1.Introduction

Water on Earth is huge in quantity when we consider that it covers more than two-thirds of the Earth's surface. Water is woven into the fabric of all civilizations and religious groups in a variety of ways due to the strong relationship it has with human life, as well as animals and plants. Surface water like rivers and lakes has been seen to become progressively polluted. It is clearly evident that the Earth is facing major environmental difficulties, with rapidly diminishing natural resources threatening the very viability of most ecosystems (Martin, 2013). Serious concerns are voiced among scientists, planners, sociologists, politicians, and economists to conserve and preserve the natural resources of the world. One of the constraints most frequently faced for decision making is lack of scientific data of our natural resources.

1.1 Lakes

A lake is an enclosed body of water (typically freshwater) surrounded by land and with no direct access to the sea. A lake can also be isolated, with no obvious direct water input and, on rare occasions, no direct output. Many of these isolated lakes are saline due to evaporation or groundwater inflow. A lake can occur anywhere within a river basin, depending on its origin. A headwater lake receives inflow from multiple tiny tributary streams, direct surface rainfall, and groundwater influx rather than a single river. These lakes almost always have a single river outlet. Lakes further downstream in river basins have a significant input and a major outflow, with the water balance from input to output shifting depending on other water sources (Nesje & Dahl 2000). A water body can be classified as a lake if it fulfils one of the following criteria:

- It should completely or partially fill a basin or a series of adjacent basins.
- With the exception of very short periods induced by wind, thick ice cover, or large inflows, it should have basically the same water level in all regions.
- Even if the water body is close to the seacoast, it does not receive frequent inflows of seawater.
- The inflow-to-volume ratio of the water body should be so low that a significant amount of the suspended silt is collected.
- At mean water level, the area of the water body should surpass a given figure, such as 1 hectare.

Lake scientific research began in the seventeenth century but was first descriptive rather than analytical. Lake measurements and observations grew increasingly focused towards the end of the nineteenth century. Alphonse Forel (1841–1912) pioneered comprehensive lake investigations on

Lac Le'man (Lake Geneva) and other Swiss lakes. Forel gave data on a wide range of themes in a three-volume book (Lac Le'man: 1892, 1895, 1904), including sediments and bottom-dwelling animals, fishes and fisheries, water flow, transparency and color, temperature, and others. Thus, Forel, who coined the term "limnology" (initially the study of lakes, but later expanded to encompass other inland waters), exhibited the holistic approach to comprehending a lake as an environmental entity, but without the use of an explicit ecosystem idea (Maitland & Morgan, 1997; Likens, 2010).

1.2 Classification and zones of lakes

Classification of lakes is done mostly by Forel and modified by Whipple based on the temperature of the surface and bottom waters (Kar, 2013).

Table 1 Classification of various lakes

Classification	Types	Details	References
On the basis of their Position on the Globe	Polar Lakes	Lakes with surface water temperatures that never exceed 4 °Celsius.	(Forel, 1901; Whipple, 1927)
	Temperate lakes	The surface temperature in these lakes varies above and below 4 °C.	
	Tropical Lakes	The surface temperature in these lakes is > 4 °C.	
Based on their origin	Glacial Lakes	The action of glaciers leads to the formation of lakes, which are generally found in the temperate regions of the world. Glaciers deepen and widen the valleys when they break down and create piles of the moraine, which blocks valleys and dams streams, and rivers.	(Hutchinson, 1957)
	Ice-Scour Lakes	Scours or hollow basins are generated when massive sheets of ice flow across relatively flat surfaces of hard, jointed, or fractured rocks. These hollow basins are later filled with water, resulting in lakes.	
	Tectonic Lakes	Tectonic lakes are lakes generated by movements of the earth's crust (tectonic plates).	
	Volcanic Lakes	In cases where the volcano was large and erupted a long time ago, the floor of the massive crater is relatively flat, and water accumulate in some of the deeper zones, resulting in the development of lake.	

	Riverine Lakes	Lakes produced by river activity are generally referred to as riverine or 'oxbow' lakes. Between two successive twists, the river cuts through the continuously degraded narrow isthmus. This may result in a river loop to one side of the new stream. This isolated area may hold enough water to produce an oxbow lake.	
Based on circulation and mixing	Monomictic Lakes	Only one mixing occurs in lakes	(Hutchinson, 1957)
	Dimictic Lakes	Two pairs of Mixing	
	Oligomictic Lakes	These are thermally stable tropical lakes with very sluggish mixing.	
	Polymictic Lakes	These are high altitude tropical lakes with almost constant circulation.	
	Amictic Lakes	Lakes with no or little mixing that is shielded from most of the changes at the earth's surface by ice	
	Meromictic Lakes	Meromictic means partially mixed. The bottom waters of such lakes maybe devoid of free oxygen and aerobic biota.	
	Holomictic Lakes	Holomictic lakes are those in which the top and bottom water mix completely and on a regular basis	
On the basis of Nutrition	Oligotrophic Lakes	Transparent water, low nutrients, less organic matter, abundant in oxygen	(Rodhe, 1969)
	Eutrophic Lakes	Less Transparent water, high nutrients, more organic matter, less in oxygen	
	Mesotrophic Lakes	More organic matter, increased productivity	
	Dystrophic Lakes	These are claimed to be particular types of lakes with significant concentrations of humic acid in the water.	

