An Analysis Of Aquatic Environment Of Khar Danda Sea Coast

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ABSTRACT

At a height of 10m to 15m, the seacoast of KharDanda is located at 18.96°N and 72.82°E on the western fringe of Mumbai's Bandra Suburb. The climate is tropical, with temperatures ranging from 18°C to 37°C. Black Deccan basalt sea boulders indicate the sea line. Between June and September, it experiences severe Indian Ocean monsoon rains. The oldest location where the Koli population dwells is the Khar-Danda fishing town in the south, and the Carter road Promenade in the north. Domestic, agricultural, and industrial activities all have an influence on water and ecosystems. Fish farming is a common activity, and other human activities such as body cremation, residential sewage, and faeces discharge have had a significant impact on the environment of the beach and the sea. Around 11,494 industries are situated in the city, while 24,554 are located in the suburbs, contributing to the largest source of industrial pollution. Nearly half of Mumbai's population, or 42 percent, lives in slums or is homeless, with no access to sewage or sanitation. They exploit coastal regions as natural toilets, resulting in massive amounts of excrement being dumped into the sea. A large number of these wastes find their way into the polluted coastal water in and around KharDanda. These contaminants transport carbon, nitrogen, phosphorus, and mineral-rich soil and particles. Algal blooms, which are caused by nutrient-rich water causing fleshy algae and phytoplankton to grow in coastal locations, have the ability to generate hypoxic conditions by utilizing all available oxygen.

KEYWORDS: Khar-Danda sea coast, pollution, Algal bloom, hypoxic condition

INTRODUCTION

In 1996, Bombay was renamed Mumbai. The city has a total area of 440 square kilometres (170 square miles). Mumbai has a fully tropical environment with consistent temperatures throughout the year. Every year, between June and September, Mumbai is submerged by severe Indian Ocean monsoon rains, which normally begin on June 7th. Mumbai has a 26-kilometer-long shoreline on its western side. Large and tiny waterways crisscross the coastline. Khar, which is derived from the term Khara, got its name from the salt pans that residents used to produce salt along the KharDanda seashore a couple of centuries ago. The ancient fishing town of "KharDanda," one of the communities that made up the original Bandra region and one of Mumbai's oldest settlements, is also located here. KharDanda is a small town on the western coast of Mumbai. With 36048 industries/factories, the Khar-Danda fishing village is the oldest location where Koli Mumbai is the industrial heart of everything from textiles to petrochemicals. There are about 11,494 industries in the city and 24,554 industries in the suburbs. Half of Mumbai's 12 million citizens live in slums or are homeless, with no access to sewage or sanitation services, and utilise the city's coastline region as a natural toilet, resulting in massive amounts of sewage being dumped straight into the Arabian Sea. The coastal water in and around Mumbai is polluted as a consequence of a large volume of industrial and household wastewater input. In Mumbai's coastal waters, a general tendency of nutrient elevation has been observed. Furthermore, there was a significant loss of faunal and floral variety. Mangrove species have decreased from 14 to just two at this time. The current research examines the influence of humans on the coastal ecology in and around Mumbai, as well as the reactions of coastal resources to anthropogenic pressure.

Checklist of Common Aquatic fauna at Khar danda.

Fin fish	Crustacean	Gastropods
Boi	Scylla sereata	Cerithidieopsila djadjaviaensis
Cat fish	Varuna literata	Telescopium tel escopium
	Prawns	
Tilapia	Neris species	
Guppy	Onchidium species	
	Melamus scyeleheocis	
Snake head fish		
Gobi		
Barbs		
Snake eel		
Pipe fish		

