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BIODIVERSITY IN BENTHIC COMMUNITIES OF GHARO CREEK

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ABSTRACT

The imbalance in the ecosystem of coastal region of Pakistan has undergone serious stress due to changes in Indus river regime as well as unchecked industrial discharge into the coastal region. This study aimed to demonstrate the ecological imbalances at Gharo Creek, one of the productive coastal zone of Karachi in the past. A total of 48 species of flora and 155 species of fauna were found in the samples of 7 different sampling sites of Gharo Creek. The most abundant group was Mollusca (37.39%), followed by Crustacea 15.64 % and Nematoda 16.52 %. Egg mass, unidentified specimen, empty mucous tubes and Porifera constituted 2.37%, 1.25%, 1.00% and 0.75 % respectively. In Mollusca the most abundant group was Gastropoda (20.90%) followed by Pelecypoda (16.77%) and Annelida (21.27%). No significant number of floral species was obtained except the members of the genus Chlorophyta(33%).

Keywords: Pollution, Gharo Creek, Industrial pollution, ecology,

INTRODUCTION

Karachi is the largest and the highly populated urban centre of Pakistan. It is situated near the coast, which makes it a focal centre of industrial development, education and multi culturalism. The coastal zone of Karachi is about 135 km long and it is reported that it is one of the most affected areas along the coast of Pakistan (Haq, 1976; Beg *et al.,* 1984; Iqbal and Jilani, 1995; Beg, 1997; Khan, *et al.,* 1999a; Khan *et al.,* 1999b).

East south east of Karachi lays the Indus delta. River Indus in 326 B.C had one of its tributary passings to the sea through Gharo Creek in the west and the other through Kori Creek in the East both being 200 km apart (Hussain 1988).

Gharo Creek is about 5.5 km long and about 500 m wide with a minimum depth of 7.5 meters and maximum depth of 17 meters. On the southern side of Gharo Creek are mangroves, while the western side has been mostly reclaimed area for Port Qasim facility. Port Qasim the second major port of Pakistan is located about 45 km from Gharo Creek.

The present Gharo Creek commences from Mazhar point at the confluence of Kadiro, Chara and Ganglaro Creek. The minimum depth of this creek upto Port Qasim area is about 6 meters outside of the navigation channel where as the maximum depth is about 17 meters. South of the marginal wharf the creek is joined by Isaro Creek. Beyond the existing turning basin there is a shallow patch in the east with a minimum depth of 3 meters and about 1 km in length. The bottom in this area is hard cemented sand. After crossing this shallow patch the Creek is again deep and maintains an average depth of about 6 meters upto Ziarat Hassan Shah Island.

The total length of Gharo Creek from Gharo city to Mazhar point is about 30 km and upto the Sea from via Kadiro Creek is about 55 km (Hussain, 1988).

The coast along the creek comprises of mangroves and marsh except about 5 km west of Gharo village where there is a firm coastline. Sand dunes along this creek on some place are about 10 m high and parallel to the creek.

Gharo city is situated at the back of Creek. The population of city is around 30,000 and the total wastewater generation is about 30,000-35,000 (approx.) gallons/day, which is discharged directly into the Creek without any treatment. In addition the bank of Creek is also used as a solid waste dumping site. Many pathogens, nutrients and chemical that come along with the effluent of Gharo city is not only detrimental to marine life but also resulted in reduced biodiversity (Ahmed 1995).

The sizeable addition of various chemicals in the Creek from various industries situated near by and waste oil from fishing boats and trawlers further aggravate the problem.

The present study was conducted to determine the abundance and biodiversity of the benthic communities of Gharo Creek.

MATERIALS AND METHODS

The study was conducted during January and February 2002. Sediment samples were collected from 7 different sampling stations along the Gharo Creek at a distance of 300 m apart from Gharo bridge upto Bhambore Bridge. At

different sampling stations the depth of water varied significantly from 1.0 to 7.5 meters. The samples were brought to the laboratory within two hours of collection, processed accordingly and analyzed for the benthic communities of Gharo Creek. Table 1 and Figure 1 represents the sites of sample collection of Gharo Creek.

Table 1. Sites of sample collection at Gharo Creek.