1.3 Significance of lakes and threats to lake bodies

Since the early Vedic period, water resources like rivers, and lakes are believed to be the epitome of God's creation. Primarily, the inclination for the idea of these river-waters holding the consecrated virtues led Hindus to recite the spiritual shlokas and mantras along the riverbanks. Such religious convictions prompted us to maintain the asserted purity of these waters in ourselves, and thus, achieve paradise. The lakes supply a diverse range of values and applications, from ecological goods and services to direct production values. These are classified as direct use values, with consumptive and non-consumptive applications such as drinking, irrigation, fishing, ecotourism, and so on. Indirect use values with beneficiaries located farther from the lake, potential future use and non-use social benefits of having a healthy water supply for future generations. In present situation, rivers are worshipped only during the ephemeral spiritual practices and subjected to anthropogenic activities in the rest of the time. Disposing of biodegradable as well as non-biodegradable waste, and entries of untended ETP (Effluent treatment plant) and STP (Sewage Treatment plant) effluents, in tremendous amounts, have irreversibly damaged the quality of these waters. There will be longer-term effects of these actions, however evident they may already be now. The world is still not capable of providing potable water at the consumer level. Hence, common masses are forced to carry out basic household activities, such as cattle bathing and cleansing at the community pond and river stream, where the threat of acute and chronic diseases lingers. Therefore, acknowledging the importance of the hydrological cycle at the residing phase, it should be mandatory to maintain /conserve the adequate standard of the universal solvent. Contamination and vitiation of these vital bodies make up the partial situation of the "tragedies of the commons".

Lakes and reservoirs around India are suffering from varying degrees of environmental degradation, primarily due to encroachment, eutrophication (caused by domestic and industrial effluents), and siltation. Over the last century, there has been great growth in population without a corresponding increase in municipal facilities, resulting in lakes and reservoirs, particularly urban ones, becoming contaminated sinks. Causes are listed below (Smol,2009; Martin, 2013; Reddy & Char, 2006):

I. Pollutants emitted by fixed point sources

Nutrients in municipal and domestic effluents; organic, inorganic, and hazardous pollutants in industrial effluents; and stormwater run-off.

II. Non-point source pollution

Nutrients from fertilizers, harmful pesticides, and other chemicals, primarily from agricultural run-off; organic pollution from human settlements on the outskirts of lakes and reservoirs.

III. Other basin-related causes of impairment

Lake silting because of increased erosion caused by urban and agricultural expansion, deforestation, road construction, and other land disturbances in the drainage basin; diversion of rivers feeding the lakes, reducing lake size; competing water uses, including drinking, irrigation, and hydropower; and untreated or inadequately treated domestic and industrial effluents from point sources located throughout the basin. Table 2 lists some of the commonly observed reasons for deterioration of water quality in lakes and ponds.

Table 2 Lake water quality deterioration parameters

Pathogens	Occasional or regional deterioration mostly in small and shallow water bodies
Suspended Solids	Not relevant
Decomposable Organic Matter	Occasional or regional deterioration
Eutrophication	Important deterioration
Nitrate	Rare deterioration
Salinisation	Rare deterioration
Heavy Metals	Important deterioration
Organic Micro Pollutants	Occasional or regional deterioration
Acidification	Important deterioration
Changes in Hydrological Regimes	Important deterioration

