Post-processing of reservoir releases to support real-time reservoir operation and its effects on downstream hydrological alterations

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Lakes supply human, animals and plant with the valuable freshwater resources. They are of great value and importance to terrestrial and aquatic ecosystems and the environment. The aquatic plants play an important role in lake ecosystem. As the primary producers of lake ecosystem, lake aquatic plants not only provide necessary food and habitat for aquatic animals, but also promote the material circulation and energy flow of lake ecosystem. Studying the diversity and statistical model of aquatic plants is of great significance for lake ecological protection. This study takes the Baiyangdian Lake as a study case and the plant community data are obtained from pollen analysis. We adopted four aquatic plant diversity indicators, including Margalef index, Simpson index, Shannon-Wiener index and Pielou’s evenness index, to analyze their historical trends from 1951 to 2010 in the Baiyangdian Lake. These indicators are employed to describe the richness, dominance, complexity and evenness of aquatic plant diversity, accordingly. Subsequently, the uncertainty statistical model and Kolmogorov-Smirnov test method are adopted to quantify the uncertainty and study the statistical models of these four aquatic plant diversity indicators. The results showed that the Margalef index, Simpson index, and Shannon-Wiener index of aquatic plant diversity have a Weibull distribution, while Pielou’s evenness index has a Gamma distribution.