

# A Study of Water Quality Analysis

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**ABSTRACT-** Water is undoubtedly supreme valuable natural supply afterward air. Despite fact that water covers majority of earth's surface, just tiny percentage of this is functional, making it extreme valuable. As a result, this valuable & restricted resource be managed with attention. Because water is obligatory for number of determinations, its appropriateness must established prior to usage. Water sources should also be inspected on a regular basis to ensure that y are in excellent functioning condition. Poorly maintained water bodies aren't symptom of ecological deterioration, but they constitute hazard to ecosystem. Poor water quality in industry can lead to hazards & severe financial loss. As a result, water quality is crucial in terms of both environment & economy. As result, testing for water quality is essential before it may be utilised for any purpose. Years of study have resulted in certain st&ard techniques for water quality examination. re are protocols in place for collecting, storing, & analysing materials. normal sequence of events is detailed succinctly here so that analysts & researchers can profit from it.

**KEYWORDS-** Contaminated, Resource, Water Quality Analysis, Water Quality Index, Water Quality Testing.

## I. INTRODUCTION

In light of population expansion & economic development, India is confronted with a severe issue of natural resource shortage, particularly water scarcity. majority of fresh water sources throughout globe are becoming contaminated, lowering water potability. Water is essential for life & may be found in various forms in nature, including ocean, river, lake, clouds, rain, snow, & fog. Chemically pure water, on or h&, doesn't exist in nature for significant period of time. Lake is vast water body bounded by l& that is home to a variety of marine life forms. For real-world purposes, clean water is defined as water with little dissolved or suspended particles, toxic gases, & biological life [1].

Storm water runoff & sewage discharge in lakes are just a fewer among frequent ways that different fertilizers infiltrate aquatic habitats, killing m. Eutrophication is most serious of all water quality problems that plague lakes throughout world. Eutrophication is word used for describing lake's aging as consequence of nutrients, residues, deposit, & organic matter accumulating in lake from neighbouring watershed. Function of plants & sediments as nutrient sources & sinks has established. It explains biological response of aquatic systems to nutrient enrichment, with end result being expansion of primary production to nuisance levels. primary reason is excessive

phosphorus & nitrogen addition, which results in high algal biomass, cyanobacteria dominance, & macrophyte loss [2]. Water quality pertains to water's biochemical, physiological, & biological qualities, as well as its suitability for a particular purpose. Water can be used for a multitude of reasons, such as recreation, drinking, fishery, irrigation, & industry. Each of se uses does have its own set of biochemical, mechanical, & biological requirements that must be satisfied in order to get intended outcome. Water in use for consumption or swim, for example, is subject to stricter regulations than water used in farming or industry [3].

Water quality st&ards are developed after years of research for ensuring appropriateness of effectual water consumption for specific goal. Analysis of Water quality involves study of evaluating essential qualities of water using recognised procedures. Water quality testing is mostly used for monitoring purposes. following are some of benefits of such an evaluation [1-5]:

- Determine if quality of water meets necessities &, as outcome, is appropriate for envisioned application.
- For conserving water quality by intensive care effectiveness of system.
- Decide if an existing system desires for upgradation or changes, along with what alteration must be made.
- To check for conformity with laws & regulations regarding water quality.

### A. Procedures of Water Quality Analysis

#### 1) Selection of Parameters

Water quality criteria are preferred completely depending on requirement for a particular application of that water. Here are a few examples:

- Drinking: In harmony with WHO/CPCB guidelines.
- Irrigation: Ph, Conductivity, Potassium & Sodium, Nutrients, substances that are unique.
- Industries: based on particular needs
- Domestic Consumption: As per BIS St&ards
- Water Bodies: As per CPCB guidelines

#### 2) Choosing of Method

Analysis of water quality techniques are chosen based on requirements. following variables influence technique selection: volume & quantity of samples for being examined, analysis cost, precision needed & analysis' punctuality [6-10].

### 3) Precision & Accuracy of Method Selected as per Requirement

Level of precision & correctness for maintaining against certain technique is determined by monitoring goal. Budget of Monitoring System Parameters for Monitored Use of Water are some of variables that influence this choice.

### 4) Chain-of-Custody Procedures

Chain-of-custody forms that are correctly developed & executed ensuring sample from integrity of sample collection through data reportage. It involves being able to smidgeon sample's custody & h&ling from time it is collected until it is processed & disposed of. This technique is known as "chain-of-custody," & it is obligatory to exhibit taster control when data is used for regulation or litigation. When no lawsuit is convoluted, chain-of-custody approaches are valuable for routine sample control. [7].

