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# Application of Water Quality Index for Assessment of Water Quality in Dhanmondi Lake, Dhaka, Bangladesh

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**Abstract**

This study is aimed to assess the water quality status of Dhanmondi Lake in a single term by the use of water quality index (WQI). Samples were collected from six sampling sites in the post-monsoon season; *in situ* and laboratory analysis were performed for water quality parameters like temperature, pH, EC, DO, BOD, TDS, Cl, $SO_4$, $HCO_3$, free $CO_2$, total hardness, Turbidity, Ca, Mg, and heavy metals. WQI for all the six sampling sites were calculated using weighted arithmetic index method. Considering the water quality standards set globally (as proposed by WHO) and locally (as set by DPHE), the EC, TDS, pH, HCO3, Cl and SO4 contents of Dhanmondi Lake (180µS/cm, 115.20 mg/L, 7.8, 120.1 mg/L, 29.59 mg/L and 11.82 mg/L respectively) were within the permissible value, but DO, BOD5 and turbidity (4.26 mg/L, 24.04 mg/L and 11.05 NTU respectively) values were beyond unsatisfactory for aquatic environment. The water of the lake is found to be very poor in quality (WQI > 75) which indicates its unsuitability for its use in drinking and fisheries purposes. The water quality of the lake is required to be restored and public awareness should be raised as well.

**Keywords:**Dhanmondi Lake, Water quality index (WQI), weighted arithmetic index.

## Introduction

Water is considered to be one of the most vital natural resources for the survival of every living being on earth and for maintaining ecological balance. Though the survival of a living being is possible for a period of time without food, it is impossible without water[1]. Apart for drinking needs, water is essential activities such as commercial activities, fisheries, forest vegetation, small- and large-scale agricultural activities etc[2]. Surface water is the major source of usable water around the globe, which is also responsible for maintaining groundwater level[3].

Increase in population and subsequent increase in urbanization, industrialization, and extensive use of agrochemicals leads to increase in both demand of water and deterioration of water quality. In addition, occurrence of natural calamities and interruption of environmental processes by human activities are also responsible for deterioration of quantity and quality of water[4,5]. Thus, monitoring water quality becomes a major concern in building our awareness and understanding of our environment[6,7]. But monitoring and managing the quality of water is not that easy as the water sources are subjects of continuous contamination from different point and non-point sources[8]. The suitability of water for human use is indicated by the term water quality which is determined by many physical, chemical and biological characteristics[9,10]. Therefore, evaluation of water quality involves measurement of a number of parameters which varies under the influence of some natural and anthropogenic factors[11,12].

The presentation of water quality data varies on the basis of its objectives, sampling area and types of samples[13]. Using suitable indices is considered as one of the most effective ways to represent the information on water quality[14]. The water quality index (WQI) is a numeric expression which convert a large set of data on several physical, chemical and biological water quality parameters into a single number. This number is the indicator of the water quality status[15,16].

The concept of WQI was coined by Horton (1965) and since then various calculation methods of WQI have been proposed[17].The process of calculating WQI involves selection of a set of parameters, quality valuation of the parameters, formulating weighing factor for each parameter, and summation of weighted

quality values to get the WQI that defines the water as very bad, bad, medium, good and excellent[18].

Dhanmondi Lake is a place for leisure and entertainment as well as a cultural hub for the inhabitants of Dhaka city. Its location and scenic beauty make it so attractive that it can be called an oasis in the megacity. It is also an important habitat for various types of aquatic animals. The water of the lake is subject to pollution from various point and non-point sources[19]. The study was aimed to analyze the water samples of Dhanmondi Lake for some water quality parameters and to assess the suitability of the lake water, in terms of water quality index, for various uses.

