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COMPARATIVE ANALYSIS OF PHYSICO-CHEMICAL PROPERTIES OF SOIL OF VIZAG NEAR BHEEMILI RIVER (ESTUARINE), WATER OF ANTARVEDI ANDHRAPRADESH STATE

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Keywords:

Physico-chemical Parameters, Soil of Vizag, Water of Antarvedi and Minor Pollution

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ABSTRACT: Environmental changes influence Physical and Chemical reactions such as pH, Temperature, EC and chemical properties such as Dissolved Oxygen, Organic matter, Silica provide important information on Soil and Water quality different sources of variations and their effects on activities and biodiversity of Soil and Water. In the present study, the Physico-Chemical parameters of Soil sample from Vizag near Bheemili River at location of estuarine region and Water sample from Antarvedi location at sakhinetipalli were compared to provide basic information on the Physical and Chemical characteres in this area of the study. The result shows that there is very little impact on water quality pollution and this study can be used for the quality to maintain aquatic ecosystem, resources, and Agriculture. Reconstruction of the Physico-Chemical properties of Soil and Water in these areas is needed as isolation and characterization of Photosynthetic Bacteria for future work.

INTRODUCTION: Water is an essential component of the ecology. The physical, chemical and biological aspects of Water can be elucidated [1]. However, some possible links between these components and importantly will be useful in determining water quality [2]. To avoid specific water use, quality guidelines provide fundamental knowledge about toxicological values and water quality measurements. Mangroves and marine areas are complex and dynamic marine environments [3]. Mangrove water absorbs a lot of contaminants from several sources, including recreation, fish cultivation, adoption and the transit of waste items into the river, as a result of growing populations and commercial sectors [4]. These conditions have created tremendous pressure on the ecosystem, leading to a decline in water quality and biodiversity and loss of critical habitats [5]. The natural environment of the Mangrove forest serves as a base for light and production of food in tropical and subtropical marine environments [6]. The availability of good quality of Water is a very important factor in preventing disease and improving health. The emergence of plume-related declines, environmental pollution, seawater, food and nutrient interactions with other particles in the atmosphere and land into water, is known to occur mainly in seawater [7, 8].

Variations in production in surface water are due to fluxes of nutrients that may have come from both natural and anthropogenic origins and changes in physico-chemical Water properties that may later change the Water quality. Therefore, it can also influence the composition and availability of marine organisms and affect the process of

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ecosystem process such as coral habitats and marine ecosystems [9, 14, 15].

The growth of biomass of phytoplankton and marine biodiversity [14] is influenced by the biochemical parameters of the sea surface such as DO, Temperature, Salinity, pH, Tube, Nutrients and other parameters also important to determine the relationships and factors involved in biogeochemical cycles and an important key for monitoring Water quality [16, 17, 18, 9, 10, 11, 12] and [13] information on the Physico-chemical properties of the present study sites is limited.

METHODOLOGY:

Learning Area: Learning area for the current study two sites were selected. Collection of Soil (sample-1) is in the Vizag, near Bheemili River (Estuarine region) and Water (sample-2) is collected from Antarvedi (Bay of Bengal), at Sakhinetipalli, Dist: East Godavari, Andhrapradesh these two samples location details **Fig. 1.**

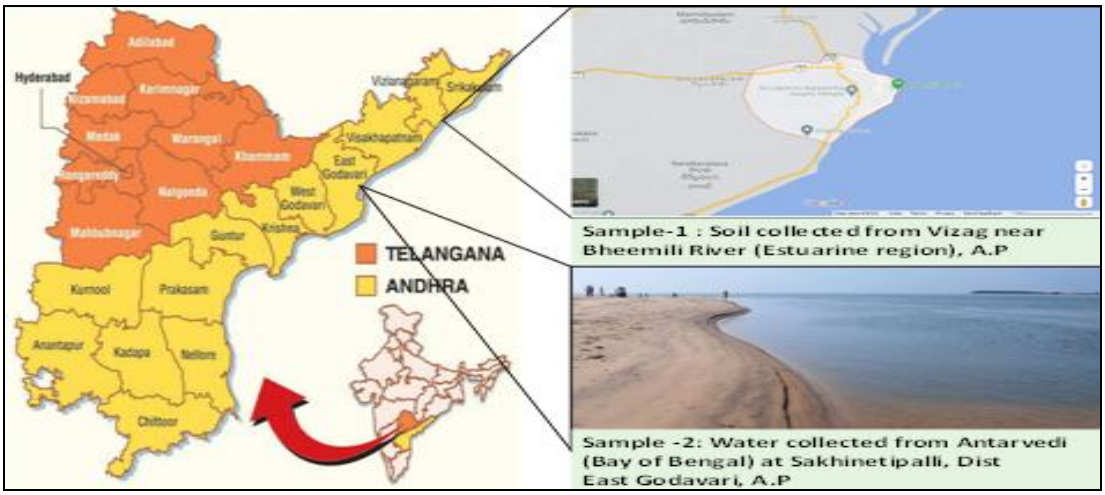

FIG. 1: LEARNING AREA FOR THE CURRENT STUDY OF TWO SITES WERE SELECTED IN ANDRAPRADESH STATE

Study Area: In different areas one Soil sample and the Water sample collection of area are two major contributor to the burden of biodiversity.

