

头黄河湿地2017-2021年水质演变趋势分析及湿地管理建议

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摘要: 本研究对 2017-2021 年包头黄河湿地生态站的水质监测数据进行了深入分析, 旨在探讨该区域水质状况的变化情况及其影响因素, 并提出相应的决策建议, 以促进湿地水质改善和生态系统服务的提升。湿地作为重要的生态系统, 其水质状况直接关系到生态平衡和生物多样性。然而, 随着工业化和城市化的快速发展, 黄河湿地面临着水质污染的挑战。本文采用统计分析方法, 对总氮(TN)、总磷(TP)、氨氮、化学需氧量(COD)和溶解氧(DO)等关键水质指标进行了综合评估。

研究表明, 总氮(TN)和总磷(TP)浓度在研究期间呈现逐年下降的趋势, 其中 2021 年的总氮均值降至 2.0 mg/L 以下, 总磷从 2017 年的 0.39 mg/L 显著下降至 2021 年的 0.08 mg/L。氨氮浓度在 2017-2021 年间波动较大, 2018 年的均值显著低于其他年份, 可能与当年枯水期水体流动性减弱有关。化学需氧量(COD)从 2017 年的 131.46 mg/L 逐年下降至 2020 年的 45.45 mg/L, 但在 2021 年略有上升至 63.50 mg/L。溶解氧(DO)浓度在监测期间波动较大, 范围在 7.498 至 5.487 mg/L 之间。

基于对水质监测数据的分析, 本文提出了一系列决策建议。首先, 水质监测的持续性至关重要, 尤其是对氨氮和化学需氧量含量的监测, 这些指标的波动需要我们密切关注。建议加强监测频率, 利用现代技术进行实时数据收集与分析, 以便快速识别问题并采取行动。其次, 控制污染源是实现水质长期改善的基础, 需要对可能的污染源进行深入调查, 如农业活动、工业排放和生活污水等, 并实施更严格的排放标准和污水处理措施。这将有助于减少污染物的排放, 为湿地水质的改善提供坚实的基础。其次, 生态修复工程的实施对于改善和恢复湿地生态系统至关重要。建议开展植被恢复、水体连通性改善和增加生物多样性等项目, 以提高湿地的自净能力和生态服务功能。这些措施将有助于湿地生态系统的恢复和维持其生态平衡。同时, 科普教育和公众参与、政策制定和执行、制定长远规划也同样重要。通过这些综合性的措施的实施, 我们可以期待包头黄河湿地的水质将得到进一步的改善, 生态系统的健康得到保障, 为当地社区和公众带来长远的利益。

本研究不仅为包头黄河湿地水质的改善提供了理论基础, 也为湿地生态系统的保护和修复提供了科学依据。通过综合性的监测、管理和修复措施, 可以有效地保护和恢复湿地生态系统, 促进生物多样性的保护, 为实现区域可持续发展目标做出重要贡献。

关键词: 包头黄河湿地; 水质监测; 生态平衡; 决策建议; 可持续发展

Analysis of water quality evolution trend of Baotou Yellow River wetland from 2017 to 2021

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Abstract : In this study, the water quality monitoring data of Baotou Yellow River Wetland Ecological Station from 2017 to 2021 were analyzed in depth, aiming to explore the changes of water quality and its influencing factors in this area, and put forward corresponding decision-making suggestions to promote the improvement of wetland water quality and ecosystem services. As an important ecosystem, wetland water quality is directly related to ecological balance and biodiversity. However, with the rapid development of industrialization and urbanization, the Yellow River wetland is facing the challenge of water pollution. In this paper, the statistical analysis method was used to comprehensively evaluate the key water quality indicators such as total nitrogen (TN), total phosphorus (TP), ammonia nitrogen, chemical oxygen demand (COD) and dissolved oxygen (DO).

The results showed that the concentrations of total nitrogen (TN) and total phosphorus (TP) decreased year by year during the study period. The mean value of total nitrogen in 2021 decreased to below 2.0 mg / L, and total phosphorus decreased significantly from 0.39 mg / L in 2017 to 0.08 mg / L in 2021. The concentration of ammonia nitrogen fluctuated greatly from 2017 to 2021, and the mean value in 2018 was significantly lower than that in other years, which may be related to the weakening of water mobility in the dry season of that year. The chemical oxygen demand (COD) decreased year by year from 131.46 mg / L in 2017 to 45.45 mg / L in 2020, but increased slightly to 63.50 mg / L in 2021. The concentration of dissolved oxygen (DO) fluctuated greatly during the monitoring period, ranging from 7.498 to 5.487 mg / L.

Based on the analysis of water quality monitoring data, this paper puts forward a series of decision-making suggestions. First of all, the continuity of water quality monitoring is very important, especially for the monitoring of ammonia nitrogen and chemical oxygen demand. The fluctuation of these indicators needs our close attention. It is recommended to strengthen monitoring frequency and use modern technology for real-time data collection and analysis in order to quickly identify problems and take action. Secondly, controlling pollution sources is the basis for long-term improvement of water quality. It is necessary to conduct in-depth investigations of possible pollution sources, such as agricultural activities, industrial emissions and domestic sewage, and implement stricter emission standards and sewage treatment measures. This will help reduce pollutant emissions and provide a solid foundation for the improvement of wetland water quality. Secondly, the implementation of ecological restoration projects is crucial for improving and restoring wetland ecosystems. It is suggested to carry out projects such as vegetation restoration, water connectivity improvement and biodiversity increase to improve the self-purification capacity and ecological service function of wetlands. These measures will contribute to the restoration of wetland ecosystems and maintain their ecological balance. At the same time, popular science education and public participation, policy formulation and implementation, and long-term planning are equally important. Through the implementation of these comprehensive measures, we can expect that the water quality of the Yellow River wetland in Baotou will be further improved, the health of the ecosystem will be guaranteed, and long-term benefits will be brought to the local community and the public.

This study not only provides a theoretical basis for the improvement of water quality in Baotou Yellow River wetland, but also provides a scientific basis for the protection and restoration of wetland ecosystem. Comprehensive monitoring, management and restoration measures can effectively protect and restore wetland ecosystems, promote the protection of biodiversity, and make important contributions to the realization of regional sustainable development goals.

Keywords : Baotou Yellow River wetland ; water quality monitoring ; ecological balance ; decision-making recommendations ; sustainable development