S. No.	Sampling station	Location
1.	S-1	Near Gharo bridge
2.	S-2	Near paper mill
3.	S-3	Near to the influent of Gharo city
4.	S-4	Fisherman colony
5.	S-5	Near crab form (way to Bhambore)
6.	S-7	Near Bhambore bridge at salt works
7.	S-6	Near mangroves at Bhambore (14 km away from Gharo city

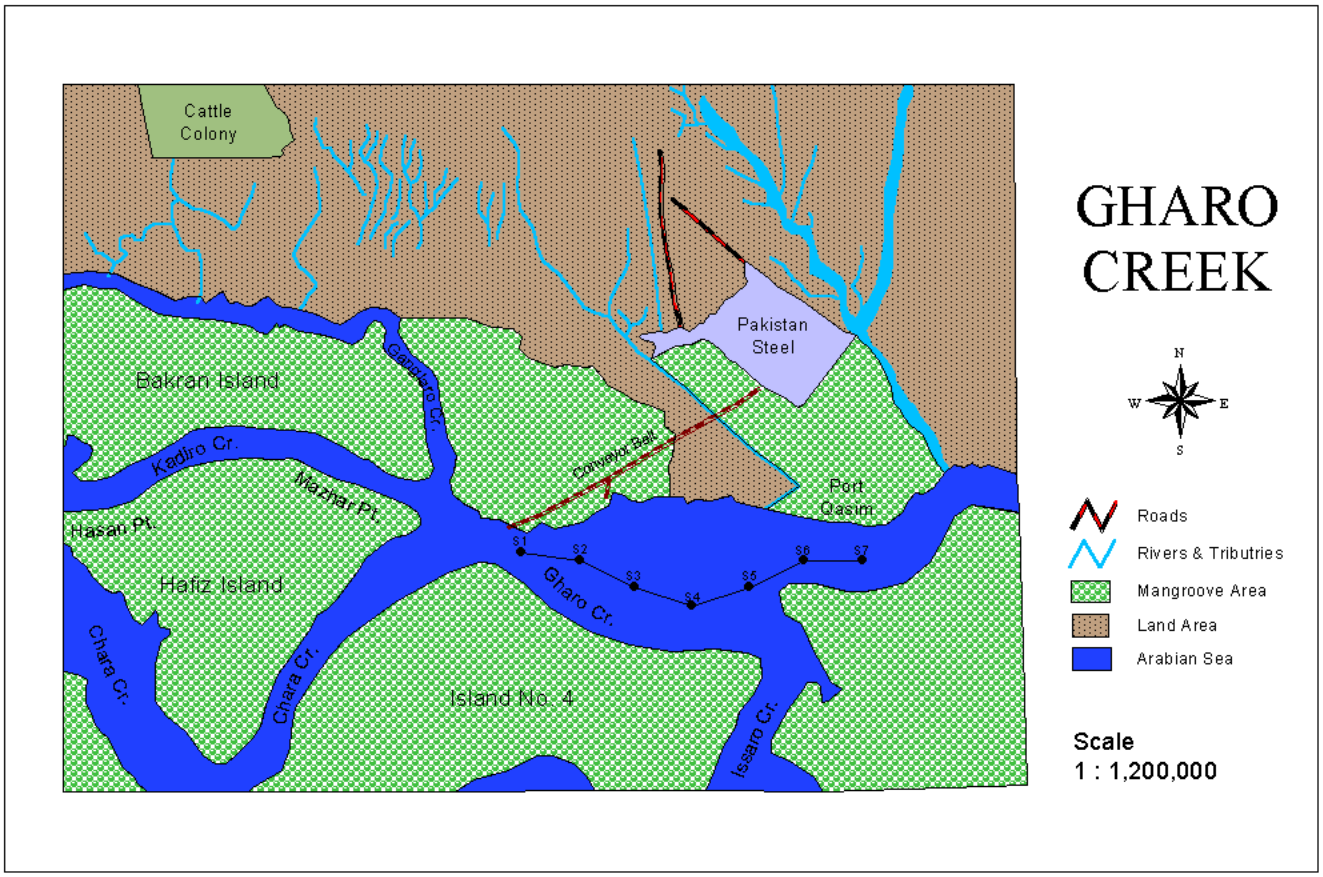

Fig 1. Site of sample collection of Gharo Creek.

Collection and Processing of Sample for Benthic Communities

Benthic sample from the pre-designated sites were collected using Patterson grab from the designated sampling sites. At each site a quadrate of 1.0 m^2 was placed at random and the sediment along with benthic organisms and

were collected and transferred in the plastic bags. Formalin (10%) was added to the sample to ensured adequate fixing of all the material. Rose Bengal (1% solution in distilled water) was also added to the sample so as to stain the benthic organisms, which made sorting much easier.

