



PHYSICAL AND CHEMICAL ANALYSIS OF SURFACE WATER AND GROUND WATER IN KRISHNA DISTRICT ANDHRA PRADESH

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ABSTRACT: The present study aimed to measure the physical and chemical properties of both ground water and surface water. Surface water and groundwater are two important sources of freshwater that are essential for human consumption, agricultural production, industrial use, and ecological balance. Surface water refers to the water that flows on the earth's surface in streams, rivers, lakes, and oceans, while groundwater is the water that is stored beneath the earth's surface in aquifers. Both surface water and groundwater are interconnected, and their quality and quantity depend on various factors such as climate, geology, land use, and human activities. Water quality can vary significantly from place to place due to a range of natural and human factors. This study provides an overview of the factors that can influence water quality and the ways in which water quality can vary across different geographic locations. The study examines the natural factors that can impact water quality, including geology, climate, and natural ecological processes. It also discusses the human factors that can contribute to changes in water quality, such as land use practices, industrial and agricultural activities, and waste disposal practices. Furthermore, the study explores the different parameters used to measure water quality, such as pH, dissolved oxygen, nutrient levels, and contaminants. It highlights how these parameters can vary from place to place, depending on local conditions and sources of pollution. The study also discusses the potential impacts of poor water quality on human health and the environment, including the spread of waterborne diseases, damage to aquatic ecosystems, and harm to wildlife. Finally, the study emphasizes the importance of monitoring and maintaining water quality to protect public health and preserve natural resources. It calls for the implementation of effective water management strategies, including the use of best management practices, regulations, and policies, to ensure that water quality is maintained at safe and sustainable levels across different geographic locations.

Keywords: Surface water, Ground water, Water Tests, pH, BOD,COD,

1. INTRODUCTION

Ground water and surface water are essential components of the water cycle and play a crucial role in sustaining the environment and human life. The parameters analyzed include pH, conductivity, temperature, dissolved oxygen, total dissolved solids, and major ions. These measurements will provide a baseline for understanding the differences between ground and surface water and inform decisions related to water management and resource protection. Water contamination occurs when harmful substances, such as chemicals, pathogens, or physical agents, are present in water at levels that can cause harm to human health or the environment. There are several reasons why water can become contaminated, including Agricultural activities, Industrial activities, Landfills and waste disposal, Mining activities, Natural sources. Analysis of water quality and monitoring for physico-chemical parameters are essential to preserve and protect the natural ecosystem. The study of different water quality parameters help in understanding the metabolic events of the aquatic system. Certain parameters such as pH, turbidity, temperature, acidity, alkalinity, hardness, Bio-chemical oxygen demand, Chemical oxygen demand (COD), nitrates, nitrites, ammonium, phosphates, iron and fluorine. Both ground water and surface water change from place to place there are many causes for change in ground water and surface water.

2. METHODOLOGY

The samples were collected from Six different locations in Krishna District And water quality analysis tests were held in laboratory. We conducted 16 tests the test are PH, Temperature, Acidity, Alkalinity, Dissolved oxygen, Bio chemical oxygen demand (BOD), Chemical oxygen demand (COD), TDS, Total hardness, Calcium hardness, Magnesium hardness, Nitrate Nitrite, Ammonium, Chlorides, Iron, Phosphates, Fluorides, Conductivity In the water resource engineering the main aim was source of water we know that generally pollution free water was not available directly due to this reason by using some mitigation process or method using this we should prepare some amount of water is polluted or contaminated free water. We should collect the water sample at different location all the physical and chemical analysis will be conducted to that water, to know the concentrated value at that sample, for highly polluted samples. we identified highly polluted water and we treated the water with Activated carbon.

3. MATERIALS AND METHODS

3.1: Sample collections

Water samples were collected from the mid of January in the year 2023 from six different location in Krishna district in Andhra Pradesh. The locations are Machilipatnam, Challapalli, Gudlavalleru, Gudivada, Vuyyur, Vijayawada. The physical-chemical parameters were analysed with respect to place to place by following standard methods. The physical-chemical parameters of each location showed difference from place to place. Physical-chemical factors such as temperature, pH, productivity, solubility of gases like Carbon dioxide; Dissolved oxygen etc.