## Materials and Methods

### *Description of Experimental Site*

Dhanmondi Lake is one of the two major lake systems in Dhaka city. Known for its scenic beauty, the lake has become a famous place for cultural and entertainment activities. The lake is 3 km long and 35 to 100 m wide. A part of Karwan Bazar River turned to be a dead channel to form the lake which has a partially linked to the Begunbari Canal. It is said that there was once a connection between Dhanmondi Lake and the Turag River. In the mid-1950s the lake development work was initiated when Dhanmondi became a model residential area. At that time, the lake with an area of 37 ha became a part of Dhanmondi Park which occupied about 16 per cent of the total residential area. The major sources of pollution of Dhanmondi Lake are surface runoff, soluble organisms, paper used for sitting, drainage water, manhole linkage, washing and bathing in lake water, human excreta, excessive food wastes etc[19].

Several ministries and government organizations are responsible for the management of Dhanmondi Lake. While the lake is owned by the Ministry of Housing and Public Works; the Fisheries Department, the LGRD and Cooperatives ministry, Dhaka South City Corporation, and the DoE take care of the developmental and conservational issues of the lake.

### *Collection of samples*

The surrounding area of Dhanmondi Lake comprises mostly of residential buildings; apart from that, some shopping malls, and a few hospitals and diagnostic centers are there as well. Sampling points were selected from a regular distance along the length of the lake. Water samples were collected in plastic bottles which were properly cleaned prior to sample collection. Samples were collected from six points in post-monsoon period (September-October). In situ measurements for some water quality parameters were done during collection of water samples.

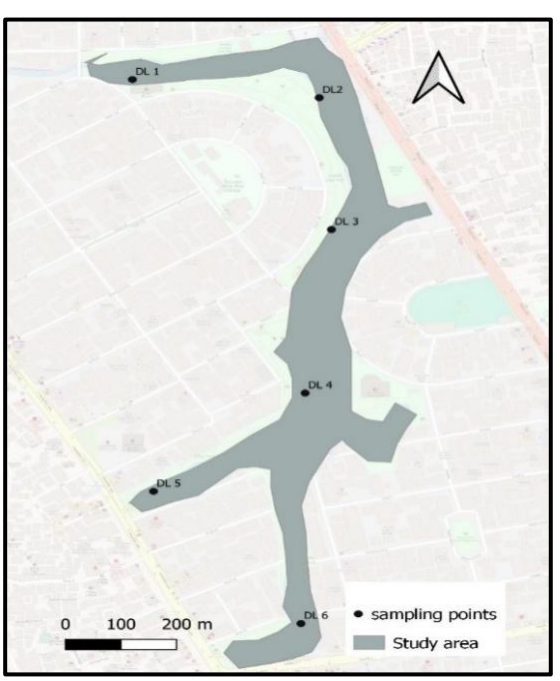


Figure 1. Sampling sites of Dhanmondi Lake

***Methodology***

Temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and turbidity were measured at the time of sampling using portable pH meter, EC meter, DO meter, and turbidity meter respectively. The EC values were multiplied by 0.64 to get the total dissolved solids (TDS). Carbonate ($CO_3$), bicarbonate ($HCO_3$), free carbon dioxide ($CO_2$), chloride (Cl), and total alkalinity were measured by titrimetric method[20]. Sulfate is measured by turbidimetric method. Cations (calcium and magnesium) and trace metals (iron, zinc, lead and chromium) were measured with the use of an Atomic Absorption Spectrophotometer (AAS)[model: VARIAN AA240].

Total hardness ($H_t$) of the water samples were calculated using the following equation.

Total hardness(mg/L) = Ca(mg/L)X2.497 + Mg(mg/L)X4.118

***Weighted Arithmetic Water Quality Index (WQI) Calculation***

Water quality index (WQI) was calculated using the following equation[21]

$WQI=\sum q_n W_n / \sum W_n$

$q_n$ =Quality rating for the nth Water quality parameter, $W_n$= unit weight for the nth parameters

$q_n = 100[V_n - V_{io}] / [S_n - V_{io}]$

$V_n$=Estimated value of the nth parameter at a given sampling station, $S_n$ =Standard permissible value of the nth parameter, $V_{io}$ = Ideal value of nth parameter in pure water [i.e., 0 for all other parameters except pH (7.0) and Dissolved oxygen (14.6 mg/L)]

$W_n = K/S_n$

$S_n$= Standard value for nth parameter, K= Constant for proportionality

Quality approach of water based on water quality index is presented in Table 1.

