



Water quality appraisal of Keti Bandar and Shah Bandar creeks of Indus delta, Sindh, Pakistan

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ABSTRACT

The present research investigation deals with the assessment of pollution status in the Indus delta creek system. This manuscript advocates the physicochemical, bacteriological characteristics and heavy metal pollution in the creek system. In the present investigation, the pH, salinity, dissolved oxygen (DO), biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), chlorophyll, cyanide, oil and grease, total phosphate, phenol, Kjeldahl nitrogen and total organic carbon (TOC) values were recorded from 36 sampling sites during 6 field surveys conducted in 2011–2013. The creek water samples were also analyzed for their heavy metal contents (As, Cd, Cr, Pb, Ni and Zn). The bacteriological parameters included in the study were total coliform count (TCC), total fecal coliform count (TFC), and total fecal streptococci (TFS). These parameters were determined as per methods described in reference [12]. Salinity of water samples ranged between 15 and 32 ‰ while pH ranged from 7.2 to 7.6. High salinity values indicated the progression of seawater into the creek system. The mean DO was low with a range of 4.2–5.7 mg/L. Low DO concentration was due to high BOD₅ (range 10–78 mg/L) while COD ranged from 320 to 1,334 mg/L. High BOD₅ load is mainly due to organic pollution coming from nearby human settlements. The mean chlorophyll-a content was 0.114 mg/L. Interestingly, higher chlorophyll-a concentration was observed near the mangroves area. The mean cyanide concentration was high, though the source of cyanide could not be traced that needs further study. Oil and grease content of water was also substantial, mainly originated from faulty boats operated in the area. Excessive concentration of oil and grease could be deleterious to marine life forms. The concentration of phosphate ranged between 2.1 and 4.6 mg/L mainly attributed to the agriculture runoff. Phenol concentration was not high (0.01–0.08 mg/L) and, therefore, could not be responsible for adverse environmental implications. The mean concentrations of total Kjeldahl nitrogen and TOC were 59.27 and 4.97 mg/L, respectively. The concentrations of heavy metals in the samples were found to be in the order Zn > Ni > Pb > As > Cr > Cd. The bacterial load was exceptionally higher in all the samples in terms of organisms of public health importance that is mainly attributed to domestic wastewater originated from nearby squatter settlements. In essence, the present study disclosed that the creeks of Indus delta are likely to be polluted mainly because of anthropogenic sources. The continuous accumulation of pollutants in the creek area may have severe ecological and health implications.

Keywords: River Indus; Pollution; Anthropogenic; Heavy metal; Public health

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