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AN ANALYSIS OF WATER BODIES IN AN AREA OF DHARNI, MELGHAT REGION

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ABSTRACT:

Water bodies were analyzed for Physico chemical parameters for a period of a year (January 2020 to December 2020). The available freshwater is not accessible to all people due to differences in geographical, geological, climate, and demographic reason. Global literature survey reveals that 70 % of earth surface is covered by water. Although it is surprising that there is shortage of pure freshwater because more than 97 % water is marine and only 3 % fresh, soft water is suitable for human consumption and other uses. Physical properties of aquatic ecosystems are determined by a combination of heat, currents, waves and other seasonal distributions of environmental conditions. The morphometric of a body of water depends on the type of water body such as a lake, river, stream, wetland, estuary etc. and the structure of the earth surrounding the body of water. Lakes, for instance, are classified by their formation, and zones of lakes are defined by water depth. River and stream system morphometric is driven by underlying geology of the area as well as the general velocity of the water.

Keywords: Physico chemical parameters, Physical properties, Melghat Region

INTRODUCTION:

Water is probably the only natural resource to touch all aspects of human civilization from agricultural and industrial development and having the cultural and religious values. Now a days, this freshwater has become the fastest depleting natural resources globally. Only a small percentage of water exists as freshwater, and the portion accessible to human is again a negligible part of its global sock the surface water bodies such as rivers and lakes. However, knowingly or unknowingly, it is this rarest of resource, which we abuse severely. Ignorant irresponsible and careless management has brought the water of the world to serious depletion. The available freshwater is not accessible to all people due to differences in geographical, geological, climate, and demographic reason. Global literature survey reveals that 70 % of earth surface is covered by water. Although it is surprising that there is shortage of pure freshwater because more than 97 % water is marine and only 3 % fresh, soft water is suitable for human consumption and other uses.

A high temporal and geographical variability of rainfall in this country a reservoir operation occupies an important place in the

utilization of water resources. Water quality becomes an important parameter for the assessment and management of surface water. Accurate information on the condition and trends of water resources quantity and quality is required as a basis for economic and social development and for the development and maintenance of environmental quality. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water human population suffers from varieties of water borne diseases [5].

The nature of threats to fresh water resources is almost uniform across the state, though some of them may be site specific. The major threats identified in the state vary in character and intensity. The main causes being change in land use, catchment degradation, irrational use of water, ground water depletion, domestic and industrial pollution, Eutrophication, intrusion of exotic weeds, local biodiversity loss, crossing of carrying capacity of wetland, climate change, droughts, floods, disaster, social economic regional disparities and issues, and local and trans boundary conflicts. Most of these cause negative and cumulative environmental impacts and are incremental with time having long-term effect. The changing attitude of the people for modern lifestyles and the dilemma between Growth V/s Developments are some of the common factors in aggravating the threat perception in rapidly industrializing state of Maharashtra. In the last few decades it is increasingly realized that there is exponential increase in the environmental problems in the state, just as in the whole country [10].

The fresh water resources not only support the live-hood but also cover the rich biological diversity. The biological diversity of the earth and its origins has long been a source of amazement and curiosity. Current interest in diversity centers both on why there are so many species and on how diversity impacts population and ecosystem processes. However, the accelerating effects of human activities on biodiversity and the possibility that the loss of biodiversity might impact ecosystem functioning renewed interest in the effects of diversity on ecosystem processes and on ecosystem services essential to society[3].

The water quality is mostly analyzed by its physicochemical properties of aquatic ecosystems are determined by a combination of heat, currents, waves and other seasonal distributions of environmental conditions. The morphometric of a body of water depends on the type of water body such as a lake, river, stream, wetland, estuary etc. and the structure of the earth surrounding the body of water. Lakes, for instance, are classified by their formation, and zones of lakes are defined by water depth. River and stream system morphometric is driven by underlying geology of the area as well as the general velocity of the water. Another type of aquatic system which falls within the study of limnology is estuaries. Estuaries are bodies of water classified by the interaction of a river and the ocean or sea. Wetlands vary in size, shape, and pattern however the most common types, marshes, bogs and swamps, often fluctuate

between containing shallow, freshwater and being dry depending on the time of year [4, 8, 9, 15].

MATERIALS AND METHODS:

The study was conducted during study periods to analyze the physicochemical status of water bodies. The effective protocol was adopted. The applied methods were as mentioned below.