Surface and Ground water sample collection

3.2: Types of materials required in the experimental works

pH meter with electrode and beaker, Buffer solution with pH 4.0 & 7.0, conductivity meter with temperature electrode, Conductivity meter with measuring cell, Thermometer, NaOH Phenolphthalein, Methyl Orange, diluted H_2SO_4 (0.02 N), reflux tube, cod digester, Mercuric Sulphate ($HgSO_4$ powder), Potassium Dichromate solution ($K_2Cr_2O_7$), Concentrated Sulphuric acid (H_2SO_4), (0.1N) Ferrous Ammonium Sulphate ($Fe(NH_4)_2(SO_4)_2$), Ferroine, standard EDTA solution, Ammonium Buffer solution, EBT, Murexide, fluoride reagent -1 (F-1), Ammonium reagent -1 (NH-1), Nitrate reagent -1 (NA-1), Nitrate Reagent (NA-2), Nitrite Reagent (NI-1), Iron reagent (Fe-1), Iron reagent (Fe-2), Iron Reagent, Iron reagent (Fe-3), Teagent-1 (PR-1) Phosphates reagent -2 (PR-2),

3.3: Methods of water sample analysis

The assessment is based on the water physical-chemical characterization including pH, electrical conductivity, dissolved oxygen, soluble ions and toxic heavy metals. Water samples were taken from different locations and analysed to identify whether or not there were any changes in water quality from place to place.

3.3.1 pH Test : At first switch on the pH meter ensure that power is supplying to the pH meter Later ensuring clean the electrode of pH meter with distilled water after cleaning the electrode clean with tissue paper .After dip the electrode in the buffer solution of known PH, and take the reading. Standardize the instrument using the calibrating knob. If it is 7, the instrument is calibrated. If not, correct the value and is manipulated so that the reading in the dial comes to 7.5. The electrode is washed with distilled water and reused with the solution and then it is dipped in the surface and ground water . The reading on the dial indicates the pH of the solution and take down the reading of surface water and ground water .



Fig 3.3.1 pH Test

3.3.2 Temperature and conductivity Test : At first switch on conductivity meter and clean the temperature and conductivity electrode with distilled water. After wipe the electrode with tissue paper and dip the temperature and conductivity electrode in water sample. And note down the readings of surface and ground water sample.

3.3.3 Acidity Test : Clean the burette and apparatus with distilled water and rinse with NaOH. Fill the burette with sodium hydroxide and fix it to stand. Measure 20ml of sample using measuring jar take 20 ml sample in conical flask. Add 2 drops of methyl orange to the water sample and Titrate the sample until the colour changes from orange to yellow and note down the volume as V_1 . Add 2 drops of phenolphthalein and titrate the sample until the colour changes from yellow to pink/red as V_2 . Note down the readings of surface water and ground water sample.

3.3.4 Fluorides : Take a test tube and wash it Now take 5 ml of given water sample Add 4 to 5 drops of fluoride reagent Shake it well Leave the test tube kept in test tube stand for 2-3 minutes .Then observe the colour change

3.3.5 BOD Test : Clean all the apparatus with water of distilled water , Now take the distilled water in BOD bottle and add 3ml of water to it .Now add 2ml of $MnSO_4$ to the bottle using measuring jar. Then no change in colour is observed. Now add 2 ml of alkali Iodide Oxide Solution and mix well . Now add concentrated H_2SO_4 to the bottle .Same procedure must be done to two bottle and one of the bottle is kept in BOD incubator in 5 days .The solution in the another bottle of bod 203 ml solution is taken in conical flask using measuring jar. Now add 2 drops of starch solution to it shake it well .Now fill the burette with sodium thiosulphate up to 0 mark . Titrate the conical flask solution with burette solution till solution turns colourless. Note the readings in burette as V_1 .The bottle which is kept in incubator also titrated against the sodium thiosulphate and note down the readings



Fig 3.3.5 BOD Test

3.3.6 COD Test : Take 0.4 grams of $HgSO_4$ powder into the reflux tube. Add 20 ml of water sample and now add 10 ml of potassium dichromate solution to the reflux tube. Now add 30 ml of con. H_2SO_4 solution to it , now keep the condenser into the reflux tube and keep it in the cod digester. Keep the sample at $150^{\circ}C$ for about 2 hrs .After 2 hrs take the reflux tube until it turns into room temperature. Now add 1 drop of indicator to the reflux tube. Take ferrous ammonium sulphate solution into burette up to zero mark and

fix it to burette stand. Titrate against the sample in the reflux tube with ferrous ammonium sulphate solution until colour changes to green, Note down the reading

3.3.6 TDS Test : Clean the dishes with tissue paper. Firstly weight the evaporating dish which is clean and dry. note the weight as W_1 Now measure the water sample 10 ml using measuring jar and pour it in evaporating dish. The dish is kept in the hot air oven for 1 to 2 hrs at 120°C . The desiccator allows the dish to keep protected after the dish has come into the room temperature weight the dish and note it as W_2 . The total solids can be determined by following formula.

