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ASSESSMENT OF PHYSICAL AND CHEMICAL PARAMETERS OF PRESENT WATER QUALITY, DECIDING LINE OF TREATMENT OF PRESENT WATER QUALITY OF KUNDA RIVER AT KHARGONE (M.P.)

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ABSTRACT – The Kunda river is located in the Khargaon district of the state of Madhya Pradesh. A study was considered for development of water quality index which includes seven parameters like turbidity (NTU), temperature (°C), TDS (mg/L), alkalinity (mg/L), hardness, chloride BOD (mg L^{-1}) and DO (mg L^{-1}). Along with the development of people and industries, water is considered as an important necessity. With population growth and industrialization, the demand for fresh water has increased over the past decades. This requirement is fulfilled by rivers that provide water for human life and agricultural purposes. Due to human and industrial wastes, the water quality of the river has decreased, affecting human life and aquatic life. Treatment of raw water to produce potable quality water can be expensive. Determining the amount of water required for treatment is advisable, as not all water used in a fishery harbor or processing plant is of potable quality. Equipment size is critical to producing acceptable water at a reasonable cost.

Keywords- Kunda River, Physical and Chemical Parameters, Water Quality Indices.

1. INTRODUCTION

The important point to remember is that separate systems and pipelines are needed for potable and non-potable water to avoid cross-contamination. Each system should be clearly identified by contrasting colored pipelines.

Water used for drinking, cleaning fish and making ice must be free of pathogenic bacteria and may require secondary treatment or even complete treatment depending on the chemical elements that need to be removed. For other needs, such as general cleaning, the water may require only basic treatment.

Both types of structures are prone to bacterial growth if they have low or non-existent residual chlorine levels. If periodic scrubbing is done, testing may not be necessary. Generally, harbor basins are tested annually. However, in areas where monsoons are very active, it may be advisable to test at the peak of the dry season

when water discharge points are concentrated in the water body and then during the wet season when agricultural activity is high. May be. Another critical period for ports is the peak fishing season when the port is at its busiest and pollution from ships is at its peak.

2. LITERATURE REVIEW

Clean, safe and adequate fresh water is of utmost importance for human existence and the survival of all living components in the ecosystem. Water quality issues are complex and diverse, deserving of urgent global attention and action [1].

Degradation of water quality has become an issue of global concern because of its natural ability to cause major changes in the hydrological cycle. The past decade has seen unprecedented human impacts on the environment due to unprecedented population growth and rapid rates of urbanization, as well as the intensification and expansion of agricultural practices. This has led to the development and continuous degradation of resources, especially surface water. Contaminated water is a major source of disease spread. Approximately 1.8 million people, mostly children, die each year in developing countries as a result of waterborne diseases [2].

According to Bullard, [3] inferred that surface water degradation always results in an unhealthy socio-economic environment. The properties of water are defined by its composition and is commonly referred to as water quality. Water quality is generally defined as "the chemical, physical, and biological characteristics of water generally with respect to its suitability for a specific use" [4].

Water quality assessment, usually by determining its physicochemical and biological characteristics or parameters against a set of standards, is used to determine whether water is fit for consumption. or safe for the environment. Water quality assessment can be defined as "the assessment of the physical, chemical and biological status of water in relation to its natural state, anthropogenic impacts and future use" [5].

Water quality parameters are then broadly classified into industrial/domestic use, human use (portability) and restoration (in the environment/ecosystem, usually for human health) based on the intended use of the water. Used as a reference to a set of standards. /Aquatic Life). Water quality standards are used to protect various specific uses of water. The standards for each of these designated uses are very different from each other. For example, water used for drinking needs a higher quality than that used for agricultural and industrial use (so water for domestic purposes must be free of toxins and organisms (to avoid water borne diseases).

3. IMPORTANCE OF WATER QUALITY ASSESSMENT AND MONITORING

Water quality assessment is very relevant for both public health and aquatic life. Water quality has a significant impact on water supply and often determines supply options. Understanding and monitoring the sources and quality of water used for water supply is of social, economic and conservation importance as per capita water demand continues to increase while access to freshwater availability continues to decline. Local water quality can be used to identify the sources and fate of pollutants and pollutants from ecology, geology, and anthropogenic activities (industrial processes, runoff from agricultural farms, etc.) in the area.

It is important to identify the source(s) of contamination and develop appropriate management strategies to minimize potential public health risks. Furthermore, data obtained through water quality assessment and monitoring provide empirical evidence to support health and environmental decision-making. In water management practices, water quality values serve as useful and sensitive indicators of changes in the physical, chemical or biological composition of the overall water status.