REVIEW OF LITERATURE

Various ecologists have documented pollution of water bodies, including Agarwal &Shrivastav 1984, Ambasht et al 1985, Mishra 2000, and Agarwal 2005[1]. Pollutants have an impact on aquatic ecosystems as well as the human food chain owing to bioaccumulation. Although there is little doubt that pollution may have an impact on aquatic creatures in the laboratory and be accountable for population declines, [2] However, it is well recognised that water contamination, particularly in coastal waters[3], has been a consequence of urbanisation and industry in recent decades. As a consequence, several aquatic species have become extinct or scarce in certain large water bodies. [4]In the last 20 years, there has been a growing worry that pollution may have an impact on the health of fish and other aquatic animals. [5] Various epidermal illnesses, including as fin rot in demersal fish and protozoan infections in mollusks, have been observed in extremely polluted bays and estuaries throughout North America. International agencies such as the International Council for the Exploration of the Sea (ICES) created workshops to examine sample methodologies and disease-reporting systems in response to the increased interest and concern in the issue. The background prevalences of illnesses in populations of fish and other aquatic animals are difficult to establish due to the diverse, interacting biological and physical effects in the aquatic environment [6] [7]. Short-term disasters may be closely linked to climate shifts, as shown by examples of their effects [8] [9]. Water acidification [10] [11], which is mostly caused by human activity, is a longer-term issue, in certain regions of Scandinavia, this has resulted in, and continues to result in, the extinction of inland fish populations [13]. In general, diseases in fish [12] and other aquatic animals are very localised, but scientists are concerned that certain cancers, particularly liver tumours, in demersal fish inhabiting polluted estuaries and coastal waters are linked to the release of potentially harmful substances into the aquatic environment, such as pesticides, heavy metals, and hydrocarbons. When huge amounts of these pollutants are discharged, there may be an immediate effect, such as large-scale abrupt mortalities of aquatic animals, such as fish deaths caused by agricultural pesticide pollution of streams. Lower discharge levels might lead to a buildup of contaminants in aquatic creatures. Immune suppression, lower metabolism, and damage to gills and epithelia are some of the long-term effects that might occur after contaminants have passed through the ecosystem. The relationship between poor water quality and fish infections, on the other hand, is unclear. In normal conditions, a number of things may have an impact on water quality. Changes in water parameters are caused by a variety of reasons, including:

1. Organic Pollutants Produced by Household Wastes

2. Pollutants originating in run-off water

3. Pollution of Nutrients

4. The influence of temperature on the seasons

RESEARCH METHODOLOGY

Secondary data is acquired for the study. Water samples are collected from 4 (four) distinct sites/locations along the Khar-Danda sea coast for laboratory analysis utilizing biological techniques for water quality evaluation. The current project will last a year, from October 2017 to September 2018. Temperature, pH, Total Hardness, Dissolved Oxygen (D.O), Phosphate, Nitrate, Nitrite, Faecal Coliform (FC), Total Coliform (TC) and other physicochemical parameters of water were measured using conventional APHA procedures.

RESULTS AND DISCUSSIONS

Chemical Parameters	SITE 1 Jogger's Park	SITE 2 Hindu Shamshan	SITE 3 Chium Village	SITE 4 Khardanda Dock
Colour	Light brown to colourless	Pale yellow to colourless	Light brown to dark brown	Pale yellow to dark brown
Temperature	Min.-23 Max.-27 Mean -25	Min. -22 Max.-27 Mean -24.5	Min. -24 Max.-27 Mean - 25.5	Min.-25 Max. -27 Mean -26
pH	7.9	7.9	7.9	7.8
Salinity(gm/liter)	3.7	3.7	3.7	3.7
Hardness (mg of Ca^{++}/liter)	1,803.6	1,683.36	1,723.44	1,763.52
Dissolved Oxygen (mg/liter)	Min.-2.17 Max. -3.43 Mean - 2.80	Min. -2.10 Max. -3.43 Mean - 2.76	Min. -1.61 Max. -3.43 Mean - 2.52	Min.-0.77 Max.-3.43 Mean- 2.10
BOD (mg/liter)	Min. -5.60 Max. -5.90 Mean - 5.75	Min. -5.02 Max. -5.04 Mean -5.03	Min. -6.40 Max. -8.10 Mean - 7.25	Min. -5.00 Max. -7.09 Mean - 6.04
CO_2 (mg/liter)	Min. - 19.34 Max. - 69.00 Mean - 44.17	Min. - 21.37 Max. - 61.13 Mean -41.25	Min. - 20.23 Max. - 39.00 Mean - 29.62	Min. -18.32 Max. - 35.12 Mean -31.22
PO_4–P (µg/ liter)	Min. - 0.25 Max. - 0.27 Mean - 0.26	Min. - 0.29 Max. - 0.32 Mean - 0.30	Min. - 0.33 Max. - 0.36 Mean - 0.34	Min. -0.24 Max. - 0.26 Mean - 0.25
Nitrate (µg/ liter)	Min. - 0.79 Max. - 0.80 Mean - 0.79	Min - 0.79 Max. - 0.80 Mean - 0.79	Min. - 0.91 Max. - 0.99 Mean - 0.95	Min. - 1.06 Max- 1.06 Mean - 1.06
Nitrite (µgatom/ liter)	Min. - 0.01 Max. - 0.01 Mean - 0.01	Min. - 0.01 Max. - 0.01 Mean - 0.01	Min. – 0.15 Max. – 0.17 Mean – 0.16	Min. - 0.16 Max. - 0.19 Mean - 0.17
Faecal coliform (MPN/100ml)	Min. - 120 Max. - 300 Mean -210	Min. - 180 Max. - 400 Mean - 290	Min. - 1120 Max. - 1380 Mean - 1250	Min. – 870 Max. - 1200 Mean - 1035
Total coliform (MPN/100ml)	Min.- 400 Max.- 610 Mean-755	Min.-380 Max.-820 Mean-600	Min.1200 Max.-1400 Mean-1300	Min.-1000 Max.-1250 Mean-1125

