Geophysical Research Abstracts
Vol. 20, EGU2018-10110, 2018
EGU General Assembly 2018

Predicting lake eutrophication responses to multiple-scenarios of lake restoration: A three-dimensional modeling approach

Yanping Wang (1,2,3), Weiping Hu (1), Zhaoliang Peng (1), Karsten Rinke (4), Ye Zeng (1,2,3)

(1) Nanjing Institute of Geography and Limnology, University of Chinese Academy of Sciences, Nanjing, China, (2) University of Chinese Academy of Sciences, Beijing, China, (3) State Key Laboratory of Lake Science and Environment, University of Chinese Academy of Sciences, Nanjing, China, (4) Helmholtz Center for Environmental Research, UFZ, Magdeburg, Germany

To improve water quality and alleviate eutrophication in Lake Yangchenghu, the third largest freshwater in the Lake Taihu basin of China and an important source of drinking water, numerous actions have been taken by the government entities of Suzhou City since mid-1990s. However, decision makers have controversy about nutrient reduction strategies to address eutrophication control in this lake due to the lack of sufficient observation data and simulation results. A three-dimensional numerical model, EcoTaihu model, was used to study the impacts of three restoration measures (total nutrient loads reduction, water transfer and spatial adjustment of inflow channels) on water quality (total nitrogen-TN, total phosphorus-TP and biomass of phytoplankton-BP) of Lake Yangchenghu. In particular, the effects of flow characteristics of the tributaries on water quality were investigated in distinct drinking water sources areas. Model results showed three key results. First, the improvement of water quality in the total average lake was positive proportionate to the percentage of total nutrient loads reduction without effects delay. Second, the effect of water inflow on the improvement of water quality parameters was strongly influenced by the concentration difference between the inflow water and lake water. Effects from different inflow discharge were less influential. The most cost-effective flow rate for water discharge was predicted to be approximately 40 m3 s-1 in autumn-winter since no proportionate increase of improvement effect in the cases of larger inflow rates (60 m3 s-1) and longer duration time. Third, the spatial narrowing of inflowing rivers in southwestern lake could preferentially enlarge the dilution of nutrients, and improve the water quality of drinking water source significantly. But, it will also result in a slightly elevated BP in this area in the first three months after implementation. Overall, our study highlighted an effective measure for TN and TP improvement in distinct drinking water sources areas, and revealed the key to the implementation of various external measures in a specific shallow lake.