# APPLICATION OF NSF-WQI FOR THE ASSESSMENT OF WATER QUALITY OF TWO TEMPLE TANKS OF KARNATAKA, INDIA

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## ABSTRACT

Water Quality Index (WQI) was applied in two temple tanks of Karnataka, using the water quality parameters such as pH, Temperature, Dissolved Oxygen, Biochemical Oxygen Demand, Turbidity, Total phosphates and Nitrates. The water quality values ranged from 1 to 100 signifying the ratings from very bad to excellent based on the importance of the parameter for aquatic life. The WQI values have reached 50.35 in Jogula Bhavi Temple Tank during September and 50.02 in Siddaroodha Math Tank during October that are almost bad ratings. Both tanks show WQI values just above 50 but much below 70, which is the threshold level specified for bad water quality water. The impact of various anthropogenic activities was evident on some parameters such as the temperature, turbidity, Nitrates and BOD. Application of the WQI is optional as a very helpful tool that enables the public and decision makers to evaluate water quality of these temple tanks.

**KEYWORDS:** NSF WQI, Physico Chemical Variables, Perennial Temple Tanks, Karnataka

## INTRODUCTION

India is a spiritual country with huge number of fortunate blessed temple lands. Karnataka is one such state having Savadatti temple of Yellamma Devi and Hubli Math of Siddaroodh Swami as hot spots for Hindu devotees in the north part of the state. These places are frequently visited by millions of people throughout the year. These are flourished by water sources in the form of perennial tanks in their vicinity. Both tanks are regularly distressed by ample of anthropogenic behavior. Verbal instructions to people in this apprehension towards water quality are not showing any impact. One of the most effective ways to communicate information on water quality trends is by use of the suitable indices (Dwivedi and Pathak, 2007). The present study deals with evaluation and comparison of Water Quality of both tanks using NSF WQI for the data collected over a period of one year.

221

There are number of WQI to evaluate water quality and summarize the data to communicate the general public. NSF WQI is a simple, surface water grading tool with reduced number of parameters. The calculation results in a single numeral that can be placed on a comparative scale to validate the water quality in categories ranging from very bad to excellent. This numerical value can be easily understood by Government personnels, non scientific water executives and the community.

**Materials and method**

**Study area**

Savadatti Jogula Bhavi is an auspicious temple tank situated on the Malaprabha River bank. The water of this perennial temple tank is used for several purposes. A ritual bath at a predetermined time & place is the major event of this festival. Bathing activity is one of the important in situ utilization of water bodies, which demands water quality requirement alien to the water quality required for drinking purposes. During bathing, people not only take dip in the water body but also drink its water irrespective of its water quality suitability.

Hubli Siddaroodh math tank harbors huge number of fishes and is very auspicious for Jala rathosthava. This perennial tank is a recreation place for people visiting in the evening hours who enjoy feeding the fish. During festival seasons this tank is fed with borewell water extracted from a nearby public toilet surrounding area for the enhancement of water source. All these change the environment of original water quality.

**Sampling procedure and analysis**

Surface water samples of both the tanks were collected from May 2012- April 2013 every month between 9.00 am to 11.00 am. pH and temperature were analyzed on spot at the collection site. The samples were analyzed for physico chemical variables in the laboratory by following the standard methods (APHA, 1998). The uses of water bodies have been identified in terms of primary water quality criteria using few physico-chemical parameters and the same is secondarily judged by Water Quality Indices.

**Result and Discussions:**

The WQI was used to aggregate various parameters and their dimensions into a single score, displaying a picture of the chronological water quality of both temple tanks separately. Water Quality indices are of different types depending on its final intended purpose and can

222

also be based not only on the readings at a single point of time but also on data collected over a period of time (Giriyappanavar and Patil, 2013).