Table 1: (Winter) from Oct 2017 to Jan 2018

Chemical parameters	SITE 1 Jogger's Park.	SITE 2 Hindu Shamshan	SITE 3 Chium Village	SITE 4 Khardanda Dock
Colour	Light brown to colourless	Pale yellow to colourless	Light brown to dark brown	Dark brown to grey
Temperature	Min. -27 Max. -35 Mean - 27	Min. -27 Max. -35 Mean -27	Min. -27 Max. -35 Mean -27	Min. -27 Max. -35 Mean -27
PH	7.9	7.9	7.6	7.1
Salinity(gm/liter)	3.7	3.7	3.7	3.7
Total hardness (mg of Ca^{++}/liter)	1,803.6	1,683.36	1,723.44	1,763.52
Dissolved oxygen (mg/litre)	Min. - 2.15 Max. - 3.43 Mean - 2.79	Min. - 2.09 Max. - 3.41 Mean - 2.75	Min. - 1.30 Max. - 3.10 Mean - 2.20	Min. – 0.73 Max. - 3.40 Mean - 2.07
BOD (mg/liter)	Min. – 7.03 Max. – 8.73 Mean – 7.88	Min. - 5.10 Max. - 5.90 Mean –5.50	Min.– 7.00 Max. - 8.28 Mean –7.64	Min.– 5.64 Max. –7.92 Mean –6.78
CO_2 (mg/liter)	Min. - 18.32 Max. – 35.12 Mean – 26.72	Min. – 20.35 Max. – 60.12 Mean – 40.24	Min. – 18.22 Max. – 38.15 Mean – 28.18	Min. – 17.98 Max. – 35.08 Mean – 26.53
PO_4–P (µgm/ liter)	Min. – 0.28 Max. – 0.30 Mean – 0.29	Min.- 0.34 Max. – 0.38 Mean – 0.36	Min. – 0.33 Max. – 0.40 Mean – 0.36	Min. – 0.24 Max. – 0.29 Mean – 0.26
Nitrate (µgatom/ liter)	Min. - 0.79 Max. - 0.80 Mean - 0.79	Min. – 0.79 Max. – 0.80 Mean – 0.79	Min. – 0.93 Max. – 1.01 Mean – 0.97	Min. – 0.93 Max. – 1.03 Mean – 0.98
Nitrite (µgatom/ liter)	Min. – 0.01 Max. – 0.01 Mean – 0.01	Min. – 0.01 Max. – 0.01 Mean – 0.01	Min. – 0.12 Max. – 0.14 Mean – 0.13	Min.- 0.11 Max. – 0.14 Mean – 0.12
Faecal coliform (MPN/100ml)	Min. - 300 Max. - 350 Mean - 325	Min. - 350 Max. - 400 Mean- 375	Min. - 1200 Max. - 1500 Mean- 1350	Min. - 1100 Max. - 1400 Mean – 1250
Total Coliform (MPN/100ml)	Min.-900 Max.-1210 Mean-1055	Min.- 900 Max.-1300 Mean-1100	Min.-1400 Max.-1800 Mean-1600	Min.-1200 Max.-1700 Mean-1450

