

A Case Study of Water Pollution in Bada Talab, Ranchi, Jharkhand

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Abstract: Bada Talab situated at the heart of the Ranchi city is considered to hold maximum catchment area of the city. Water hyacinth is the serious problem of this pond. Water hyacinth the distribution and abundance increase the current time and also strongly decreased water quality and intensity of aquatic biodiversity in the Lake. The objective of the study was to check the water quality of the pond to enlist the factors causing growth of water hyacinth in the pond. The Physico-chemical parameters of experimental water samples were collected and analyzed as per standard methods of BIS; also obtained values were compared with standard values. The study reveals that the pond is deteriorating and there is a need to take strong measures in order to revive the earlier condition of pond.

Keywords: Water hyacinth, water quality, pond, catchment.

I. INTRODUCTION

Water is vital for the existence of all life forms and is essential for all activities of human beings. Polluted water is the main cause of a number of diseases (Kumar et al. 2017). Polluted water not only affects the life of present generation but it also affects the life of upcoming generations because its effect remains for long. Water pollution in urban water bodies is mostly caused by sewage discharged from cities and towns are the primary cause for degradation of water resources (Rajagopalan.2005). That generally leads to problem of excessive growth of water hyacinth in the water bodies. Water hyacinth problem of Bada Talab had caught the attention of environmentalist and civil society of the city. As, it replaces existing aquatic plants, and develops floating mats of interlocked water hyacinth plants, which are colonized by several semi-aquatic plant species. The conditions created by water hyacinth encourage the vectors of several human diseases, including the intermediate snail hosts of bilharzia (schistosomiasis) and most mosquito vectors, including those responsible for the transmission of malaria, encephalitis and filariasis.

Objective

- To check the existing water quality of Bada Talab.
- To enlist the factors causing enormous growth of water hyacinth in pond.

1.1 Study Area Description

The Bada Talab is situated in the heart of the Ranchi City. Located at the base of the landmark Ranchi Hill, the man-made lake—2,100ft above sea level—was dug up by Colonel Onsely, a British agent and his men in 1842. It is considered that the Talab holds maximum catchment area for the city. The Talab has a total area of 218592 Sq m while area of water body is 18542 Sq. m. The average depth of water is 2.2 metres. Bada Talab is geographically located at latitude 23° 22'04"N and longitude 85°19' 05"E. The Bada Talab is ringed by Chhoti Masjid, Surya Mandir and Shiv Mandir. It is a manmade lake dug by British in heart of the city. The Bada Talab has Upper Bazar area on North East, Sai Nagar on North, Bhumiartoli on West and Nizam Nagar on South West (source:RMC).

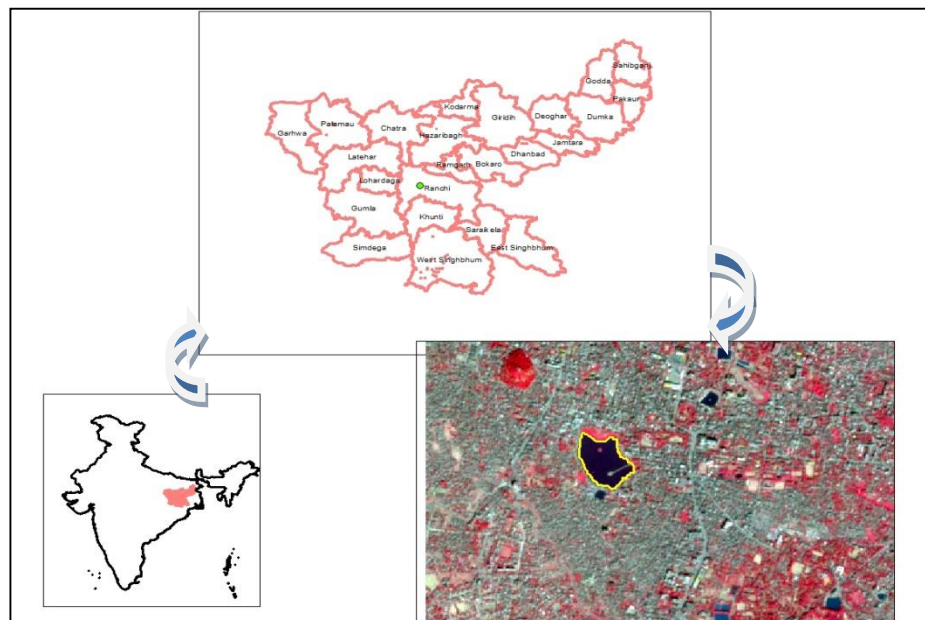


Figure 1: Study Site

2. DATA COLLECTION

The sources of data are divided into two categories. The data collected during field visit or from study area is termed as primary data. Primary data was collected through field observations and test results of samples from laboratory (IEM, Pundag Ranchi). The secondary data was collected from authentically published sources such as books, research papers or other documents containing the topics relevant to the study. (Bhattacharya and Shandilya 2017)

Water samples were collected from three different locations: near inlet from sewerage drain of Upper bazaar and Seva Sadan, near outlet to external pond which has been closed by the municipal corporation and sewerage drain of Kishorgunj area.