Collection of Soil and Water Samples: In this paper work total two samples were collected (one soil and one water samples), Soil (sample-1) is located in the Vizag, near Bheemili River (Estuarine region) and Water (sample-2) is collected from Antarvedi (Bay of Bengal), at Sakhinetipalli, Dist: East Godavari, Andhrapradesh. soil samples was collected in plastic bag and transferred to polyethylene bottle that had been soaked in 5 M HCl for more than three days before being rinsed with distilled-deionized water. The Water sample was collected at the 1 mm bottom of the bottles.

Analysis of Parameters: The collected soil and water samples were taken to the laboratory and kept at 34°C to 37°C for further study. The period of study is from November 2019 to April 2020. PH, TDS MG / L, Phosphates PO_4 Mg / L, Nitrogen, DOD MG / L, BOD MG / L, COD MG / L, Potassium. As K mg/L. Two samples were analysed individually. Parameter analysis of Atmospheric temperature and Water temperature were measured and recorded using on-the-spot thermometers [15]. Salinity was measured using an Etago refractometer (Arumugam and Sugirtha Kumar, 2014). The pH value is measured by employing a pH meter. Total nitrogen is measured using the Kjeldahl (Nessler's reagent Spectrophotometry method). Potassium was estimated using the tetraphenylborate method. The revised oxygen estimate is measured by the modified Winkler method. In addition to the biochemical oxygenation method, chemical oxygen demand is also measured. Total dissolved solids and Potassium levels were measured for both Soil and Water samples.

Statistical Analysis: Data obtained were statistically analyzed using one-way ANOVA. An essentialness level of 0.05 shows a 5% danger of inferring that distinctions exist when there is no genuine contrast.

RESULTS:

Physico-Chemical Parameters: Generally, Physico-chemical parameters of soil such as Temperature, pH, TDS mg / L, Phosphates as PO_4 mg / L, Nitrogen, BOD mg / L, COD mg / L and Potassium as K mg / L were analyzed. Soil and water samples were collected randomly. The Physico-Chemical parameters were analyzed for both Soil & Water samples and the codes were given as sample-1 is Soil of Vizag near Bheemili River (Estuarine region) Andhrapradesh and samples-2 is Water of Antarvedi (Bay of Bengal) at Sakhinetipalli, East Godavari District, Andhrapradesh. Sample-1 is dissolved in water ratio (1:2) the analysis of all physico–chemical parameters and sample-2 is analysed directly of physico-chemical parameters.

Temperature (^{O}C): In the tropics, aquatic species frequently occur between 8^0C and 32^0C of distance (Alabaster and Steven Lloyd, 1980). Soil temperatures are controlled by all chemical reactions and have an impact on plant root development, reproduction, and immunization. Inconsistent temperature changes can be harmful to plant organisms. The Temperature of the soil sample and water samples between the study sites showed little variation (28.0^{O}C – 32.9^{O}C). The Temperature of sample-1 (28.2 to 30.5^0C) and sample-2 (30.2 to 31.4^0C) respectively.

pH: The quality of soil and water is greatly influenced by pH. The more corrosive the soil environment, the lower the pH. Total alkalinity and electrical performance had a favourable correlation with pH. (Gupta *et al.*, 2009). The concentrations of free CO_2, carbon, and bicarbonate control the pH variations in soil and water. Other physico-chemical parameters that affect the quality of the soil and water are also changing in tandem with these changes. There are places where the pH is almost neutral. The soil and water samples have pH values of 7 and 7.64, respectively. The pH values of the sample-1 (pH 7.68) and sample-2 (pH 7.22) are given. This result indicates that the two samples are neutral. (Boyd and Lichtkoppler, 1979), reported a pH range of 6.09 - 8.5 as suitable for supporting aquatic life including microbial organs, Fish and Agricultural crops. The results indicate that the pH is within the permissible limit for the growth of aquatic and plant organisms.

