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INVESTIGATION OF WATER QUALITY PARAMETERS AT CHEYYERU RIVER WATER, ANNAMAYYA PROJECT, ANNAMAYYA DISTRICT

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Abstract:

The Annamayya Project (Cheyyeru) is a completed Medium Irrigation Project constructed across Cheyyeru, a tributary to the Penna River, situated near Badanagadda (V), Rajampet Mandal, Annamayya District. It's worth noting that water pollution poses significant challenges to life on Earth. Over time, reliance on river water has shifted to groundwater due to contamination concerns, impacting everyone's dependence on groundwater for fulfilling their needs. The interaction between surface water and groundwater means that pollution in one can lead to contamination in the other, thus affecting the global water cycle. The quality of water is influenced by its source and the level of environmental protection in the area. Some groundwater sources exhibit high levels of total dissolved solids (salinity), fluorides, iron, and manganese. The current study focuses on testing water samples collected from the Annamayya Dam for drinking and construction purposes.

.**Keywords: Annamayya Project, ground water, quality**

1. INTRODUCTION

The discourse on water management, particularly in the context of India's National Water Policy, underscores the critical importance of providing safe water for drinking and sanitation as a primary need. This entails prioritizing resources to ensure access to clean water for the vast population and various industries. The allocation of water resources should align with this priority, followed by other essential uses like irrigation, hydro-power, ecology, and industrial needs. The Annamayya Project, situated across the Cheyyeru river in the Annamayya District of Andhra Pradesh, stands as an example of water resource development aimed at benefiting agriculture and providing drinking water to numerous habitations in the region. Sampling and analysis of water quality play a crucial role in monitoring and maintaining water standards. Various sampling devices and procedures are employed to collect representative samples for analysis, ensuring that water quality meets prescribed standards for different uses such as drinking, irrigation, and industrial purposes. For instance, drinking water standards emphasize the absence of impurities that could affect taste, odor, color, and pose health risks to consumers. Similarly, quality requirements for irrigation water consider factors such as total soluble salt concentration, specific ion concentrations, and soil type to ensure optimal soil fertility and crop growth. Moreover, water quality standards for concrete usage focus on minimizing the presence of substances that could impair the chemical reactions or structural integrity of concrete, emphasizing the need for water free from harmful elements like oils, acids, alkalis, and salts. In essence, effective water management involves a comprehensive approach encompassing policy frameworks, infrastructure development, and stringent quality control measures to safeguard both human health and environmental sustainability.

2. LITERATURE SURVEY

Dwivedi and Pathak (2007): This study focuses on the Mandakini river in Chitrakoot and presents a preliminary assignment of water quality index. Assessing water quality through indices can provide a concise way to communicate complex data regarding water conditions.

Girgin, Kazanci, and Dügel (2010): Investigates the relationship between aquatic insects and heavy metals in an urban stream using multivariate techniques. Understanding the interactions between aquatic life and pollutant levels can offer insights into ecosystem health and pollution impacts.

Icaga (2007): Explores fuzzy evaluation techniques for water quality classification. Fuzzy logic methods allow for the handling of uncertain or imprecise data, which can be valuable in environmental assessments where data may be incomplete or variable.

Ramakrishniah, Sadashivaiah, and Ranganna (2009): Conducts an assessment of water quality index for groundwater in Tumkur Taluk. Groundwater quality is vital for drinking and agricultural purposes, and assessing it through indices aids in understanding its suitability for various uses.

Ronghang et al. (2019): Presents a case study of riverbank filtration in the hilly regions of Uttarakhand, India. Riverbank filtration is an important water treatment method that utilizes natural processes to improve water quality, particularly in areas where conventional treatment may be challenging.

3. Proposed System:

3.1.Regular Testing: Emphasizes the necessity of consistent water quality testing to identify any existing or emerging issues.
3.2. Agricultural Use: Ensuring water suitability for intended agricultural purposes, safeguarding crop health and productivity.
3.3. Drinking Water Safety: Prioritizing testing to guarantee the safety of drinking water for human consumption.
3.4. Evaluation of Water Treatment: Assessing the effectiveness of water treatment systems in removing contaminants and improving water quality.
3.5. Determining Sampling Objectives: Identifying sampling objectives to determine the number, location, and type of samples required**.**
3.6. Some Reasons for Testing:
3.7. Long-term Monitoring: Ensuring ongoing monitoring of water quality to detect changes or trends over time.
3.8. Assessing Suitability: Determining if water quality meets the required standards for specific uses.
3.9. Identifying Concerns: Pinpointing specific areas of concern such as suspected contamination points.

