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Analysis of Water Quality Characteristics at Annamayya Project , Rajampet, Kadapa.

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Abstract:

Annamayya Project (Cheyyeru) is a completed Medium Irrigation Project constructed across Cheyyeru, a tributary to Penna River located near Badanagadda (V), Rajampet Mandal, Kadapa District. The water pollution that raise problems for existence of life on the earth. The people using river water from long time ,after river water contaminated suddenly moves on utilization of ground water and everyone are depends on ground water and fulfill their needs. Surface water ground water are connected with hydrological interaction with surface water pollution causes ground water pollution. Ground water contaminations will strongly impact on global water cycle. The quality of water depends on the location of source and state of environment protection in a given area. High content of total dissolved solids (salinity), fluorides, iron and manganese are the special characteristics of some groundwater. The present work confines in testing the water samples for drinking and construction purpose collected from Annamayya Dam.

Keywords: Annamayya Project, ground water, water samples

1. INTRODUCTION

India's National Water Policy is meant to provide a definite course of action on water management, ensuring the country's population of nearly 1.3 billion and industries have access to adequate water for various uses. Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture and minimum eco-system needs.

Water is necessary for all forms of life as well as industries on which humans are reliant, like technology development and agriculture. This global need for clean water access necessitates water resource policy to determine the means of supplying and protecting water resources. In the allocation of water, first priority should be given for drinking water, followed by irrigation, hydro-power, ecology, agro-industries and non-agricultural industries, navigation and other uses, in that order.

The Annamayya Project was constructed across the Cheyyeru river which is a tributary to the Pennar river. The project is located near the Badanagadda village, Rajampet Mandal, Kadapa District. Annamacharya Dam which has previously named as Cheyeru Dam. nnamayya is located near Badanagadda in Rajampet mandal. It was taken up in 1981 and completed in 2001 with total ayacut of 22,500 acres.

The project has only a right canal of 23.63 km. This project is useful for Agriculture and drinking water for 140 habitations under Rajampet Mandal. The places which are getting benefitted from the project are Akepadu,Hastavaram,Mandapalle,Rajampet,PullampetMandals,Utukur,Bramhanapalle,Mittampalle,Puttanavaripalli,Devasamudram,Seshamambapuram,Balrajupalli,Mannuru,Anantharajugaripalli etc.,

Sampling devices:

Depending on the type of sample collection, sample apparatus or specialised equipment (pumps, automatic samplers) are employed. Further, auxiliary equipment such as cool boxes, tubes, ropes, cables, plastic bags, spades or gas burners to ensure sterile bottling of samples for bacteriological testes are not further mentioned here. The choice of sample container is of prime importance in most cases, containers of polythene or glass are employed. Materials which are not suitable for use with water containing substances should be noted. Samples having non polar organic contaminants should not be placed in plastic containers, whereas glass containers are unsuitable for use with water in which low concentration of sodium potassium, boron or silicic acid are to be determined.

Preservation, transport and storage of samples:

Water is dynamic system during sampling, the water is removed from its natural environmental due to this change the chemical composition of water may not remain same, but may tend to adjust itself according to its new environment

the contents of water sample can alter at very different rates. As only a few parameters can be measured during collection, a preliminary treatment are stabilisation is essential in many cases. These steps allow testes to be carried out even after longer period of time have elapsed. However many ingredients are so stable that no special precaution for transport and storage are necessary. The samples must be examined at the earliest possible time for a hole serious of further parameters especially in relatively pure water, cooling to 4^{o}c is generally a suitable storage condition. Sampling is carried out using sterile glass stoppered bottles, where the stopper bottles, where the stopper and neck are covered with aluminium foils to prevent contamination. Before sterilization, sodium thiosulfate solution (1m) should be places in the bottle in order to bind any chlorine or chloramine present. Separate bottles should always be used for microbiological test and should always be used for microbiological test and should be 5/6 fill in order to facilitate the shaking necessary before examination.

