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Analysis of Physico-Chemical Parameters of Soil and Water In and Around Avaragolla Village, Davangere District

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Abstract
The purpose of the present study was to assess the current state of soil and water physico-chemical parameters. Ground water, surface water, and domestic sewage water were the three types of water gathered. The eight dire ctions of the study areaEast (E), West (W), North (N), South (S), NorthWest (NW), NorthEast (NE), South West (SW), and South East (SE)—were used to collect soil and water samples.In May and June, a two month study was carried out for this goal. pH, Electric Conductivity(EC), Moisture Content, Particle/Grain Size Distribution ,Organic Carbon, and Water are examples of soil physico-chemical parameters. Electric conductivity, pH, dissolved oxygen (DO), total hardness, chlorides, and total dissolved solids (TDS) are a few of the physico-chemical characteristics that were examined. All of the samples' physico chemical values for the soil and water were well within the WHOpermitted limits for these variables as well as the standard limits for irrigation and agricultural standards.

Keywords: *Soil, Water, Physico-Chemical Parameters.*

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I. INTRODUCTION

A thin layer of the ground's surface that serves as a normal substrate for plant development is what is meant by the term "soil." In time, biological and natural elements like climate, parent material, geology, and creatures have an impact on soil, an unconsolidated mineral substance. Additionally, soil is crucial for preventing global climate change since it acts as the main source and sink for greenhouse gases. Today's society depends on soil for a number of essential functions, including those related to food production and health. Protecting this resource and ensuring its sustainable growth are therefore imperative. The five main components of soil are water, mineral stuff, life, organic matter, and air. Soil has a complicated structure. The content of thes e chemicals in the soil fluctuates with location rather than remaining constant. Because soil is an essential natura l resource for human life, soil pollution has become a significant problem. In addition to being a crucial resource for a growing economy and culture, soil is also important for farming, the food industry, and many other endeav ours. Because of this, it is essential to protect these resources to maintain their sustainability.

One of the most important resources that affects human life is water. All living things plants, animals, and humans need it, and it can be supplied naturally from two main sources: fresh water surface (found in lakes and rivers), and ground water. Both bore wells and wells with wells contain groundwater. Water is required for i rrigation, domestic consumption, and industrial supply everywhere in the world. However, groundwater contami nation is a result of urbanisation, industrialization, and population increase. It is challenging to restore the conta minated groundwater. Therefore, maintaining the quality of the groundwater is crucial.Infections are brought on by polluted ground water, according to the WHO, in 80% of cases. A sizable number of pollutants are reintroduc ed into an aquatic system as a result of expanded industrial duties, technological development, an escalating hu man population, abuse of the environment's resources, and run-off from home and agricultural waste. Clean water is really a scarce resource, but it is distributed unevenly around the world, with the vast majority of it being hundreds of kilometres away from populous regions. Rivers in particular are now more polluted than is safe for consumption by humans and aquatic life. Significant challenges were the assessment of environmental effects and the development of a mechanism for continual improvement of soil and water quality.

II. MATERIAL AND METHODOLOGY

2.1 Study Area

The village of Avaragolla is chosen as the study area The distance between Davangere city and Avaragolla village is 12 kilometers. Inside the middle of the Karnataka, among latitudes of 13° 5' & 14° 50' N & the longitude of 75° 30' & 76° 30' E, sits on the Davangere district, which is 602.5 meters above mean sea level. 7.74km^2 is the whole area that Avaragolla occupies. The two main types of soil in this area are black soil and red sandy soil. This location receives 644mm of rain on average per year. The source of water in Avaragolla is Under ground water and Bhati lake water.

2.2 Soil And Water Sampling

During the months of May and June, Water & Soil samples were Collected in the 8 directions of the village of Avaragolla, i.e., E, W, N, S, N-E, N-W, S-E, & S-W. From the earths surface, Soil samples collected at the depth, of 20 cm. Grab sampling is the method used for sampling of soil. For analysis, soil sample samples were placed in clean paper bag and let to air dry for four days. Each sample was ground in an agate-mortar before being put through a sieve with a mesh size of 2 mm stainless steel. The water samples collected are surface water, Borewell water and Domestic Sewage water. Sample containing bottles and containers had clearly labeled.

