International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 3 Issue: 2 041– 045

Investigation of Water Quality Parameters of Nag River in Nagpur Region, MS, India

Payal K. Baitule,
M. Tech. Scholar,
Dept. of Chemical Engineering,
PIET, Nagpur,
payalbaitule14@gmail.com

Wahid Deshmukh,
Assistant Professor,
Dept. of Chemical Engineering,
PIET, Nagpur,
awasdk@gmail.com

M. P. Bhorkar,
Assistant Professor,
Dept. of Civil Engineering,
GHRCE, Nagpur,
mangeshubh@rediffmail.com

Abstract-Nature is changing its form day by day. Due to change in natures form, the quality of environment is depleting day by day. Environment mainly depends on the air & water. Water in the river exposes to environment during flowing and passes through various regions & may result in carrying polluted water. Water quality of river is deteriorating day by day due the wanted & unwanted activities of the human being. Most of the rivers in India are severely polluted due to anthropogenic activity which is of serious concern.

In this project the water quality of Nag River of Nagpur in Maharashtra, India is determined. Recently various endless efforts are being made to bring Nag River into city's heritage list. This river flows across the city and serves as waste water carrying drainage for city of Nagpur. Its ecosystem is extremely polluted by urban waste pollution from Nagpur. All metabolic, physiological activities & life processes of aquatic organism are generally influenced by such polluted waste & hence it is essential to study physico-chemical characteristics of water. The waste water will be analyzed for the main water quality parameters such as temperature, pH, color, dissolved oxygen, conductivity, turbidity, total dissolved solids. The effluent samples will be collected from five different locations.

Keywords: - Nag River, Analysis, Water Quality, Physico-chemical parameters

*****

I. INTRODUCTION

Nagpur is the second capital city of Maharashtra. Nagpur city is the largest city in Central India. It is also known as the Orange City. Nagpur is also the Tiger capital of India. The latitude and longitude of Nagpur are 21º 09'N, 79º 05'E / 21.15ºN. 79.07'E. Nag River is a river flowing through the city of Nagpur in Maharashtra, India.

The Nag River situated in Nagpur. The river is a part of the Kanhan River System. The river originates from Ambazari Lake, stretching through the city finally pouring down into the Kanhan River. Constant dumping of untreated sewage and industrial effluents has resulted in river water quality deterioration and the river has since been emerging as a bad smelling river. In fact the river has now turned into a running sewage drain. Data published by NEERI clearly stated that mere sewage is flowing in the river. The condition of river is so poor that Nag River lost its Heritage Status in the year 2000. In the year 2013, there was a boom in awareness for rejuvenation and restoration of Nag River.

This paper includes the study of the attempts already taken towards this objective. Taking into consideration other attempts already undertaken in different parts of India and around the world, this paper will focus on understanding various sources and causes of pollution, the present physical and environmental condition of river, benefits of restoration and how those attempts can be utilized for the rejuvenation and restoration of Nag River.

Due to increase in population, there is a consistent rise in the level of sewage in the Nag River. If proper and immediate measures to restore the river are not taken, the life of river will posses great danger.

Nag River stretches 16.5 km within the city limits and meets the Pili River towards the eastern part of Nagpur city just outside the Municipal boundary limits. These rivers drain into Kanhan River and then into the Vainganga River. Historically, the River was perennial. But after the constant dumping of sewage without any prior treatment, the quality of river started to deteriorate.

In this project the water quality of Nag River of Nagpur in Maharashtra, India is determined. Recently various endless efforts are being made to bring Nag River into city's heritage list. This river flows across the city and serves as waste water carrying drainage for city of Nagpur. Its ecosystem is extremely polluted by urban waste pollution from Nagpur.

All metabolic, physiological activities & life processes of aquatic organism are generally influenced by such polluted waste & hence it is essential to study physico-chemical characteristics of water. The waste water is analyzed for the water quality parameters such as pH, color, dissolved oxygen, conductivity, turbidity, total dissolved solids & temperature. The effluent samples are collected from five different locations.

II. LITERATURE REVIEW

P. C. Sujitha et. al., (2012) used technique for quantitative analysis of Karamana River, various samples were collected from the station Mankattukkadavu (Station 1), Kundanankadavu (Station 2), Near Siva Temple (Station 3), Thiruvallam (Station 4) & Pallichal (Station 5). The study was carried out in premansoon. (March) & south west mansoon (July) period in 2009. Surface water samples & sediment samples were collected from the sampling stations. For the analysis of physico-chemical parameters, the surface water samples collected in new white colour 1 liter pearl pet bottle using clean buckets and in sterlise glass bottles, for the bacteriological parameters study.

Varunprasath K. & Nicholas A. Daniel, (2010) have selected water samples form river Bhavani were from 3 stations, one at Pillur dam received water from the western ghats and other two are Mettupalayam. One year continuous monthly poriods in July 2007

to June 2008 were selected. The samples were collected from all stations at 11.00 to 12.00 noon in both the seasons for physico chemical examination & from Bhavani river. Most of the units discharge there handling were adopted based the standard procedures.

