

INFLUENCE OF PHYSICO-CHEMICAL PARAMETERS ON FISH DIVERSITY IN PARADEEP COAST, ODISHA

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Abstract— Pollution in the marine environment cause serious threat to the both biotic and abiotic components of the ecosystem. Coastal water mainly influence by the anthropogenic activities. The present study was carried out in coastal areas of Paradeep, which has its importance as a major port of India. During this study water samples were collected for the physico-chemical analysis from these areas. The physico-chemical parameters include pH, alkalinity, conductivity, hardness, turbidity and dissolve oxygen during this experimental analysis. During the collection of water sample, twelve marine fish species were observed and most of them *M.cephalus*. These studies also find out the effect of water and fish diversity in coastal areas of Paradeep to protect the faunal diversity.

Keywords—Marine,Paradeep, physico-chemical, diversity

1. INTRODUCTION

Water is the important constituent of our environment we can't imagine life without water. The quality of water varies depending upon the sources. Different types of ecosystem are like marine ecosystem found in sea, ocean and fresh water ecosystem found in river, pond etc [1]. Odisha is situated as one of the coastal states of India by the Bay of Bengal. It is the ninth largest state by area and the eleventh largest by population. Odisha is located in the eastern coast of India. Jagatsinghpur District is one of the coastal districts of Odisha. It lies between 19° 58 'and 20° 23' N latitude and 86° 30'and 86° 45' E longitude. Paradeep coastal area is about 125 km away from Bhubaneswar and it is situated in the east coast of India between latitude 20°15' to 55°44'N and longitude 86°40' to 36°62'E[2]. Nutrient input to the sea may occur anthropogenically or through natural physical, chemical and biological processes. Recently the entry of nutrients to this coastal areas has increased due to anthropogenic activities,

agricultural practicals and industrial sewage discharges[3]. Several methods are available to analyse the water quality. Data may change depending upon the types of sample, the size of the sampling area. Electrical conductivity, dissolved oxygen, pH, total alkalinity, hardness of the aquatic environment are influenced by the physical and chemical parameters of the water. These parameters are the limiting factors for the survival of aquatic organisms [4]. The present study involves the influence of physico-chemical parameters on fish diversity in Paradeep coast, Odisha, India. It is also aimed to determine the quality of water source with respect to physico-chemical parameters.

2. MATERIALS AND METHODS

2.1 Study area

The present study was carried out in Paradeep port of Jagatsinghpur district, Odisha and is situated between 20.26N, 86.86E. These sites were selected as these are affected by local industrial wastage. Jagatsinghpur District is one of the coastal districts of Odisha.



Fig.1. Selected study area for the collection of samples.

2.2 Methodology

The water samples were collected from Nehru bangla and Light house of Paradeep during the month of December,2019 to February,2020.From these selected areas in these selected costal area. The sampling and analysis of various physico-

chemical attributes were done by standard protocol [5].

2.2.1 Estimation of pH

The pH is calibrated with two standard buffer solutions with pH 4 and pH 9. The combined electrode is thoroughly rinsed with distilled water and is wiped carefully by using a tissue paper. The electrode is then dipped into the required water sample whose pH needs to be measured. The water sample is continuously swirled and the reading is taken after waiting for one minute [6].

2.2.2 Estimation of Total alkalinity

To determine the total alkalinity, 50ml of fresh sample was taken. Then 4 to 5 drops of methyl orange indicator was added to it. The colour of methyl orange indicator was imposed. Then the sample was titrated against N/50 H₂SO₄ till the yellow tinge colour was appeared. Then calculation was prepared by taking mean burette reading.