Table 2: In Summer from the period Feb 2018-June 2018

Chemical parameters	SITE 1 Jogger's Park	SITE 2 Hindu Shamshan	SITE 3 Chium Village	SITE 4 Khar Danda Village
Colour	Pale yellow to colourless	Pale yellow to colourless	Light brown to Pale yellow	Light brown to Pale yellow
Temperature	Min. -27 Max. -30 Mean – 27	Min.-27 Max.-30 Mean-27	Min.-27 Max.-30 Mean -27	Min.-27 Max.-30 Mean -27
PH	7.9	7.9	7.9	7.9
Salinity (gm/liter)	3.7	3.7	3.7	3.7
Total hardness (mg of Ca^{++}/liter)	1,803.6	1,683.36	1,763.52	1,723.44
Dissolved oxygen (mg/litre)	Min. – 5.28 Max. - 7.63 Mean- 6.45	Min. -3.10 Max. -5.60 Mean - 4.30	Min. - 1.40 Max. -4.80 Mean -3.60	Min. - 2.90 Max. -5.40 Mean -4.10
BOD (mg/liter)	Min.-5.00 Max.-9.45 Mean-7.27	Min. -5.01 Max. -5.09 Mean -5.05	Min. -5.60 Max. - 9.45 Mean - 7.52	Min. -5.80 Max. -18.0 Mean - 11.9
PO_4 –P (µgatom/ liter)	Min. – 0.23 Max.– 0.25 Mean– 0.24	Min- 0.25 Max. -0.27 Mean– 0.26	Min-0.31 Max.– 0.38 Mean– 0.34	Min- 0.24 Max.-0.32 Mean–0.28
Nitrate (µgatom/litre)	Min- 0.70 Max.– 0.66 Mean– 0.68	Min- 0.76 Max.– 0.78 Mean– 0.77	Min- 0.90 Max.– 0.92 Mean–0.91	Min- 0.89 Max.– 0.92 Mean– 0.90
Nitrite (µgatom/ liter)	Min- 0.00 Max. – 0.00 Mean–0.00	Min-0.00 Max. -0.00 Mean–0.00	Min- 0.04 Max.– 0.04 Mean–0.04	Min- 0.04 Max. -0.06 Mean– 0.05
Faecal coliform (MPN/100ml)	Min. - 110 Max. - 290	Min. - 150 Max. - 350	Min. - 900 Max. - 1200	Min.-700 Max.-1150
	Mean- 200	Mean – 250	Mean-1050	Mean-925
Total coliform (MPN/100ml)	Min.-250 Max.-600 Mean-425	Min.-320 Max.-800 Mean-560	Min.-1280 Max.-1370 Mean-1325	Min.-1200 Max.-1300 Mean-1250