There are several reports on water quality assessment using physico chemical parameters (Hosmani, 1975; Hegde, 1985; Huddar, 1995; Basavarajappa *et al*., 2009). Even new methodologies have been adapted by many researchers to provide quick and specific Water quality indices (Avvannavar & Shrihari, 2008; Ramakrishnaiah, 2009; Abdul Hameed *et al*., 2010). Specifically NSF WQI was applied by many workers on some fresh water bodies (Chavan *et al*., 2009; Samantray *et al*., 2009; Rajankar *et al*., 2009; Siddaraju *et al*., 2010; Hosmani, 2011; Giriyappanavar & Patil 2013).

In the present study WQI was calculated using NSF-WQI (Mitchell Williams, 2000). The standard water quality index values and the ratings are shown in Table-1. The water quality parameters chosen for the study are represented in Figure-1 and Figure-2. The comparative water quality values of both tanks are represented in Figure-3.
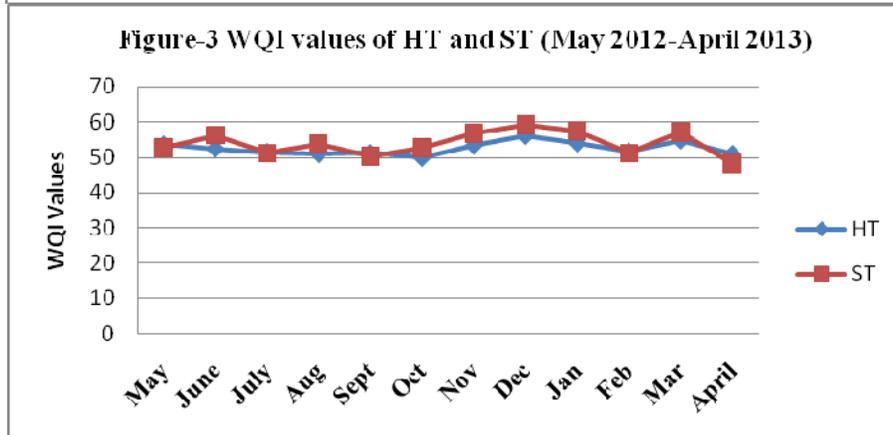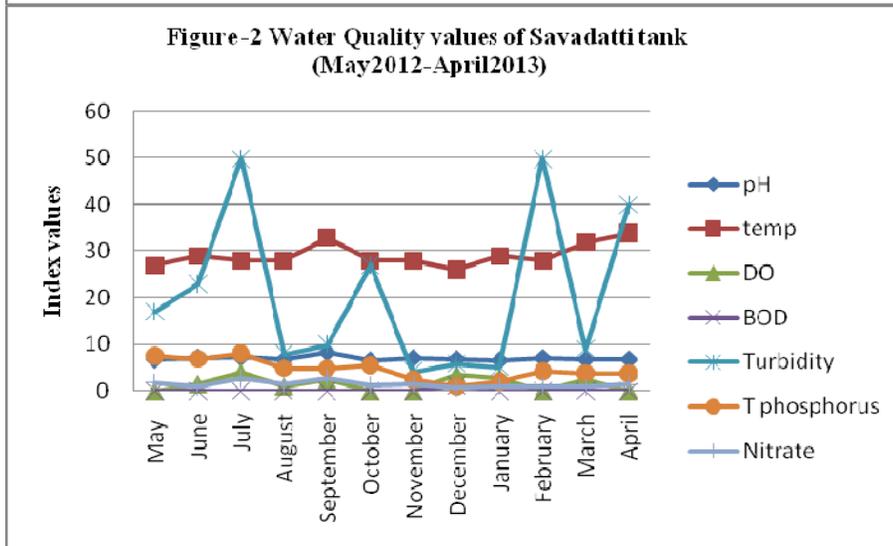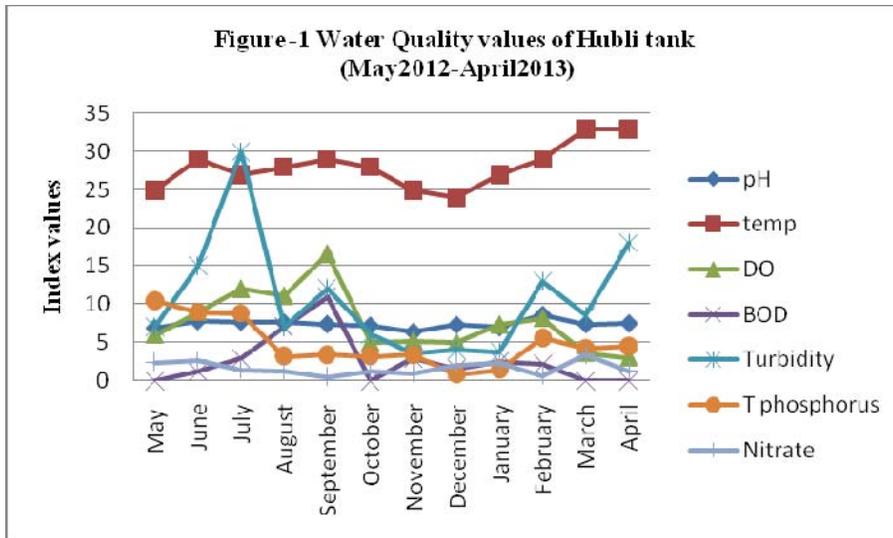
Surface water in Sddaroodh Math Tank remained medium for all the months of the study period. Even Jogula Bhavi Temple Tank water remained medium for maximum months of the study period but during summer (April month) showed water quality rating as bad. Similar observations were made by Hosmani (2011), in Lake Waters of Hassan district.

