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Perspective

An Ecological Risk Assessment of Water Quality's Nutrient Over-Enrichment

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Abstract

The lives of organisms in shallow marine environments continue to be threatened by the natural (seasonality) and anthropogenic (e.g., coastal developments and changes in land-use practices) drivers that compromise water quality. In three Kenyan coral reef ecosystems—the Tana Delta, Watamu, and Shimoni Mupunguti Reef—water and sediment

nutrient over-enrichments. For (N-(NO3-+ NO2-)) and (P-PO43-), the assessed nutrient over-enrichment levels were higher than the universal reference background concentrations of 0.01 and 0.003 mg/L, respectively.

Keywords: Ecosystem; Water quality; Coastal cities

Introduction

It is commonly acknowledged that nutrient over-enrichment caused by both natural and human-induced drivers is endangering the water quality of the shallow marine environment. Anthropogenic activities, such as maritime operations, the growing tourism sector, and altered land-use practices, are currently putting pressure on the tropical and sub-tropical coastal environments. e growing number of people living in coastal cities as a result of maritime activity and the growing tourism sector has increased the amount of urban domestic sewage that overburdens coral habitats.. It has been observed globally that, in addition to naturally occurring drivers like erosion, runo , and riverinto be caused by an unchecked influx of nutrients brought on by human activity.

A concentration of 0.03-0.1 mg/L of N or P is su cient to establish macro-algae bloom dominancy, according to. Because macro-algae blooms are linked to a structural community shi in benthic communities—that is, from a coral reef community to macro-algae dominance—they can be harmful in the absence of grazers and herbivores. Concerns regarding the e ect of human activity on marine pollution have been highlighted in earlier studies conducted by a number of marine scientists reported nutrient over-enrichment from Peri-Urban Creeks and estuaries above the universal reference background concentrations of 0.003 and 0.01 mg/L of P and N, respectively [3].

It should be understood that, especially during high tides, ephemeral environments like creeks and estuaries are constantly in communication with shallow marine environments. Strong tidal waves of pelagic origin in nature resuspension nutrient-rich sediment from these environments during high tides. rough desorption processes, the water column of the shallow coral reef environment becomes nutrient enriched with the help of the intricate and dynamic hydrological circulation of the marine environment. Consequently, it is important and merits attention to regularly assess nutrient over-enrichment in the shallow environment, as suggested by a number of marine researchers. It is possible to address marine pollution through routine assessment. Moreover, the information derived from routine evaluations can serve as a guide for the development of policies aimed at conserving and protecting marine life [4-6].

Even though routinely assessing nutrient over-enrichment is a crucial e ort to combat marine pollution, recent developments in pollution assessment have shown that quantifying nutrients alone—without taking sediment quality into account as one of the water quality parameters, for example—is a less accurate method of assessing nutrient over-enrichment. According to Shen et al. (2021), an evaluation of pollution that disregards the ecological pollution index is considered inadequate, less illuminating, and thus untrustworthy. erefore, it is believed that the best method is to use sediment quality as a criterion tool for aquatic water quality assessment. is method's strength is its capacity to assess and identify the degree of the risk associated with nitrogen exposure [7,8].

Results

In order to assess the e ects of anthropogenically induced and natural drivers on the ecological risk exposure of total dissolved inorganic nitrogen (TIN) and phosphorous (TIP) on coral reef ecosystems, the current study attempts to take sediment quality into account. By comparing the levels of nitrogen and phosphorous in sediments and water columns across the coral reef ecosystems under investigation, the current study aims to accomplish the following two goals: (1) to identify nutrient over-enrichment; and (2) to assess the susceptibility of nutrient over-enrichment in Kenyan coral reef ecosystems using nitrogen and

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phosphorous pollution index. By addressing marine pollution, this study is in line with the 14th Sustainable Development Goal (SDG), "Life below water [9,10].

Discussion

When assessing pollution, it is crucial to use reference background concentration, particularly when attempting to pinpoint pollution hotspots. Table 6 presents a comparison between the current ndings and comparable published research concerning the background concentrations for coastal waters. e critical nutrients N-(NO3-+NO2-) and P-PO43-, whose mean concentrations were measured in the water column, fell between the reported concentration ranges from Kenyan estuaries.

Conclusion

ere were nutrient over-enrichments above the universal background reference concentrations in both the shallow marine settings (coral reef ecosystems) and the transitional environments (creeks and estuaries). e N/P ratios in both seasons were less than the Ren eld ratios of (N/P = 16), suggesting that there was an excess of phosphorous in the water columns of all the reefs under investigation. e nutritional enrichment temporal trend showed that both naturally occurring and man-made drivers.

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