STUDY AREA:

Maharashtra state has occupied a pride to be at the heart of the country. It has also received a ecologically fragile western coast of 500 km and its geographical area also has received the benefits of being situated at the southern tip of the Satpudas Mountain and at the east at Western Ghats. This geographical situation of the state has bestowed with rich flora and fauna flourished. These two Western Ghats and Satpudas have gifted many rivers and water bodies to the state. However, irrigation department have tapped these water sources and created good water potential for the development of the state. The reservoir selected for the present investigations is also one of the important water bodies present in an around area of Dharni of Melghat Region.

Field Visit and Sample Collections

Water samples were collected from the lake early in the morning from different stations. Samples for Physico-chemical analysis were collected manually from two different depths. Samples were collected from surface (1-2 cm) and bottom (maximum 10 meters) regions of the reservoir. Variations occurred in sampling according to the variations in water level of the reservoir. Samples were collected directly from the surface of water with the help of 2 liters acid cleaned bottles [13] and samples were transferred to the acid cleaned 2 liters polythene bottles using a plastic tube. All possible precautions were taken to avoid air bubbles. These water samples were kept in darkness packed in an ice boxes at 4^0 C till the samples reached laboratory for analysis.

OBSERVATION AND RESULT:

The study was conducted during a period of a year (January 2020 to December 2020) to analyze the physicochemical status of water bodies. The following table represents the physicochemical status.

The study revealed the rich zooplankton diversity. The observed status of zooplankton diversity was mostly related to the studied physicochemical parameters. The observed results were correlated and significantly different at $p<0.05$. The results shows the positive relation between these physicochemical parameters such as Water Temperature, pH, Total Dissolve Solids, Total Hardness, Total Alkalinity and Chlorides, with observed zooplankton diversity. But comparing with BIS drinking water standard, the water of these sites is not that much suitable for drinking purpose but can be used for drinking after proper processing/ filtration. But water of reservoir is suitable for irrigation and fish culture.

Water is probably the only natural resource to touch all aspects of human civilization from agricultural and industrial development and having the cultural and religious values. Water is a necessity for all living beings, without it; there would be no life. Life originated in water and ultimate basis of it, the protoplasm is a colloidal

solution of complex organic molecules in a watery medium. Water is essential at all levels of life, cellular to ecosystem. It is essential for the circulation of body fluids in the plants, animals and it stands as the key substance for the existence and continuity of life through reproduction and different cyclic processes in nature. It plays the central role in mediating global scale ecosystem processes, linking atmosphere, lithosphere and biosphere, by moving substances among them, and enabling chemical reactions to occur. Humans depend on these resources for all their needs of existence and survival. Understanding such aquatic life requires a sound knowledge not just of the organisms themselves but also of these external influences of media that affects them.

The freshwater ecosystems include rivers, streams, lakes, ponds and springs and the total water content of these systems is called terrestrial waters. The main source of terrestrial water is rainfall, although thermal spring beneath the earth's surface also contributes to the freshwater systems. The amount of freshwater on earth is insignificant as compared to that of the world ocean; yet the freshwater ecosystems; the rivers are important geo-chemically because they are responsible for the most of the weathering erosion of landmasses. A large proportion of the fresh water is stored as ice and snow at higher altitudes and around the poles or ground water as and less than 0.5 % is available for use by organisms, including for human civilization. However, increasing human populations have resulted accelerating demands on water supplies for drinking, industrial, hygiene and agricultural process.

Wetlands are the most productive ecosystems of the world. They are unique and many wetlands are as old as or older than rivers. These are the transitional zones where the flow of water, the cycling of nutrients and the energy of the sun meet to produce a unique ecosystem characterized by hydrology, soil and vegetation. The water reservoirs play a major role in agricultural, fishery and electricity production along with the use of water for drinking purposes. Several factors which determine the water quality of a reservoir includes seasonal climatic changes [2].

Water temperature is an important factor which influences the chemical, biochemical and biological characteristics of river water. The temperature is a physical quantity that expresses the subjective perceptions of hot and cold. Temperature is measured with a thermometer, historically calibrated in various temperature scales and units of measurement.

The pH is one of another most important factor in measuring water quality. The pH is a numeric scale used to specify the acidity or alkalinity of an aqueous solution. It is approximately the negative of the base 10 logarithm of the molar concentration, measured in units of moles per liter, of hydrogen ions. More precisely it is the negative of the base 10 logarithm of the activity of the hydrogen ion. Solutions with a pH less than 7 are acidic and solutions with a pH greater than 7 are basic. Pure water is neutral, at pH 7, being neither an acid nor a base. Contrary to popular belief, the pH value can be less than 0 or greater than 14 for very strong acids and bases respectively.