2.3 Experimentation

The pH of Soil and Water was measured by using pH meter. Electric Conductivity of Soil and Water was carried out by Conductivity meter. Soil Organic Carbon was done by Titration method. Particle Size Distribution was conducted by Wet Sieve Analysis. Moisture Content in Soil was done by Gravimetric method. Total Hardness, Chlorides of Water conducted by Titration method and Total Dissolved Solids was measured by using TDS meter.

III. RESULT AND DISCUSSION

The test's outcomes of Physico-chemical parameters of Water and Soil samples which were collected in the month of May and June were tabulated below.

TABLE 1: Results of Physico-Chemical Properties of the Soil Conducted in the Month of May

Sl No	Parameters of Soil	E	W	N	S	NE	NW	SE	SW
1	pH	7.7	8.1	7.5	7.6	8.0	7.9	8.1	7.8
2	EC	0.4	0.3	0.2	0.2	0.5	0.4	0.7	0.4
3	Organic Matter	3.5	2.82	3.34	3.63	4.1	2.3	4.56	3.7
4	Moisture Content	16.5	12.5	13.6	14.3	17.2	13.4	16.8	14.5
5	Grain Size Distribution	Fine Grained Soil							

TABLE 2: Results of Physico-Chemical Properties of the Soil Conducted in the Month of June

Sl No	Parameters of Soil	E	W	N	S	NE	NW	SE	SW
1	pH	7.85	8.25	7.65	7.72	8.16	8.1	8.21	7.89
2	EC	0.5	0.4	0.3	0.4	0.7	0.5	0.8	0.5
3	Organic Matter	3.75	2.95	3.46	3.72	4.26	2.58	4.77	3.85
4	Moisture Content	18.2	13.8	14.7	175.5	19.5	14.6	17.5	15.8
5	Grain Size Distribution	Fine Grained Soil							

TABLE 3: Results of Physico-Chemical Properties of Water Conducted in the Month of May

Sl No	Parameters of water	E	W	N	S	NE	NW	SE	SW
1	pH	7.2	7.3	7.65	7.7	7.5	7.1	7.45	7.8
2	EC	1.7	0.7	0.7	1.1	1.9	0.7	2.0	0.9
3	Total Hardness	172	255	311	362	186	290	194	340
4	TDS	700	720	1400	1350	800	620	750	1200
5	Chlorides	130	118	78	95	140	112	145	86
6	DO	Nil	5.2	6.7	7.4	Nil	5.6	Nil	6.1

TABLE 4 :Results of Physico-Chemical Properties of Water Conducted in the Month of June

Sl No	Parameters of water	E	W	N	S	NE	NW	SE	SW
1	pH	7.4	7.45	7.8	7.83	7.65	7.3	7.6	7.95
2	EC	1.6	0.55	0.6	0.9	1.7	0.5	1.8	0.7
3	Total Hardness	185	270	325	380	198	310	215	356
4	TDS	745	760	1485	1390	860	650	800	1280
5	Chlorides	142	126	85	102	152	120	153	93
6	DO	Nil	5.8	7.4	8.0	Nil	6.2	Nil	6.9