Table 1. Water Quality Index (WQI) and status of water quality[21]

| Water quality index level | Water quality status | Suitable for |
|---|---|---|
| 0-25 | Excellent | Drinking, irrigation, industrial uses |
| 26-50 | Good | |
| 51-75 | Poor | Irrigation, industrial uses |
| 76-100 | Very poor | Irrigation, industrial, recreational purposes |
| > 100 | Unsuitable | Restricted use |

**Result and Discussion**

***Water Quality Parameters***

The physical and chemical features of collected water samples, along with their mean value and standard deviation, are presented in Table 2. The pH is consistent and mean value is 7.8, the highest value examined in sample 1 and sample 6. The pH values are within the recommended limit[22] although the water is found to be alkaline probably because of effluent runoff and discharge of alkali consisting waste[23].

The electrical conductivity varied from 123-228 µS/cm with an average value of 180 µS/cm and the highest value was detected in sample 2. The concentration of EC is directly proportional to the concentration of runoff and discharge trend[24]

The dissolve oxygen content of the lake water showed the average DO concentration was 4.26 mg/L. Compare to standard concentration, the water samples have DO level below the standard limit[25].

The highest BOD content was found in sample 4 which was 28.64 mg/L whereas the mean BOD content was 24.04 mg/L. The BOD contents of Dhanmondi Lake water were much higher than the standard limit[25].Higher organic matter content result in the increase of BOD which subsequently cause a decrease in DO content upon dissolution and seepage into water[26].

Table 2. Properties of water samples of Dhanmondi Lake during post-monsoon period

| Parameters | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 | Sample 6 | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| pH | 7.9 | 7.8 | 7.7 | 7.8 | 7.8 | 7.9 | 7.8 | 0.075 |
| EC (µS/cm) | 123 | 228 | 204 | 202 | 136 | 187 | 180 | 41.468 |
| DO (mg/L) | 4.38 | 4.44 | 4.27 | 3.68 | 4.28 | 4.49 | 4.26 | 0.295 |
| $BOD_5$ (mg/L) | 23.24 | 21.52 | 25.80 | 28.64 | 25.35 | 19.71 | 24.04 | 3.216 |
| Tubidity (NTU) | 2.79 | 10.71 | 26.90 | 5.85 | 6.06 | 13.98 | 11.05 | 8.719 |
| Temperature (°C) | 28.3 | 28.7 | 30.2 | 29.4 | 29.8 | 29.2 | 29.3 | 0.698 |
| $HCO_3$ (mg/L) | 131.5 | 124.5 | 118.9 | 110.5 | 114.7 | 120.3 | 120.1 | 7.377 |
| Free $CO_2$ (mg/L) | 4.81 | 4.39 | 4.60 | 5.02 | 4.22 | 5.29 | 4.72 | 0.399 |
| Total Alkalinity (mg/L) | 103.21 | 96.33 | 89.45 | 87.16 | 94.30 | 94.56 | 94.17 | 5.621 |
| Chloride (mg/L) | 31.33 | 29.84 | 29.84 | 28.35 | 29.84 | 28.35 | 29.59 | 1.121 |
| Sulfate (mg/L) | 11.04 | 11.83 | 12.06 | 11.83 | 11.83 | 12.30 | 11.82 | 0.423 |
| Calcium (mg/L) | 39.82 | 37.45 | 32.62 | 36.64 | 37.86 | 34.85 | 36.54 | 2.512 |
| Magnesium (mg/L) | 0.13 | 0.12 | 0.10 | 0.11 | 0.12 | 0.10 | 0.1111 | 0.010 |
| Iron (mg/L) | 0.009 | - | 0.016 | 0.008 | 0.010 | - | 0.007 | 0.006 |
| Lead (mg/L) | 0.02 | - | 0.00 | 0.03 | - | 0.01 | - | - |
| Zinc (mg/L) | - | 0.00 | 0.00 | - | 0.00 | 0.00 | - | - |
| Chromium (mg/L) | - | 0.00 | 0.00 | 0.00 | - | 0.00 | - | - |
| TDS (mg/L) | 78.72 | 145.92 | 130.56 | 129.28 | 87.04 | 119.68 | 115.20 | 26.540 |
| Total Hardness (mg/L) | 99.97 | 94.01 | 81.86 | 91.94 | 95.03 | 87.43 | 91.71 | 6.324 |

SD=Standard Deviation

Turbidity was highest in sample 3 and lowest in sample 1. While most of the samples cross the standard limit[22].