Transparency is clarity of water which inversely proportional to turbidity. The turbidity is the cloudiness or haziness of water caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality. Water can contain suspended solid matter consisting of particles of many different sizes. While some suspended material will be large enough and heavy enough to settle rapidly to the bottom of the container if a liquid sample is left to stand, very small particles will settle only very slowly or not at all if the sample is regularly agitated or the particles are colloidal. These small solid particles cause the liquid to appear turbid.

Total dissolved solids (TDS) is a measure of the combined content of all inorganic and organic substances contained in a liquid in molecular, ionized or micro- granular suspended form. Generally the operational definition is that the solids must be small enough to survive filtration through a filter with two-micrometer pores. Total dissolved solids are normally discussed only for freshwater systems, as salinity includes some of the ions constituting the definition of TDS. The principal application of TDS is in the study of water quality for streams, rivers and lakes, although TDS is not generally considered a primary pollutant. It is used as an indication of aesthetic characteristics of drinking water and as an aggregate indicator of the presence of a broad array of chemical contaminants.

Hard water is water that has high mineral content. Hard water is formed when water percolates through deposits of limestone and chalk which are largely made up of calcium and magnesium carbonates. Hard drinking water may have moderate health benefits, but can pose serious problems in industrial settings, where water hardness is monitored to avoid costly breakdowns in boilers, cooling towers, and other equipment that handles water. In domestic settings, hard water is often indicated by a lack of foam formation when soap is agitated in water, and by the formation of lime scale in kettles and water heaters. Wherever water hardness is a concern, water softening is commonly used to reduce hard water's adverse effects.

Total alkalinity refers to the ability of the pool water to resist a change in pH. The key purpose total alkalinity serves is to help control the pH in the pool. It is the name given to the quantitative capacity of an aqueous solution to neutralize an acid. Measuring alkalinity is important in determining a stream's ability to neutralize acidic pollution from rainfall or wastewater. It is one of the best measures of the sensitivity of the stream to acid inputs. There can be long-term changes in the alkalinity of streams and rivers in response to human disturbances.

In aquatic environments, oxygen saturation is a ratio of the concentration of dissolved oxygen (O_2) in the water to the maximum amount of oxygen that will dissolve in the water at that temperature and pressure under stable equilibrium. Well-aerated water such as a fast-moving stream is without oxygen producers or consumer is 100% saturated. It is possible for stagnant water to become somewhat supersaturated with oxygen either because of the presence of photosynthetic aquatic oxygen producers or because of a slow equilibration

after a change of atmospheric conditions. Stagnant water in the presence of decaying matter will typically have an oxygen concentration much less than 100%.

The chloride ion is formed when the element chlorine gains an electron or when a compound such as hydrogen chloride is dissolved in water or other polar solvents. Chloride salts such as sodium chloride are often very soluble in water. Chloride is also a useful and reliable chemical indicator of aquatic fecal contamination, as chloride is a non-reactive solute and ubiquitous to sewage & potable water.

The findings of present study cleared that the seasonal fluctuations in water properties. While comparing with BIS drinking water standard, the water of these sites is not much suitable for drinking purpose but can be use for drinking after proper treatment. Physico-chemical status showed that the water is suitable for irrigation and fish farming. The study also revealed the rich zooplankton diversity. The observed status of diversity was mostly related to the studied physico-chemical parameters. The results showed the positive relation between these physico-chemical parameters such as Water Temperature, pH, Turbidity, Total Dissolve Solids, Total Hardness, Total Alkalinity, Dissolve Oxygen, Chlorides, Sulphates, Magnesium, Nitrate and Phosphate with number of zooplankton species. [6, 7, 11, 12, 14]

SUMMARY AND CONCLUSION:

The study was conducted during a period of a year (January 2020 to December 2020) to analyze the physicochemical status of water bodies of Dharni. The results shows the positive relation between these physicochemical parameters such as Water Temperature, pH, Total Dissolve Solids, Total Hardness, Total Alkalinity, Chlorides

But comparing with BIS drinking water standard, the water of these sites is not that much suitable for drinking purpose but can be used for drinking after proper processing/ filtration. But water of reservoir is suitable for irrigation and fish culture.

According to physicochemical status, the present lake seems to be productive but moderately polluted due to agricultural run-off and domestic sewage which is indirectly suggests the beginning of eutrophication. These data would be helpful in planning for future policy decisions on using the reservoir as drinking water source as well as in the better conservation and management.