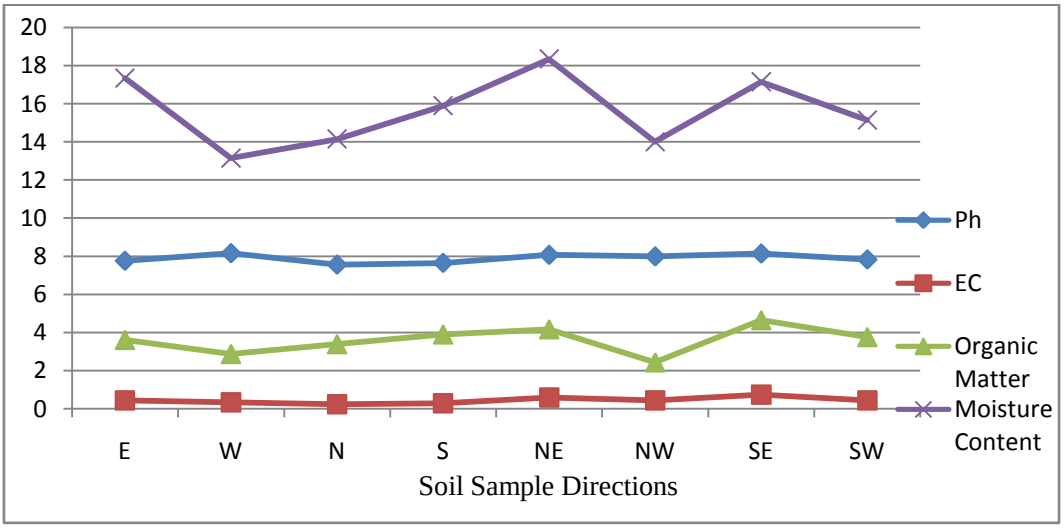

Fig 1 : Average values of pH, EC, Organic Matter and Moisture Content of Soil sample conducted in the month of May and June

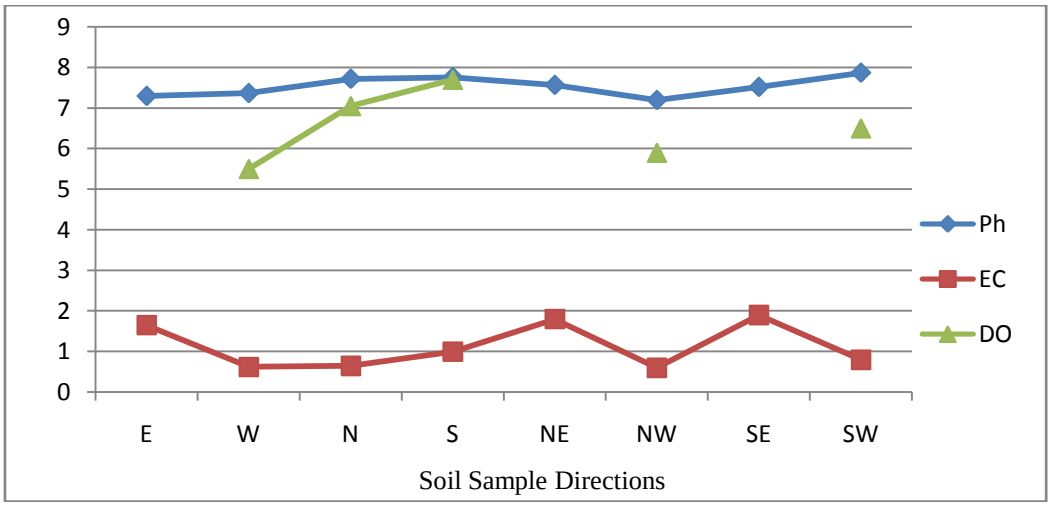

Fig 2 : Average values of pH, EC and DO of Water sample conducted in the month of May and June