The maximum water temperature was 30.2ºC (sample 3) while lowest temperature (28.3ºC) was examined in sample 2. The average temperature of water samples was 29.3ºC which indicate that the water temperature is within the suggested limit[22].

Total alkalinity, $HCO_3$ and free $CO_2$ content of the water samples are within the permissible limits with average values of 94.17 mg/L, 120.1 mg/L and 4.72 mg/L respectively[27].

The average values for chloride (Cl) and sulfate ($SO_4$) concentration of the lake water was found to be 29.59 mg/L and 11.82 mg/L respectively representing that both the anions are within the recommended level[27].

The Atomic Absorption Spectrophotometer (AAS) readings indicate the absence of heavy metal contamination in the water of Dhanmondi Lake, although there were traces of iron (Fe) and lead (Pb) in some of the water samples collected.

Total dissolved solids (TDS) and total hardness (Ht) values were found to be within the standard limit in all the water samples[22].

***Water quality index (WQI)***

Water quality index (WQI) is calculated considering 12 water quality parameters. It is a dimensionless number which is computed by utilizing weighted arithmetic index method. The unit weight ($W_n$) for each water quality parameter is determined in accordance with its standard value ($S_n$) and the outcomes are presented in Table 3. Water quality index is an expression of the quality of water in terms of water use and management purposes[28].

Table 3. Unit weight (Wn) of different parameters along with their standards (Sn)

| **Water quality parameters** | **Standard values ($S_n$)** | **Recommending agency** | **$1/S_n$** | **Constant of Proportionality K = $1/(\sum 1/S_n)$** | **Unit weights $W_n = K/S_n$** |
|---|---|---|---|---|---|
| pH | 6.5-8.5 | WHO | 0.11765 | 0.609 | 0.0717 |
| Dissolved oxygen | 6 mg/L | DPHE | 0.16667 | 0.609 | 0.1015 |
| Turbidity | 10 NTU | DPHE | 0.1 | 0.609 | 0.0609 |
| Total alkalinity | 120 mg/L | USPHS | 0.0083 | 0.609 | 0.0051 |
| Total dissolved solids | 1000 mg/L | DPHE | 0.001 | 0.609 | 0.0006 |
| Total hardness | 200-500 mg/L | DPHE | 0.002 | 0.609 | 0.0012 |
| Calcium | 75 mg/L | DPHE | 0.01333 | 0.609 | 0.0082 |
| Magnesium | 30-35 mg/L | DPHE | 0.02857 | 0.609 | 0.0174 |
| Chloride | 150-600 mg/L | DPHE | 0.00167 | 0.609 | 0.0011 |
| Biochemical oxygen demand | 5 mg/L | WHO | 0.2 | 0.609 | 0.1218 |
| Iron | 0.3-1.0 mg/L | DPHE | 1.0 | 0.609 | 0.6090 |
| Sulfate | 400 mg/L | DPHE | 0.0025 | 0.609 | 0.0015 |
| | | | $\sum 1/S_n$=1.6417 | | $\sum W_n$ = 1.00 |

The WQI of the six sampling sites of Dhanmondi Lake are shown in Tables 4-9. The WQI values ranged from 75.59 (site 6) to 96.52 (site 3). According to the WQI, water quality of all the six sampling sites of the lake is very poor[29].