In India, human settlements and public wastewater sources are the primary causes of lake deterioration, particularly in urban lakes. Anthropogenic pressures in the lake catchment produce degradation of the catchment region due to factors such as deforestation, excessive agricultural usage, and the resulting erosion and increasing silt flows, which contaminate lake water. All urban lakes have grown hypertrophic because of infrastructure expansion, housing pressure, and encroachment. Under this strain, many urban and rural lakes have perished or reduced in size. Reductions in the Osman Sagar and Himayat Sagar Lakes (drinking water sources to Hyderabad in Andhra Pradesh), Udaipur lakes in Rajasthan, and Nainital lakes in Uttaranchal are a few examples of these pressures. The water quality of urban lakes has deteriorated to the point where it is causing significant disruptions to the biodiversity of lake habitats. Using bioremediation procedures alone, like with the Powai lakes in Mumbai, the Kodaikanal and Ooty lakes in Tamil Nadu, and so on, has proven ineffective in achieving full lake balance. Water hyacinth growth has been prolific in many lakes, resulting in the reproduction of water vectors and, as a result, the transmission of endemic diseases. Loktak Lake, Bhopal Lakes, Ropar Lake, Sukhna Lake, Sukna Lake, Kanjli Lake, and Pong Dam Lake are notable examples. Cultural siltation, in the form of idol immersion during specific annual festivals in India, has been a significant source of heavy metal contamination in lakes. The Bhoj Wetlands and city lakes in Bombay, Hyderabad, and Bangalore are three examples. Furthermore, unchecked tourist pressure has harmed the biodiversity of lake-related flora and animals in many lakes. Tso Moriri, Tsumori, Pangong Tso Pongsho, and Dal, for example, are high-altitude lakes affected this way. Coastal lakes have also been severely impacted by salinity imbalances, which have been attributed to a lack of balance between freshwater from the lakes' inland catchment and seawater input at the estuary's mouth. Chilika Lake in Orissa, Pulicat Lake in Tamil Nadu, and Kuttanad Lake in Kerala are some examples. The development of satellite ports, chemical companies, and thermal power plants, as in case of Pulicat Lake, has also contributed to siltation and pollution. Water shortages in lakes, which have significantly hampered water replenishment, have had a catastrophic impact on bird sanctuaries and fisheries. Keoladeo National Park (Bharatpur Lake), Nalsarovar Bird Sanctuary Lake, and Dal Lake are a few examples (Reddy & Char, 2006).

1.4 Importance of monitoring lake bodies

Water is a fundamental substance on which the dynamics of a water body, and thus the life of the biota within it, rely. The following are the primary goals of physical and chemical water testing (Bartram et al., 1996; Duck, 2002).

- To determine the precise composition of the sample at the time of collection.
- To categorize water based on its overall level of gaseous and mineral ingredients.
- To determine the presence or absence of components that affect various beneficial applications of water.
- To ascertain the number of organic contaminants and determine the degree of clarity and the type of the matter in suspension.

Some important parameters analyzed for assessment of lake bodies are listed in table 3.

Table 3 List of important parameters for assessment

Parameters	Sub parameters
Physical	Temperature
	Turbidity
	Transparency
Chemical	pH, dissolved oxygen (DO), free carbon dioxide (FCO_2), total alkalinity (TA), specific conductivity
Nutrients	Nitrates, phosphates, and chlorophyll

1.5 Water quality index

A Water-quality index seeks to assign a single value to a water quality based on one or more systems that translate the list of constituents and their concentrations in a sample into a single value. In ecology, indices have been used to represent species richness, evenness, diversity, and other characteristics. As a result, the Shannon Index, the Simpson Index, and so on have been developed. Indices are widely used in a variety of other fields, including medicine, sociology, and process safety. Indices are composite representations of a condition or situation derived from a combination, done in specific ways, of several relevant but non commensurate observed facts/measurements. The combination yields a single ordinal number, which aids comprehension and interpretation of the overall significance of the facts that contributed to that number (Song & Kim, 2009; Sarkar & Abbasi, 2006).

Water quality index is a major component of environmental indices. Regulatory agencies use them as communication tools to describe the 'quality' or 'health' of a specific environmental system (e.g., air, water, soil, and sediments) and to assess the impact of regulatory policies on various environmental management practices (Pusatli et al., 2009; Sadiq et al., 2010; Abbasi & Abbasi 2012).

Once developed and implemented, the WQIs are a useful tool for examining trends, highlighting specific environmental conditions, and assisting governmental decision-makers in evaluating the effectiveness of regulatory programmes. Indices serve all the purposes for which water quality is monitored, including assessment, utilization, treatment, resource allocation, public information, R&D, and environmental planning. Furthermore, indices greatly simplify and clarify the transfer and use of water quality data. WQIs have become a pivotal component for interpreting the environmental variation or condition for a prevailing water body (Terrado et al., 2010; Sutadian et al., 2016). They are used:

1. To provide an overall status of water quality to the water authorities and the wider community (Chang et al., 2001; Ocampo-Duque et al., 2006)
2. To study the impact of regulatory policies and environmental programs on environmental quality (Swamee & Tyagi, 2007).