Sample is deliberated in individuals personal custody if it's in individual's ownership at time, in individual's sight, guarded & tamper-proofed by that person, or secured in an area restricted to authorised individuals. following procedures highlight most significant aspects of chain-of-custody:

- Labels for Samples: Labels are being used to prevent misidentification of samples &, if required, to auticate hoarder. Labeling, in or words, ensures collector's obligation & responsibility.
- Sample Seals: Sample sealing are used to detect illicit manipulation with specimens up until time of testing. As consequence, it is vital to seal a specimen it before leaves collector's custody. specimen must be packed in such way that it should be destroyed in order to be accessed.
- Field Log Book: A Field Log Book should include all pertinent information pertaining to a field survey or sample. log book should include at least following information: Sampling purpose, Sampling point location, Field contact name & address, Producer of item being sampled & address, if different from location, Type of sample & Preservation method, date, & time [11-13].
- Request for Sample Analysis Sheet: Sample analysis request form is used to send samples to lab. collector completes field portion of such a form, which comprises majority of data collected in log book. lab fraction of such a form must be completed by laboratory staff & contains following data: signature of person having received sample, lab sample number, dating site of sample receipt, situation of each sample (i.e., regardless of wer it is warm or cold, wher container is full or not, colour, if more than one stage is present, etc.), & decisions to be made. [8].
- Laboratory Sample Delivery: Following collection, samples should be delivered to laboratory as soon as possible, generally within two days. When shortened sample holding durations are required, specific arrangements must be made to guarantee prompt delivery to lab. When specimens are carried by commercial courier, waybill no should be included in specimen custody papers. Each specimen must be accompanied by a complete chain-of-custody record & a sample analysis requirements document.

- Sample Receipt & Logging: Before sample is accepted for analysis, sample custodian inspects quality & seal of sample & compares label information & seal to chain-of-custody record. After acquiescence, the custodian provides a lab number to the specimen, records it in a workplace log book and/or computerised laboratory management information system, and stores it in a protected supply closet, cabinet, or fridge at the prescribed temperature until it is allocated to an analyzer.. supervisor or analyst is in charge of sample after it has arrived at laboratory.
- Disposal: Samples are kept for project's specified length of time & duration, or until data is evaluated & approved. After documenting, samples are typically discarded. Disposal, on or h&, must be done in line with authorized procedures.

### 5) Proper Sampling

Correct sampling is required for accurate measurement of parameters of water quality. Even if progressive methods & sophisticated tools are employed, poor sampling may cause parameters to provide an inaccurate picture of real situation. following requirements should be met by appropriate sampling:

#### i. Representative

data must accurately reflect wastewater or water tested. As a result, following variables must be carefully considered in order to ensure appropriate sampling:

- Sampling procedure
- Sampling volume/size
- Number of sampling locations
- Number of samples
- Samples of various kinds
- Intervals of Time

These variables must also be considered while sampling:

- Choosing right sample container
- avoiding contamination
- ensuring collector's personal safety

#### ii. Reproducible

results must be repeatable by ors using same sampling & analytical procedures.

#### iii. Defensible

Documentation supporting sample methods must be provided. data must be accurate & precise to a known degree.

#### iv. Useful

data may be utilized to fulfil monitoring plan's goals.

### 6) Proper Labelling

Correct labeling avoids sample misidentification & establishes collector's duty & accountability. sample container should be properly labeled, ideally with a tag or label engraved with necessary information. Alternatively, a waterproof marker may be used to label bottle directly. Nowadays, barcode labels are also accessible.

following information should be included on sample container or tag:

- Sample code number (identifying location)
- Date & time of sampling
- Source & kind of sample
- Any sample pre-treatment or preservation
- Any specific comments for analyzer
- Name of sampler

#### 7) Preservation

Between time a sample is collected & time it is analyzed, there is usually a delay. During this time, sample's properties may be altered. As a result, adequate preservation is needed both on route to laboratory & in laboratory until analysis begins. Because full stability for every component will never be attained, complete & unambiguous conservation of sample, where household wastewater, industrialised trashes, or natural waters, is realistic impracticality. Preservation methods can only slow down chemical (particularly component hydrolysis) & biological changes that occur after a sample is collected. There is no one technique of preservation that is completely acceptable; preservative is selected in consideration of decisions to be made. PH control, chemical accumulation, usage of amber & cloudy bottles, cooling, filtration, & freezing are only means of preservation [15-16].

#### 8) Analysis

After arriving at laboratory, samples are examined using established techniques & processes to determine required parameters.

#### 9) Reporting

Last step in water analysis process is to write a suitable report in response to demand. Before transferring authority, report must be verified. All data must be recorded in workroom log &, ideally, in a database [17-20].

Total quality of water may also be expressed in form of a Water Quality Index (WQI). WQI is simple numerical measure of a water body's overall water quality that is easy to understand & frequently utilized. Instead of several numbers for all WQP, WQI indicates total quality of water with a single digit. As a result, it is easily imaginable for ordinary individuals.

#### B. Water Quality Index (WQI)

WQI is dimensionless no. that regularises data to subjective grading curves to integrate numerous water-quality variables in single no.. WQI model's factors may vary based on specified water usage & local preferences. DO, pH, , total coliform bacteria, temperature, & nutrients (nitrogen & phosphorus) are some of these variables. These variables may be found in a variety of ranges & are represented in a variety of units. WQI synthesizes rich scientific knowledge contained in these variables into a single value [21].