Though the water body under investigation is not severely polluted but requires careful monitoring in the future to maintain quality of water by proper means. Supervision of experts and remedial measures are essential for rehabilitation and conservation of for long duration.

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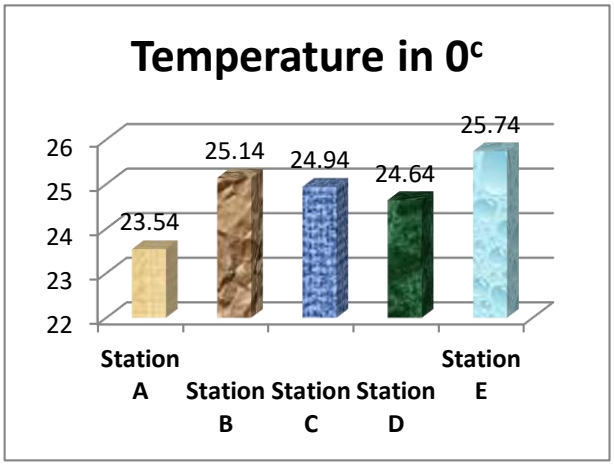
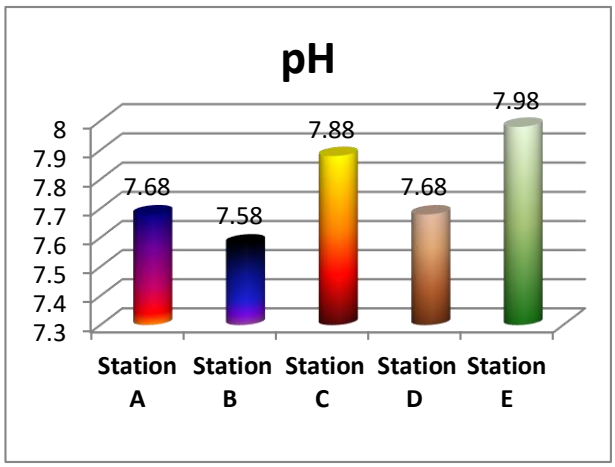
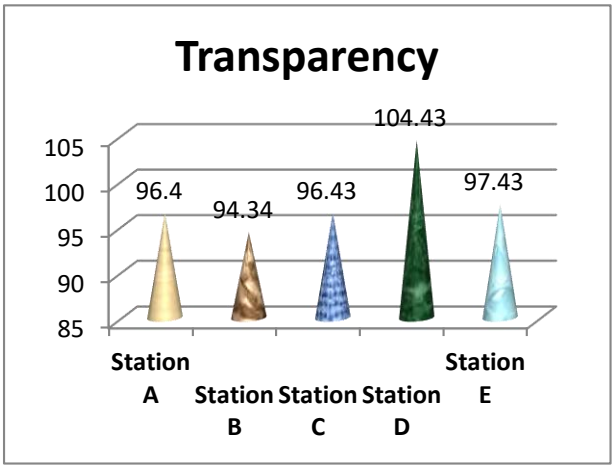
Sampling Stations for Study

The physicochemical status of water body

Parameter	A	B	C	D	E	Mean	± SD
Temperature	23.54	25.14	24.94	24.64	25.74	24.80	0.811
pH	7.68	7.58	7.88	7.68	7.98	7.76	0.164
Transparency	96.40	94.34	96.43	104.43	97.43	97.83	3.847
TDS	259.55	259.55	269.75	270.15	259.55	263.71	5.698
Tot. Hardness	126.12	124.54	130.68	132.27	133.28	129.38	3.850
Tot. alkalinity	182	184	184	185	187	186.4	3.362
DO	11.3	11.0	11.0	11.2	11.2	11.14	0.134
Chlorides	9.93	9.83	9.83	10.13	10.13	9.97	0.152






Transparency
105
100
95
90
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104.43
97.43
Station A
Station B
Station C
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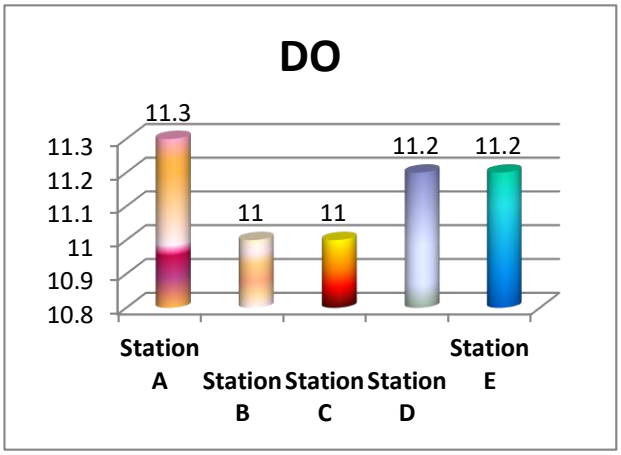
Station E


