Abstract

The Gulf of Paria is a semi-enclosed shallow basin with increasing coastal development activities along Trinidad’s west coast. Sediments present a host for trace metal pollutants from overlying waters, therefore determination of their content is critical in evaluating and detecting sources of marine pollution. This paper presents a Geographic Information System (GIS) analysis of geochemical assessment for trace metals in coastal sediments of the Gulf of Paria. This GIS approach facilitates interpretation of the spatial relationships among key environmental processes. The GIS development involves the integration of spatial and attribute data pertaining to bathymetry, current systems, topography, rivers, land use/land cover and coastal sediments. It employs spatial interpolation and retrieval operations to analyze the total trace metal concentrations of aluminum, copper and lead in the sediments and the clay-enriched sediments, to determine whether they are related to sediment type or are affected by the discharge from anthropogenic sources. Spatial distribution modeling of element concentrations are produced to indicate contamination plumes from possible anthropogenic sources such as rivers entering the Gulf of Paria, and to reveal potential hot spots and dispersion patterns. A direct spatial correlation between clay-enriched sediments and high concentrations of aluminum and lead is detected, however regions of high concentrations of copper and lead indicate a relationship to anthropogenic sources. The effectiveness of GIS for visualization, spatial query and overlay of geochemical analysis is demonstrated.

Keywords

Geographic Information System, spatial interpolation, geochemical analysis, trace metal pollution, Gulf of Paria.