Environmental Engineering and Management Journal

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SPATIOTEMPORAL ANALYSIS AND COMPREHENSIVE EVALUATION OF WATER QUALITY IN SHENGZHONG RESERVOIR, CHINA

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Abstract

Based on monthly water quality data from four provincial monitoring sections in Shengzhong Reservoir (2018-2020), seven indicators were analyzed using multivariate statistics to assess spatio-temporal characteristics, and the Nemerow pollution index was applied for a comprehensive water quality evaluation. Additionally, longer-term data (2018-2022) from the Lijiaba section at the reservoir's center were examined for interannual trends. The results show that COD_{cr}, TP and I_{mn} were the main pollution parameters of Shengzhong Reservoir. The reservoir's NPI values ranged from 0.504 to 0.633, indicating excellent water quality that fluctuated between Class I and II standards, with no significant spatio-temporal difference. However, pollutant concentrations exhibited distinct seasonal trends, occasionally reaching Class III standard in certain months. The concentrations of TP, Chl-a, DO and I_{mn} were greater in spring and summer than in autumn and winter; the concentrations of BOD_5 and ammonia nitrogen were greater in autumn and winter than in spring and summer; and the concentrations of COD_{cr} were greater in spring and autumn than in summer and winter. Spatially, the water quality at Guoyuanchang (S4) was superior to other sections, while Tielusi (S1) was the most polluted. This research provides a scientific basis for the precise management and protection of water quality in Shengzhong Reservoir, highlighting the necessity of focusing on eutrophication and organic pollution control in future conservation strategies.

Keywords: multivariate statistical method, nemerow pollution index, spatio-temporal distribution, water quality assessment

Received: March, 2025; Revised final: November, 2025; Accepted: February, 2026

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