Sample collection procedure:
General: the quantity of sample to be collected varies with the extent of laboratory analysis to be performed. A sample volume between two and three litres is normally sufficient for a fairly complete analysis. The total number of samples will depend upon the objectives of the monitoring programme. The use of a few strategic locations and enough samples to define the results in terms of statistical significance is usually much more reliable than using many stations with only a few samples from each.
Drinking water: The collection of the samples of drinking water for physic-chemical examination is generally problem free as taps are usually available. It is recommended that several bottled be filled. For bacteriological tests, the tap must be of metal so that it may be flamed with a gas burner. Still water contained in the whole piping system must be removed before sample collection. A running time of 15 to 30 minutes normally sufficies for this purpose. Sterile glass bottles of 100 to 1000 ml capacity and contamination of the bottle necks as well as speaking and coughing during collection are to be avoided. The bottles are filled almost to capacity leaving an air bubble of about 2 ml in volume.

Waste water: The representation collection of raw waste water samples with their quantities of suspended material presents problems, especially where automatic device are employed. Therefore, an exact measurement of the solids must be dispensed with or pools are prepared from representative random samples. In those cases, where organics (e.g. Oil) are present in a separate phase manual sampling techniques provide the only suitable collection method. The collection of purified water is however, relatively easy to carry out and similar to that for the surface water. Random or average sampler (time or flow proportional) can be obtained either manual or automatically. In general, 15 minutes samples or daily pools are employed. Several bottles are normally filled to avoid later splitting in the laboratory.

Major uses of water are for drinking, industrial, irrigation. The water supplied to the specific use should follow certain standards.

Drinking water standards: Water supplied to the consumer should not have any impurities which cause taste and odour, colour, toxicity and injurious substances to human health. The different impurities in water which cause undesirable effects may be classified into physical, chemical, bacteriological and radiological and radiological parameters. The standards prescribed for potable water supplies by different authorities usually give two types of norms e.g. permissible and tolerable concentration for the different impurities. Indian Council of Medical Research (ICMR), Bureau of Indian standards have published standards for potable water quality, while the WHO has given standards which can be used for all.

Quality requirement for irrigation water: Irrigation water should perform its functions without any adverse effects on the fertility of the soil or on the proper growth of plants. The suitability or otherwise of water for irrigation purpose is determined on the following considerations:

1. The total soluble salt concentration of the water as it affects crop yield through osmotic effects.
2. The concentration of specific ions that may be toxic to plants or that have unfavourable effects on crop quality.
3. The concentration of cautions that can cause deflocculating of the clay in the soil and resulting damage to soil structure and declines infiltration rate.
4. Natural of soil to be irrigated.
5. Type of crop grown.

The present of soluble salts in excessive quantities than recommended value is very harmful to the soil and plants. Water containing high sodium content produces a soil with a large percentage of exchangeable colloids. This type of soil is termed ‘black alkali soil’ which is unfertile. Similarly salts of calcium, magnesium and potassium are injurious to crop. These salts, if present in excess rated the growth of plants by preventing the absorption of nutrient from the soil. The permeability of the soil is also reduced.

Quality standards for water in concrete usage: Cement needs less than 0.3 times its weight of water for chemical action, but some more is required for proper workability of concrete. Water used for making and curing of concrete should be free from injurious substances such as oils, acids, alkalis, salts, sugar, organic materials or other elements that may be deleterious to concrete or steel. A popular yard-stick to the suitability of water for mixing concrete is that if water is fit for drinking, it is fit for making concrete. This doesn’t appear to be a true statement for all conditions. Some waters containing a small amount of sugar would be suitable for drinking but not for mixing concrete. Setting time is likely to be affected by the presence of sugar, carbonates and bicarbonates of sodium and potassium. Excessive salts of manganese, tin, zinc, copper and lead cause marked reduction in attainment of strength of concrete. Sodium iodide, sodium phosphate and sodium borate reduce the initial strength of concrete to an extra-ordinary high degree. Salts and suspended particles are undesirable as they interfere with setting, hardening and information of bonds. The presence of mineral or humic acids or carbonic acid can retard the hardening of low calcium cements by reacting with calcium before setting begins.

