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EVALUATION ON PHYSICO-CHEMICAL PARAMETER OF SELECTED STATIONS FROM RIVER GODAVARI, ANDHRA PRADESH

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ABSTRACT

The River Godavari is the largest of the peninsular rivers and the second longest river in India next only to Ganga. It is originated near Nashik (Maharashtra) in Northern Western Ghats. It flows across the Deccan Plateau from Western to Eastern Ghats through Maharashtra and Andhra Pradesh before emptying into the Bay of Bengal. It is a vital source of water for the people live surrounding villages, primarily for agriculture, aquaculture, domestic and industrial need. To assess the scale of water quality determine, water samples were collected and to evaluate different types of parameters. This study emphasis monthly variations of physico-chemical parameters of water. The results of present study evaluation showed that there was a significant monthly variation. The temperature was found to be maximum during summer months & minimum during winter months and range was 22-32°C in Station-I and 24-32 °C in Station-II. The pH of the water was found in slightly alkaline range throughout the study period and range was 7.4-8.6 in Station-I and 7.5-8.8 in Station-II. Dissolved oxygen showed marked variations and its goes to 4.0-5.4 mg/l in Station-I and 4.4-5.2 mg/l in Station-II. Total Alkalinity was 138-178mg/l in Station-I and 139-178mg/l in Station-II and Total Hardness was 129-190mg/l in Station-I and 118-199mg/l in Station-II with little fluctuations. However, phosphates and nitrate, were found to the slight monthly variation. The present study indicates that the fluctuations of physico-chemical parameters in the river region influence the feeding, breeding and other activities of fishes

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INTRODUCTION

Water is a most imperative renewable natural reserve resources which plays a vital role in the survival of all aquatic biota. It is vital factor of life and it is considered as precious compound on the earth. All living organisms on earth are so intimately connected with the water that life on this globe is believed to have evolved in and around water. Water condition is equally important for the survival and growth of organisms. Seasonal variations in both anthropogenic and natural processes such as temperature, DO, nitrates, phosphates and other parameters are affect the quality of river water and leads to different attributes for different seasons (Panchakshari *et al.*, 2015). Water quality interns of physical, chemical and biological characteristics may directly influence the water (Diersing Nancy, 2009). It is a measure the condition of water relative to the requirements of biotic species and or to any other purpose (Johnson *et al.*, 1997). The most common standards used to assess water quality related to drinking water, irrigation, fisheries, and safety of human.

The fresh water bodies of India are rivers, reservoirs, ponds lakes, canals and dams. The riverine system with the construction of dams is directly or indirectly impact on animal life. The measurement of the productivity and energy of any water body needs assessment of physico-chemical parameters of water (Krishna *et al.*, 2023). The physico-chemical parameters are altered or modified due to the activities of human being that may directly impact metabolic conditions of fishes. Any alter in the environmental conditions may bring in an undesirable activities, which may lead to the pollution of that water body (Krishna *et al.*, 2013).

The ecological parameters has a directly influence the growth of plankton and other organisms. The pH of running water is slightly alkaline and it is better condition for the fishes. When turbidity is higher in water bodies leads to low dissolved oxygen. In winter, turbidity is reduce and therefore dissolved oxygen in water increases. When turbidity is low, there is good density of planktons. So, where the river is less turbid abundance of plankton feeder fishes is higher, therefore species abundance is higher in the upper reaches of the river and tributaries. In turbid water, there is a reduction of dissolved

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Table 3 Correlation co-efficient values observed between physico-chemical parameters of water (2021-22) from river Godavari Station- I, Rajahmundry

	Temperature	Transparency	DO	pH	Alkalinity	Hardness	Nitrites	Nitrates	Phosphates
Temperature	1								
Transparency	.662*	1							
DO	-.162	-.203	1						
pH	-.046	-.378	.557	1					
Alkalinity	.286	.224	-.731**	-.612*	1				
Hardness	-.283	.303	-.423	-.301	.024	1			
Nitrites	-.315	-.361	-.573	-.336	.560	.061	1		
Nitrates	-.357	-.128	-.174	-.494	.420	-.066	.233	1	
Phosphates	-.590*	-.532	-.318	.178	-.076	.297	.509	-.103	1

*. Correlation is significant at the 0.05 level (2-tailed).
 **. Correlation is significant at the 0.01 level (2-tailed).

