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Assessment of Water Quality Parameters in different points of Pulivendula Constituency

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ABSTRACT:

Water is crucial in forming the terrain and regulating the climate. It is one of the most vital molecules that have a significant impact on life. Water quality is often defined by its physical, chemical and biological properties. Rapid industrialization and the uncontrolled use of chemical fertilizers and pesticides in agriculture are producing heavy and diverse pollution in the aquatic environment, resulting in deterioration of water quality and biota depletion. Water-borne diseases affect the human population as a result of the usage of contaminated water. As a result, the water quality must be checked at regular intervals. **Temperature, pH, Turbidity, Salinity, Nitrates and Phosphates** are some of the parameters that can be measured. An examination of aquatic macro invertebrates can also provide information about water quality. Water samples were taken from several spots throughout the Pulivendula Constituency and tested for various water quality criteria. The research was carried out in the ground water areas of **Lingala, Vemula, Ippatla, Gondipalli and Ambhakapalli**. The physical, biological and chemical properties of ground and surface water are being determined at various places in this investigation.

Key words: pH, Conductivity, TDS, Salinity, Temperature, Ground cum surface water.

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INTRODUCTION:

India is experiencing a severe challenge with the lack of natural resources, particularly water due to population increase and economic expansion. Water's mobility is decreasing as the majority of fresh water bodies on earth become contaminated. Water is the basis of all life and it manifests itself in nature in a variety of ways, including as clouds, rivers, lakes, rain, snow and fog. But strictly speaking, naturally occurring chemically pure water doesn't last very long. For all intents and purposes, pure water is thought to be that which contains low dissolved or suspended particles, unpleasant gases, as well as low biological life (**Castrillo *et al.*, 2020**). A lake is a huge body of water that is surrounded by land and is home to many aquatic life forms. Only drinking water may require such high quality, although for other applications, such as agriculture and industry, the quality of water can be very flexible and, generally speaking, water that has been polluted up to a certain amount can be regarded as pure **(Chen, K. *et al.*, 2020b)**. The health of nearly every element of the ecosystem is directly correlated with the biological diversity and health of lakes. With extraordinary development activities, lakes are also subject to a variety of natural environmental processes including the hydrologic cycle; people are to blame for suffocating a number of lakes. Some of the frequent ways that different nutrients infiltrate aquatic ecosystems and lead to their demise includes storm water runoff and sewage discharge into lakes. A lake ages as a result of the buildup of nutrients, sediments, silt, and organic matter from the nearby watershed. This process is known as eutrophication. It has been proven that plants and sediments serve as both sources and sinks of nutrients. It depicts the biological response of aquatic systems to nutrient enrichment, which leads to the eventual increase of primary production to obtrusive levels. The primary culprit is the excessive phosphate and nitrogen added, which causes a rise in algal biomass, the domination of cyanobacteria, and the disappearance of macrophytes. (**Gorde *et al.*, 2013**).

From "groundwater development" to "groundwater management," a paradigm change has happened recently **(Chou *et al.*, 2018)**. Due to the rapidly increasing demand for water brought on by population expansion, irrigation, urbanisation and changing lifestyles, many areas of India, especially hard rock areas, are now experiencing water stress. Aquifer mapping in various hydrogeological contexts is therefore designed and put into practise to enable effective groundwater management strategies, in order to have an accurate and thorough microlevel picture of groundwater in India. (**Aquifer mapping and management of ground water resources, 2019**).

Ground water occurrences and movement: The flow of ground water from the worn zone into the fracture zone happens under unconfined, semi-confined, and confined circumstances. At the top are the primary aquifers, which are followed by a separate anisotropic fractured/fissured zone that typically extends to a depth of 200 m. Storage in granite rocks is mostly restricted to the weathered zone, and because of overexploitation, primarily for irrigation purposes, the weathered zone has become significantly less saturated in many locations (**Ali El Bilali *et al.*, 2020**). Typically, the weathered zone is up to 10 metres thick. in the majority of the granitic region. By building shallow or deep bore wells, ground water in

a fractured zone can be developed. The weathered component of the formation has a thickness of roughly 10 m.bgl, and it is where ground water in the Meta sediments occurs under conditions of a water table (**Palanisamy *et al.*, 2020**). By building deep bore wells that reach a depth of 300 m.bgl, ground water in fractured zones is developed. (**Aquifer mapping and management of ground water resources, 2019**).