3. To compare the water quality of different sources and sites, without making a highly technical assessment of the water quality data (Sarkar & Abbasi, 2006).
4. To assist policymakers and the public to avoid subjective assessments and subsequent biased opinions (Ocampo-Duque et al., 2006; Rehana & Mujumdar, 2009)

1.6 WQI models

The basic form of WQI models is depicted in figure 1, revealing that the majority of WQIs consist of four major steps (Abbasi & Abbasi 2012; Sutadian et al., 2016; A Lumb et al., 2011):

- The water quality parameters are chosen for inclusion in the assessment.
- Parameter sub-indices are created by converting parameter concentrations to unit-less sub-indices.
- Weighting of parameters: weightings are assigned to parameters based on their importance to the assessment.
- The water quality index is computed using an aggregation function: individual parameters sub-indices are combined using weightings to yield a single overall index.

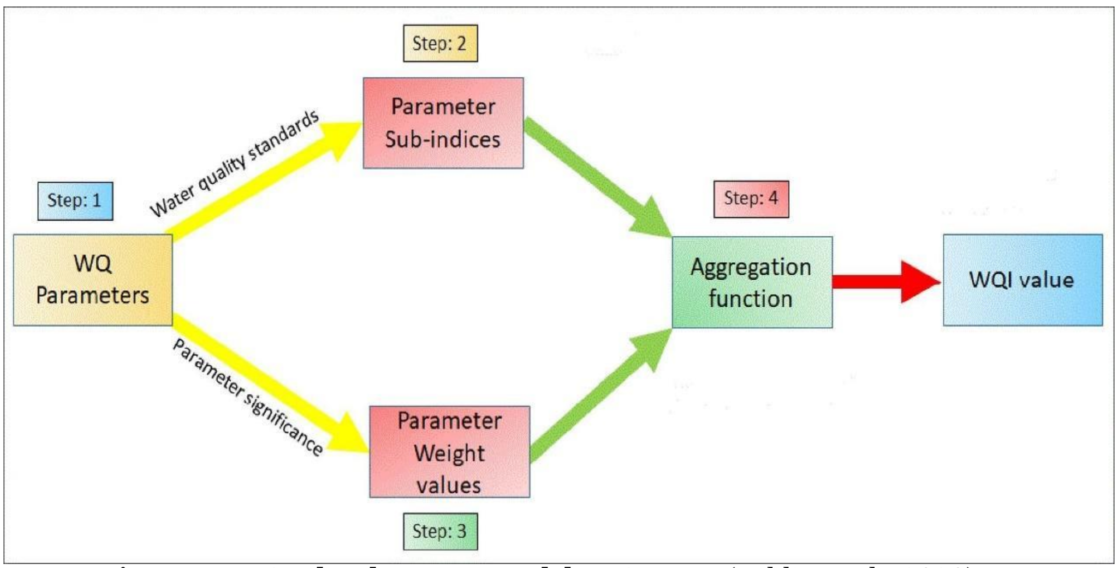


Figure 1. WQI development model Source: (Uddin et al., 2020)

The following sections discuss in detail the four steps.

1. Parameter Selection

The initial step in the WQI process is parameter selection, and there is significant variation among various models in terms of the type and number of parameters chosen, as well as the reasons for doing so. Water quality varies according to its spatiotemporal dimensions during its cycle, as well as its allocations and uses. The latter determine the water quality variables to be used, the analytical method, and the sampling period. The most included parameters are temperature, turbidity, pH, suspended solids (SS), total dissolved solids (TDS), fecal coliforms (FC), dissolved oxygen (DO), biochemical oxygen demand (BOD), nitrate, Ammonical nitrogen (NH_3-N) and phosphate. Parameter selection depends on expert opinions plus type of index being used; many models have 8 to 11 parameters (Bhutiani et al., 2016; Sargaonkar & Deshpande, 2003) while others have 20 to 26 parameters also in consideration (Hussien et al., 2019; Labrador,2001). The Delphi method can be used to select these variables, but it is still reliant on expert opinion (Grisham, 2009). As a result, depending on the panels of experts consulted, the final WQI can be highly variable (Kachroud et al., 2019).

2. Sub-Indexing

Various parameters occur in diverse ranges, are expressed in different units, and behave differently in terms of the concentration-impact relationship. All of this must be transformed into a single scale, usually beginning at zero and ending at one, before an index can be created. The range of some index scales is 0 to 100.

Subindices can be classified as one of four general types (Abbasi & Abbasi 2012; Uddin et al., 2020):

- Linear
- Nonlinear
- Segmented linear
- Segmented nonlinear

3. Parameter Weighting

Weightage assignment, like parameter selection, is a matter of opinion, and thus subjective. Well-formulated opinion-gathering techniques, such as Delphi, are used in this case as well to reduce subjectivity and increase credibility. If inappropriate weightings are used, i.e., a parameter is given more importance than it deserves, it can have a negative impact on model evaluation.

