the two spatial clusters. The result indicated water quality in the two regions are influenced by different types of anthropogenic activities. Our findings provide valuable information for decision-making related to pollution control, ecosystem restoration, and water resource management in Baiyangdian Lake, as well as other large, shallow lakes in high-intensity human activities regions.