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SOME STUDIES ON NANG SPRING AND TORRENTS OF KHAR CENTER, KHIRTHAR NATIONAL PARK , GUDAP AREA, MALIR, KARACHI, SINDH, PAKISTAN

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Abstract

The water samples of Nang spring, Khan (Pluoro), Pluoro and Kenhein torrents were collected for water quality and biological life. The water samples were analysed for physico – chemical parameters. The water indicates conductivity and total dissolved solids within the range of 3040 – 9000 μS/cm and 1945–5760 mg/l respectively. The spring water flow rate was about 60 – 100 l/h in the form of small stream. *Phragmites australis* Trin, *Scripus tuberoses* and *S. littoralis* are growing in water logged and shallow water pools. *Chara* zeylanica, (L.) *Najas minor*, *Potamogeton pectinatus, Typha domingensis* and *Vallisineria spiralis* were present in the pools in the form of patches. Besides these plants, 16 species of Cyanophyta, 11 species of Chlorophyta, Gyrosigama *kutzingii* and *Riccia* sp. have also been recorded from these springs.

Keywords: Natural spring, Torrents, Water quality, Biota.

Introduction

Khar center check post of Khirthar National Park, Gudap, Karachi is about 50 km north of Super Highway toll plaza. It is located at 25 km north east of Hub Dam, 473 ft above the sea level (at latitude 25.4^{O} longitude 67.2^{O}). The area is dry and arid. The natural water resources of Khirthar Park have importance because of acute scaricity of water and being a main source for the wild life inhabiting this region. There are only a few reports on the water quality of natural resources available within Khirthar National Park. Iqbal (1986) has made perlimanary studies on limnology of Hub Lake. Nazneen and Iqbal (1986) reported the fishes of Hub river of Balochistan . The limnological studies of the natural springs of Thana Bola Khan have been conducted by Leghari *et al.* (1995, 2002). The investigations on the water quality, fauna and flora of natural springs of Karachi area have been carried out by Khan *et al.* (1960), Rafiquezaman and Hassan (1964), Shah *et al.* (1964), Beg *et al.* (1984), Khan & Hussaini (1987), Zahid (1989), Jahangir *et al.* (2001) and Leghari *et al.* (2001).

The present work examines one spring and two torrents available within Khar center area for water quality and biological life present within the water.

Material and Methods

Four samples were collected from (1) Nang spring (2) Khan (Pluoro) (3) Pluoro and (4) Kenhein torrents. A water sample was collected from the center of each water pool. The samples were taken from the surface at the depth of about 3 – 9 inches. The water samples were collected in clean 1.5 l plastic bottle which was rinsed several times with water before sampling. The sampling was carried out through Oct. 2000. The temperature of water and air, 1 meter above the surface of water, was measured with mercury thermometer. The conductivity, salinity and TDS were recorded with WTW 320 conductivity meter at the sampling site. The pH measurements were made with Orion 420A pH meter. Total acid hydrolysable phosphate and sulphate were determined by using Hitachi 220 spectrophotometer. Total phosphate phosphorus was determined by persulphate digestion method followed by the reduction of the phosphomolibidate to molybdenum blue with ascorbic acid. Sulphate was determined by turbidiometric method using barium chloride. Chloride, hardness and alkalinity were determined by titrimetry with standard silver nitrate, E.D.T.A and hydrochloric acid. Dissolved oxygen was estimated by Winkler's method. Chemical oxygen demand (COD) was determined by acid dichromate oxidation method using silver sulphate as catalyst. Total residues were determined by evaporating well mixed sample (50 ml) and drying the residues at 105^{O}C. Fixed and volatile contents of the residue were evaluated by recording the amount left and the loss in weight after heating at 550^{O}C for two hours in muffle furnace (APHA, 1976).

Sodium, potassium, calcium and magnesium were determined by air acetylene flame using Varian Spectr AA – 20 atomic absorption spectrometer at 589 nm, 766.5 nm, 427.5 nm, and 285.2 nm,

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respectively in triplicate using integration time 3 sec and delay time 3 sec at the conditions recommended by the manufacturer. The sodium absorption ratio (SAR) was calculated using the following formula (Concentration of each in milli equivalent):

$$SAR = \frac{Na}{\sqrt{\frac{Ca + Mg}{2}}}$$

The flow of water was measured from the relation:

$$Q = A \times V$$

Where Q is flow, A, area of stream and V, velocity of water flow.

All the biological samples were collected by using plankton net # 25 μm, hand net and hand picking methods and preserved in 3 to 4 % commercial formaldehyde. The identification of algae was carried out with the help of taxonomic keys of Desikachary (1959) and Prescott (1962), aquatic plants by Cook (1996).

Results and Discussion

The aim of present study was to ascertain the water resources of springs within the region of ecological importance. The results of physico – chemical analysis are summarized in Table 1. The water was transparent; air temperature at the time of collection was 36 to 37 ^{0}C. The water temperature of the spring was 30.4 ^{0}C as compared to the torrents (34 to 35^{0}C). The lower water temperature of spring may be due to continuous flow of water. pH varied within 7.4 to 8.1 and total alkalinity between 282–465 mg/l. Dissolved oxygen was observed within the range of 5.2 to 6.5 mg/l. The conductivity and total dissolved solids (TDS) of the spring were 3040 μS/cm and 1945 mg/l. In torrents the conductivity and TDS were 3400 to 9000 μS/cm, an increase in TDS was observed from 2196 to 5760 mg/l in torrents, probably due to less availability of renewable water and evaporation or natural dissolution of salts from the bed. In spring, chlorides were 328 mg/l and hardness of the spring was 800 mg/ℓ. In torrents chloride ranged from 642 to 1066 mg/l and hardness from 387 to 680 mg/l. The analysis of metal contents indicated following decreasing sequence.

