Abstract—Fresh water is necessary for healthy living. River water is used for various purposes such as drinking, bathing, recreation, community water supply, irrigation etc. This natural resource is being polluted by indiscriminate disposal of sewage, industrial waste and human activities which affect quality of river water. A water quality index expressed as single number is developed to describe overall water quality conditions. Therefore it is necessary for monitoring the water quality of river by analysis of various physiochemical parameters.

Keywords — Chemical characterisation of river, Physical characterisation of river, River quality, Water pollution, and Water Quality Index.

INTRODUCTION

The quality of drinking water is of vital concern for human health & life in an attempt to devise a system to study rivers in a various parts of the country is very essential. There are several factors influencing the water quality based on its usages. From the present study grossly polluted rivers on specific stretches are Sabarmati, Godavari, Satluj, Yamuna, Cauvery, Ganga, Krishna, Tapi, Mahanadi & Brahmani are relatively clean rivers where as Mahi, Narmada, Brahmaputra & Beas. To find out water quality with respect to organic & bacterial pollution National Sanitation Foundation (NSF) created and design a standard index called the Water Quality Index (WQI). The WQI is the one of the most widely used of all existing water quality procedures. The overall results of 9 separate tests can be used to determine if particular stretch of river is healthy. Dissolved oxygen, fecal coliform, pH, BOD, temperature, total phosphate, nitrates, turbidity, total solids, are very essentials tests to find out water quality & WQI. For each tests, the numerical value or Q value is multiplied by “Weighting factor”. It is more significant in determining water quality than the other tests.

The nine resulting values are then added to arrive at an overall water quality index. Statistical analyses like factor analysis were performed by using different statistical methods. Therefore, WQI is simplified way of representing water quality information.

Kumar et. al., carried out the water quality assessment on the ‘Sabarmati River’ as a source of irrigation, drinking water and as a sink for urban and industrial waste water for the duration of 12 months (July2009-July2010). An assessment of various physico-chemical characteristics of river water such as pH, temperature, DO, Hardness, Phosphate, Sulphate, Nitrate, and COD were carried out at three sites of Sabarmati River in morning hours. They choose NSF WQI as it is an excellent management and general administrative tool in communicating water quality information. This index has been widely tested and applied to data from a number of different geographical areas all over the world in order to calculate WQI and it is taken into consideration nine parameters and a weight was given to each factor according to its importance in water quality. The classification of the river quality standard is shown in the mathematical expression for NSF WQI is given by,

\[
\text{NSFWQI} = \sum_{i=1}^{p} W_i \cdot I_i
\]

Where,

‘I,’ is the sub-index for i\textsuperscript{th} water quality parameter
‘W,’ is the weight associated with i\textsuperscript{th} water quality parameter
‘p’ is the number of water quality parameters.
The study shows that the levels of nutrient parameters of water in being adversely affected by discharge of domestic, agricultural and industrial effluents. (Kumar, et al., 2011).

Hiramani and Sunkad investigated water quality on Tambraparni River for estimation of various physico-chemical parameters to study monthly variations, for 12 months from Feb 2008 to Jan 2009. They had carried out a simple statistical linear analysis, and concluded that water was free from pollutants but in due course if anthropogenic activities continue may lead to pollution. Some preventive measures must be taken by local people such as washing of clothes, domestic animals and cleaning vehicles must be prohibited. Sewage should not be discharged to the river water. Immersion of idols must be at specific site. (Hiramani, et al., 2011).

Rajamanya et al. carried the analysis on water samples at specific site, monthly intervals for a period of two years from river Wan in Beed district of Maharashtra and Water Quality Index calculated using Weighted Arithmetic Index (WAI) method. Collected samples were analyzed for the parameters like pH, Turbidity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Chloride, Sulphate, Electrical Conductivity, Alkalinity, Nitrate, and Iron. The quality rating scale (qi) for each parameter was calculated by using the expression:

\[ qi = \frac{(C_i - S_i)}{S_i} \times 100 \]

Relative weight for each parameter calculated as inverse of respective standards, and overall WQI of calculated by,

\[ \text{Overall WQI} = \frac{\sum q_i W_i}{\sum W_i} \]

The study of physico-chemical characters of river Wan reveals that the river water can be used for public consumption. Application of WQI in this study has been found useful in assessing the overall quality of water (Rajamanya, et al., 2011).