4. Methodology: Quality Analysis Objectives:

4.1. Characterization: Identifying and characterizing water quality parameters and changes over time.
4.2. Problem Identification: Detecting existing or emerging water quality issues.
4.3. Program Design: Gathering data to design pollution prevention or remediation programs.
4.4. Program Evaluation: Assessing the effectiveness of pollution control measures and regulatory compliance.
4.5. Emergency Response: Responding to emergencies like spills and floods by providing timely and accurate water quality information.

5. RESULTS AND DISCUSSION

5.1. COMPARISION OF THE RESULTS WITHPERMISSIBLE LIMITS

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	0 mg/l	< 50 mg/l	8
2.	Alkalinity	250mg/l	< 250mg/l	75
3.	Chlorides	250mg/l	<2000 mg/l forPCC <500 mg/l forRCC	40
4.	Hardness	300mg/l	<300mg/l	295
5.	Sulphate	150mg/l	150 mg/l	100
6.	DO	>5 mg/l	5 to 7mg/l	6.5
7.	pH	6.5 to8.5	6.5 to 8.5	7
8.	Total solids	500 mg/l	<2000mg/l	985
9.	TSS	300 mg/l	500 mg/l	565
10.	TDS	500 mg/l	1500 mg/l	695
11.	Fluorides	1.5mg/l	<1.5 mg/l	1.00

5.2. RESULTS FOR AGRICULTURE TEST

S.NO	Name of Ion	Results for Annamayya Dam water
1.	Ion(E.C) (micromos/centimeter)	0.86
2.	Carbonates (CO_3)	6.5
3.	Bicarbonates (HCO_3)	3.6
4.	Chlorides (Cl_2)	3.3
5.	Sulphates (SO_2)	Traces
6.	Nitrates (NO_3)	-
7.	pH	7.99
8.	Calcium (Ca)	5.5
9.	Magnesium (Mg)	2.5

10.	Sodium + Potassium(Na+K)	2.5
11.	Residual SodiumCarbonate (R.S.C)	2.6
12.	Sodium AdsorptionRatio (S.A.R)	1.33

5.3. Comparison to the Relevant Standards

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 limitsfor drinking asper BIS	Permissible limits for construction as per IS456:2000	Results of Cheyyeru River Water
1.	Acidity(mg/l)	0 mg/l	< 50 mg/l	8.0
2.	Alkalinity (mg/l)	250mg/l	< 250mg/l	69
3.	Chlorides	250mg/l	<2000mg/l forPCC <500 mg/lfor RCC	55
4.	Hardness	300mg/l	<300 mg/l	310
5.	Sulphates	150mg/l	150 mg/l	105
6.	Dissolve d Oxygen	>5mg/l	5 to 7mg/l	6.9
7.	pH	6.5 to8.5	6.5 to 8.5	7.5
8.	Totalsolids	500mg/l	<2000mg/l	920
9.	Total suspended solids	300mg/l	500 mg/l	670
10.	Total dissolvedsolids	500mg/l	1500 mg/l	600
11.	Fluorides	1.5mg/l	<1.5 mg/l	1.02

6. CONCLUSION

Cheyyeru River Water:

- **pH, Alkalinity, Chlorides, Hardness, Sulphates, Fluorides, Total solids, Total suspended solids, Total dissolved solids**: Within permissible limits.
- **Acidity**: Exceeds desirable limits.
- **Dissolved Oxygen (D.O):** Indicates a high organic load, possibly due to higher levels of carbon dioxide leading to increased acidity.
- **Presence of Dissolved Solids:** Likely induced by runoff from the sides of the river.

Ground Sample:

- **Alkalinity, Dissolved Oxygen, pH, Total solids, Total suspended solids, Total dissolved solids, Fluorides:** Within permissible limits.
- **Acidity, Chlorides, Sulphates, Hardness:** Within desirable limits.

Implications and Recommendations:

- Both samples are deemed suitable for construction and drinking purposes after appropriate treatment, despite the Annamayya Dam water exceeding desirable limits for acidity.
- The presence of heavy amounts of carbon dioxide, gases, and minerals like chlorides and sulphates may contribute to the exceedance of permissible limits in the dam water.
- The findings highlight the importance of ongoing monitoring and treatment of water sources to ensure compliance with water quality standards.
- These surveys provide valuable insights and resources for enhancing each state's ability to analyze and assess water quality in the future, supporting sustainable water management practices.

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