2. LITERATURE SURVEY

Experiment: Determination of P^H:
P^H is the measure of hydrogen ion activity in the given sample. It indicates the acidic or alkanik or neutral nature / condition of the given sample. P^H is determined using the electrometric method. Every phase of water and waste water treatment is determined on the p^H, example acid-base neutralization, water softening, precipitation, coagulation, and disinfection and corrosion control. Test procedure is explained in accordance with IS 3025 – Part 11.

Experiment: Determination of Alkalinity of water:
Alkalinity is a measure of an aggregate property of water and it is primarily a function of carbonate, bicarbonate and hydroxide content. Alkalinity is significant in many uses and treatments of natural waters and waste waters. Titration methods is employed in determining alkalinity of water. Test procedure is explained in accordance with IS 3025 – Part 23.

Experiment: Determination of Chlorides:
Chloride is one of the major inorganic ions in water and waste water. There are five different methods for the determination of chlorides. However, Argent metric method is explained. High chloride content may harm metallic pipes and structures and effect the portable nature of water test procedure is explained in accordance with IS 3025 – Part 32.

Experiment: Determination of Dissolved Oxygen:
Dissolved oxygen in water and waste water depends upon physical, chemical and biochemical activities in water body. Analysis of DO is essential in water pollution control activities and waste water treatment process control. There are two methods for DO analysis (a) winkler or iodometric method (b) Electromeric method. Iodometric method is the most precise and reliable titrimetric procedure. Test procedure is explained in accordance with IS 3025

Experiment: Determination of Total solids:
Total solids refer to matter suspended or dissolved in water. Water with high total solids may not be pleasant and non-potable. Test procedure is explained accordance with IS 3025

Experiment: Determination of Total Dissolved solids and Suspended solids:
Total dissolved solids is the term used to describe the inorganic salts and small amount of organic matter present in the sample. Total suspended solids refer to the non-filterable residue retained in the filter. It is useful and highly valuable in analysis of polluted water. Test procedure is explained in accordance with IS 3025 – Part 16

Experiment: Determination of sulphates:
Sulphate is measured in water and waste water. Sulphate are of considerable concern because they are indirectly responsible for handling and treatment of waste water. Odour and sewer corrosion can result from reduction of sulphate to Hydrogen sulphide in anaerobic condition. Sulphate can be determined in accordance with IS 3025 – Part 24.

Experiment: Determination of Hardness:
Hardness of water is due to the presence of carbonates, bicarbonates, chlorides and sulphates of calcium and magnesium in dissolved form. Hardness is defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate in milli grams per liter. Hardness of water is an important consideration in determining the suitability of water for domestic and industrial uses. The test procedure is explained in accordance with IS 3025 – Part 21

3. PROPOSED APPROACH

3.1 PROPOSED SYSTEM

1. Regular testing is the only way to know if problems exist with your water quality.
2. To help ensure you are using water suitable for your intended agricultural use.
3. To help ensure that your drinking water is safe.
4. To help determine the effectiveness of your water treatment system.

Determining the sampling objectives will help determine the number of samples required, and the location and type of the samples needed.

3.2 SOME REASONS FOR TESTING

1. For the purpose of long-term monitoring of your water quality.
2. To determine whether the water quality is generally good or bad for your intended use.
3. To identify specific areas of concern such as points of suspected contamination.

4. METHODOLOGY

Quality analysis can be conducted for many purposes. Five major purposes are to:

- Characterize waters and identify changes or trends in water quality over time;
- Identify specific existing or emerging water quality problems;
- gather information to design specific pollution prevention or remediation programs;
- Determine whether program goals -- such as compliance with pollution regulations or implementation of effective pollution control actions -- are being met; and
- Respond to emergencies, such as spills and floods.

Some types of monitoring activities meet several of these purposes at once; others are specifically designed for one reason.