4. MERITS OF THE WATER QUALITY INDEX

Some of the many benefits and advantages of using a water quality index include:

1. Reduction in the number of parameters needed to compare water quality for a given use
2. Supplying a single number that represents the overall water quality at a particular location and time.
3. Identifying spatial and temporal dynamics in water quality.
4. Ensuring the safety of water bodies for users such as habitat for aquatic life, irrigation water for agriculture and livestock, recreation and aesthetics, and drinking water supply.
5. It is very effective for water quality monitoring.
6. Provides a means of comparison between different rivers and sampling locations.
7. Indexes are one of the easiest ways to communicate water quality ratings to the general public or authorities.
8. It simplifies a complex dataset into easily understandable and usable information.
9. The production of a single value of an index derived from multiple parameters provides important information about water quality that can be easily interpreted by the general and non-technical population.
10. The Index is a useful tool for communicating water quality information to the general public and legislative decision makers.

5. LIMITATIONS OF THE WATER QUALITY INDEX

1. Despite the benefits attributed to WQI, it is however surrounded by some challenges, some of which are described below.
2. Lack of accuracy and precision in the importance ranking technique of parameters evaluation.
3. Failure to deal with uncertainty and subjectivity in a complex environmental problem such as inconsistency of observations, uncertainty, errors in quality.
4. Lack of uniform methodology for measuring water pollution containing biological parameters.
5. Inadequate to transform complex environmental data into information.

6. TURBIDITY (NTU)

Turbidity is a measure of the degree to which water loses its clarity due to the presence of suspended particles. The more total suspended solids in the water, the muddier it looks and the more turbid it is. Turbidity is considered also as a measure of water quality.

6.1 CAUSES OF TURBIDITY

There are various parameters affecting the water cloud. Some of them are:

1. Phytoplankton
2. Sedimentation from erosion
3. Resuspended sediment from the bottom (often stirred up by bottom feeders such as carp)
4. Waste disposal
5. Algae growth
6. urban flow

6.2 CONSEQUENCES OF HIGH TURBIDITY

Suspended particles absorb heat from sunlight, which warms the turbid water, and thus lowers the oxygen concentration in the water (oxygen dissolves better in colder water). Some organisms cannot survive even in warm water. Suspended particles scatter light, thereby reducing the photosynthetic activity of plants and algae, which further reduces oxygen concentrations. As a result of particles accumulating on the bottom, shallow lakes fill up quickly, fish eggs and insect larvae are covered and suffocated, gill structures are blocked or damaged.

6.3 IMPACTS OF TURBIDITY

The main effect is purely aesthetic: nobody likes the look of dirty water. But it is also important to remove the turbidity of the water so that it can be effectively sterilized for drinking purposes. This incurs some additional cost in treating the surface water supply. Suspended particles also help to bind heavy metals and many other toxic organic compounds and pesticides.

6.4 MEASUREMENT OF TURBIDITY

Turbidity is measured in NTU: Nephelometric Turbidity Units. The instrument used to measure this is called a nephelometer or turbidimeter, which measures the intensity of light scattered at 90 degrees when a beam of light passes through a water sample.

7. ALKALINITY

It is a measure of water's ability to neutralize acids or hydrogen ions. Alkalinity is sometimes called "carbonate hardness".

7.1 FACTORS AFFECTING THE AMOUNT OF ALKALINITY

1. Alkalinity may be due to the presence of bicarbonate ion, which is obtained from the dissolution of carbonate by carbonic acids.
2. Minor contributors to alkalinity include carbonate and hydroxide ions.
3. Some sources of alkalinity come from limestone and clay.
4. Some minerals such as dolomite and calcite provide a source of alkalinity.
5. Low alkalinity can be caused mostly by precipitation in the form of rain or snow.

7.2 OPTIMUM AMOUNT OF ALKALINITY

1. An alkalinity range of 100-250 mg/L is considered normal for a river and will stabilize the pH of the river.
2. Levels between 20-200 mg/L are commonly found in freshwater.
3. Seawater levels are typically between 100-125 mg/L.

7.3 FACTORS AFFECTED BY THE AMOUNT OF ALKALINITY

1. Alkalinity can act to buffer water against sudden changes in pH and thereby protect aquatic organisms from sudden changes in pH.
2. If the water's alkalinity is too high, the water can become cloudy, which inhibits the growth of aquatic plants.
3. If the alkalinity is too high, it raises the pH level, which in turn harms or kills fish and other aquatic organisms.
4. Low Alkalinity Water pH can become too acidic and adversely affect the hatching and growth of aquatic animals and adult fish.