2.2.3 Dissolved Oxygen

Dissolved oxygen and biological oxygen demand (after 5 days) were measured by conventional Winkler method. Estimation of dissolved oxygen is estimation by the titration method. 500ml of the sample solution is taken in the DO bottle. Add 10 ml of alkaline KI and 10ml of MnSO₄ is added to it. Stopper the bottle and shake it well and conc. H₂SO₄ solution is added to it so that the brown precipitate are dissolved. Titrate against the hypo till the color changes to light yellow. 3-4 drops of the starch solution is added to it and the color of the sample will change to the blue color. The blue color solution is titrated against the hypo solution till the color disappeared. This is the end point of the titration. The concordant reading is taken. Estimation of hardness, turbidity and electrical conductivity: These tests were analyzed by standard guidelines (APHA) [7,8].

4. RESULT AND DISCUSSION:

Water is an indispensable natural resource essential for the existence of man and the ecological system. In the last few decades, anthropogenic activities coupled with rapid urbanization and industrialization have brought about ecological pressure on aquatic environment which directly or indirectly affects human health. The aquatic ecosystem often gives a reflection of extent of environmental degradation from various anthropogenic activities. From this above study, several physico-chemical parameters of water were analyzed. The pH is a measure of the intensity of acidity or alkalinity and measures the concentration

of hydrogen ions in water. The present study has the mean pH was 7.9 due to little rain in winter season. The pH value showed a trend of increasing pattern from slightly acidic during monsoon slightly alkaline medium during summer (9). Turbidity is a measure of scattering of light in seawater. It depends on depends on the quantity, size and composition of the suspended particles like silt, clay, colloidal particles, plankton, algae and other microscopic organisms present in water with Maximum permissible limit 10 as per IS 10500- 2012. Present study reveals 0.05 NTU.

Electrical Conductivity (EC) is the ability of a solution to conduct electricity or medium for transfer for electric current. The electrical conductivity (EC) of the water of sea water was found 27.16 μ S/m by the help of digital electrical conductivity meter. The higher values of EC are due to presence of high chemicals in the solution or salinity of the samples.

Total alkalinity and pH value were increasing pattern from slightly acidic during monsoon slightly alkaline. The value was comparatively low during rainy season. The increased alkalinity during summer was due to concentration of nitrates in water against the permissible limit (10). It is found that 34.36 in marine water collected from Paradeep.

Hardness is caused by multivalent metallic cations. The principal Hardness causing cations are the divalent Calcium, Magnesium, Strontium, Ferrous and Manganese ions. The Hardness in water is derived largely from contact with the soil and rock formations. Calcium and Magnesium are the greatest portion of the Hardness occurring in natural waters. During this study, the total hardness of water varied from 16.16mg/l to 43.66 mg per liter. Near the river it was 16.16 and in marine water it was 43.66 mg per liter (11).

Dissolved Oxygen content in water reflects the physical and biological processes prevailing in water and is influenced by aquatic vegetation and plankton population. Low oxygen content in water is usually associated with organic pollution. The DO is another vital parameter regulating the survival of aquatic life. Higher DO values were noted 5.6mg/l during to winter. Oxygen content from the collected water was 8.7 mg L⁻¹

A total of 22 fish species were recorded during the study period. *Dorosoma petenense*, *Xenentodon cancila*, *Nucleola nuchalis*, *Trichiurus lepturus*, *Cynoglossus macrolepidotus*,

Achirus achirus, Solo fish, *Terpedo* and some fishspecies were also observed during the collection of samples. Maximum Percentage of average fish abundance *M. cephalus* (13%) was recorded in the year 2019 and 2020. The diversity index of Paradeep coast indicates that the coast is less polluted. Present study revealed that physiochemical parameters play a vital role in species distribution (12).

5. CONCLUSION

Study of biological environment is one of the most important components for conservation of environment and biodiversity. The biological environment comprises of aquatic and terrestrial ecosystem. Biological communities show dependency and complex inter-relationship with abiotic environmental conditions and location of its resources. They are sensitive to anthropogenic activities and may change with the changes in the environment. The changes in biotic community over a span of time are studied by the pattern in their distribution, abundance and diversity, and can be quantified and correlated to the existing environmental conditions. Moreover, strategizing developmental activities from an ecological perspective prevents deterioration of natural environment and leads to sustainable environment.

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