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基于污染物平衡分析的污水厂尾水补水城市内湖的优化运行研究——以昆明翠湖为例

Optimized strategies of pollution control for landscape lakes replenished with WWTP effluent based on pollutants balance analysis: A case study in Cuihu Lake in Kunming,China

关键词：城市内湖 尾水补水 污染物平衡 污染物净积累 优化措施
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摘要：针对污水厂尾水补水的城市内湖污染调控问题,提出了基于水量和污染物收支平衡分析的污染物净积累(NPA)模型,建立了污染物输入和输出量化计算方法.最后,以昆明翠湖为案例,在调查水体污染物输入和输出途径及水体自净量计算的基础上,选择COD、TN和TP为代表性污染物,开展了模型和计算方法的应用.结果表明,尾水补水是污染物输入的最主要途径,排水和渗漏是污染物输出的两个主要途径,COD在水体中的净积累程度较低,TN和TP的净积累比例分别达到42.9%和39.0%.以此为基础,本文提出了以调整补水和用水途径为主要手段的水体优化运行方案,并对方案实施后的预期效果进行了分析验证.本研究可为城市景观水体的污染物积累分析提供新方法和典型案例.

Abstract：Towards pollution control of landscape lakes replenished with WWTP effluent, a Net Pollutants Accumulation (NPA) model was proposed for water and pollutants in-output balance analysis, and quantitative calculation method was established. This paper presented the case study of Cuihu Lake in Kunming, China and chose COD, TN and TP as representative pollutants for analysis. The NPA was calculated based on the pollutants in-output purposes analysis and self-purification calculation. The results showed that the pollutants input was mainly attributed to effluent replenishment, meanwhile, water drainage and bottom leakage were the main purposes of pollutants output. Besides, it also showed that the NPA of COD was low in the lake, while the NPA of TN and TP amounted to 42.9% and 39.0%. Based on these, this paper introduced the optimized strategies for pollution control by adjusting the water in-output purposes, and also verified its remarkable effect on pollutants reduction. This paper provided a new approach and typical case for pollutants accumulation analysis in landscape lakes.

Key words：landscape lakes WWTP effluent replenishment pollutants balance net pollutants accumulation optimized strategies