8. MEASURES OF WATER HARDNESS

Hardness is caused by compounds of calcium and magnesium and a variety of other metals. General guidelines for water classification are: 0 to 60 mg/L (mg per liter) because calcium carbonate is classified as soft.

9. CHLORIDE

Chloride is one of the major inorganic ions, or negative ions, in salt water and freshwater. It is produced by the decomposition of salts, such as sodium chloride or calcium chloride, in water. Chlorides are binary compounds of chlorine. Chlorine chemically combines with a metal to form a chloride.

9.1 FACTORS AFFECTING CHLORIDE INTAKE

1. Chloride naturally forms when hydrochloric acid reacts with any metal in water.
2. Chloride is common in areas with limestone deposits, but is not found in most other soils, rocks, or minerals.
3. Water pollution can cause chloride to be found in areas where it does not occur naturally. Some sources may be from rock salt (NaCl) flows. Other sources can be from septic tank effluent, animal waste, water softener regeneration, chlorinated drinking water, and potash fertilizers (KCl).
4. Sources of chloride ions may come from mixing of seawater with freshwater.
5. In arid regions of the United States, high salt concentrations can occur when irrigation water is returned to rivers.

10. BOD

Water with a BOD value of 1-2 ppm is considered pure and clean. In fresh water, the BOD value should not exceed 5 ppm because the dissolved oxygen will be used in the decomposition of organic matter and will not be available for the survival of aquatic organisms leading to the death of aquatic organisms. The BOD level of drinking water is 1 - 2 ppm. When the BOD value of the water is in the range of 3 - 5 ppm, the water is moderately clean. The BOD value of polluted water is in the range of 6 - 9 ppm.

11. DISSOLVED OXYGEN

Dissolved oxygen refers to the level of free, uncombined oxygen present in water or other liquids. It is an important parameter in assessing water quality because of its influence on the organisms living within the water body. In limnology (the study of lakes), dissolved oxygen is the second most important element after water. A dissolved oxygen level that is too high or too low can harm aquatic life and affect water quality. Uncompounded oxygen, or free oxygen (O_2), is oxygen that has not bonded to any other element. Dissolved oxygen is the presence of these free O_2 molecules in water. Bonded oxygen molecules (H_2O) in water are in a compound and are not counted in dissolved oxygen levels.

12. RESULTS AND DISCUSSION

Water Quality at Different Locations

S1 - WATER TREATMENT PLANT

S2- ONDAL RIVER

S3- CANAL AT SHRI SIDDHI AVENUE

S4- GANDHIGRAM EXTENSION COLONY

S5- RAHIMPURA

S6- TANDI MOHALLA (BADA BRIDGE)

S7- SEWAGE TREATMENT PLANT

12.1.1 Physical and Chemical Parameters at Different Locations and Present Water Quality at 06:00 AM

Table 1 The value of Physical Parameters at Different Locations (06:00 AM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	Turbidity (NTU)	2.3	8.1	8.2	15.2	11.3	9.7	6.3
2	Temperature (°C)	24.2	25.4	24.4	20.3	21.6	22.5	26.3

Table 2 The value of Chemical Parameters at Different Locations (06:00 AM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	TDS (mg/L)	655	278	342	365	368	207	217
2	Alkalinity (mg/L)	120	142	171	101	148	182	182
3	Hardness	107.2	111.3	112.6	120.3	120.9	108.2	124.8
4	Chloride	36.28	49.78	37.10	40.14	33.45	43.19	38.98
5	BOD (mg L^{-1})	0.71	1.22	0.82	0.95	1.32	0.62	1.20
6	DO (mg L^{-1})	6.2	6.4	6.5	7.1	7.1	7.5	7.5

12.1.2 Treatment of Present Water Quality

Table 3 The value of Physical Parameters after Treatment of Present Water Quality at 06:00 AM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	Turbidity (NTU)	0.5
2	Temperature (°C)	23.2