Avnish Chauhan & Suman Singh were carried out studies intended to calculate WQI for National River (Ganga) of India at Rishikesh for drinking, recreation and other purpose. They represented a water quality evaluation in order to appreciate the impact of unregulated waste discharge on the quality of river based on computed WQI values. for the study they selected three sites along river Ganga. The water samples were collected on monthly basis (at interval of 30 days) from Jan 2007 to Dec 2008. Collected samples were analysed for the eight parameters like Turbidity, TS, TDS, TSS, BOD, COD, DO, Free CO₂. Their results indicate that water of river Ganga is not suitable for drinking purpose, wild animals and cattle.

Samantray et al. studied the water quality of Mahanadi and its distributaries, streams, Atharabanki river and Taldanda Canal adjoining Paradip in three different seasons namely summer, pre-monsoon and winter. Four parameters namely pH, Dissolved Oxygen, Biochemical Oxygen Demand and Fecal Coliform were considered to compute Water Quality Index based on National Science Foundation studies. Six water samples from Mahanadi River and three water samples from its distributaries were analysed to assess the water quality. Surface waters were collected from all the rivers and streams on a monthly basis for the year 2006. Their findings highlighted the deterioration of water quality in the rivers due to industrialisation and human activities (Samantray et al., 2006).
Karikari et al. were studied Water quality assessment of Densu basin of Ghana between July 2003 and March 2004. They were chosen five sampling stations based on accessibility. Surface water samples for physico-chemical analyses were collected mid-stream at depths 20–30 cm directly. Acceleration in the progressive deterioration of water quality because of increased domestic, municipal, agricultural and industrial activities, and effluent being discharged into water bodies. Five sampling stations were chosen based on accessibility by the Hydrological Services Division of Ghana. Surface water samples for physico-chemical analyses were collected mid-stream at depths 20–30 cm. The high turbidity observed in the basin large quantities of top soil ending up in the river after heavy rains. Very high nutrient and BOD, SS, TDS loads were observed at Ashalaja due to high discharge rate and intensive agriculture (Karikari et al., 2004).

Prakirake et al., were studied six major rivers of central basin of Thailand, were chosen for this study with 63 sampling according to the water quality data obtained from the Pollution Control Department (PCD) between 3 years the water qualities of these rivers could be classified as poor, average, good. Samples from each river chosen were collected twice for the entire period of study. Data regarding water qualities were solicited from 24 water quality management experts in Thailand using two sets of questionnaires which were modified from those of Brown et al. (1970). The effective specific water quality index for assessing Water Supply Usage (WSI) was developed using Solwayaggregation function together with minimum operator (Prakirake et al., 2009).

Meyers C. Studied on Pearson Creek which flows into Cedarville Bay. Cedarville Bay has experienced a growth of aquatic vegetation that has affected the local water systems. Eurasian milfoil was mostly responsible for aquatic wildlife. The purpose of their study was to examine the water which entering in to the Cedarville Bay from Pearson Creek. The tests were conducted at 3 sampling sites of Mile upstream on Pearson Creek and are upstream from the discharge point considering the parameters Dissolved Oxygen, Fecal Coliform, pH, B.O.D., Temperature Change, Total Phosphates, Nitrates, Turbidity, and Total Solids.

The treated sewage containing the nutrients like nitrogen and phosphate which flow through the Pearson creek and which most affects the growth of Milfoil in Cedarvillie Bay. Their study revealed that Lagoon discharges can be eliminated as the primary reason for the decline in water quality as discharges are only being made into Pearson Creek. (Meyers C.)

**SUMMARY**

The water quality of river is deteriorated due to domestic, industrial effluents direct discharge in to river and various human activities along the banks of the river. Instead of analysing the single parameter and predicting the quality of river does not define the actual quality of the river for serving required purpose. So, the seasonal river quality monitoring by analysing various physico-chemical parameters and by integrating them is very much necessary in order to determine and maintain the water quality of the rivers.

**REFERENCES**


