

## Impacts of Hydrologic and Topographic Changes on Water Regime Evolution of Poyang Lake, China

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**Abstract :** Poyang Lake, the largest freshwater lake in China, is located at the middle-lower reaches of the Yangtze River basin. It has great value in socioeconomic development and is internationally recognized as an important lacustrine and wetland ecosystem with abundant biodiversity. Impacted by ongoing climate change and anthropogenic activities, especially the regulation of the Three Gorges Reservoir since 2003, Poyang Lake has experienced significant water regime evolution, resulting in challenges for the management of water resources and the environment. Quantifying the contribution of hydrologic and topographic changes to water regime alteration is necessary for policymakers to design effective adaption strategies. Long term hydrologic data were collected and the back-propagation neural networks were constructed to simulate the lake water level. The impacts of hydrologic and topographic changes were differentiated through scenario analysis that considered pre-impact and post-impact hydrologic and topographic scenarios. The lake water regime was characterized by hydrologic indicators that describe monthly water level fluctuations, hydrologic features during flood and drought seasons, and frequency and rate of hydrologic variations. The results revealed different contributions of hydrologic and topographic changes to different features of the lake water regime. Noticeable changes were that the water level declined dramatically during the period of reservoir impoundment, and the drought was enhanced during the dry season. The hydrologic and topographic changes exerted a synergistic effect or antagonistic effect on different lake water regime features. The findings provide scientific reference for lacustrine and wetland ecological protection associated with water regime alterations.

**Keywords :** back-propagation neural network, scenario analysis, water regime, Poyang Lake

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