

# Analysis of Water Quality Parameters: A review

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**Abstract**—In present scenario, the river water has become wastewater due to disposal of city waste through which it flows. Most of the existing wastewater treatment plants are getting overload because of unexpected rapid urbanization and due to change in life style of common man. The quality of water is analyze at some time interval because due to the contamination of water the water borne diseases are arise which affects on the human health and aquatic life also. Parameters that may be tested including temperature, pH, DO, turbidity, COD, BOD, heavy metals. Heavy Metals such as Pb,Cr,Hgetc produce chronic poisoning in aquatic life. Heavy Metals naturally exist in very little amount of water.

**Keywords**—Physico-Chemical,COD,BOD,Heavy Metals

## I. INTRODUCTION

### A .General

The water problem is a global phenomenon, and is not restricted to any one nation. Water pollution has been the inevitable outcome of the human's powerful desire for betterment of living standards, through increasing efforts and activities manifesting as heavy industrialization and constant urbanization leading to progressive aquatic system pollution. Human being truly depend on renewable fresh water for drinking, irrigation of crops, and industrial uses as well for production, transportation, recreation and waste disposal. In many regions of the world, the amount and quality of water available to meet human needs are already limited. The gap between freshwater supply and demand will widen during the coming century because of climate change and increasing consumption of water and increasing population.

The change in water quality also varies due to a change in chemical composition of the underlying sediments and aquifer. About one third of the drinking water requirement of the world is obtained from surface sources like rivers, dams, lakes and canals. The chemical and physiological process of organism involves utilization of water in some form or the other. Water plays an essential role in several life activities. It has become our prime responsibility to maintain the quality of water from such water samples from rivers and lakes creates an excellent platform to the study of various physicochemical parameters of water namely pH, turbidity, total dissolved solids (TDS), alkalinity and hardness phosphate content, chemical oxygen demand (COD) and sulphate content. The physicochemical characteristics of water bodies have been studied by many researchers from time to time. The physicochemical properties will also help in the identification of sources of pollution, for conducting further investigation on the eco-biological impacts and also for initiating necessary steps for remedial actions in case of polluted water bodies. In India, many researchers have worked on physicochemical and biological characteristics of reservoirs and river.

The aquatic environment with its water quality is considered the main factor controlling the state of health and disease in

both cultured and wild fishes. Pollution of the aquatic environment by inorganic and organic chemicals is a major factors posing serious threat to the survival of aquatic organisms including fish. Pollution of the aquatic environment by inorganic chemicals has been considered a major threat to the aquatic organisms including fishes. The agricultural drainage water containing pesticides and fertilizers and effluents of industrial activities and runoffs in addition to sewage effluents supply the water bodies and sediment with huge quantities of inorganic anions and heavy metals. The most anthropogenic sources of metals are industrial, petroleum contamination and sewage disposal.

Metal ions can be incorporated into food chains and concentrated in aquatic organisms to a level that affects their physiological state. Of the effective pollutants are the heavy metals which have drastic environmental impact on all organisms. Trace metals such as Zn, Cu and Fe play a biochemical role in the life processes of all aquatic plants and animals; therefore, they are essential in the aquatic environment in trace amounts. In the Egyptian irrigation system, the main source of Cu and Pb are industrial wastes as well as algacides (for Cu), while that of Cd is the phosphatic fertilizers used in crop farms.

## II. LITERATURE REVIEW

The extensive literature review was carried out by referring standard journals and conference proceedings. The major work carried out by different researchers are summarized below.

Chandanshive Navnath Eknath [01] studied "The Seasonal Fluctuation of Physico-Chemical parameters of River Mula-Mutha at Pune, India and their Impact on Fish Biodiversity" The paper highlights pollution status and impact on fish diversity in Mula-Mutha River and dams on it. Seventy two species was reported in 1942 in this river. However, it has been observed that fish diversity is gradually decreasing since last thirty years unprecedentedly, mainly due to manifold human activity. Fish diversity in midway of river is becoming rare and only four species have been reported form polluted stretch of river. The river Mula-Mutha is flowing through city area and is one of the important sources of water body because of seven dams on it and its importance in agricultural, industrial and development of Pune city. Its perennial nature supports abundance of aquatic life including fish fauna. About Sixty Three species of different fishes have been reported from upstream from January2003- December -2007 and only Four species of fishes in the downstream during winter and summer. The Mula-Mutha River and its tributaries are highly polluted due to domestic and industrial wastes. The physico-chemical aspects of water pollution of Mula-Mutha Rivers was analyzed seasonally with respect to following parameters from July-2004 to May-2005. i. Water temperature, ii. pH, iii. Dissolved solids, iv. Dissolved oxygen, v. free carbon dioxide, vi. Acidity, vii. Alkalinity, viii. Chloride content, ix. Nitrates,

x. Phosphates, xi. Biological oxygen demand, xii) Chemical oxygen demand. It is observed that the level of these parameters was optimum during winter and summer seasons. In the polluted stretch of this river, tolerant species as *Aorichthysseengala*, *Oreochromismossambicus* and *Gambusiaaffinis* as well as air breathing fish *H. fossilisare* found at many places.