Table 4. WQI at Sampling Site 1

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.9 | 8.5 | 7 | 0.0717 | 60 | 4.302 | 76.14 |
| DO | 4.38 | 6 | 14.6 | 0.1015 | 118.8372 | 12.06198 | |
| Turbidity | 2.79 | 10 | 0 | 0.0609 | 27.9 | 1.69911 | |
| Total alkalinity | 103.21 | 120 | 0 | 0.0051 | 86.00833 | 0.438643 | |
| TDS | 78.72 | 1000 | 0 | 0.0006 | 7.872 | 0.004723 | |
| Total Hardness | 99.97 | 500 | 0 | 0.0012 | 19.994 | 0.023993 | |
| Calcium | 39.82 | 75 | 0 | 0.0082 | 53.09333 | 0.435365 | |
| Magnesium | 0.13 | 35 | 0 | 0.0174 | 0.371429 | 0.006463 | |
| Chloride | 31.33 | 600 | 0 | 0.0011 | 5.221667 | 0.005744 | |
| BOD | 23.24 | 5 | 0 | 0.1218 | 464.8 | 56.61264 | |
| Iron | 0.009 | 1 | 0 | 0.609 | 0.9 | 0.5481 | |
| Sulfate | 11.04 | 400 | 0 | 0.0015 | 2.76 | 0.00414 | |
| | | | | | | ∑76.1429 | |

Table 5. WQI at Sampling Site 2

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.8 | 8.5 | 7 | 0.0717 | 53.33333 | 3.824 | 75.63 |
| DO | 4.44 | 6 | 14.6 | 0.1015 | 118.1395 | 11.99116 | |
| Turbidity | 10.71 | 10 | 0 | 0.0609 | 107.1 | 6.52239 | |
| Total alkalinity | 96.33 | 120 | 0 | 0.0051 | 80.275 | 0.409403 | |
| TDS | 145.92 | 1000 | 0 | 0.0006 | 14.592 | 0.008755 | |
| Total Hardness | 94.01 | 500 | 0 | 0.0012 | 18.802 | 0.022562 | |
| Calcium | 37.45 | 75 | 0 | 0.0082 | 49.93333 | 0.409453 | |
| Magnesium | 0.12 | 35 | 0 | 0.0174 | 0.342857 | 0.005966 | |
| Chloride | 29.84 | 600 | 0 | 0.0011 | 4.973333 | 0.005471 | |
| BOD | 21.52 | 5 | 0 | 0.1218 | 430.4 | 52.42272 | |
| Iron | 0 | 1 | 0 | 0.609 | 0 | 0 | |
| Sulfate | 11.83 | 400 | 0 | 0.0015 | 2.9575 | 0.004436 | |
| | | | | | | ∑75.62632 | |

Table 6. WQI at Sampling Site 3

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.7 | 8.5 | 7 | 0.0717 | 46.66667 | 3.346 | 96.52 |
| DO | 4.27 | 6 | 14.6 | 0.1015 | 120.1163 | 12.1918 | |
| Turbidity | 26.9 | 10 | 0 | 0.0609 | 269 | 16.3821 | |
| Total alkalinity | 89.45 | 120 | 0 | 0.0051 | 74.54167 | 0.380163 | |
| TDS | 130.56 | 1000 | 0 | 0.0006 | 13.056 | 0.007834 | |
| Total Hardness | 81.86 | 500 | 0 | 0.0012 | 16.372 | 0.019646 | |
| Calcium | 32.62 | 75 | 0 | 0.0082 | 43.49333 | 0.356645 | |
| Magnesium | 0.1 | 35 | 0 | 0.0174 | 0.285714 | 0.004971 | |
| Chloride | 29.84 | 600 | 0 | 0.0011 | 4.973333 | 0.005471 | |
| BOD | 25.8 | 5 | 0 | 0.1218 | 516 | 62.8488 | |
| Iron | 0.016 | 1 | 0 | 0.609 | 1.6 | 0.9744 | |
| Sulfate | 12.06 | 400 | 0 | 0.0015 | 3.015 | 0.004523 | |
| | | | | | | ∑96.52235 | |