Dissolved Solids (TDS): A liquid, ionised, or micro-granular suspension's total dissolved solids (TDS) is a measurement of the total amount of all organic and inorganic materials present. Some of the most naturally occurring dissolved organic matter comes from weather extremes and the dissolution of Soil and Water samples. The TDS mg / L (Total Non-volatile Solution) of the sample-1 is (198.30) and sample-2 (162.5) respectively. The quality of the soil and water samples were correct and the quality of both the samples were acceptable. The soil you receive should exceed the level of TDS that should be present in the soil and water. Generally standard values of Soil and Water with a TDS level above 1000mg / L are not suitable for use. TDS levels that are too high in soil and water can cause a variety of health issues. TDS levels in the soil and water are raised by the presence of potassium, sodium, and chlorides.

Phosphates: Both the samples were examined to determine how phosphates react with the molybdate ions in an acidic environment to produce the yellow colour. The phosphate level in sample-1 is (34.24.) and in sample-2 is (10.42). This exploits rapid growth and consecutive problems.

Nitrogen (Nessler's reagent Spectrophotometry Method): By staining the complex with Nessler's reagent, nitrogen is spectrally detected at the wavelength of 425nm. Alkaline reaction conditions result in significant disruption due to the soil hardening and water. The Nitrogen level in sample-1 is (134.2) and in sample-2 is (126.10). The acceptable range for total nitrogen is 2mg / L to 6mg / L.

Dissolved Oxygen (Do) (Modified Winkler Method): One of the most crucial qualities are dissolved oxygen. Both direct and indirect information, such as bacterial activity, photosynthesis, gene availability, stratification, *etc*., is provided through its relationship to the Soil and water samples body (Premlata Vikal 2009). The organic carbon (%) level in sample-1 is (0.40%) and in sample-2 is (0.24%) respectively.

Biological Oxygen Demand (BOD): Biological Oxygen Demand which is measured in mg/L. BOD measures the amount of dissolved oxygen

necessary for the chemical removal of organic compounds and liquid hydrocarbons (such as iron and sulfites). Biological Oxygen Demand (BOD) tests are typically run over the course of five days. The amount of oxygen consumed by living things to break down this waste is measured by BOD. The most polluted water body will have a BOD above 8 mg/L, while the median contaminated soil and water body has a Biological Oxygen Demand of 2 to 8 mg/L. The BOD level for sample-1 is (16.4) and for sample-2 is (18.50). So, both the samples were not polluted.

Chemical Oxygen Demand (COD): Another type of measurement for pollution in soil and water is COD, which is measured in mg/L. COD is the quantity of oxygen needed to produce organic matter's chemical emissions. The COD level in sample-1 is (179.2) and in sample-2 is (178.6) respectively. The majority of pollution control efforts centre on COD because it also measures lower levels of chemicals like sulphides, sulfites, iron ferrous, and organic carbon. COD is a good indication of chemical contaminants in water. Important environmental health markers for surface of Soil and Water input are Biological Oxygen Demand and Chemical Oxygen Demand respectively.

Potassium (Tetraphenylborate Method): Utilizing the Tetraphenylborate technique, potassium is measured. The insoluble white solid potassium tetraphenylborate is created when potassium in the sample reacts with sodium tetraphenylborate. The quantity of turbidity created is proportional to the potassium concentration. Potassium level in sample-1 is (34.31) and in sample-2 is (10.38) respectively.

TABLE 1: PHYSICO-CHEMICAL PARAMETERS OF BOTH SOIL AND WATER SAMPLES

S. no.	Parameter	Sample -1 Soil of Vizag near Bheemili Area (Estuarine region)	Sample -2 Water of Antarvedi (Bay of Bengal) at sakhinetipalli
1	Temperature	28.2^{0}C to30.5^{0}C	28.2^{0}C to30.5^{0}C 30.2^{0}C to 31.4^{0}C
2	pH (Hydrogen ion concentration) Soil: water(1:2)	7.68	7.22
3	EC (dS m^{-1})	0.39	0.21
4	TDS mg/L	198.3	162.5
General Parameters			
5	Phosphate as PO4 kg/ha^{-1}	34.24	10.42
6	Nitrogen (total nitrogen) (kg ha^{-1})	134.2	126.2
7	Organic carbon (%)	0.40%	0.24%
8	BOD mg/L (Biological oxygen demand) (ppm)	16.4	18.50
9	COD mg/L (chemical oxygen demand) (ppm)	179.2	178.6
10	Potassium as (K) Kg/ha-1	34.31	10.38