## II. LITERATURE REVIEW

P. J. Puri, et al. assessed water quality index (WQI) for various surface resources of water, particularly lakes, in Nagpur, Maharashtra (India), during period Jan to December 2008, which included 3 seasons: summer, wintertime, & raining season. Significance of sampling places was taken into consideration. WQI was computed

using National Sanitation Foundation (NSF) information system's water quality index calculator. Computed (WQI) for different investigated lakes indicated good water quality during monsoon season, medium during winter, & bad during summer. With exception of monsoon season, Gorewada Lake has a medium water quality grade throughout year. Aesthetic quality of Futala, Ambazari, & G&hisagar lakes has also deteriorated over last decade [22].

Gaikwad R et al. discussed Evaluation of water quality mostly around Lonar Lake and potential water remediation in which the water quality of drinking water in and around Lonar Lake was assessed. To analyse water quality, specimens were collected and submitted to a complete physiochemical study. When examining quality of water, acidity, total alkalinity, calcite, mg, bicarbonate, chlorine, nitrates, sulfate, dissolved solids, ferrous, iron, and fluorides have all been investigated.. Iron, total hardness, chloride, fluoride, calcium, & magnesium were found to have higher levels. Many studies have indicated that nitrate pollution has harmed groundwater quality in Lonar Taluka. According to findings, groundwater in region requires some kind of treatment before consumption, as well as protection against pollution. Many alternative methods for water purification are currently being considered on a local level. Countless community-based initiatives have attempted in past, only handful of these entirely community-run plants have proven to be effective. Future rests in delivering clean drinking water in rural regions using a combination of these approaches to meet goals of providing safe water at a cheap cost that can be sustained over time & reaches greatest number of people [23].

Majumder M et al. discussed Comparison of surface water quality to land use in Tripura in which they explained how land use pattern of a place is an important element in determining water quality in that region. To further understand impact of land use on surface water quality, a case study was conducted. Land use pattern of each site was compared to water quality indices of surface water from various locations within research region. Priority values (PV) of various water quality parameters were determined using multi-criteria decision-making methods such as weighted sum method, weighted product method, & grey relational analysis based on important criteria such as hazard potential, cost of mitigation, utilization potential, & researcher popularity. Weighted average technique was used to determine water quality indices of samples. To evaluate relationship between land use pattern & water quality, indices were compared to relevant land use pattern. Findings indicate that dense settlement, moderate to low vegetation, & dense cultivation are beneficial to surface water, whereas low density, dense vegetation, & moderate cultivation are detrimental. These results may help managers & policymakers regulate land use in order to preserve best possible quality of surface water [24].

T. M. Heidtke, et al. studied water quality preparation & organisation options for Great Lakes are utilized for identifying economical pollution control approaches, to assess pollutional loadings, particular water quality issue regions, costs, & pollutant reductions provided by various management methods, mathematical models & or systems analysis approaches are used. Humans get infected with water-borne illnesses as a result of their usage of polluted water. As a result, it is essential to monitor water quality

on a frequent basis. Temperature, pH, turbidity, salinity, nitrates, & phosphates are some of parameters that may be evaluated. A survey of aquatic macroinvertebrates may also provide information about water quality. A judgment is made as to how these options could be anticipated to meet Great Lakes water quality goals. Data from a variety of Great Lakes research projects is collected, combined, & utilized to forecast local & lake-wide water quality over the next two decades. The study's findings suggest a phased strategy to pollution management, in which most cost-effective initiatives are deployed & their outcomes evaluated before more costly control measures are introduced [25].

### III. DISCUSSION

One of the most essential factors in sculpting terrain & controlling climate is water. It is one of the most essential chemicals that has a significant impact on human existence. Physical, chemical, & biological properties of water are often used to define its quality. Rapid industrialization & indiscriminate use of chemical fertilizers & pesticides in agriculture are polluting the aquatic environment in a variety of ways, causing water quality to deteriorate & aquatic biota to dwindle. Humans get infected with water-borne illnesses as a result of their usage of polluted water. As a result, it is essential to monitor water quality on a frequent basis. Temperature, pH, turbidity, salinity, nitrates, & phosphates are some of parameters that may be evaluated. A survey of aquatic macroinvertebrates may also provide information about water quality. Water of such high quality may be needed solely for drinking reasons; but, for applications such as agriculture & industry, water quality may be fairly flexible, & water that has contaminated up to a certain degree in general might be considered clean. The health of lakes, as well as their biological variety, is linked to the health of almost every component of an ecosystem. Lakes are also exposed to a variety of natural processes in the environment, such as the hydrologic cycle, as well as extraordinary development activities, which have resulted in the death of many lakes.

### IV. CONCLUSION

Water quality testing is required for concluding if water supply is appropriate for the envisioned purpose. To evaluate the acceptability of water to be utilized, many water quality parameters are examined & compared to their standard values. Methods for assessing water have been established after extensive study. For the convenience of researchers & analysts, such rules are presented succinctly in one place in this article. As a result, getting an understanding of water quality evaluation standards & processes may be beneficial to many.

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