4. Aggregation

The WQI model's final step is the aggregation process. It is used to combine the parameter sub-indices into a single score for the water quality index. Types of functions used are:

- Additive
- Multiplicative
- Combined aggregating
- Square root of the harmonic mean function

- Minimum operator function

Figure 2 explains the overall roadmap for obtaining and using WQIs, from sample collection to calculating WQIs and applying them, using 4 steps process mentioned above.

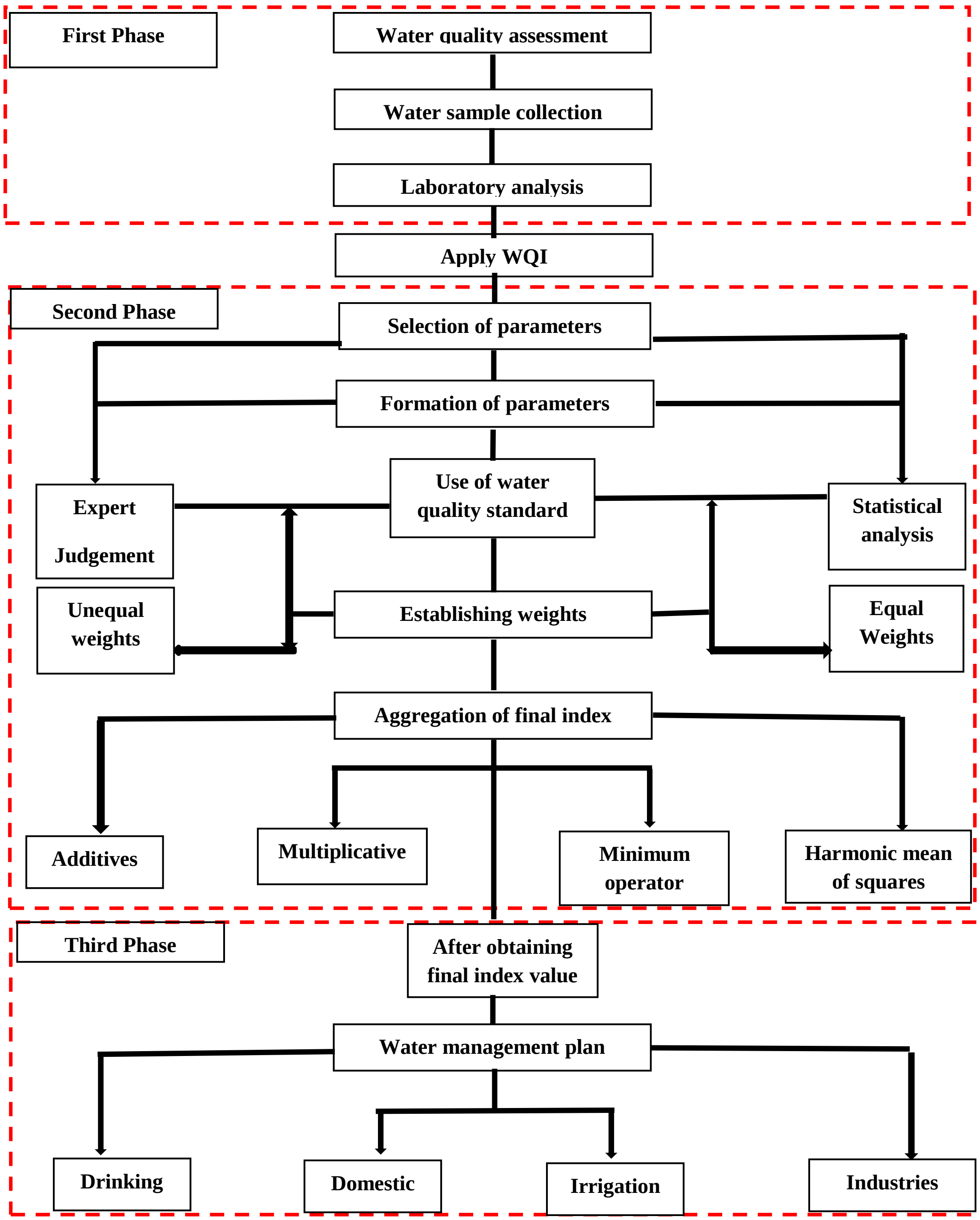


Figure 2 Development of WQI in 3 phases Source : (Akhtar et al. 2021)