5. RESULTS AND DISCUSSION

COMPARISION OF THE RESULTS WITH PERMISSIBLE LIMITS

The results of analysis of eleven quality parameters showing their range in comparison to the relevant standards are presented in the Table

S.NO	List of Experiments	Permissible limits for drinking as per BIS	Permissible limits for construction as per IS456:2000	Results of Annamayya Dam water
1.	Acidity (mg/l)	0 mg/l	< 50 mg/l	7
2.	Alkalinity (mg/l)	250 mg/l	< 250 mg/l	60
3.	Chlorides	250 mg/l	<2000 mg/l for PCC <500 mg/l for RCC	39.9
4.	Hardness	300 mg/l	<300 mg/l	285
5.	Sulphate	150 mg/l	150 mg/l	95
6.	Dissolved Oxygen	>5 mg/l	5 to 7 mg/l	6
7.	P^H	6.5 to 8.5 mg/l	6.5 to 8.5	7
8.	Total solids	500 mg/l	<2000 mg/l	890
9.	Total suspended solids	300 mg/l	500 mg/l	660

10.	Total dissolved solids	500 mg/l	1500 mg/l	589
11.	Fluorides	1.5 mg/l	<1.5 mg/l	1.00

RESULTS FOR AGRICULTURE TEST

S.NO	Name of Ion	Results For Annamayya Dam water
1.	Ion(E.C) (micromos/centimeter)	0.93
2.	Carbonates (CO_3)	6.0
3.	Bicarbonates (HCO_3)	3.4
4.	Chlorides (Cl_2)	3.2
5.	Sulphates (SO_2)	Traces
6.	Nitrates (NO_3)	_
7.	P^H	7.86
8.	Calcium (Ca)	5.0
9.	Magnesium (Mg)	2.0
10.	Sodium + Potassium (Na+K)	2.3
11.	Residual Sodium Carbonate (R.S.C)	2.4
12.	Sodium Adsorption Ratio (S.A.R)	1.229

Comparison To The Relevant Standards

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S.NO	List of Experiments	Permissible limits for drinking as per BIS	Permissible limits for construction as per IS456:2000	Results of Annamayya Dam water
1.	Acidity (mg/l)	0 mg/l	< 50 mg/l	7.9
2.	Alkalinity (mg/l)	250 mg/l	< 250 mg/l	63
3.	Chlorides	250 mg/l	<2000 mg/l for PCC <500 mg/l for RCC	43.3
4.	Hardness	300 mg/l	<300 mg/l	302
5.	Sulphates	150 mg/l	150 mg/l	103
6.	Dissolved Oxygen	>5 mg/l	5 to 7 mg/l	6.8
7.	P^H	6.5 to 8.5 mg/l	6.5 to 8.5	7
8.	Total solids	500 mg/l	<2000 mg/l	914
9.	Total suspended solids	300 mg/l	500 mg/l	663
10.	Total dissolved solids	500 mg/l	1500 mg/l	590.3
11.	Fluorides	1.5 mg/l	<1.5 mg/l	1.03

6. CONCLUSION

The analysis of the water quality parameters of the Annamayya Dam**water** at shows that the p^H Alkalinity, chlorides, Hardness, sulphates, Fluorides, Total solids, Total suspended solids, total dissolved solids are well within the permissible limits. The desirable limits of Acidity, has exceed. The higher values of D.O indicate much organic load. The CO_2 in the form of carbonic acid cause more acidity. The higher amount of dissolved solids is induced by more run-off form the sides of the sides of the river. The analysis of the water quality parameters of the ground sample shows that alkalinity, dissolved oxygen, PH, total solids, total suspended solids, total dissolved solids, fluorides are with in permissible limits. The desire limits of acidity, chlorides, sulphates, and hardness with in permissible limits. The presence of heavy amount of carbon dioxide, gases and other type of minerals like chlorides, sulphates the dam water to crosses the permissible limits of acidity, chlorides, sulphates and hardness. From the results we can say that both the dam water sample Annamayya Damsample are allowed for construction and drinking purposes after giving the appropriate treatment.These

surveys also provide funding and expertise that will enhance each state´s ability to analysis and assess the quality of its waters in the future.

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