3.3.7 Total Hardness Test : At first clean the burette, conical flask and beakers with distilled water. Fill the burette with EDTA solution up to 0 mark on the burette. Measure 20 ml water sample using measuring jar to conical flask. Now add 1 ml of ammonium buffer solution and 2 drops of EBT to conical flask which is in wine red in colour. Titrate until the colour changes from wine red to blue colour. Note down the readings as A. Again measure 20 ml water sample using measuring jar to conical flask. Now add a pinch of Murexide to the sample which is in conical flask. Titrate until the colour changes from pink to purple. Note readings

3.3.8 chloride Test: Clean the burette and apparatus with distilled water and rinse the burette with AgNO_3 . Fill the burette with silver nitrate and fix it to stand. Take 20 ml of sample in conical flask. Add indicator silver nitrate of 1 ml to the sample. The solution changes colour from colourless to pale yellow. Titrate the solution with potassium chromate until the colour of solution changes from pale yellow to brick red colour. Take the burette readings. Repeat the same procedure up to get two consecutive values obtained.

3.3.9 Ammonium Test: Take a test tube and wash it. Now take 5 ml of given water sample. Add 4 to 5 drops of ammonium reagent. Shake it well. Leave the test tube kept in test tube stand for 2-3 minutes. Then observe the colour change.

4. RESULTS

Table 4.1: Surface Water Quality index parameters of Six Different locations

Parameters	Machilipatnam	Chalapalli	Gudlavalleru	Gudivada	Vuyyur	Vijayawada
pH	7.67	7.96	8.23	7.06	7.8	7.3
Temperature	27	26.8	26.9	31.9	31.5	31.6
Conductivity	2.312	0.642	0.737	2.26	1.525	1.22
Acidity	15	15	55	60	65	68
Alkalinity	15	15	20	20	15	35
BOD	316	341	253	315	725	436
COD	848	944	928	924	940	848
TDS	263	37	84	164	143	343
Total Hardness	225	210	220	275	725	875
Fluorides	0.0	0.0	0.0	0.0	0.0	0.0
Ammonium	0.0	0.0	0.0	5	3	1
Nitrate	5	5	5	5	5	5
Nitrite	0.5	0.5	0.5	0.5	0.5	0.5
Iron	5	5	5	5	5	5
Phosphate	0.0	0.0	0.0	0.0	0.0	0.0
Chlorides	149	157	130	334	224	288
Do	2.21	2.8	2.7	1.5	2.1	1.9

Table 4.2: Ground Water Quality index parameters of Six Different locations

Parameters	Machilipatnam	Chalapalli	Gudlavalleru	Gudivada	Vuyyur	Vijayawada
pH	7.59	7.94	7.01	7.28	7.57	7.95
Temperature	26.8	26.9	26.9	31.9	31.6	32.1
Conductivity	2.312	0.964	0.764	2.262	0.754	1.22
Acidity	15	35	45	42	100	110
Alkalinity	15	15	20	25	30	50
BOD	315	410	284	158	380	937
COD	856	936	880	1048	924	908
TDS	57	15	41	29	152	134

Total Hardness	425	450	275	410	1260	640
Fluorides	0.0	0.0	0.0	0.0	0.0	0.0
Ammonium	3	0.0	0.0	1	0.5	0.0
Nitrate	5	5	5	5	5	5
Nitrite	0.5	0.5	0.5	0.5	0.5	0.5
Iron	0.3	3	5	5	5	5
Phosphate	0.0	0.0	0.0	0.0	0.0	0.0
Chlorides	300	200	162	257	337	262
Do	1.17	1.6	1.5	2.5	2.7	3.2

5. Conclusion

1. The study you conducted to assess the water quality of six different in Krishna District, Andhra Pradesh. It is commendable that you evaluated both surface water and ground water samples from multiple locations and analysed seventeen different parameters to determine the water quality index.
2. The parameters are pH, temperature, acidity, alkalinity, DO, BOD, COD, iron, fluoride, phosphorous, ammonia, nitrates and nitrites, chloride, hardness, total solids, dissolved solids and suspended solids.
3. Each parameter is taken major parts in the water quality index (WQI) analysis. It is important to note that water quality is a critical issue that affects public health, environmental sustainability, and economic development. The presence of contaminants such as pathogens, chemicals, and other pollutants in water can have severe impacts on human health, aquatic ecosystems, and wildlife. Therefore, it is crucial to ensure that water sources are safe for human consumption and other use.
4. Based on our findings, it is good to know that the water samples collected were found to be suitable for domestic purposes.
5. However, it is concerning that both surface water and ground water must be treated before human consumption. This underscores the need for proper water treatment and management practices to ensure that people have access to safe and clean drinking water.

6. REFERENCES

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