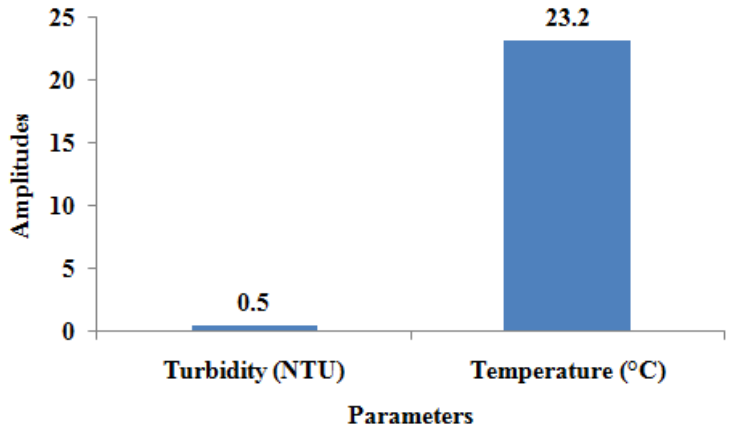

Figure 1 The value of Physical Parameters after Treatment of Present Water Quality at 06:00 AM

Table 4 The value of Chemical Parameters after Treatment of Present Water Quality at 06:00 AM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	TDS (mg/L)	166
2	Alkalinity (mg/L)	86
3	Hardness	101.6
4	Chloride	31.5
5	BOD (mg L^{-1})	0.45
6	DO (mg L^{-1})	6.1

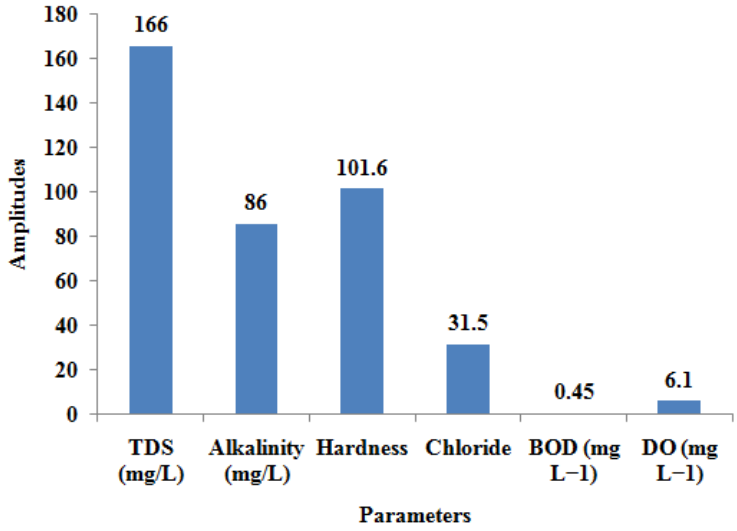

Figure 2 The value of Chemical Parameters after Treatment of Present Water Quality at 06:00 AM

12.2.1 Physical and Chemical Parameters at Different Locations and Present Water Quality at 12:00 PM

Table 5 The value of Physical Parameters at Different Locations (12:00 PM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	Turbidity (NTU)	3.9	8.3	9.6	17.8	15.49	6.7	8.2
2	Temperature (°C)	24.1	25.1	24.2	21.5	22.5	25.5	26.8

Table 6 The value of Chemical Parameters at Different Locations (12:00 PM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	TDS (mg/L)	674	243	342	345	328	229	249
2	Alkalinity (mg/L)	131	152	142	142	188	122	145
3	Hardness	118.2	122.3	114.8	121.8	124.9	109.7	127.8
4	Chloride	32.3	42.98	38.45	40.88	38.51	43.89	38.98
5	BOD (mg L^{-1})	0.78	1.24	0.88	0.78	1.74	0.25	1.34
6	DO (mg L^{-1})	6.8	6.9	6.7	6.8	7.8	7.8	6.8

12.2.2 Treatment of Present Water Quality

Table 7 The value of Physical Parameters after Treatment of Present Water Quality at 12:00 PM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	Turbidity (NTU)	0.5
2	Temperature (°C)	23.8

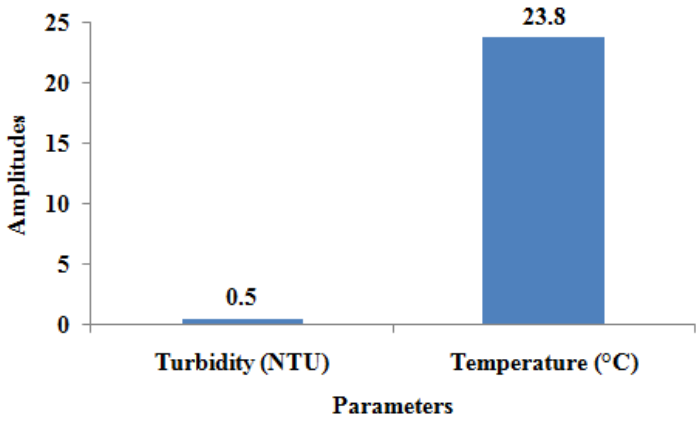

Figure 3 The value of Physical Parameters after Treatment of Present Water Quality at 12:00 PM