Table 3: In the rainy season from the period July 2018-Sept 2018

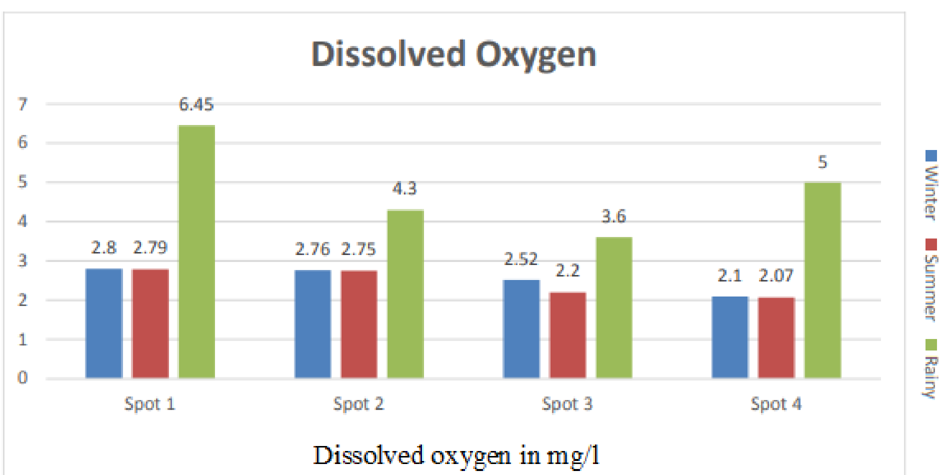

Fig. 1: Dissolved oxygen

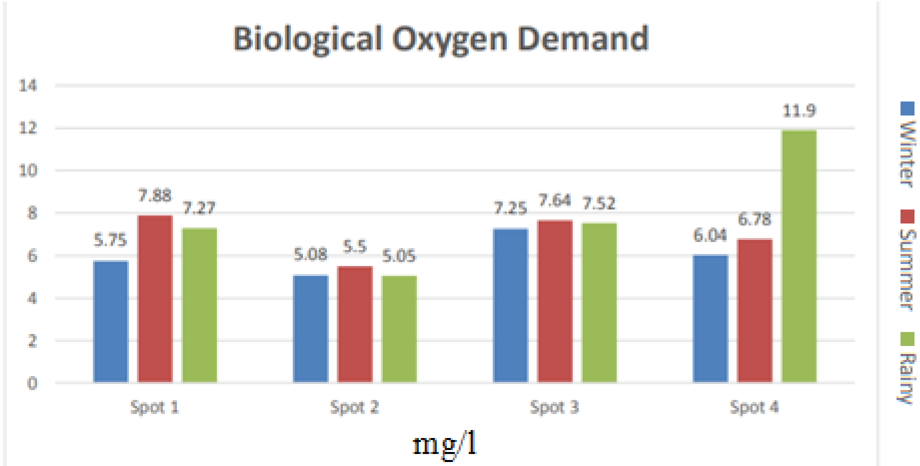

Fig. 2: Biological Oxygen demand

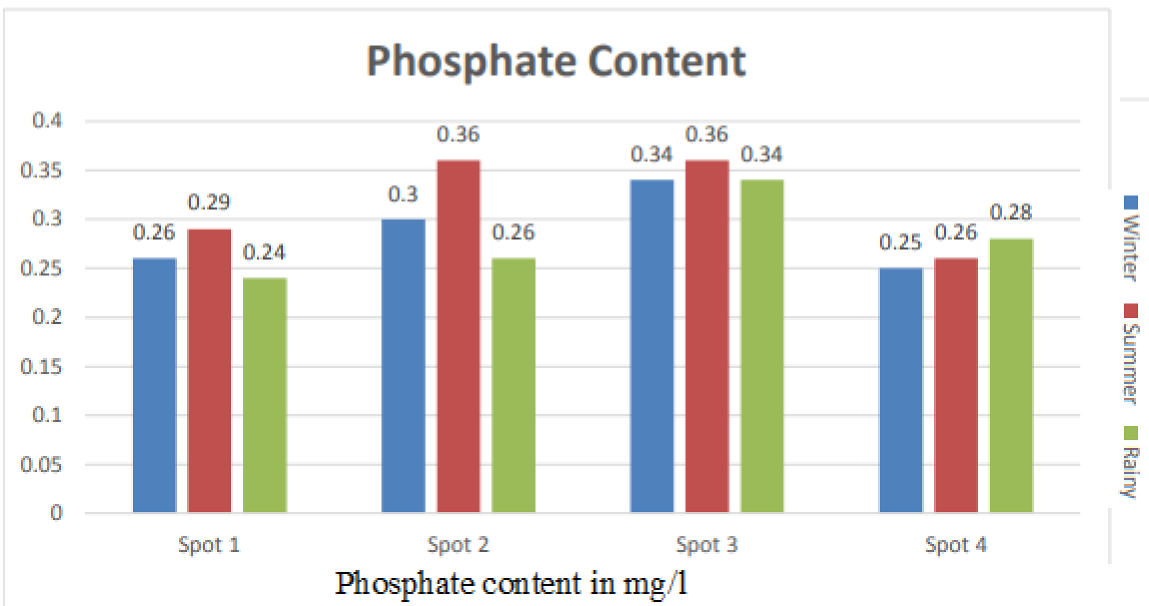

Fig. 3: Phosphate content in mg/l

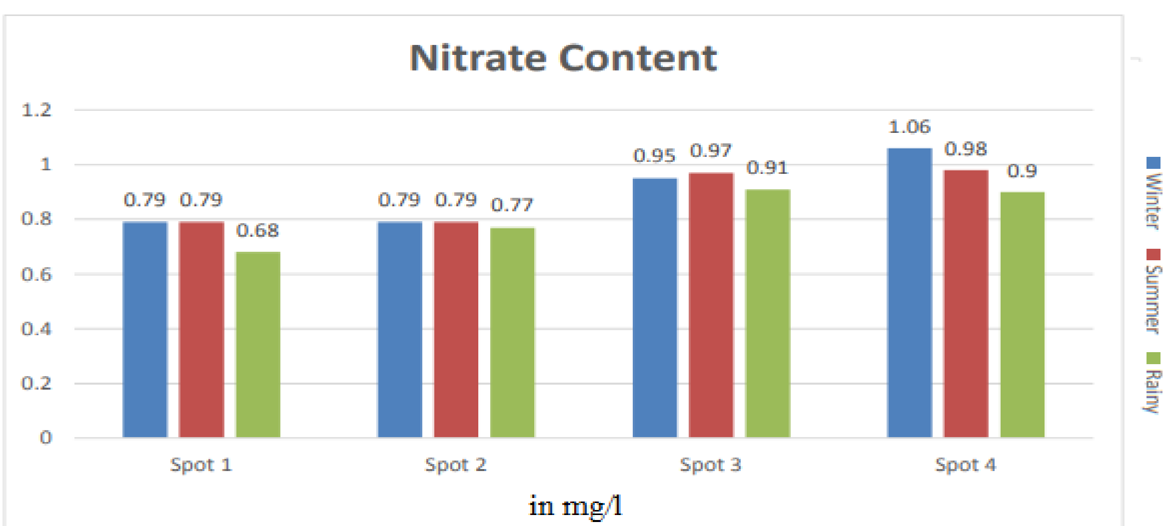

Fig. 4: Nitrate Content in mg/l

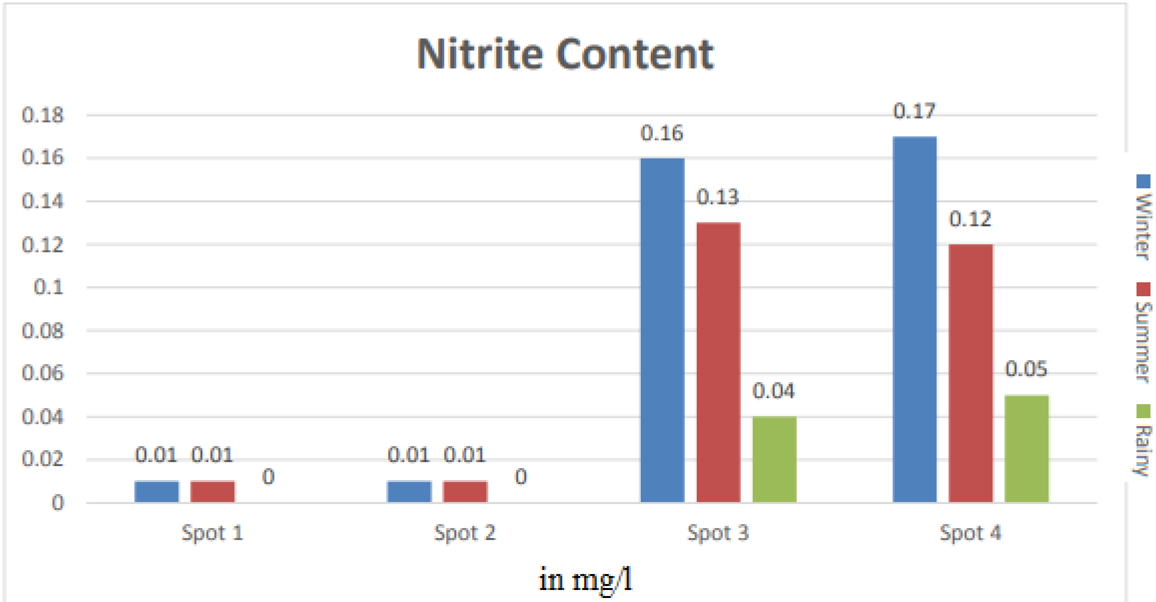

Fig. 5: Nitrite Content

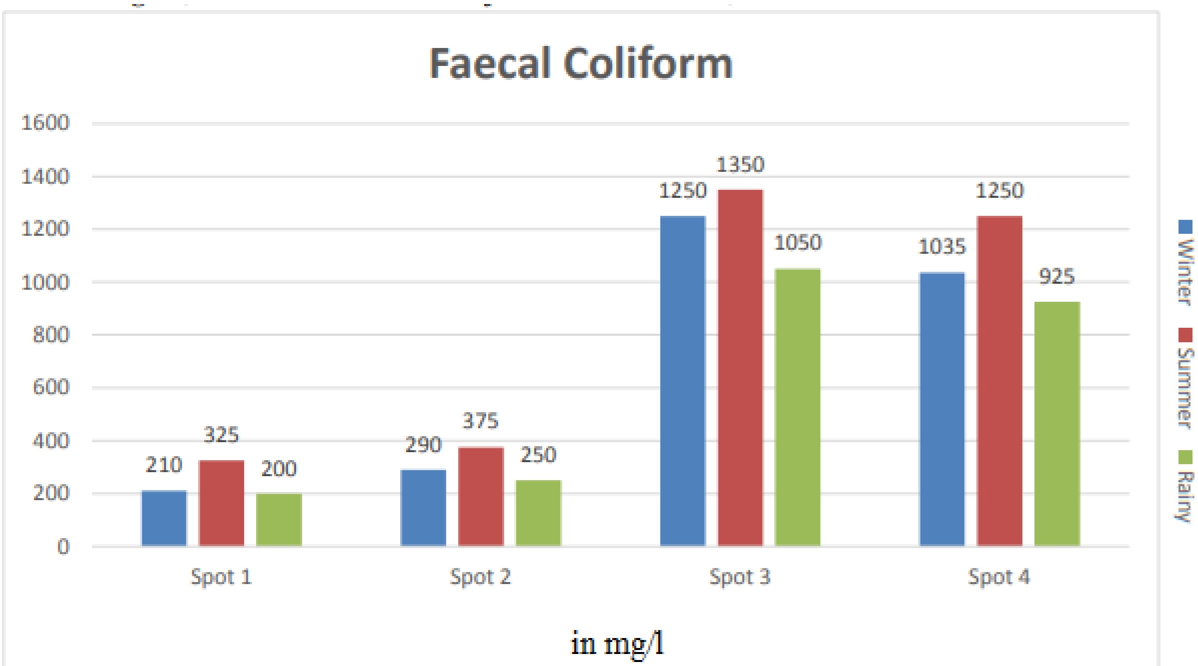

Fig. 6: Faecal coliform

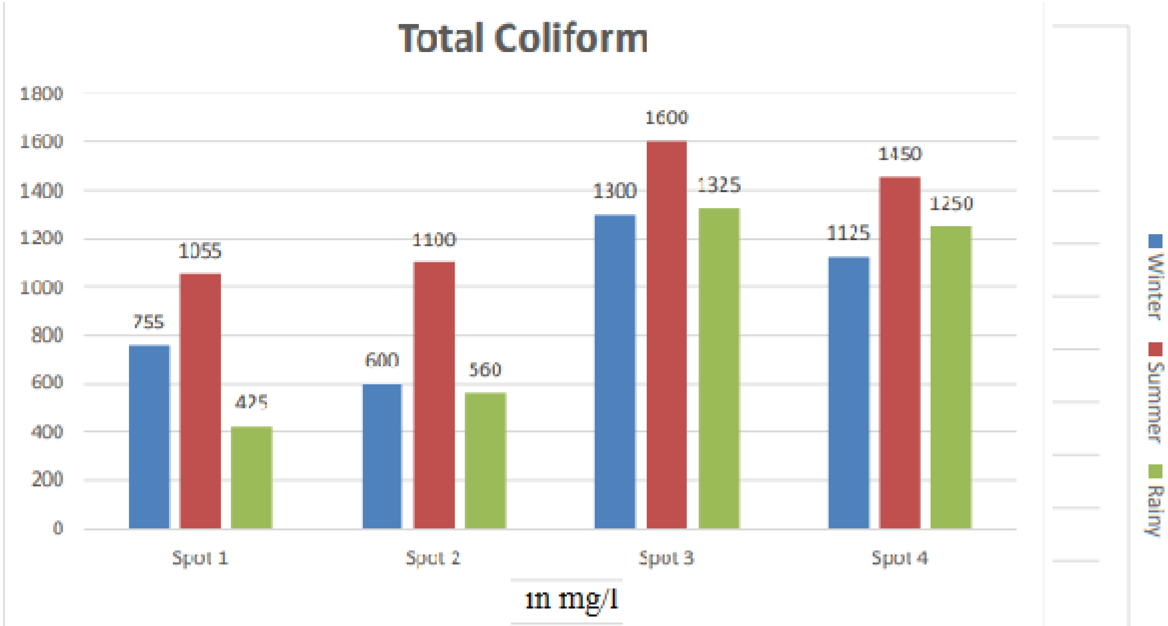

Fig. 7: Total coliform

Water quality standards for one or more metrics have been determined as contaminated, necessitating action to restore water quality. The above tables and figures compare the water quality characteristics