

Improving Sustainability Concept in Developing Countries

## Physico- Chemical Profile of Malir River and Chinna Creek

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### Abstract

In this research an attempt has been pretended to dissect the conduct and the pollution index of Malir River and Chinna Creek contaminated with untreated domestic and industrial wastewater and finally dump into Arabian Sea. The primary focal point is on the quench of physical, chemical and heavy metal analysis. Almost all the parameters crossed the guidelines of National Environmental Quality Standards except pH. This indiscriminate disposal of untreated wastewater is responsible for aquatic pollution and disturbs the ecosystem.

*Keywords:* Malir River; Chinna Creek; Heavy metal; Industrial discharge; Pollution Index; Karachi.

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### 1. Introduction

Marine pollution due to anthropogenic activities has now become a worldwide environmental concern<sup>1</sup>. Several researchers have reported the influence of indiscriminate discharge of untreated industrial effluent and municipal waste water to the marine environment in terms of danger to habitants, serious risk to marine life, deterioration of aesthetic values and limited access to coastal areas<sup>2, 3, 4, 5</sup>. Hence, monitoring of marine coastal environment is essential to formulate a viable management strategy<sup>6</sup>.

Like other coastal regions of the world, Karachi coast, especially Manora channel, is heavily polluted due to untreated industrial wastewater and Metropolitan municipal sewage which indiscriminate discharge into coastal waters through Lyari and Malir rivers<sup>7</sup>. According to a report<sup>8</sup>, only 20 percent of total annual wastewater produced in Metropolitan Karachi is treated and the rest is discharged directly into coastal waters. This situation demands to characterize the coastal water in order to determine pollution load, its extent and type.

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Karachi is the largest city of Pakistan and a hub of industrial activity. The coastal zone of Karachi is extended up to 135 km that is exposed to a heavy pollution load of both domestic and industrial origins<sup>9</sup>.

Karachi is the most populous metropolitan city and highly populated urban center of Pakistan. The city has an estimated population of 23.5 million people as of April 2013, and a density of nearly 6,000 people per square kilometer. This figure is continuously increasing day by day due to natural growth rate and migration from up country. Karachi is situated near the coast, which makes it a focal center of industrial development, education and multi-culturalism<sup>10</sup>. It ranks as a beta world city and it is the hub of higher education in South Asia and the Muslim world.

The study area Chinna creek is about 5.0 Km long, 300 to 500 m wide with the depth ranges from 1 m to 3 m. It covers an area of about 6 square Kilometer which extended from Boat Basin to Native Jetty Bridge and joins, Kemari. At its northern bank, PNS building Lalazar Bungalows, Boat club, Port house, naval officer's residence, Karachi club and KPT officers' society are situated and towards its southern bank Shirin Jinnah colony, Sikandarabad, Majeed colony, Okhai colony is present.

China Creek receives about 16 million gallons of untreated wastewater per day and toxic wastes of Karachi city, through Nehr-e-Khayyam, TPX drain and a drain from the Habib Public School. In addition, there is an indirect impact of about 200 MGD of wastewater discharged by Lyari River<sup>13, 14</sup>

The cumulative effect of the indiscriminate disposal of domestic and industrial effluents in the Malir River and Chinna Creek is not only responsible for river bed degradation but also results in ecological imbalances. . All toxic and harmful toxic materials in the variety of effluent from Industries and domestic wastewater are directly released into the Malir River and Chinna creek without any treatment as treatment plants are out of order. This dumping of wastewater causes deprivation of flora and fauna to a higher extent.

The substantial quantity of these pollutants in water increases the risk of uptake into shellfish or other benthic organisms and eventually into the food chain. On the other hand deterioration of Mangrove patches has also been noted. The primary reason of this deprivation is illegal cutting of mangroves for fodder, timber and fuel, farming patterns, urbanization which leads to serious environmental and social tensions in the form of loss of habitat and biodiversity, decline in fish productivity and social problems for coastal communities.

The present investigation aims at the analysis of wastewater samples so as to determine the extent of pollution load entering in the Malir River and Chinna Creek which is responsible for its degradation.

## **2. Methods:**

### **2.1. Study Area:**

Malir River is located in Karachi, Sindh, Pakistan. Malir River passes through the city of Karachi from North East to the Centre and drains into the Arabian Sea. Malir River is one of the two rivers passing through Karachi and the other is Lyari River. It has two main tributaries, the Thadhho and the Sukhan. In the rainy season, this river experiences heavy water flow, with millions of gallons emptying into the Arabian Sea. Now a day, this river converted into wastewater of both domestic and industrial origin.

Chinna Creek had two entrances one at Manora point and other at Clifton foreshore, prior to 1873 before the construction of Karachi Port. This natural arrangement had a good water circulation. In 1873 the Clifton entrance was artificially closed with a view to use the Eastern Breakwater as intertidal water reservoir so that the water stored here during high tides leaves Manora channel at high velocity during ebb keeping the channel bed clean and

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