Water samples were collected in PET bottles. The on-field parameters of the samples i.e. pH, DO and Temperature was obtained at the site using pH & DO meter respectively. The collected water samples were sent for analysis of chemical parameters i.e. BOD, COD, Total Hardness, Nitrates, ammonia etc.

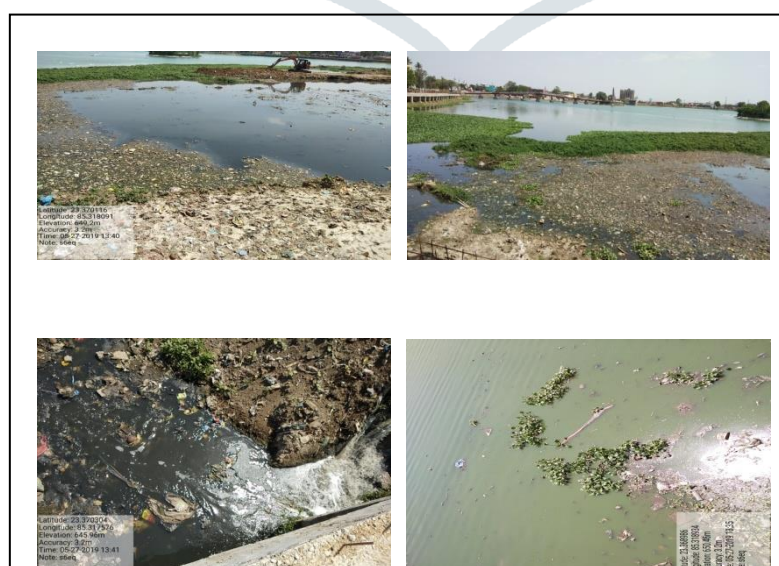


Fig2: Growth of Water Hyacinth in Bada Talab Ranchi
(Photo taken by Author in.27-05-19)

3. RESULTS AND ANALYSIS

Table 1 Results of on- Field Parameters

Permissible Limit	Sl no.	Sample Code	pH	Temperature (°C)	Dis-solvedOx-ygen (mg/L)	Odour
			6.5-8.5	25-32°C	5	Agreeable
	1	BT1	8.8	34.7	5.5	Disagreeable
	2	BT2	9	34.6	4.8	Disagreeable
	3	BT3	8.9	32.9	5	Disagreeable

*BT (1-3) depicts Bada Talab

Table 2 Laboratory Report of collected Samples

Parameters	Permissible Limit	Sample Code		
		BT1	BT2	BT3
Total Dissolved Solids	500	843	748	744
Biological Oxygen Demand	5	46.4	28	25.3
Chemical Oxygen Demand		320	144	128
Total Hardness	300	286	267	274
Sulfates	<0.002mg/L	8.6	29.2	31.9
Fluoride	1.5	0.38	0.59	1.58
Phosphates	0.1(USPHS)	1.26	0.96	1.09
Total Kjeldhal Nitrogen	<5.0mg/L	60.5	21.3	63.8
Ammonical Nitrogen	<1.0mg/L	3.92	5.60	3.08
Organic Nitrogen		56.6	15.7	60.7

The pH of samples ranged between 8.8 to 9 which is slightly higher than the permissible limit of .The DO ranged between 4.8 to 5.5 which is slightly higher than the minimum range of 4.0 mg/l. The odor was disagreeable in all the samples. It is not suitable for aquaculture because DO level directly indicates the health of flora and fauna of pond ecosystem. The TDS of all the samples are much higher than the permissible limit of 500mg/L. The BOD level of all three points are much higher than the permissible limit of 5 mg/L which is considered suitable for the living organisms of water according to BIS standard for water quality. Among the all three samples highest BOD level of 46.4mg/L was reported from BT1, sampling point near the drain coming from Upper Bazaar and Seva Sadan. The sulfates and ammonical nitrogen concentration was much higher than the acceptable limit which shows excessive water pollution due to municipal wastes. It is also the significant reason for excessive growth of water hyacinth in pond. All other parameters are also higher than the permissible limit that shows poor health conditions of the pond. Hence, the pond needs to be revived.

4. SUGGESTED MEASURES

However this is a preliminary study of the lake which requires further more studies in order to produce much more reliable data. Even though through this study it can be confirmed that The Ranchi Lake renamed as Vivekananda Lake is highly polluted and has become a trouble of the peoples living nearby its vicinity. Thus, there is a need to take possible measures to retrieve its earlier status.

- Need to close direct drain of sewerages.
- To build a treatment plant.
- It's highly recommended to use biotechnological aspects like bio-enzymes to control growth of water hyacinth because the lake is a source of ground water recharge and chemical procedures may contaminate the ground water.
- Frequent monitoring of water quality of lake.

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