# Evaluation of Water Quality Index for Krishna River At Wai, Dist. Satara

**Mr.Prashant R.Narayane[1], Dr. Sunil B. Thakare[2], Mr.Ramakant S.Narayane[3]**
[1, 2, 3] Department of Civil Engineering
[1, 2] Anantrao Pawar College of Engineering, parvati, Pune, India
[3] Superintending Engineer, Maharashtra Jeevan Pradhikaran

***Abstract-*** *Water is a finite resource on earth and fresh water is important for human existence. Due to contamination of fresh water we are leading towards water scarcity. Now a day's water quality is a global issue and river Krishna has no escape to it. This research is based on evaluation of water quality of Krishna River at Wai and its suitability for various purposes. For this study NSF (National Sanitation Foundation) WQI method was adopted. Various parameters like BOD, DO, fecal coliform, nitrates, pH, TDS, phosphates, turbidity, etc. were tested in laboratory in two different seasons namely winter and summer in 2016. Our findings highlighted the deterioration of water quality in the rivers due to industrialization and human activities.*

***Keywords***- Water Quality Index, water parameters.

## I. INTRODUCTION

Wai is small town situated just 30 kms away from the origin of Krishna River in Satara district. Approximately town has a population of 36,500 only households in town generates 32, 85,000 lit's of waste water approximately. Which is directly discharged into river water due to absence of collection and treatment facilities. All of us familiar with changes in the water cycle, uneven and insufficient raining which can lead to droughts. For the sake of healthy environment and water we have to stop deteriorating natural water bodies. Now to know water quality, its suitability and impacts we have chosen to calculate WQI.

## II. METHODOLOGY

1. Selection of water collection points on the Krishna River in Wai was done with the help of maps, river bank survey and with public interaction the Krishna River in Wai.
2. The river water samples were collected after 9.00 am form various locations.
3. Different parameters were tested in the laboratory by using APHA (American Public Health Association) standards.
4. After testing results were tabulated suitably. This recorded results, then analyzed for interpretation of results.
5. The obtained results are compared with WHO, BIS, ICMR standards.
6. WQI was calculated by NSF method.

## III. WQI CALCULATION

A commonly-used water quality index (WQI) was developed by the National Sanitation Foundation (NSF) in 1970 (Brown and others, 1970). The NSF WQI was developed to provide a standardized method for comparing the water quality of various bodies of water. To find out WQI following 9 parameters are fixed by NSF developers and that are BOD, DO, fecal coliform, nitrates, pH, TDS, phosphates, turbidity, and temperature change. The mathematical expression for NSF WQI is given by.

$$WQI = \sum_{i=1}^{n} QiWi$$

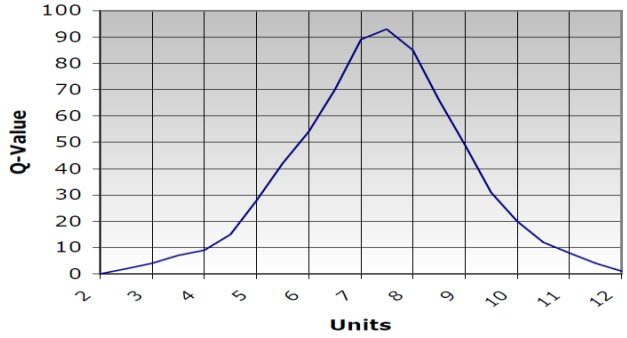
Where,
$Q_i$= sub-index for $i^{th}$ water quality parameter;
$W_i$= weight associated with $i^{th}$ water quality parameter.
**n**= number of water quality parameters.

For this NSFWQI method, the ratings of water quality have been defined by using following

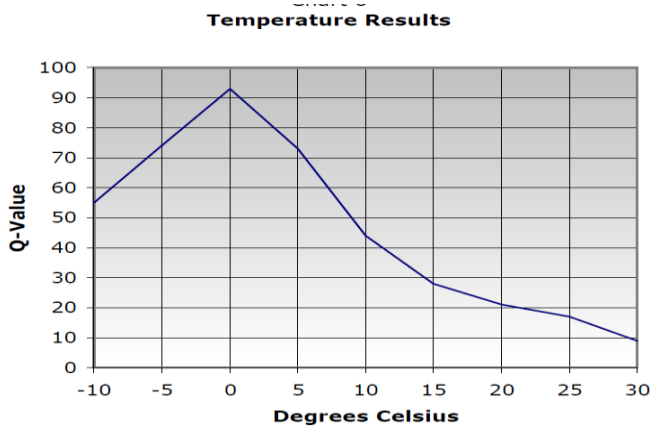
Table 1. National Sanitation Foundation Water Quality Index (NSFWQI). Water quality rating