Table 4 Different types of WQIs and their functions

Sr No	Index Model	Parameters	Sub Index Function	Weightage Method	Aggregation Method	References
1	Horton Index	8	✓	✓	Additive	(Horton, 1965)
2	National Sanitation Foundation (NSF) Index	11	✓	✓	Additive and Multiplicative	(Gradilla-Hernández et al., 2020; Kumar & Alappat, 2009)
3	Scottish Research Development Department (SRDD) Index	10	✓	✓	Additive and Multiplicative	(Banda & Kumarasamy, 2020)
4	Dinius Index	11	✓	✓	Multiplicative	(Dinius, 1987)
5	Ross Index	4	✓	✓	Additive	(Uddin et al., 2020)
6	Bascaron Index	26	✓	✓	Two additive functions: Subjective and Objective	(Menberu et al., 2021; Hussien et al., 2019)
7	Oregon Index	8	✓	✓	Weight arithmetic mean function	(Borisenko and Hubler 2010; Brown, 2019)
8	Environment Quality(EQ) Index	9	✓	✓	Additive	(Das Kanjabam et al,2017; Uddin et al., 2020)
9	House Index	9	✓	✓	Used SRDD aggregation technique	(House & Ellis, 1987)
10	Smith Index	7	✓	✓	Minimum operator function	(Carpenter et al., 1998; Abbasi & Abbasi 2012)
11	Dojildo Index	26	▪	▪	Square root of the harmonic mean function	(Dojlido et al., 1994)
12	British Colombia Index	10	▪	▪	Simple specific	(Abbasi & Abbasi 2012;

					mathematical formula	Dash & Kalamdhad, 2021)
13	Dalmatian Index modified version of SRDD Index	8	✓	✓	Used automatic index formulas	(Ŝtambuk-Giljanović, 2003)
14	Canadian Council of Ministers of the Environment (CCME) Water Quality Index	4	▪	▪	Used fixed mathematical functions	(Regmi & Mishra, 2016; Lumb et al., 2006)
15	Liou Index	13	✓	✓	Additive and Multiplicative	(Liou et al.,2004)
16	Said Index	5	✓	✓	Simple specific mathematical formula	(Abbasi & Abbasi 2012)
17	Malaysian Index	6	✓	✓	Additive	(Abidin et al., 2015)
18	Hanh Index	8	▪	▪	Additive and Multiplicative	(Abbasi & Abbasi 2012; Uddin et al., 2020)
19	Almeida Index	10	✓	✓	Multiplicative	(Abbasi & Abbasi 2012; Uddin et al., 2020)
20	West Java Index	13	✓	✓	Non equal geometric technique	(Abbasi & Abbasi 2012; Uddin et al., 2020; Dash & Kalamdhad, 2021)

21	Fuzzy-based Indices	No guidelines	▪	▪	Fuzzy	(Ocampo-Duque et al., 2006; Chang et al., 2001)
22	Bhargava's Index	4	✓	✓	Modified multiplicative	(Bhargava, 1985)
23	Status and Sustainability Index	15	▪	▪	Minimum operator	(Uddin et al., 2020; Dash & Kalamdhad, 2021)
24	Dalmatian Iindex	9	✓	✓	Additive or Multiplicative	(Stambuk-Giljanovic,2003)
25	Ved Prakash's Index	4	✓	✓	Additive	(Bhutiani et al. 2016; Kachroud et al., 2019)
26	Water Pollution Index	15	▪	▪	Root mean square	(Akhtar et al., 2021; Sutadian et al., 2016)
27	Contact Recreation Index	8	▪	▪	Minimum operator	(Akhtar et al., 2021; Uddin et al., 2020; Sutadian et al., 2016)

28	Hallock's Index	8	▪	▪	Additive	(Akhtar et al., 2021; Uddin et al., 2020)
29	Boyacioglu's Index	12	✓	✓	Additive	(Boyacioglu, 2007)
30	Harkins' Index	No guidelines	▪	▪	Statistical Method	(Gupta et al., 2003)
31	Indian pollutant Index	13	✓	✓	Additive	(Akhtar et al., 2021; Uddin et al., 2020)
32	Prati's Index	13	✓	✓	Additive	(Prati et al., 1971)
33	Stoner's Index	13	✓	✓	Additive	(Stoner, 1978)
34	Walski and Parker's Index	11	✓	✓	Geometric mean	(Abbasi & Abbasi 2012)
35	Weighted Arithmetic Index	No guidelines	✓	✓		((Abbasi & Abbasi 2012)
36	Tiwari and Mishra Index	14	✓	✓	The logarithm and antilogarithm	(Kachroud et al., 2019; Abbasi & Abbasi 2012)
37	Drinking Water Quality Index	17	✓	✓	Additive	(Akhtar et al., 2021; Uddin et al., 2020)
38	Wastewater Water Quality Index	23	✓	✓	Additive	(Akhtar et al., 2021; Uddin et al., 2020)

✓ : Includes all 4 steps for index formation

▪ : One or more common steps are not followed

Figure 3 shows distribution of various WQIs used on global map discussed in above Table 4.