Table 7. WQI at Sampling Site 4

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.8 | 8.5 | 7 | 0.0717 | 53.33333 | 3.824 | 91.34 |
| DO | 3.68 | 6 | 14.6 | 0.1015 | 126.9767 | 12.88814 | |
| Turbidity | 5.85 | 10 | 0 | 0.0609 | 58.5 | 3.56265 | |
| Total alkalinity | 87.16 | 120 | 0 | 0.0051 | 72.63333 | 0.37043 | |
| TDS | 129.28 | 1000 | 0 | 0.0006 | 12.928 | 0.007757 | |
| Total Hardness | 91.94 | 500 | 0 | 0.0012 | 18.388 | 0.022066 | |
| Calcium | 36.64 | 75 | 0 | 0.0082 | 48.85333 | 0.400597 | |
| Magnesium | 0.11 | 35 | 0 | 0.0174 | 0.314286 | 0.005469 | |
| Chloride | 28.35 | 600 | 0 | 0.0011 | 4.725 | 0.005198 | |
| BOD | 28.64 | 5 | 0 | 0.1218 | 572.8 | 69.76704 | |
| Iron | 0.008 | 1 | 0 | 0.609 | 0.8 | 0.4872 | |
| Sulfate | 11.83 | 400 | 0 | 0.0015 | 2.9575 | 0.004436 | |
| | | | | | | ∑91.34498 | |

Table 8. WQI at Sampling Site 5

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.8 | 8.5 | 7 | 0.0717 | 53.33333 | 3.824 | 82.91 |
| DO | 4.28 | 6 | 14.6 | 0.1015 | 120 | 12.18 | |
| Turbidity | 6.06 | 10 | 0 | 0.0609 | 60.6 | 3.69054 | |
| Total alkalinity | 94.3 | 120 | 0 | 0.0051 | 78.58333 | 0.400775 | |
| TDS | 87.04 | 1000 | 0 | 0.0006 | 8.704 | 0.005222 | |
| Total Hardness | 95.03 | 500 | 0 | 0.0012 | 19.006 | 0.022807 | |
| Calcium | 37.86 | 75 | 0 | 0.0082 | 50.48 | 0.413936 | |
| Magnesium | 0.12 | 35 | 0 | 0.0174 | 0.342857 | 0.005966 | |
| Chloride | 29.84 | 600 | 0 | 0.0011 | 4.973333 | 0.005471 | |
| BOD | 25.35 | 5 | 0 | 0.1218 | 507 | 61.7526 | |
| Iron | 0.01 | 1 | 0 | 0.609 | 1 | 0.609 | |
| Sulfate | 11.83 | 400 | 0 | 0.0015 | 2.9575 | 0.004436 | |
| | | | | | | ∑82.91475 | |

Table 9. WQI at Sampling Site 6

| Parameters | Observed value ($V_n$) | Standard value ($S_n$) | Ideal value ($V_{io}$) | Unit weight ($W_n$) | Quality ratiing ($q_n$) | $W_nq_n$ | WQI |
|---|---|---|---|---|---|---|---|
| pH | 7.9 | 8.5 | 7 | 0.0717 | 60 | 4.302 | 75.59 |
| DO | 4.49 | 6 | 14.6 | 0.1015 | 117.5581 | 11.93215 | |
| Turbidity | 13.98 | 10 | 0 | 0.0609 | 139.8 | 8.51382 | |
| Total alkalinity | 94.56 | 120 | 0 | 0.0051 | 78.8 | 0.40188 | |
| TDS | 119.68 | 1000 | 0 | 0.0006 | 11.968 | 0.007181 | |
| Total Hardness | 87.43 | 500 | 0 | 0.0012 | 17.486 | 0.020983 | |
| Calcium | 34.85 | 75 | 0 | 0.0082 | 46.46667 | 0.381027 | |
| Magnesium | 0.1 | 35 | 0 | 0.0174 | 0.285714 | 0.004971 | |
| Chloride | 28.35 | 600 | 0 | 0.0011 | 4.725 | 0.005198 | |
| BOD | 19.71 | 5 | 0 | 0.1218 | 394.2 | 48.01356 | |
| Iron | 0 | 1 | 0 | 0.609 | 0 | 0 | |
| Sulfate | 12.3 | 400 | 0 | 0.0015 | 3.075 | 0.004613 | |
| | | | | | | ∑73.58738 | |