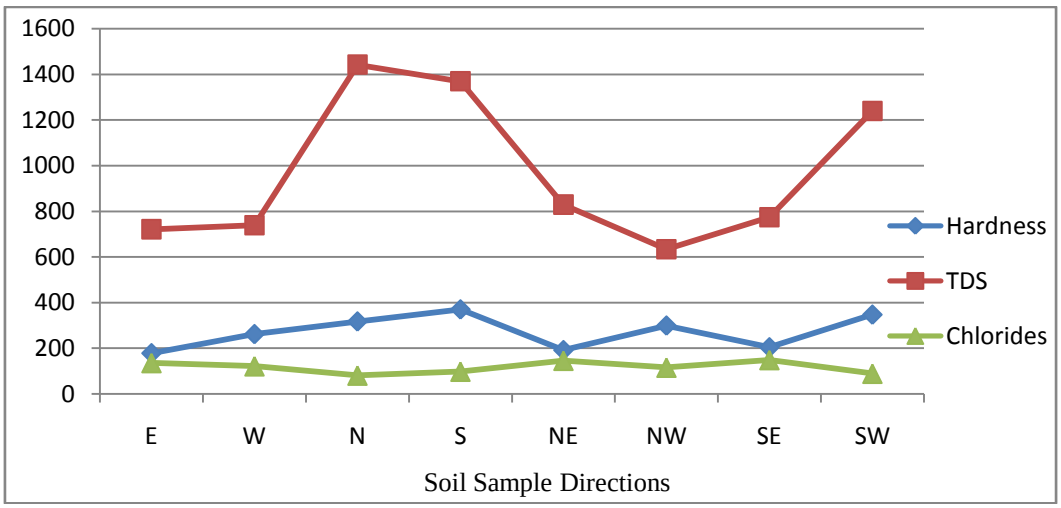

Fig 3 : Average values of Hardness, TDS and Chlorides of Water sample conducted in the month of May and June

3.1 Soil

The pH of the soil varied from 7.5 to 8.25. The findings showed that the research area's soil pH is Alkaline. Agricultural soil's alkalinity can reduce HeavyMetals solubility, mobility, and retention. The Study area's soil is a fine-grained soil, which has a grain size distribution that regulates how quickly water percolates into the ground. The Soil a range of 2.3–4.62% is obtained as a result for organic matter. Soil Moisture is more in the Direction NE, East, SE compared to other Direction in each month. Soil moisture content varies from 12.5-20.5%. Soil moisture is more in the month of June due to rainfall. One essential characteristic of the soil is electrical conductivity, because it shows how salty the soil is. The Electrical Conductivity of soil varies from 0.2-0.8 in the month of May and June. SE & NE Direction has more Electrical conductivity.

3.2 Water

The pH of water samples was measured were between 7.1 and 7.95. The samples of Water pH levels were alkaline. The pH readings fell within the drinking water quality regulations permitted range. The EC value in examined samples ranges from the 0.5 to 2 µs/cm. The quality of water for irrigation and drinking is determined by the concentration of ions in solution, which is shown by electrical conductivity. Between 172 and 369 mg/l of total hardness were measured in May and June. Groundwater has a higher amount of the total hardness than surface water and domestic wastewater. Between 78 and 153 mg/l of chloride were present in the water in May and June. It was demonstrated that chloride, in reasonable amounts, is not dangerous, but that, above 250 mg/l, it causes corrosion. Surface water contains more chlorides than ground water does. To evaluate the water's ability to absorb waste, DO is a crucial measure. The DO content was between 5.2 and 7.9 mg/l. For home sewage water, DO is 0. When DO levels in water fall below 4 mg/L, numerous life forms were put into stress. DO levels in water should be between 4 & 6 mg/L. The TDS values ranged between 700 - 1485 mg/l.

Higher values of TDS accumulated in Ground water. The variation shows that higher values of TDS in the month of May due to accumulation of Carbonates and Bicarbonates after Rainfall.

IV. CONCLUSION

All Physical and Chemical Parameters of Soil and Water Samples were evaluated in the current study were well within the Standard limits set by Agricultural Standards, WHO standards for Soil and Standard limit for Irrigation, WHO standards for Water. The Study area has Fine grained soil, have more clay content in black cotton soil, hence it is ideal for cultivating paddy that is high in organic content, nutrients, and other factors. The parameters of Ground and Surface water are well within the Safe limits which can be used for both Irrigation and for Drinking Purposes as it is not affected to Humans.

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