

## Coastal Water Quality Assessment in Hormozgan Province: Implications for Sustainable Marine Ecosystems and Aquaculture in the Persian Gulf

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**Abstract :** Water quality is a critical driver of healthy marine ecosystems and a cornerstone of the blue economy, particularly fisheries. The coastal waters of Hormozgan Province, located in the northern Persian Gulf and Gulf of Oman, are increasingly threatened by wastewater discharges from industrial, urban, and agricultural activities. This study evaluates the spatial and temporal patterns of coastal water quality over two decades (2001–2021), drawing on a comprehensive dataset from 200 sampling stations along the province’s shoreline. Key environmental parameters -temperature, dissolved oxygen, salinity, turbidity, chlorophyll-a, nitrate, nitrite, ammonium, and phosphate- were analyzed. Using geographic information systems (GIS), spatial distributions were mapped, and a water quality index (WQI) was derived to classify overall water quality conditions. The WQI values ranged from weak to excellent, reflecting notable spatial variability. The interquartile range (IQR) method was applied to determine acceptable parameter ranges and establish early-warning thresholds for management. Zones were categorized into “caution” and “action” areas, guiding targeted interventions. Results highlight the significant impacts of sustained nutrient loading, particularly from nitrate and phosphate linked to anthropogenic sources, on coastal ecosystem health. These findings underscore the urgent need for stringent nutrient management policies to protect marine ecosystems, ensuring the long-term sustainability of fisheries and other marine resources in this region.

**Keywords :** coastal area, Hormozgan, Persian Gulf, water quality

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