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Topic of Research: Impact of Urban Growth on Health of Wetlands: A Study in Kolkata Agglomeration

Keywords: Wetland Health, Kolkata Urban Agglomeration (KUA), Ecosystem Service Valuation; Importance Performance Analysis (IPA), Nature Based Solution (NBS), Wetland Management, Bibliometric Analysis

Findings:

- The study shows a 7.46% decrease in wetlands and a 7.63% decline in vegetation over 24 years. Built-up areas increased significantly by 12.92%. The study reveals that many changes in land use land cover have taken place in proximity to transportation network and the established periphery of urban centres.

- The analysis reveals wetland degradation in the Kolkata Urban Agglomeration due to urban and industrial growth, population increase, and poor waste management. Water quality issues are highlighted by fluctuating BOD, DO, pH, and coliform levels. Indices like NDWI, NDVI, and NDBI show developed areas encroaching on wetlands, harming flora, aquatic ecosystems, and arable land.

- The wetland health index shows KUA wetlands are least healthy during monsoon and post-monsoon periods, improving in winter, indicating climate conditions significantly impact their well-being.

- The wetland health assessment uses DPSIR and AHP models, categorizing into various health categories. Many are classified as "unhealthy" and "poor," emphasizing the urgent need for conservation efforts.

- The research findings indicate a notable decrease in the economic value and performance discrepancies of wetland ecosystem services over time, namely in the domains of water supply, water regulation, climate regulation, waste treatment, disturbance regulation. These services, among others, were considered to require immediate attention, confirming the significance of matching managerial endeavours with community priorities.

- The study found that satisfaction levels positively correlate with proximity to wetland ecosystem services, increasing from urban cores to rural areas. The observed spatial variance indicates that the proximity to wetlands has an impact on the availability of ecosystem services and the perceptions of residents.

- Agricultural workers showed increased satisfaction with water supply and food production services. The study highlights urbanization, land use changes, industrialization, and population growth as key factors in wetland degradation. It emphasizes a bottom-up approach, starting with on-site observations, to improve wetland management and address community needs and priorities.

- Phytoremediation research in wetlands has surged since 2015, with a notable compound annual growth rate of 14.65%. This rise reflects increased global interest and investment in sustainable wetland management strategies. Key contributors are from China, the US, and India, highlighting a broad international commitment to addressing environmental challenges through interdisciplinary approaches.

- The bibliometric analysis identified three main research clusters: cluster 1 environmental conditions and operations, focusing on biodegradation, pollutant removal, and wastewater management; cluster 2 Pollution remediation, with emphasis on constructed wetlands and macrophytes; cluster 3 Efficiency enhancement, concentrating on pollutant types like heavy metals and their removal. These terms are crucial for effective wetland management.

- Phytoremediation is an eco-friendly technique utilizing plants to remove pollutants from wetlands, improving soil fertility and water quality. Methods such as phytoextraction, phytostabilization, and rhizofiltration target various contaminants, including heavy metals and organics, enhancing environmental conservation and remediation efforts in wetland ecosystems

- Indicators related to the sense of ownership and responsibility among community members (Q4) and community participation in monitoring and reporting on wetland health (Q8) fall under the low-importance and low-performance category. There were various governmental rules and regulations in place, but practical application was lacking to tackle challenges such as solid waste, illegal construction, sewage, disturbance, and pollution.