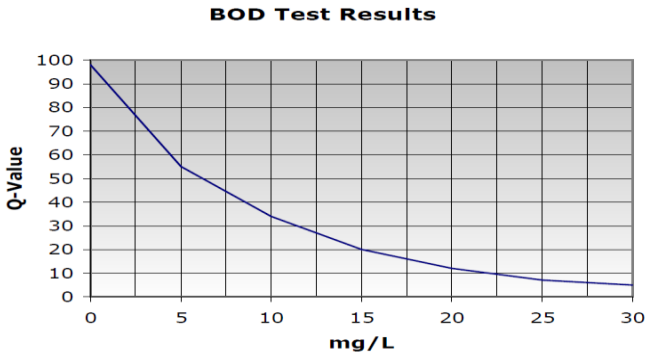
| WQI Value | Rating of Water Quality |
|---|---|
| 91-100 | Excellent water quality |
| 71-90 | Good water quality |
| 51-70 | Medium water quality |
| 26-50 | Bad water quality |
| 0-25 | Very bad water quality |

The Q value in this method is obtained from graphs available for various parameters. Weighing factors are fixed by the developers for 9 parameters. And to calculate DO% saturation separate graph available.

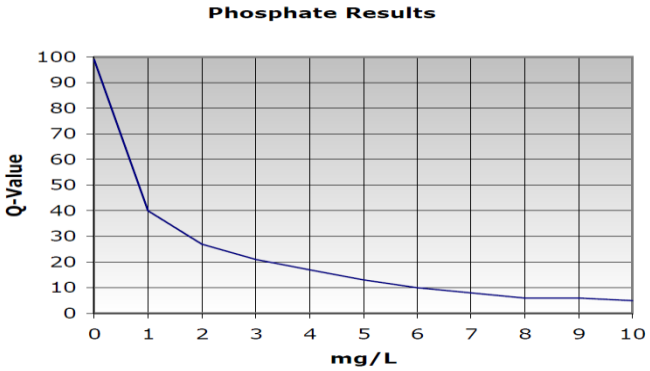



(Note: If pH is < 2.0 or > 12.0, Q=0)



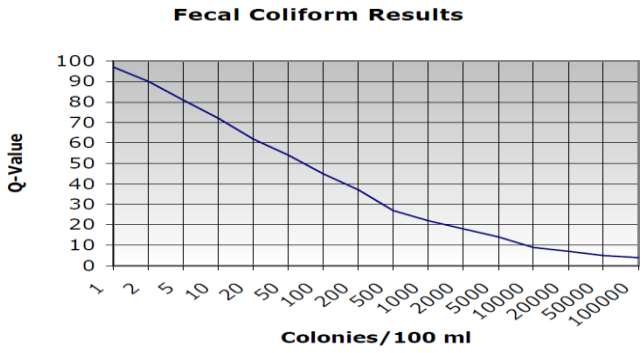




(Note: If BOD > 30, Q=2.0)

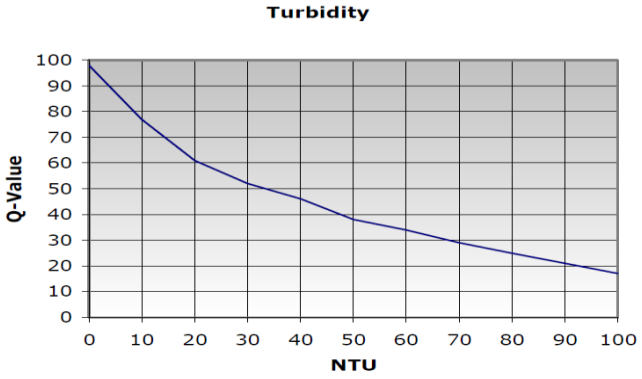



(Note: If phosphate > 10.0, Q=2.0)