Table 4 Correlation co-efficient values observed between physico-chemical parameters of water (2021-22) from river Godavari Station- II, Dhavaleswaram

	Temperature	Transparency	DO	pH	Alkalinity	Hardness	Nitrites	Nitrates	Phosphates
Temperature	1								
Transparency	.259	1							
DO	.097	-.151	1						
pH	-.282	-.283	.492	1					
Alkalinity	.248	.547	-.639*	-.830**	1				
Hardness	.084	-.172	-.188	.101	.036	1			
Nitrites	-.363	.198	-.362	-.057	.275	-.046	1		
Nitrates	.182	.029	-.140	-.023	.278	.153	.632*	1	
Phosphates	-.724**	-.034	-.540	.177	.065	.244	.561	.372	1

** Correlation is significant at the 0.01 level (2-tailed).
 * Correlation is significant at the 0.05 level (2-tailed)

RESULTS AND DISCUSSION

The average physico-chemical parameters water from River Godavari was recorded from January 2021 to December 2022 and presented Table No: 1& 2 and their correlation were given in Table 3 & 4.

Temperature

Temperature is one of the essential vital environment factors in freshwater ecosystems. It varies not only different geographical regions but also in the same waters during different time and season (Sharma *et al.*, 2000). It is an essential physico-chemical parameter (Rawat and Jakher, 2002). The temperature regulates the self-purification capacity of rivers and reservoirs. Sharma *et al.*, (2000) analyzed that there is a greater influence of temperature on physiology and ecology of fresh water organisms in water bodies at the same time all the living organisms in the water bodies are also influenced by temperature and its effects on biological activities such as, reproduction, metabolism and behavior. Increased temperature may cause increased decomposition of organic matter and impact of season. The temperature suitable for freshwater aquatic organisms are 20 to 30°C and optimal range was 25 to 28 °C (Huet, 1971). The optimum temperature can improve the digestive and metabolic enzymes to function effectively so that they will produce energy for growth and survival (Lestari and Dewantoro, 2018). In the present study temperature ranges from 22 to 32°C in Station-I and 24-32 in Station-II. The lowest temperature recorded in the month of December in station-I and November in station-II.

The highest temperature recorded in the month of May in station I and II.

Transparency

Transparency is the vital property of water because of it offer resistance to passage of light. It caused by suspended solids like silica, clay, living or dead algae and other macro and microorganisms. Patra *et al.*, (2010) stated that turbidity is a measure of transparency of water. Expressed maximum value of Turbidity may be due to runoff of water from and heavy rain falls. Rao *et al.*, (2001) expressed that the term ‘Turbid’ is applied to waters containing suspended matter that interferes with the passage of light through it. Balvay *et al.*, (1990) noted that Turbidity causes threat to aquatic life. During the present study Transparency ranged from 28-40 cm in station-I and 27-39 cm in station-II.

pH:

The pH is considered as negative logarithm of hydrogen ion concentration of water. pH values from 0 to 7 are diminishing acidic, 7 to 14 was alkaline and 7 is neutral. It is controlled the solvent property. In the present study highest pH 8.8 recorded in the month of November in station-II whereas lowest 7.4 pH recorded in the month of June in Station-I. The pH level in the river is optimal to support the survival of aquatic organisms. The seasonal change of pH was mainly due to the rainfall and fresh water inflow. Davis (1954) emphasized that pH is the most important chemical factor of water and it controls the solvent properties. Thus pH is influence alkalinity, CO₂ and many other acid - base

2012). To study the dependency of parameters, matrix of correlation and their systematic study of water quality parameters help to assess the overall water quality.

Water resources are under severe threats from pollution generated by human interventions and inappropriate agricultural and aquaculture drainage from rivers (Krishna et al., 2017, Jin et al., 2020a, 2020b). Anthropogenic sources such as untreated industrial effluents, improperly disposed domestic waste and agricultural runoff are the prime contributors to surface water pollution and water quality deterioration (Uddin and Jeong, 2021). Seasonal variations in both anthropogenic and natural processes such as temperature and precipitation affect the quality of river water and lead to different attributes for different seasons (Krishna et al., 2017). The physical and chemical quality of the lower reaches of the Cimanuk River is influenced by activities in the river such as sand mining, water sources, power plants, industrial raw water, irrigation canals, livestock activities, and fisheries which will affect the value of water quality in the upper reaches of the Cimanuk River (Yustiati et al., 2023). The variation of physico-chemical parameters mainly depends on monsoon rains and also other sources of freshwater. The fluctuations in physico-chemical parameters influence the biological activity and productivity of aquatic organisms. The aim of the present study was to understand distribution of physico-chemical parameters from June, 2021 to May, 2022 and may influence on feeding, breeding and other activities of fishes in the Godavari River area.

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