## Conclusion

Although many of the water quality parameters are within the satisfactory level, the DO and BOD values of the water samples were far beyond the permissible limits which turned to be the main determinants in calculating water quality index (WQI). The findings, as WQI, clearly demonstrate that the water of Dhanmondi Lake is very poor in quality. Thus, the water is unsuitable or unfit for drinking and fish culture, but can be utilized for irrigation activities, industrial and recreational purposes. Appropriate treatment is required before using it as a drinkable source. The suitability class indicates that the lake water can be used in agriculture, industry, and for recreational purposes but human interruptionsand waste incorporation into the water from the surroundings makes it vulnerable for further deterioration. The narrowing of contamination and improvement of the quality of water vastly depends on the effective strategic plan and responsiveness of the residents of Dhanmondi area and other stakeholders of the lake.

## References


1. Igwe, O., Adepehin, E. J. and Adepehin, J. O. 2015. Integrated geochemical and microbiological approach to water quality assessment: case study of the Enyigbametallogenic province, South-eastern Nigeria. *Environmental earth sciences***74**, 3251-3262.
2. Islam, M. M., Azad, A. K., Ara, M. H., Rahman, M., Hassan, N., Swarnokar, S. C. and Rabeya, I. 2016. Environmental study on a coastal river of Bangladesh with reference to irrigation water quality assessment: A case study on Shailmari River, Khulna. *Journal of Geoscience and Environment Protection***4**(10), 41.
3. Deo, R. C., Samui, P., Kisi, O. and Yaseen, Z. M. 2021. eds. *Intelligent data analytics for decision-support systems in hazard mitigation: theory and practice of hazard mitigation*. Springer, 2021.
4. Ji, X., Dahlgren, R. A.and Zhang, M. 2016. Comparison of seven water quality assessment methods for the characterization and management of highly impaired river systems. *Environmental monitoring and assessment* **18,** 1-16.
5. Chen, K., Chen, H., Zhou, C., Huang, Y., Qi, X., Shen, R. and Ren, H. 2020. Comparative analysis of surface water quality prediction performance and identification of key water parameters using different machine learning models based on big data. *Water research* **171**, 115454.
6. Gleick, P. H. 1993. An Introduction to Global Fresh Water Issues. In *Water in Crisis*, (Gleick, P., Translator) Oxford University Press: New York, NY, USA. pp. 3–12.
7. Karim, M., Das, S. K., Paul, S. C., Islam, M. F. and Hossain, M. S. 2018. Water quality assessment of Karrnaphuli River, Bangladesh using multivariate analysis and pollution indices. *Asian Journal of Environment and Ecology* **7**, 1–11.
8. Angello, Z. A., Tränckner, J. and Behailu, B. M. 2021. Spatio-temporal evaluation and quantification of Pollutant source contribution in little Akaki River, Ethiopia: Conjunctive application of factor analysis and multivariate receptor model. *Polish Journal of Environmental Studies* **30**(1). 23-34.
9. Vaux, H. J. 2001. Water Quality (Book Review). *Environment* **43**(3), 39.