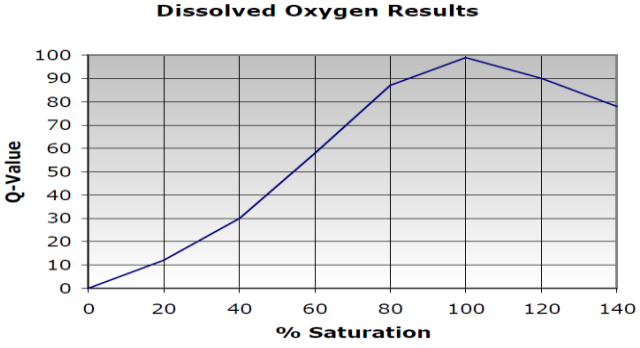
Chart 3



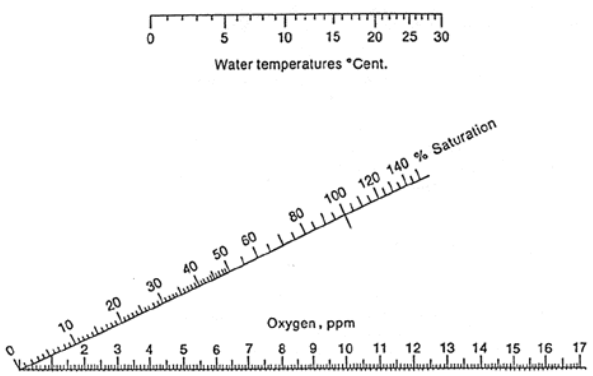

(Note: if Fecal Coliform > 100000, Q=2.0)




(Note: If Turbidity > 100.0, Q=5.0)




(Note: if % saturation is > 140.0, Q=50.0)




To calculate DO in % saturation

## IV. RESULTS AND DISCUSSION

Following table shows results and WQI for winter season.

Table 2. WQI for winter season

| TEST PARAMETERS | TEST RESULTS | Q-VALUE | WEIGHING FACTOR | SUB TOTAL |
|---|---|---|---|---|
| BOD | 8 | 35 | 0.11 | 3.85 |
| DO | 6.574 | 75 | 0.17 | 12.75 |
| FECAL COLIFORM | 22 | 60 | 0.16 | 9.6 |
| NITRATE | 0.468 | 90 | 0.1 | 9 |
| pH | 7.764 | 85 | 0.11 | 9.35 |
| TDS | 360.8 | 55 | 0.07 | 3.85 |
| PHOSPHATES | 0.64 | 50 | 0.1 | 5 |
| TURBIDITY | 7.9 | 78 | 0.08 | 6.24 |
| ∑ | | | 0.9 | 59.64 |
| | | | ***WQI*** | ***66.26667*** |

Table 3. WQI for summer season

| TEST PARAMETERS | TEST RESULTS | Q-VALUE | WEIGHING FACTOR | SUB TOTAL |
|---|---|---|---|---|
| BOD | 5.6 | 47 | 0.11 | 5.17 |
| DO | 5.9 | 65 | 0.17 | 11.05 |
| FECAL COLIFORM | 20 | 60 | 0.16 | 9.6 |
| NITRATE | 0.63 | 65 | 0.1 | 6.5 |
| pH | 7.82 | 85 | 0.11 | 9.35 |
| TDS | 374.2 | 47 | 0.07 | 3.29 |
| PHOSPHATES | 0.6 | 55 | 0.1 | 5.5 |
| TURBIDITY | 3.16 | 91 | 0.08 | 7.28 |
| ∑ | | | 0.9 | 57.74 |
| | | | ***WQI*** | ***64.15556*** |

If less than 9 tests are performed, the overall WQI can be estimated by adding the results and then adjusting for the number of tests. We have selected 8 parameters in this calculation, so the formula is

***WQI= ∑ SUB total (x) / ∑ Weighing factors***
***E.g. from table 3.***
***WQI=57.74 / 0.9***
***WQI=64.155***

As per rating mentioned in table 1. the water quality available in Krishna River for both the seasons is found to be medium. On this basis, we can say that the water in Krishna River at Wai is suitable for drinking purpose after conventional treatment.

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