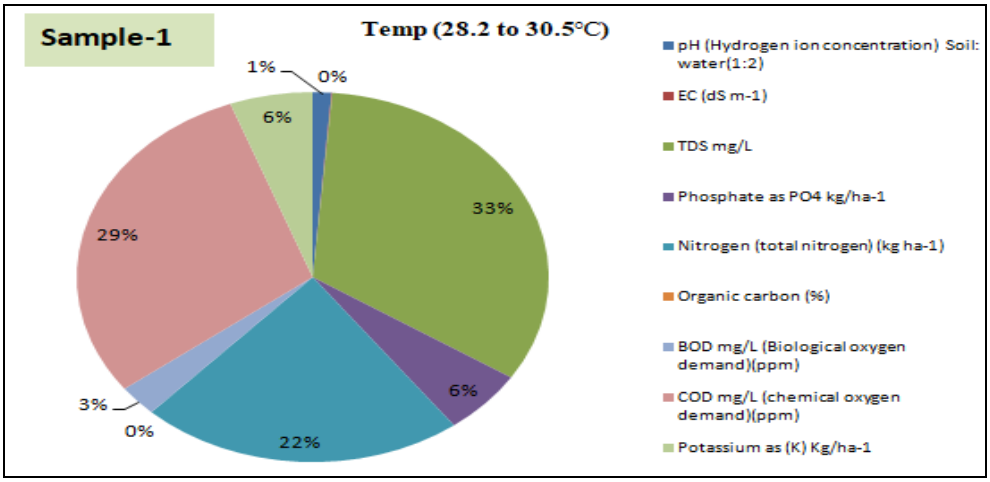

FIG. 2: PHYSICO-CHEMICAL PARAMETERS OF SOIL SAMPLE (SAMPLE-1)

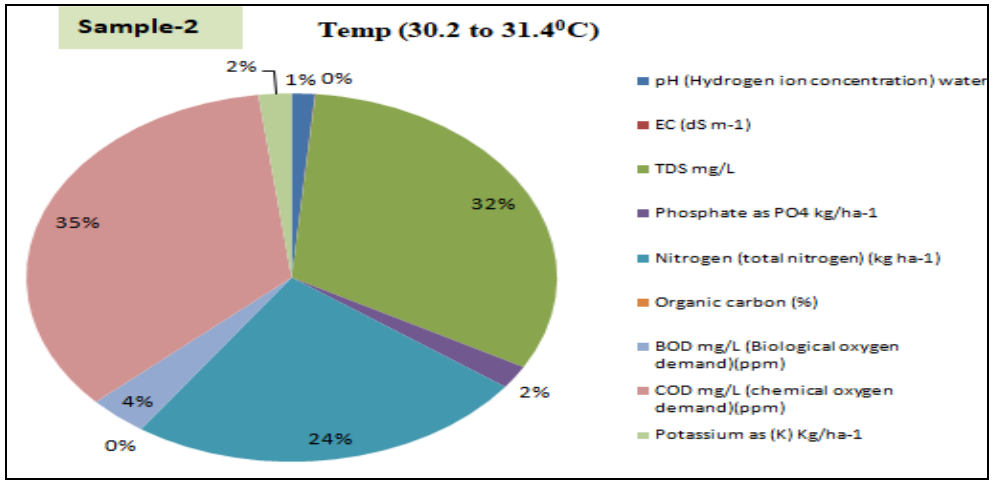

FIG. 3: PHYSICO-CHEMICAL PARAMETERS OF WATER SAMPLE (SAMPLE-2)

Water sample was collected along with some mud in polythene bottles filled up to the rim. Samples were analyzed for physical parameters like color, turbidity, Temperature taste, pH, EC, TDS, Phosphate, Nitrogen, Organic carbon conductivity and Total Dissolved Solids, BOD and COD were analyzed in the laboratory following the Standard procedures. Data recorded was shown in **Table 1.**

DISCUSSION: After existing research shows that Vizag soil and Anthervedi water have little impact on water pollution and this study can be used to monitor soil and Bay of Bengal is river water quality to maintain aquatic ecosystems and resources. Water pollution is a major problem as it is not only hurts health but can also have devastating effects on various Industries and Agriculture. This study also provides basic information on the physical chemical parameters of Vizag soil and Antharvedi water which may be useful for the assessment of land-based changes that may occur over time due to climate change and anthropogenic activities.

CONCLUSION: Existing research shows that Vizag soil is good, but Antarvedi water has little impact on water pollution and this study can be used and compared the different locations of soil and water quality to maintain aquatic ecosystems and resources. Water pollution is a major problem as it is not only hurts health and can also have devastating effects on various Industries, Agriculture and Horticultural crops. And microbial degradation of pollutant soil and water activity.

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CONFLICTS OF INTEREST: Nil

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