MATERIALS AND METHODS: Standard methods were adapted for the analysis of various water quality parameters **APHA-AWWAWPCF (1989)**. For the analysis of water quality parameters and pesticides, 1 L glass bottles and 1 L polypropylene bottles were both used. All bottles were cleaned with acetone and then distilled water before being dried in an oven prior to sample collection. Water samples were taken at each test site in two polypropylene and one glass bottles. The bottles were thoroughly cleaned three times with the water that would be used for the final water tests. Date and sampling source information was written on the sample bottles. Additionally, details were acquired regarding the kinds of herbicides and fertilizers being applied close to sampling locations. From July 7th -2022, samples were collected. A group of students carried out the research under the guidance of Mr. G. Sankaraiah, mentor. At the moment, it aids a user in anticipating changes in pH, Conductivity, TDS, Salinity, Temperature, DO, Nitrogen, Phosphorus and Heavy Metals as these travel through various stages of pollution in Ground water systems. With the easily available data from the field trial, the sub-models have been validated. (**Alam *et al.*, 2007**).

RESULTS:

Physical environmental parameters: Water samples were taken from the several points in the Pulivendula constituency, including Lingala, Ippatla, Ambakapalli, Gondipalli and Vemula, and they were examined for physical characteristics, chemical compositions, and microbial counts. Ten sampling locations were chosen, each 250 metres apart. The crucial water quality parameters were examined, including conductivity, DO, pH, TDS, DS, density, ORP, TH, faecal coliform and NH3. Five sites were used to analyse the concentrations of iron, lead, sodium, magnesium, calcium, chromium, copper and zinc. Dissolve oxygen standards for maintaining aquatic life are 4 mg/L and 6 mg/L, respectively, for drinking purposes. According to Table 1, the DO value for our samples along our specific reach ranges from 10 mg/L (dry) to 15 mg/L.

Table 1. – Statistical analysis of environmental parameters

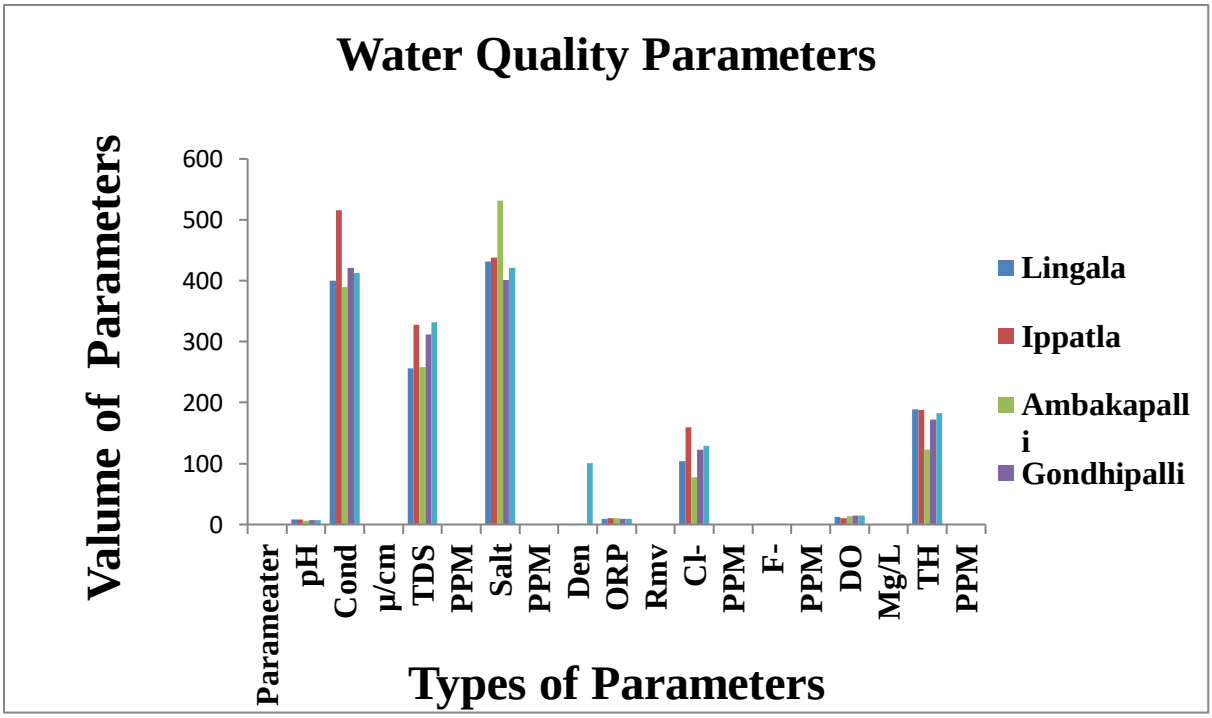
Place/ Parameater	Lingala	Ippatla	Ambakapalli	Gondhipalli	Vemula	Standard values in Drinking water
pH	8.0	7.8	6.1	6.8	6.7	6.5-8.5
Cond µ/cm	400	516	390	421	413	179.3–20 µS/cm
TDS PPM	256	328	258	312	332	50-150ppm
Salt PPM	432	438	532	401	421	500 ppm
Density	1.03	1.07	1.09	1.02	101	997 kg/m3
ORP Rmv	9.3	10.1	10.5	9.4	9.6	300 and 500 mv