of the KharDanda sea water, such as pH, Conductivity, DO, BOD, Total Coliform(TC), Faecal Coliform(FC), Nitrite, and Nitrate, as well as the level of change in water quality throughout the year. The four separate locations along the KharDanda sea shore have DO ranging from 0.0 to 7.6 mg/l and BOD ranging from 0.7 mg/l to 296 mg/l, which does not match the intended criterion. The amount of DO must be more than 4 to maintain aquatic life throughout the year, although values less than 4 are seen in stretches downstream of urban areas owing to the flow of untreated / partly treated municipal wastewater, which causes excessive oxygen demand. The lowest DO, which is one of the most significant markers of pollution, was recorded in 2010. The conductivity is quite high, ranging from 22 to 62690 mhos/cm. Nitrate ($NO3^-$) values are found to be between 0.02 to 6.85 mg/l. Except at Site 4 (140000 MPN/100ml & 110000 MPN/100ml) and Site 3 (12000MPN/100ml&6400MPN/100ml), the total and faecal coliform counts are under the criterion limit. Organic pollution continues to be the most significant contaminant of aquatic resources, according to monitoring findings acquired in 2017-18. Organic pollution was assessed in terms of Bio-Chemical Oxygen Demand (BOD) and Coliform bacterial count, and it was discovered that approximately 60% of the observations had BOD less than 3mg/l, 22% had BOD between 3- 6mg/l, and 18% had BOD more than 6mg/l. Total and Faecal coliform, both of which indicate the presence of pathogens in water, are also serious concerns. Total Coliforms are found in 46% of observations, while Faecal Coliforms fewer than 500 MPN/100ml are found in 68% of observations, indicating the level of water quality deterioration. CPCB is an abbreviation for the acronym " (Ministry of Env& Forest 2010).

CONCLUSION

Due to a number of circumstances, only around 40% (748 billion cubic metres) of accessible water resources are deemed usable today. This is most likely a gift in disguise, since it meets the needs of ecosystems. As a result, water conservation measures must take precedence, followed by rehabilitation and recycling. Water resource environmental concerns are projected to be resolved in the next years.

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