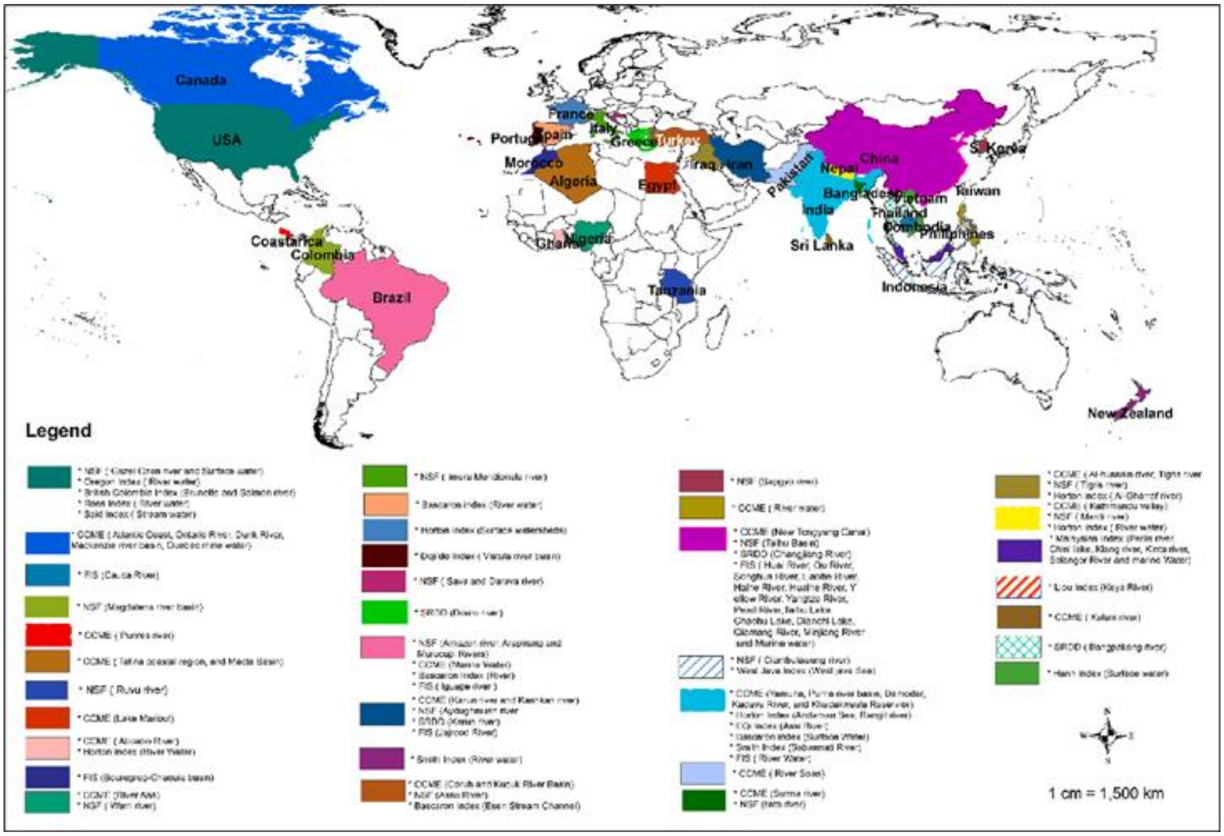


Figure 3 Different types of WQIs used worldwide Source: (Uddin et al., 2020)

1.7 Limitations of WQIs

Use of WQIs for monitoring water quality has some limitations, as was indicated earlier. Some aspects of the same are discussed below (Swamee & Tyagi, 2007; Abbasi & Abbasi 2012; Sarkar & Abbasi 2006; A Lumb et al., 2011; Sutadian et al., 2016)

- **Ambiguity**

When index exceeds the critical level (unacceptable value) without any of the subindices exceeding the critical level, an aggregation method becomes ambiguous. Ambiguity is defined as a situation in which the overall index suggests poorer water quality than would be expected based on all determinant subindex values. This is primarily a problem with weighted indices, depending on how the weights are assigned.

- **Eclipsing**

When index does not exceed the critical level (unacceptable value) despite one or more of the subindices exceeding the critical level, eclipsing occurs. The masking of low-value subindices in an overall high WQI value is referred to as eclipsing. Attempts to circumvent this issue include the use of alternative indices based on either weighted or unweighted multiplicative models, new index formulations, and/or novel approaches to subindex value determination.

