Surface Water Quality Assessment at Ongole, India

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Abstract: Water is the most essential and basic need for basic need for biotic environment on the earth. Due to modernization of world, the water resources of the earth getting polluted (or) reduced. Without water there is no life on the earth.This paper explores the necessity of quality analysis of drinking water. For this, we assessed various physical & chemical properties of surface water, which mostly affects the quality of water.The main aim of the Project is to assess various physico-chemical parameters of surfaces water around the ongole city, India. We collected samples of surface water around the ongole town from five distinct locations. And important physic-chemical parameters like $P^H$of those were tested .Finally the results of those tests were compared with IS standards of drinking water.

IndexTerms - Surface water, IS10500-2012, Acidity, Alkalinity, Chlorides, Quality analysis, Ongole.
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I. INTRODUCTION

1.1 General

Water is the most essential and important element to all living organisms on the earth there is no alternate to water and there will be no life on earth without water. The sources of water on the earth are divided into two categories are surfaces water divided into two categories are surfaces water and another one is ground water. The sources of surface water upon the earth are mainly of rivers, lakes and ponds. However, a main and primary source of any kind of water is precipitation.

The water used for drinking by human beings should be portable i.e. the water which is free from impurities and safe for human health..The quality of surface water will be varied due to dissolution of various contaminants from atmosphere into the water. The quality analysis of surface water is to be done by using its various physic-chemical and biological parameters like P^H, acidity, alkalinity, total hardness, total solids, various dissolved gases salts from atmosphere and the presences of living organisms, etc. The quality analysis of surface water is also essential to determine the quantity and type of treatment required to make the water potable.

1.2 Surface Scenario in India

Approximately the annual precipitation in India is 4000km3. Out of this 1869km3 is average annual potential flow in rivers available as water resources. Out of these total available water resources, only 690 km3 is available as surface water resources. The water demand in the year 2000 was 634km3 and it is likely to be 1093km3 by the year 2025. Due to rapid rise in population and growing economy to the country, there will be continuous increase in demand for water, and it became scarce. As per latest information furnished by the state governments, total storage capacity of 225.14km3 has been created in India by the projects having a like storage capacity.

(Surface water resources –India-www.nrsc.gov.in) per water Aid's assessment based on the latest data from the ministry of urban development, census 2011 and the central pollution control Board 80% of India's surface water is polluted .The report holds domestics sewerage, in adequate sanitation facilities, poor septage management and the near absences of sanitation and waste water policy frame works responsible for this .Also, high levels of water pollution is leading to poor nutritional standards and poor development in children along with increasing the burden of water borne diseases.

1.3 Drinking Water Standards

In India, the standards for public water supplies are laid down by the recommendations of the Environment Hygiene committee (1949). These very old standard recommendations have further been utilised by the Bureau of Indian Standards in formulating the Indian Standard drinking water specifications (1991), and again modified those specifications in 2012. Table-1 gives the specifications for drinking water standards by Bureau of Indian Standards and tabulated in IS 10500:2012.

Table-1
IS Specifications for drinking water

S. No.	Characteristic or substance	Desirable limit	Permissible limit in the absence of alternate source
1	Colour	20 Hazen units	25 Hazen units
2	Odour	Unobjectionable	-
3	Taste	Unobjectionable	-
4	Turbidity	5 NTU	10 NTU
5	pH	6.5 to 8.5	-
6	Total hardness	300 mg/l	600 mg/l
7	Iron	0.3 mg/l	1 mg/l
8	Chlorides	250 mg/l	1000 mg/l
9	Fluorides	1 to 1.5 mg/l	-
10	Dissolved solids	500 mg/l	1500 mg/l
11	Magnesium	30 mg/l	100 mg/l
12	Calcium	75 mg/l	200 mg/l
13	Copper	0.05 mg/l	1.5 mg/l

14	Manganese	0.1 mg/l	0.3 mg/l
15	Alkalinity	200 mg/l	600 mg/l

II. STUDY AREA

We have done our research work upon ponds of five areas which are located around the ongole city, India. Those locations/ponds are Sarvereddy Palem, Vengamukka Palem, Kothamamidi Palem, Mangamuru And Ongole West. Ongole is a city in prakasam District of the Indian state of Andhra Pradesh. The city is a municipal corporation and the headquarters of prakasam district. The city located in $15^0 30^1 20.602^{11}$N latitude and $80^0 2^1 59.7084^{11}$E longitude.