$$Na > Ca > K > Mg$$

The water resources indicated a similar nature of dissolved solids mostly as NaCl and $CaCO_3$. The water flow spring was calculated about 60 to 100 l/h. The spring water seeps out from water logged sandy and calcareous area in the form of a small stream, certain grasses and patches of *Chara zeylanica*, *Najas minor*, *Potamogeton pectinatus* and *Typha domingensis*, were observed. The spring water was covered with *Chara zeylanica*, *Cladophora glomerata*, *Rhizoclonium crassipelitum* along with *Chroococcus minimus*, *C. minutus*, *C. tenax*, *C. turgidus*, *Gloeocapsa* sp. *Lyngbya martensiana*, *Oscillatoria limosa*, *Oscillatoria princeps*
(Table : 2) were present on the surface of water. The torrents appeared as shallow pools of water and indicated similar vegetation. The pools were fully covered with *Spirogyra pratensis*, *Lyngbya limnetica*, *L. martensiana*, *Mougeotia parvula* and *Oscillatoria princeps*. On the sides of the pools *Riccia* sp. was present.

Conclusion

In the present study the water quality of four perennial water resources has been reported within dry and arid region. The resources are of less economic importance due to high conductivity, hardness and chloride content but in case of scarcity of the water the spring water and torrents are the only source of humans, use cattle and other animals of the region.

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Table 1: Water quality of Khar Center, Khirthar National Park.

Date of collection of samples 21 – 5 – 2000

S No.	Parameters	Nang spring	Pluoro torrent 1	Pluoro torrent 2	Kenhein torrent 3
1	Time	12.40	13.10	13.40	14.10
2	Temperature of air °C	36	37	37	37
3	Temperature of water °C	30.4	35	35	34
4	Color	Transparent	Transparent	Transparent	Transparent
5	pH	7.44	7.62	7.48	8.10
6	Conductivity µS/cm	3040	9000	4380	3400
7	Salinity g/l	1.7	5.0	2.3	1.8
8	TDS mg/l	1945	5760	2803	2176
12	Chloride mg/l	328	1066	908	642
13	M-Alkalinity as $CaCO_3$ mg/l	440	465	328	282
14	Hardness as $CaCO_3$ mg/l	800	680	415	387
15	Sulphate in mg/l	64	328	280	218
16	Kjeldahl's Nitrogen mg/l	ND	ND	ND	15
17	COD mg/l	ND	448	110	200
18	Dissolved oxygen mg/l	5.24	5.2	6.0	6.2
19	Total phosphate mg/l	0.05	0.05	0.09	0.105
20	Sodium mg/l	172	480	290	248
21	Potassium mg/l	80	105	97	92
22	Calcium mg/l	148	196	146	138
23	Magnesium mg/l	69	94	82	75

Sampling Stations

1 Nang spring beneath Mari hill, near Mataro village from south of check post of Khar center, Khirthar national park.

2 Khan (Pluoro) torrent 1. Beneath Losar hill, about 4 km away from Mataro village.

3 Pluoro torrent 2. (200 m away)

4 Kenhein torrent, beneath Losar hill, Khar center, Khirthar national park.

Table – 2. Flora of Nang Spring and Torrents of Khar Center, Khirthar National Park , Gudap area, Malir.

	Nang Spring	Torrent 1	Torrent 2 & 3
Aquatic plants			
Typha domingensis Persoon	+	-	-
Potamogeton pectinatus Linnaeus	++	-	-
Najas minor Allioni	++	-	-
Algal flora			
Cyanophyta			
Chroococcus montanus Hansgirg	+	+	+
Chroococcus minutes (Kütz) Nägeli	+	+	+
Chroococcus minor (Kütz) Nägeli	++	+	+
Chroococcus minimus (Keissler) Nägeli	++	++	+
Chroococcus tenax Hieron	+	+	++
Gloeocaspsa calcarea Tilden	++	+	+
Gloeocaspsa magna (Berb.) Hollerbach	++	+	+
Gomophosphareia aponina Kutzing	+	++	++
Homoethrix fusca Starmach	++	+	+
Johannes baptistia pellucida Taylor	++	+	++
Lyngbya majiscula Harv.	+	++	+
Lyngbya martensiana Menegh.	+	+	++
Lyngbya limnetica Lemma.	+	+	++

Spirulina major Kuetz.	+	+	++
Merismopedia tenuissima Lemm.			
Oscillatoria princeps Vauchar	+	+	-
Oscillatoria nigra Vauchar	+	+	+
Phormidium uncinatum (Ag.) Gomont.	+	+	-
Chlorophyta			
Coelastrum microporum Naegeli	+	++	++
Cladophora glomerata (L.) Kuetzing	+	++	++
Scenedesmus bijuga (Turp) Lager.	+	-	++
Rhizoclonium crassipelitum W. & W.	-	+	+++
Oedogonium epiphyticum Transeau and Tiffany	+	-	+
Spirogyra pratensis Transeau	+	+	-
Spirogyra mirabilis (Hass.) Kuetzing	+	+	-
Mougeotia parvula Hassall.	++	+++	-
Cosmarium leave Rabenhorst	++	+	+
Cosmarium sportella Berbission	+	-	-
Chara zeylanica Willdenow	+++	-	-
Bacillarophyta			
Gyrosigama Kutzingii (Gurn.) Cleve	+	+	+
Bryophyta			
Riccia sp.	-	+++	

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