- **Rigidity**

Rigidity is defined as the inability of an index to accommodate additional or alternative water quality determinants. This is especially important when an impairment occurs in a determinant(s) not included in the index or when an index is used in an area with concerns other than those for which it was designed. For example, a regulatory agency may already have an overall index but would like to add one or more additional parameters. This situation can occur when the index indicates that the water quality is good at a particular site, but the water is negatively impacted by constituents not included in the index. Alternatively, an agency may wish to use an index developed for one region in another where weather and other environmental conditions may differ significantly.

- **Compensation**

A good compensation aggregation method is one that is not biased towards extremes (i.e., the highest or lowest subindex value). However, when ambiguity-free and eclipsing-free models are desired, this property becomes a hindrance. Maximum (or minimum) operators, for example, that are free of ambiguity and eclipsing have poor compensation because they are biased towards the highest (or lowest) subindex values. As a result, the benefits of compensation must be balanced against the drawbacks of ambiguity (and eclipsing).

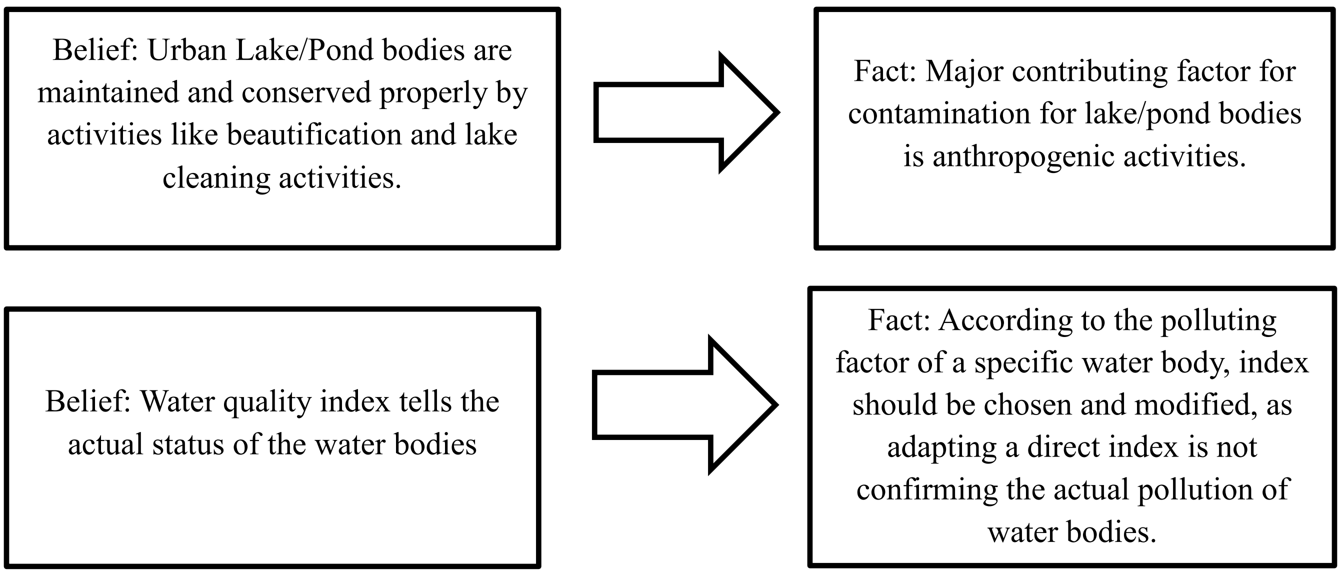
1.8 Aims And Objectives

The aim of the study is to assess the lakes/pond water reservoirs within Vadodara city. To achieve this aim, following objectives are set:

1. To characterize the surface water based on two types of water quality parameters (e.g., physical, and chemical). Data for three years to be collected to observe trend in change in water quality and the data will also be compared with reported data for the same lakes.
2. To construct a Water Quality Index (WQI) based on the studied water quality parameters and compare the WQI with the existing water quality standard.
3. To identify one or more critical parameters causing WQI to be high, and to suggest remedial measures based on chemical / physical treatment method focused on that parameter alone. This will be followed by determination of WQI again to see whether this treatment is effective.

4. To propose suitable modifications in the WQI calculations to suit local needs, which shall give better understanding of the pollution of the lake and to propose solutions to support the master Plan of the local/state government regarding water resources management issues in changing climate and Proposed New or Modified Water Quality Index.

1.9 Gap Analysis



2.0 Rationale for the present study

With the surge in increasing water demand with increasing population, surface waters are the ones which need immediate attention. Contamination and vitiation of the water bodies make up the partial situation of the "tragedies of the commons", calling for immediate action for grave necessity to instigate the awareness on restoration and sustenance. Monitoring of such water bodies, recording the major contaminating factor and making people and local authorities aware of the water quality by use of Indices is need of the hour.