MVS Vaishnavi et al [02] studied "Study of levels of heavy metals in the river waters of regions in and around Pune City, Maharashtra, India" Heavy metal contamination of the Mula Mutha and Pavana Rivers of Pune city during the month of January 2015 was assessed through quantitative analysis. The samples were analyzed for different heavy metals (Cd, Co, Cr, Cu, Ni, Pb and Zn). This study was conducted to determine the quality of run-off water which is used for drinking in the study area. A total of nine water samples were collected from the river sites. The samples were analyzed for their pH, electrical conductivity, total dissolved solids and different trace metal contents. The mean concentrations of Cd and Pb obtained were respectively 0.039 and 0.107 mg/L which were higher than the permissible limits declared by World Health Organization (WHO), while mean nickel concentration was slightly at higher end than the permissible limit of WHO. Results showed the presence of Cd, Ni, Pb and Cu in the water samples. It is further inferred from the results that the concentration of Cr, Mn, Zn and Mo is within the allowed WHO limits in drinking water.

PaliSahu et al [03] studied "Physicochemical Analysis of Mula Mutha River Pune" Mula-Mutha River in Pune (India) is one of the most vulnerable water bodies to pollution because of their role in carrying municipal and industrial wastes and run-offs from agricultural lands in their vast drainage basins. Despite of the various standards and laws made by government many industries were discharging their waste directly into the river making its quality poor day by day. The restoration of river water quality has been a major challenge to the environmental managers. Detailed research and analysis is needed to evaluate different process and mechanism involved in polluting water. The aim of the work under the title is to analyze the river by dividing it into various sampling station. The present study also identifies the critical pollutants affecting the river water quality during its course through the city. The indices have been computed for pre-monsoon, monsoon and post-monsoon season at four locations, Khadakwasla, Sangamwadi, and Vithalwadi & Bund Garden. It was found that the water quality ranged from satisfactory to marginal category at Khadakwasla and fell under very poor category at all other locations. This research have a vast future scope as the rapid industrialization results in formation of toxic contaminants leading to enormous damages to environment directly putting the lives at risk. Thus, this gathered information would be handy and helpful for preventing or at-least reducing the hazardous impacts.

Nidhi Jain et al [04] studied "Comparative Review of Physicochemical Assessment of Pavana River" The study was aimed to review the status of physicochemical characteristics of Pavana River, Pune. Comparative study of data of water quality has been studied from 2005 to 2013 and the physicochemical parameters such as pH, DO, COD, BOD, etc. has been compared. It was found that at many places the water

is highly polluted. There was an increase in DO and decrease in COD, BOD contents in the water. For the statistical analysis, values of mean, standard deviations and correlation were also calculated for the water quality characteristics.

Patil. P.N et al [05] studied "Physico-chemical parameters for testing of water" People on globe are under tremendous threat due to undesired changes in the physical, chemical and biological characteristics of air, water and soil. Due to increased human population, industrialization, use of fertilizers and man-made activity water is highly polluted with different harmful contaminants. Natural water contaminates due to weathering of rocks and leaching of soils, mining processing etc. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know details about different physico-chemical parameters such as color, temperature, acidity, hardness, pH, sulphate, chloride, DO, BOD, COD, alkalinity used for testing of water quality. Heavy metals such as Pb, Cr, Fe, Hg etc. are of special concern because they produce water or chronic poisoning in aquatic animals. Some water analysis reports with physico-chemical parameters have been given for the exploring parameter study. Guidelines of different physico-chemical parameters also have been given for comparing the value of real water sample.

Mane A. V. et al [06] studied "Water quality and sediment analysis at selected locations of Pavana river of Pune district, Maharashtra" Water pollution is one of the major global environmental problems. It is an acute problem almost in all major rivers and water reservoirs in India. Water pollution is increasing and becoming severe day-by-day and posing a great risk to human health and other living organisms. There is growing concern on the deterioration of ground water quality due to geogenic and anthropogenic activities. Present investigation aims at insight about the level of contaminants of surface water, groundwater and sediment analysis of selected locations of Pavana river of Pimpri- Chinchwad area of Pune district. An attempt has been made to assess the water quality, sediment and weed analysis of the samples. A higher value of TDS was observed at groundwater site G4 with 834.27 mg/l while it was lower at surface water site 1 by 65.12 mg/l. Dissolved oxygen content of the water samples was observed quite well in limit but it was lower with 1.6 mg/l at surface water site 4 while higher at surface water site 2 with 5.23 mg/l. In the present study, highest value of COD was observed by value of 120 at surface water site S4 while was lowest with only 64 mg/l at groundwater site G4. As expected groundwater samples showed higher values of hardness content as compared to surface water samples of Pavana river. Nickel content was found to be present at all sites with a range of 22 to 40 mg/kg. There is urgent need for more representative samples to be used to go beyond preliminary assessment as reported in the present study for making appropriate recommendations.

