**Optimal regulation of river ecology based on coupling simulation of water quantity and water quality**

Wenqi Wang, Siru wang, Jinhua Sun

*Department of Hydrology and Water Resources, Nanjing Hydraulic Research Institute*

*Nanjing, China*

Jiaxi Luo, Shiwen Zhao

*Nanjing R&D Tech Group Co., Ltd.*

*Nanjing, China*

yi lu, jicheng hu

Water Conservancy Bureau

Suqian, China

As one of the main rivers in Suqian city, Jiangsu Province, the old Yellow River is responsible for regional drainage, water supply and ecological services. Taking the old Yellow River as the water supply channel, it is necessary to optimize the supply of regional industrial, agricultural and ecological water, and realize the economical and intensive utilization of water resources and the optimal regulation of river ecology. According to the water replenishment and supply of the 11-step water storage projects in the old Yellow River, comprehensively considering the supply relationship of Luoma Lake, Zhongyun River and Hongze Lake to the old Yellow River channel, the optimal operation scheme of the old Yellow River channel under the background of multi-source water replenishment and multi-objective water supply is proposed through the establishment of a water quantity-quality coupling model. Based on the calculation results of water demand and pollution load, the numerical simulation and scenario comparison of various water resource allocation schemes are carried out by comprehensively considering the water quantity and quality objectives, economic cost and technical difficulty. The research results show that on the basis of "high water and high use, low water and low use", a small amount of ecological water replenishment (42-52 million m3) is added every month. The cost is moderate, the technical difficulty is low, and the water quality improvement effect is good. The comprehensive improvement rate of water quality is 22% and 9% in the current situation and planning level year, and the overall compliance rate of water quality can reach 82% and 93%. The cost of water transfer is 16% and 24% lower than that of a single water source ("high water"). The above can provide new ideas for the optimal regulation of river ecology under the goal of water quantity and quality guarantee.