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Assessment of irrigation water quality of Turkey using multivariate statistical techniques and water quality index: Sıddıklı Dam Lake

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ABSTRACT

This study was done in order to evaluate the status of the water quality of Sıddıklı Dam Lake as well as its suitability for irrigated agriculture. Sıddıklı Dam Lake is one of the major irrigation dam lakes flowing into Hirfanli Dam Lake. Throughout the first report on this study, surface water samples were taken monitoring 25 physicochemical variables at 4 different sites at every month between September 2015 and August 2016. In the present study, multivariate statistical techniques (hierarchical cluster analysis (HCA), principal component analysis (PCA)), the Pearson correlation, the Surface Water Quality Index, and Carlson's Trophic State Index were applied to the physicochemical variables on the water quality of the dam lake. Thus, we aim to determine the main pollution factors as well as the same time risky polluted areas. Sıddıklı Dam Lake was found eutrophic with a mean TSI value of 57. Moreover, the surface water quality index value was 67, inferring that it is of "medium quality". According to the results of HCA, four surface water sampling zones were grouped into two clusters. Upon looking at the PCA results, on can estimate that the lake dame pollution is mainly from agricultural run-off and soil erosion. Additionally, the water of Sıdıklı Dam Lake is not suitable for drinking, however it is fit for other purposes such as aquaculture, livestock drinking, and agricultural activities. Consequently, Sıddıklı Dam Lake has a satisfying level of water quality according to the overall quality variable permissible limits, however it has been strongly affected by agricultural use.

Keywords: Water quality; Multivariate statistical techniques; Water quality index (WQI); Carlson trophic state index (TSI)

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