Sieving and Sorting

In laboratory, each plastic bag containing biotic sample was carefully opened and the content was transferred on a sieve of 0.5 mm mesh. The bottom of the sieve was gently dipped several times in sink containing water. The sediment remained on the sieve was transferred to Petri plates and the benthic organisms were handpicked, mostly under a stereomicroscope. Care was taken to pick up all the organisms present in the sediment sample. These organisms were put in suitable containers and fresh formalin solution (10%) was added. The containers were properly labeled.

Counting of the biota

Individual organisms were counted carefully, either with naked eyes or under a stereomicroscope. Where an organism was not intact, care was taken not to count different parts of the body as separate individuals.

Identification of biota

Attempts were made to identify all the biota present in the samples up to species level, but it was not always possible to do so. Hence several specimens were identified only up to group, family or generic level. This was mainly due to: (i) the complex nature of the invertebrate taxonomy and (ii) the condition of the preserved specimens, which sometimes lacked those parts of the body that bears species specific characters.

Temporary slides of microscopic organisms were made in glycerol jelly, which is a mixture of gelatin (10g), distilled water (60ml), glycerol (70ml) and phenol (0.25g) (Peacock 1966). Lactophenol (Amann's Medium) was used to clear the specimens, especially nematodes and polychaetes. The lactophenol was prepared by adding 20g of phenol to 20 ml of distilled water, when the phenol dissolved completely, 16.8 ml of lactic acid (glacial) was mixed and finally 33.3 ml of glycerol was added (Peacock 1966).

The references which were used for the identification of biota include: Dance (1974), Oliver (1975), George and George (1979), Bemert and Ormond (1982), Burukovskii (1982), Davaney *et al.* (1987), Campbell (1989), Fish and Fish (1989), Allen (1997), Tirmizi, and Zehra (1984). and Mustaquim (1997).

RESULTS AND DISCUSSION

The data collected during the course of study is presented and discussed with a view to determine diversification among the benthic communities of Gharo creek.

During present investigation biota sample from benthic deposits were collected from 7 sampling sites as described earlier. The frequency of occurrence of biota is reported in Table 2. A total of 48 species of flora and 155 species of fauna were found in the samples of 7 different sampling sites of Gharo Creek. The most abundant group was Mollusca, which constituted 37.39 % of the total organisms collected from all the sampling sites. Next in the abundance was Crustacea 15.64 % followed by Nematoda 16.52 %.Egg mass, unidentified specimen, empty mucous tubes and Porifera constituted 2.37%, 1.25%, 1.00% and 0.75 % respectively. In Mollusca the most abundant group was Gastropoda (20.90%) followed by Pelecypoda (16.77%) and Annelida (21.27%). In Crustacea the most abundant group was Ostrocoda (15.26%). No significant number of floral species was obtained except the members of genus Chlorophyta(33%).

The study reveals that the Creek is continuously receiving industrial discharges which are resulting in reduced biological diversity which the Creek was enjoying in the past. In addition the untreated domestic wastewaters from Gharo city further aggravate the problem in terms of organic pollution.

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Table 2. Frequency of occurrence of biota of Gharo Creek.

Taxa	Sampling sites								
	S-1	S-2	S-3	S-4	S-5	S-6	S-7	Total number of species	% distribution
Flora									
Leaf of grass (Graminae)	2	3	3	6	1	5	__	20	41.66
Leaves of dicot *Prosopis)*	1	__	3	__	2	2	4	12	25.00
Chlorophyta	__	__	__	__	6	5	5	16	33.33
Total number of species	3	3	6	6	9	12	9	48	99.99
Fauna									
Porifera (Sponges)	___	___	___	___	1	__	__	1	0.869
Nematoda (Round worm)	5	2	3	3	1	2	3	19	16.52
Mollusca									
Gastropoda (Snail and Sea slugs)	3	2	4	3	1	5	4	22	19.13
Pelecypoda (Bivalves)	1	3	3	2	2	1	9	21	18.26
Annelida (Polychaeta)	3	1	3	2	2	1	2	14	12.17
Crustacea									
Copepoda	___	___	2	1	1	___	3	7	6.08
Ostracoda	2	1	2	1	1	3	1	11	9.56
Egg mass/eggs	3	2	2	3	___	___	___	10	8.69
Unidentified specimen	3	2	5	___	___	___	___	10	8.69
Total number of species	20	13	24	15	9	12	22	115	99.96

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