It was observed from the computed annual WQI that the values ranged from 50.02 to 56.26 during May 2012- April 2013 in HT and therefore can be categorized into "Medium". The WQI values of ST for the same period ranged from 48.2 to 59.27 which are categorized as "Bad" and "Medium" water quality respectively (Table-2).

The WQI values have reached 50.35 in ST during September and 50.02 in HT during October that are almost bad ratings. Both tanks show WQI values just above 50 but much below 70, which is the threshold level specified for bad water quality water. Either excellent or good water quality was not noticed in both the tanks.

**Table – 1 Water Quality Index values & Ratings of NSF**

| WQI Values | WQI Ratings |
|---|---|
| 90-100 | Excellent |
| 70-90 | Good |
| 50-70 | Medium |
| 25-50 | Bad |
| 00-25 | Very Bad |

Figure-1 Water Quality values of Hubli tank (May2012-April2013)



Figure-2 Water Quality values of Savadatti tank (May2012-April2013)



Figure-3 WQI values of HT and ST (May 2012-April 2013)

224

### Table-2 WQI values and ratings of HT and ST from May 2012-April 2013

| HT | May | June | Jul | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WQI | 53.68 | 52.56 | 51.55 | 51.12 | 51.28 | 50.02 | 53.44 | 56.26 | 54.13 | 51.7 | 54.95 | 51.05 |
| WQR | M | M | M | M | M | M | M | M | M | M | M | M |
| ST | May | June | Jul | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr |
| WQI | 52.74 | 56.25 | 51.2 | 53.74 | 50.35 | 52.79 | 56.72 | 59.27 | 57.49 | 51.23 | 57.21 | 48.2 |
| WQR | M | M | M | M | M | M | M | M | M | M | M | B |

**Conclusions:**

From NSF WQI and water quality parameters, it is evident that Dissolved oxygen, Turbidity, and Nitrate were the most affecting factors for the computed WQI values of both the tanks in the study period. The possible cause of nitrate in the surface waters of both tanks are mainly from the atmosphere, surface runoff, sewage discharges, and organic wastes. The effect was quite evident from the results; that the values of WQI in the tanks have reached almost bad quality ratings and show rapid decline in water quality status which is possibly due to the increase in the human activities. It is clear that the domestic activities, organic pollution, animal fecal matters, agricultural runoff have destructed the water quality of Jogula Bhavi. The pristine water quality of Siddaroodha Math tank has gone down due to addition of borewell water and organic pollution. It is disguised that the anticipatory measures taken by the local authorities are still not sufficient. The NSF WQI can serve as a basis for water quality monitoring in both temple tanks.

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