III. EXPERIMENTAL METHODOLOGY

3.1 Collection of Water Samples

For this, research work, we have collected the water samples from the above mentions five water ponds at different times on 20th February 2018. Table-2 gives the places and respective times of sampling of surface waters.

Table-2
Locations of Samples Collection

S.No.	Sample No.	Name of Pond (from where water samples were collected)	Time
1	Sample-1	Sarvereddy Palem	10:10Am
2	Sample-2	Vengamukka Palem	11:30Am
3	Sample-3	Kothamamidi Palem	12:10Pm
4	Sample-4	Mangamuru	01:30Pm
5	Sample-5	Ongole West	02:00Pm

3.2 Analysis of Physico-chemical parameters

The collected samples of surface water were brought to environmental engineering lab at QISIT, Ongole on the next of the sampling. And then, the various important physico-chemical parameters of those samples were measured by standards procedures and the measured physic-chemical parameters are P^H, acidity.

IV. RESULTS AND DISSCUSSIONS

The concentration of the important physic-chemical parameters of surface waters, which were measured at the lab are tabulated as table-3

Table-3
Results of Analysis

S.No	Name of the Parameter	Sample-1	Sample-2	Sample-3	Sample-4	Sample-5
1	P^H	7.8	6.9	8.1	7.5	6.8
2	Acidity (mg/l)	55	70	35	30	15
3	Chlorides(mg/l)	25	22.5	17.5	20	25
4	Electrical conductivity (μmhos)	590	520	610	670	560
5	TH (mg/l)	95	100	55	75	80
6	Alkalinity(mg/l)	270	190	175	200	185
7	TS	26	20	31	30	18
8	DO(mg/l)	6	7	5.5	7	7.2
9	Turbidity	8	10	8	9	9

4.1 P^H

The values of PH for collected five samples are being in between 6.8 to 8.1. As per the recommendations of IS standards of drinking water, the P^H should be in between 6.5 to 8.5. So, these waters are recommended for drinking purpose.

4.2 Acidity

Acidity is the property of water, responsible to decreases the P^H value of the water. The values of acidity for collected five samples are being in between 15 to 70 mg/l. And mineral acidity of each of these samples was zero. So, these waters are recommended for drinking purpose.

4.3 Chlorides

The chlorides are divalent anions and present in water in the form salts the concentration of chlorides in the present five samples of water are being in between 17.5mg/l. As per the IS:10500-2012 recommendations, the chlorides concentration in drinking water should not be more than 250mg/l. Therefore, all these waters are suitable for drinking purpose.

4.4 Electrical Conductivity

Electrical conductivity / specific conductivity is the most important parameter of water, which allows electrical current to pass through it. Pure water (or) distilled water will never be an electrical conductor. The presences of total solids will responsible for electrical conductivity of water. The electrical conductivity of these five collected samples being in between 520 μmhos to 670 μmhos.

4.5 Total Hardness

The values of total hardness for collected five samples are being in between 55mg/l to 100mg/l. Hence all these waters are soft waters. As per IS 10500-2012 recommendations, the total hardness for drinking waters are suitable for drinking.

4.6 Alkalinity

The alkalinity of these samples being in between 175 to 250 mg/l. As per IS10500-2012 recommendations, the total alkalinity in drinking water should not exceed 250mg/l. Except first sample, remaining four samples are suitable for drinking. However, all these samples are recommended for drinking purpose with small amount of treatment.

4.7 Total Solids

The total solid is the sum of both suspended solids and dissolved solids. The concentrations of total solids in the present five samples are between 18 to 31 mg/l. As per IS10500-2012, the total solids for drinking water should be less than 500mg/l. So, these waters are recommended for drinking purposes.

4.8 Dissolved Oxygen (DO)

The concentration of dissolved oxygen decides the purity of water. The DO concentrations of these five collected samples are being in between 5.5 to 7 mg/l. As per, Is10500-2012, the concentration of DO in drinking water should be in between 4 to 8 mg/l. So, these waters are recommended for drinking purpose

4.9 Turbidity

The turbidity of these five samples were measure by using Nephelometeric turbidity meter. The turbidity values of these five samples found as being in between 8 to 10N Tu. As per Is 10500-2012, the turbidity for drinking water should be lie in between 5-10 N Tu. So, these waters are recommended for drinking purpose.

V. CONCLUSION

After measuring the physic-chemical parameters of these samples of waters, we found that, all the measured parameters i.e. P^H, acidity, chlorides, EC, TH , alkalinity, TS, DO and turbidity are being with in desirable limits, as per the recommendations provided by IS10500-2012. So, we recommended that, all these waters are suitable for drinking purpose without any treatment.

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