Table 8 The value of Chemical Parameters after Treatment of Present Water Quality at 12:00 PM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	TDS (mg/L)	189
2	Alkalinity (mg/L)	99
3	Hardness	112.3
4	Chloride	38.8
5	BOD (mg L^{-1})	0.64
6	DO (mg L^{-1})	6.4

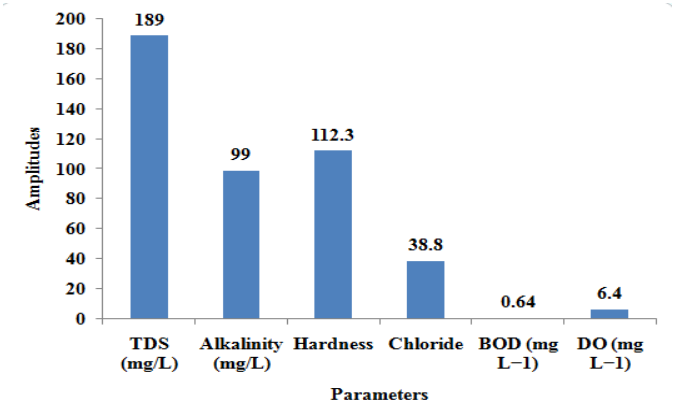

Figure 4 The value of Chemical Parameters after Treatment of Present Water Quality at 12:00 PM

12.3.1 Physical and Chemical Parameters at Different Locations and Present Water Quality at 06:00 PM

Table 9 The value of Physical Parameters at Different Locations (06:00 PM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	Turbidity (NTU)	2.9	8.4	8.6	16.8	12.49	8.7	7.2
2	Temperature (°C)	24.3	25.5	24.3	21.3	22.6	24.5	26.8

Table 10 The value of Chemical Parameters at Different Locations (06:00 PM)

Sl. No.	Parameters	Locations						
		S1	S2	S3	S4	S5	S6	S7
1	TDS (mg/L)	672	293	352	385	398	209	219
2	Alkalinity (mg/L)	121	152	172	102	188	192	185
3	Hardness	108.2	112.3	114.6	121.3	124.8	109.2	125.8
4	Chloride	36.3	49.98	38.00	40.24	33.5	43.39	39.98
5	BOD (mg L^{-1})	0.74	1.24	0.88	0.98	1.34	0.65	1.21
6	DO (mg L^{-1})	6.6	6.7	6.9	7.2	7.3	7.9	7.8

12.3.2 Treatment of Present Water Quality

Table 11 The value of Physical Parameters after Treatment of Present Water Quality at 06:00 PM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	Turbidity (NTU)	0.4
2	Temperature (°C)	23.6

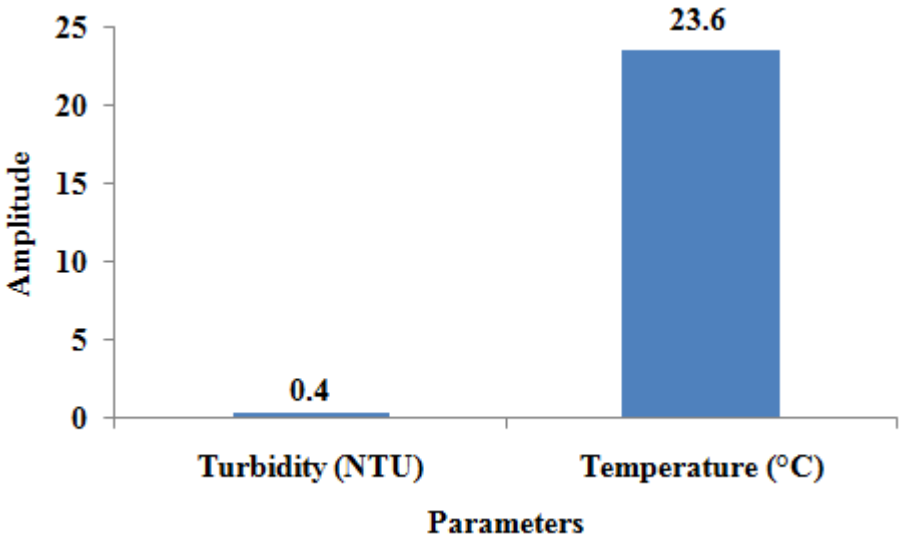

Figure 5 The value of Physical Parameters after Treatment of Present Water Quality at 06:00 PM