S. P. Gorde et al [07] studied "Assessment of Water Quality Parameters" water is the most important in shaping the land and regulating the climate. It is one of the most important

compounds that profoundly influence life. The quality of water usually described according to its physical, chemical, biological characteristics. Rapid industrialization and indiscriminate use of chemical fertilizers and pesticides in agriculture are causing heavy and varied pollution in aquatic biota. Due to use of contaminated water, human population suffers from water borne diseases. It is therefore necessary to check the water quality at regular interval of time. Parameters that may be tested include temperature, pH, turbidity, salinity, nitrates and phosphates. An assessment of the aquatic macro invertebrates can also provide an indication of water quality.

### III. ANALYSIS OF WATER QUALITY

For the assessment of water pollution status of the water bodies the following water quality parameters are analyzed: 1) Temperature 2) pH 3) DO 4) BOD 5) COD 6) TS 7) Turbidity 8) Heavy Metals

#### 1. Measurement of Temperature:

The temperature is measured by using digital thermometer the thermometer is dipped in the sample and the temperature is recorded.

#### 2. Measurement of pH:

The pH is important parameter of water, which determines the suitability of water for various purposes such as drinking, bathing, cooking, washing and agriculture etc. The desirable limit of pH of water is having 6.5 to 8.5 as specified by the BIS. Pure water is said to be neutral, with a pH of 7. Water with a pH below 7.0 is considered acidic while water with pH greater than 7.0 is considered as basic or alkaline.

#### 3. Measurement of DO:

The determination of dissolved oxygen present in River is very important, because aquatic life of river is depend upon DO and minimum 4 ppm DO is required to survival of aquatic life. To ensure this, DO tests are performed. DO test is measure on site of sample collection with the help of Digital Dissolve Oxygen Meter. Because of on-site measurement of DO gives the accurate result and if DO is measure after some time period then because of temperature changes and atmospheric changes DO get changed.

#### 4. Measurement of BOD:

Biological Oxygen Demand (BOD) is a measure of the oxygen used by microorganisms to decompose this waste. If there is a large quantity of organic waste in the water supply, there will also be a lot of bacteria present working to decompose this waste.

#### 5. Measurement of COD:

Chemical oxygen demand is related to biochemical oxygen demand (BOD), another standard test for assaying the oxygen demanding strength of waste waters. However, biochemical

oxygen demand only measures the amount of oxygen consumed by microbial oxidation and is most relevant to waters rich in organic matter.

#### 6. Measurement of TS:

Total suspended solids are those solids which are retained by the filter of 1 micro m pores, and they are, therefore, also called as non-filterable solids. Their quantity can be determined by passing a known volume of sewage sample through a glass fiber filter apparatus and weighing the dry residue left.

#### 7. Measurement of Turbidity:

Determine turbidity as soon as possible after the sample is taken. Gently agitate all samples before examination to ensure a representative measurement. Sample preservation is not practical, begin analysis promptly. Refrigerate or cool to 4°C, to minimize microbiological decomposition of solids, if storage is required. For best results, measure turbidity immediately without altering the original sample conditions such as temperature or pH. Turbidity is measure with the help of Digital turbidity meter. This calibrated with the help of standard NTU.

#### 8. Measurement of Heavy Metals:

Each acid digested water sample of 100 cm<sup>3</sup> was taken in the beaker and the beaker was kept in an oven at 70°C to reduce the volume of the water up to 50 cm<sup>3</sup>. The concentration of Cd, Co, Cr, Cu, Ni, Pb and Zn in each water sample were determined by using an Atomic Absorption Spectrometer (AAS: AAS: LABINDIA: AA- 7000) AAS required an acid digestion step prior to analysis by treating the samples with concentrated HNO<sub>3</sub>. Digestion of samples is performed essentially as described in standard method in American Public Health Association (APHA, 2012). The instrument settings were determined from the recommendations in the instruction manual (IO).

### IV. CONCLUSION

1. The water quality is dependent on the type of pollutant added.
2. River water quality is poorer in Summer season than winter and Rainy Season.
3. The physico chemical parameters are varies with the sources of pollutants.

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