10. Sargaonkar, A. and Deshpande V. 2003. Development of an Overall Index of Pollution for Surface Water Based on a General Classification Scheme in Indian Context. *Environmental Monitoring and Assessment* **89**(1), 43-67.
11. Boyacioglu, H. 2006. Surface Water Quality Assessment Using Factor Analysis. *Water SA* **32**(3), 389-394.
12. Simeonov, V., Einax, J. W., Stanimirova I. and Kraft J. 2002. Environmetric Modeling and Interpretation of River Water Monitoring Data. *Analytical and Bioanalytical Chemistry* **374**(5), 898-905.
13. Boyacioglu, H. and Boyacioglu, H. 2007. Surface Water Quality Assessment by Environmetric Methods. *Environmental Monitoring and Assessment* **131**(1-3), 371-376.
14. Dwivedi, S. L. and Pathak, V. 2007. A Preliminary Assignment of Water Quality Index to Mandakini River, Chitrakoot. *Indian Journal of Environmental Protection* **27**(11), 1036-1038.
15. Sánchez, E., Colmenarejo, M. F., Vicente, J., Rubio, A., García, M.G., Travieso L. and Borja, R. 2007. Use of the Water Quality Index and Dissolved Oxygen Deficit as Simple Indicators of Watershed Pollution. *Ecological Indicators* **7**(2), 315-328.
16. Bordalo, A. A., Teixeira, R. and Wiebe, W. J. 2006. A Water Quality Index Applied to an International Shared River Basin: The Case of Douro River. *Environmental Management* **38**(6), 910-920.
17. Horton, R. K. 1965. An Index Number System for Rating Water Quality. *Journal of Water Pollution Control Federation* **37**(3), 300-306.
18. Al Obaidy, A. H. M. J., Abid, H. S. and Maulood, B. K. 2010. Application of Water Quality Index for Assessment of Dokan Lake Ecosystem, Kurdistan Region, Iraq. *Journal of Water Resource and Protection* **2**, 792-798.
19. Howlader, Z. H. 2023. Dhanmondi Lake – an Oasis of Dhaka City. The Daily Sun, 6 May 2023, https://www.daily sun.com/post/687801/Dhanmondi-Lake-%E2%80%93-an-Oasis-of-Dhaka-City.
20. APHA 2012. *Standard Methods for the Examination of Water and Waste Water* (22nd Edition). American Public Health Association (APHA), American Water Works Association (AWWA), Water Environment Federation (WEF), 800 I Street, NW, Washington, DC 20001-3710, USA. 1360 pp. ISBN 978-087553-013-0.
21. Chaterjee, C. and Raziuddin, M. 2002. Determination of water quality index (WQI) of a degraded river in Asansol Industrial area, Raniganj, Burdwan, West Bengal. *Nature Environment and Pollution Technology* 2, 181-189.
22. DPHE 2019. Water Quality Parameters: Bangladesh Standards & WHO Guidelines. Directorate of Public Health Engineering (DPHE). https://dphe.gov.bd/site/page/15fa0d7b-11f1-45c0-a684-10a543376873/Water-Quality-Parameters-
23. Majumder, M. S. I., Talukder, S., Hasan, I., Islam, M. S., Kabirul, M. and Islam, N. H. 2018. Water Quality Assessment: A Case Study of the Jhenai River in Bangladesh. *The Journal of Applied Research* **4**(7), 1884-1888.
24. Kawo, A. H., Abdullahi, B. A., Saminu, M. Y. and Abdul Hadi, S. K. 2008. Seasonal and Spatial Variations in Water Quality and Its Ecological Implications on Challawa River, Nigeria. *Nigerian Journal of Basic and Applied Sciences***16**(2), 129-135.
25. WHO 2011. *Guidelines for drinking-water quality*, 4th edn. World Health Organization (WHO). Geneva, Switzerland, P. 564.
26. Abdullahi, B., Siregar, R., Pakiding, W. and Riwu, M. 2021. The analysis of BOD (Biological Oxygen Demand) and COD (Chemical Oxygen Demand) contents in the water of around laying chicken farm. *IOP Conference Series: Earth and Environmental Science* **788**, 012155.
27. WHO 2006. *Guideline for Drinking-water Quality*. Recommendations, Vol. 1, World Health Organization (WHO), Geneva, p. 595.
28. Jagadeeswari, P. B. and Ramesh, K. 2012. Water quality index for assessment of water quality in South Chennai coastal aquifer, Tamil Nadu, India. *International Journal of ChemTech Research* **4**(4), 1582-1588.
29. Mou, S. I., Ridwan, T., Swarnokar, S. C. and Ishtiak, K. F. 2023. Assessment of Water Quality using Water Quality Index in Jhapjhapia River, Khulna, Bangladesh. *American Journal of Water Resources* **11**, 112-119.