Table 12 The value of Chemical Parameters after Treatment of Present Water Quality at 06:00 PM

Sl. No.	Parameters	After Treatment of Present Water Quality
1	TDS (mg/L)	188
2	Alkalinity (mg/L)	98
3	Hardness	102.3
4	Chloride	32.8
5	BOD (mg L^{-1})	0.54
6	DO (mg L^{-1})	6.2

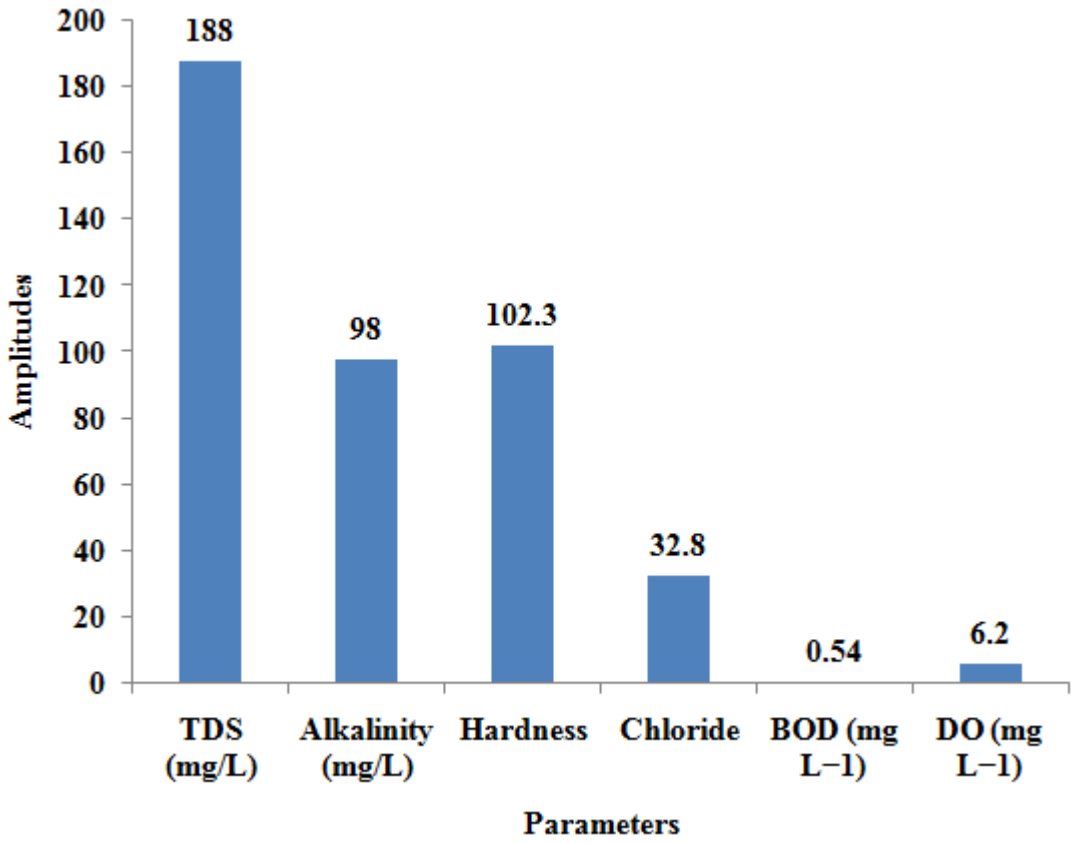

Figure 6 The value of Chemical Parameters after Treatment of Present Water Quality at 06:00 PM

13. CONCLUSIONS

Test results for some samples may vary significantly among laboratories, which may limit the use of these data for important. Table 3 and Figure 1 shown the value of physical parameters such as Turbidity (0.5 NTU) and Temperature (23.6 °C) after treatment of present water quality. Table 4 and Figure 2 shown the value of chemical parameters such as TDS (166 mg/L), Alkalinity (86 mg/L), Hardness (101.6), Chloride (31.5), BOD (0.45mg L−1) and DO (6.1 mg L−1) after treatment of present water quality at the Time of 06:AM. Finally, it is concluded that the minimum value of parameters is the time 06:AM, which is shown in Table 3, Figure 1, Table 4 and Figure 2 .

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