Identifying the major pollution sources and pollution loading status of Qiputang River in Taihu Lake basin of China

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ABSTRACT

A proper understanding on the pollution sources and pollution loads of a water body is essential for its pollution control. Taihu Lake basin of China is an environmentally sensitive area. Currently, most of the river systems in this region are severely polluted, but information about these rivers is still lacking. Here, we present a comprehensive investigation into the pollution status of a typical river in Taihu Lake basin, Qiputang River, by using chemical oxygen demand (COD) and ammonia (NH\textsubscript{4}\textsuperscript{+}–N) as two major evaluation indexes. The major pollution sources, actual pollution loads, as well as the expected pollution carrying capacity were estimated via model simulation and calculation. The results show that the orders of pollution load are: for COD, urban domestic non-point source (NPS) > industrial NPS > wastewater treatment plant (WWTP) effluent > rural domestic NPS > agriculture NPS > livestock NPS; for NH\textsubscript{4}\textsuperscript{+}–N, agriculture NPS > urban domestic NPS > WWTP effluent > industrial NPS > rural domestic NPS > livestock NPS. Thus, urban domestic NPS, industrial NPS, agriculture NPS and WWTP effluents are the major pollution sources of the river, accounting for 84.17% of the total COD load and 87.1% of the total NH\textsubscript{4}\textsuperscript{+}–N load. Pollution overloading is severe for the river, especially for No. 4 ~ sections where the overloading of COD and NH\textsubscript{4}\textsuperscript{+}–N reached up to 748.1 and 422.3%, respectively. Thus, more future efforts of pollution control should be devoted to these sources and areas. This work presents a simple and useful way to investigate into the pollution situation of complex river systems, and offers valuable information on river pollution situation of Taihu Basin, which may help policy-makers and planners in implementing more effective and practical pollution control strategies.

Keywords: Pollution load; Pollution carrying capacity; Nonpoint sources; Modeling; Overload

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