

Estimation of total phosphorus load in the Lancang River

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The Lancang River Basin, a window for China's external cooperation is facing the disruption of the nutrient balance of aquatic ecosystem. Phosphorus is a crucial limiting factor of the aquatic ecosystem in the Lancang River. This study proposed a framework for estimating the total phosphorus (TP) load and spatial distribution in the Lancang River Basin in the absence of measured data. Because the difference of the sources of TP load, both integrated empirical model based on social-economic data and distributed mechanism model (ie. ULSE) are used in the accounting process. The uncertainties of some key parameters in this framework and some input data were also analyzed. Moreover, the TP load in Lancang River Basin was compared with those of some large-scale basins, i.e., the Yangtze River, the Yellow River, the Pearl River, the Huai River, the Hai River, and the Songhua River. Results showed that the annual average TP load is in the range of 1.6×10^4 t to 3.9×10^4 t, increasing from the upper reaches to the lower reaches, and the lower reaches accounted for about 60% of that in the whole basin. Among them, natural soil erosion is the dominant source of TP load with large uncertainty, accounting for about 69% of the whole basin. Compared with other large-scale basins, the TP load in the Lancang River Basin is at a very low level, mainly because the land use types in the basin are natural forest and grassland, and the farmland area is less than 10%, which is less affected by human activities. The data set of TP load in Lancang River Basin is given in this paper, which can be used to guide the integrated watershed management, as well as provide a more scientific basis for the relationship between upper reaches and lower reaches, and also offer some data support and reference for future research.

Keywords: Lancang River Basin, total phosphorus load, spatial distribution, uncertainty analysis.