DO
11.3
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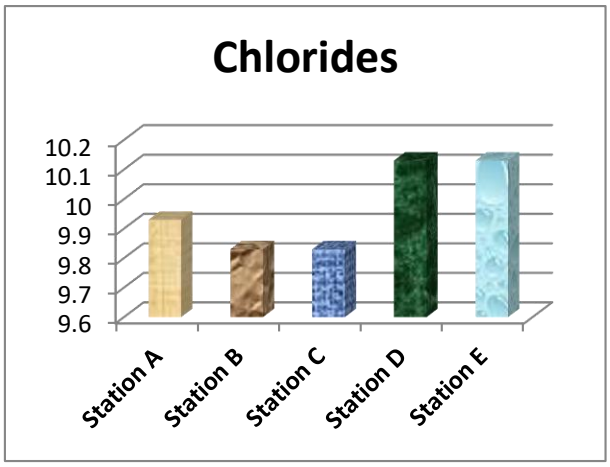
Chlorides
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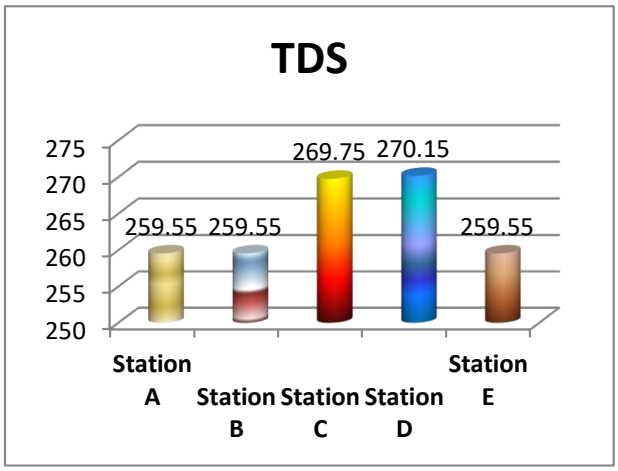
TDS
275
270
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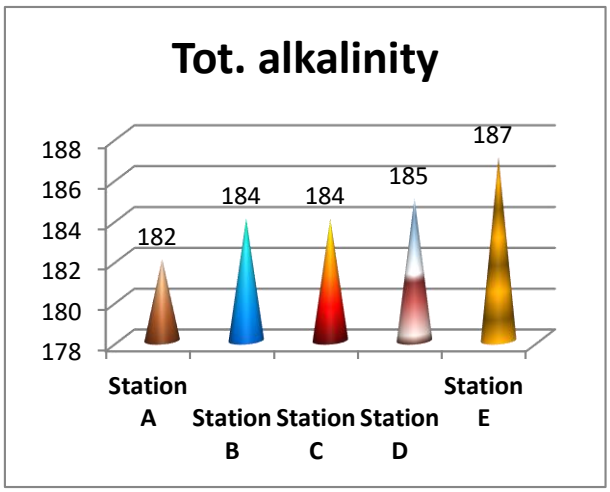
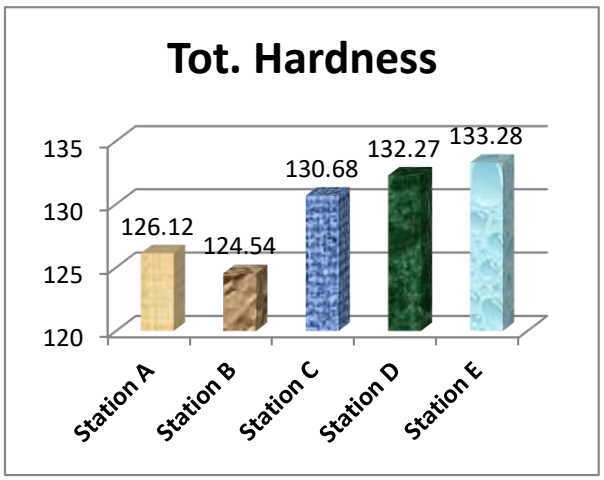

Tot. alkalinity
188
186
184
182
180
178
182
184
184
185
187
Station A
Station B
Station C
Station D
Station E


Tot. Hardness
135
130
125
120
126.12
124.54
130.68
132.27
133.28
Station A
Station B
Station C
Station D
Station E