Cl^- PPM	104	160	78	123	129	1.0 to 4.0 Mg/L
F^- PPM	0.3	0.5	0.2	0.6	0.5	0.5-1ppm
DO Mg/L	12	10	13.2	15	14.3	4Mg/L
TH PPM	189	188	123	172	183	100 mg/l

(The research values are comparing with standard values**)**

Water Quality Parameters: Government Bore wells on 7.07.2022

Fig. 1- Graphical presentation of physical characteristics' of water quality parameters



The pH of water is a good predictor of whether it is acidic or alkaline. The pH range for all purposes is 6.5-8.5; hence, our research's results were most significant in Lingala and substantial in Ambakakapalli. A pH of more than 8 suggests water that is only slightly acidic. The pH data from ten sampling locations are represented visually in the following Fig. 1. Concentrations of all solids at particular locations the capacity to assimilate waste increases in the ground level system, which accounts for this variance. Silt and clay particles found in the surface and ground water is the primary cause of higher total solids readings.

According to our research findings, more than ten samples from each chosen area were analyzed. We listed standard values based on WHO records and the values of our findings are shown in Table. 1

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Our research revealed that the ORP readings in several fields in the Pulivendula area were 9.3, 10.1, 10.5, 9.4 and 9.6 ppm (Lingala, Vemula, Ippatla, Gondipalli, and Ambhakapalli). In healthy waters, the ORP should register high between 300 and 500 millivolts. As to the global WHO standard, the most preferable level for TH is 100 mg/l.

The results for the above-mentioned fields for water density are 1.03, 1.07, 1.09, 1.02 and 101. 997 kg/m3 is the typical water density at 25 degrees Celsius. 256, 328, 258 312 and 332 ppm are the TDS levels in the various samples that were tested. 50 to 150 is generally regarded as the most optimal and acceptable range for TDS in drinking water. Total dissolved salts are expressed in milligrammes or parts per million per unit of water (PPM). The Bureau of Indian Standards has specified a maximum concentration threshold of 500 ppm for drinking water; nevertheless, the salt concentrations found in our research are 432, 438, 532, 401, and 421 ppm.

The EC value should not be greater than 400 S/cm, as per WHO guidelines. According to the current investigation, the EC value ranged from 179.3 to 20 S/cm µS/cm, with an average value of 192.14 µS/cm. Out of ten samples of recent values, our findings showed that 400, 516, 390, 412 and 413 µS/cm.

Discussion and Conclusion:

Comparative study of the pH levels reveal that the water in the villages under study seems to be within the range. As high level variation in pH will affect the metabolic reactions of the body and have severe consequences on health (**Li *et al.*, 2017**). The Cl^- values are 104-160ppm is within the desirable limit of 250mg/L (By IS10500:1991). The Fluoride content is between 0.3 to 06ppm. It is also within the desirable limit prescribed by Indian Standards (IS10500:1991). These values indicate that the water is suitable for drinking purposes.

In 2019, Krishna water was pumped into lakes/reservoirs of this region. Comparison with our earlier values of certain villages reveals that there is a marked change in the TDS and Conductivity values. Further studies have to be carried out in those villages to ascertain this fact.

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