Joshi Dhirendra Mohan et. al., 2009 collected a total of 90 water samples from 5 different spots during different seasons over a period of two years (Nov. 2006 to Oct. 2008). The samples were taken in BOD bottles and plastic jerry cans and brought to the laboratory with necessary precautions. All samples were labelled properly. Some parameters like temperature, pH & dissolved oxygen were measured on site. Grab sampling was generally applied during the sampling. Water samples were analysed by standard methods.

Yadav R. C. & Srivastava V. C., 2011 analyzed samples of the river Ganga water which were collected at monthly intervals from the selected site in the first week of each month (Form Sept. 2004 to Aug. 2006). Triplicate samples each of two liter in polythene bottles were collected between 8 am to 10.00 am from each sampling site and brought to the laboratory in the ice boxes for the analysis of physico-chemical parameters.

III. CASE STUDY

A tributary of the Kanhan which rises in the hills to the west of Nagpur and flows in a serpentine course past Nagpur City, joining the main river at Saongi in the east of the District. The river probably derives its name (Nag, a cobra) from its sinuous course, and in turn gives a name to Nagpur city.

The study is carried out on Nag River. The river serves as drainage for Nagpur city. Its ecosystem is extremely polluted by urban waste. Therefore it is decided to analyze and investigate the water quality parameters so that some remedies for the improvement could be possible. The effluent samples were collected from five different locations of Nag River during the month of September 2014. These samples are collected in two litre plastic bottles, which are earlier washed and rinsed with triple distilled water before the collection of water samples. Separate and individual samples are collected for the purpose of dissolved oxygen. After sample collection, they are either analyzed immediately for various parameters like TDS, Hardness, Fluoride etc or preserved safely by taking suitable precautions to avoid deterioration or alterations. The pH was determined electrometrically using digital pH meter, electrical conductivity was measured by conductivity meter, dissolved oxygen is measured by DO meter, total dissolve solid was measured by using TDS meter and similarly turbidity is measured by Nepthalo turbidity meter. Alkalinity, chloride, TDS, calcium, magnesium, total hardness, nitrate and phosphate were determined.

The Stations at which the samples were collected are:

Near Ambazari Spillway
Canal Road Ramdaspeth
Behind Ashirwad Theatre
Behind Lokanchi Shala
Hivri Nagar

The Following map shows the location of the sensitive sampling stations-

Fig. I Location Map of Sampling Station of Nagpur Region

IV. METHODOLOGY

The waste water is analyzed for the water quality parameters such as-

1. Temperature
2. Color
3. pH
4. Conductivity
5. Total Dissolved Solids
6. Dissolved oxygen
7. Turbidity

Precautions Taken:

- Borosilicate Glassware & distilled water are used throughout the testing.
- Samples were collected in sterilized screw cap bottle of 1 liter capacity & analyzed in lab for physico-chemical parameters.
- Samples collected from the stations were properly labeled.

V. RESULT & DISCUSSION

Results for Sample station

TABLE I AMBAZARI OVERFLOW

Sr. No	Parameter	Unit	Result of Sept.14 Month	Result of Nov. 14 Month
1	Temperature	ºC	32	25.9
2	pH	---	7.71	7.52
3	Conductivity	µmho/cm	400	410
4	Total Dissolved Solids	mg/l	240	255
5	Dissolved oxygen	mg/l	8.9	4.8
6	Turbidity	NTU	7	5
7	Color	---	Colorless	Colorless

ISSN: 2321-8169
041– 045

TABLE II RAMDASPETH CANAL ROAD

Sr. No.	Parameter	Unit	Result of Sept.14 Month	Result of Nov. 14 Month
1	Temperature	ºC	31.5	26.7
2	pH	---	7.21	6.54
3	Conductivity	µmho/cm	650	540
4	Total Dissolved Solids	mg/l	410	380
5	Dissolved oxygen	mg/l	1.8	2.4
6	Turbidity	NTU	41	42
7	Color	---	Greenish	Greenish

TABLE III BAIDYANATH SQUARE

Sr. No.	Parameter	Unit	Result of Sept.14 Month	Result of Nov. 14 Month
1	Temperature	ºC	33	26.8
2	pH	---	7.40	6.82
3	Conductivity	µmho/cm	620	578
4	Total Dissolved Solids	mg/l	390	410
5	Dissolved oxygen	mg/l	1.8	2.2
6	Turbidity	NTU	31	38
7	Color	---	Greenish	Greenish

TABLE IV RESHIMBAGH SQUARE

Sr. No.	Parameter	Unit	Result of Sept.14 Month	Result of Nov. 14 Month
1	Temperature	ºC	32.5	25.7
2	pH	---	7.40	6.61
3	Conductivity	µmho/cm	620	610
4	Total Dissolved Solids	mg/l	400	390
5	Dissolved oxygen	mg/l	1.8	1.9
6	Turbidity	NTU	29	39
7	Color	---	Greenish	Brownish

TABLE V BEHIND KDK COLLEGE

Sr. No.	Parameter	Unit	Result of Sept.14 Month	Result of Nov. 14 Month
1	Temperature	ºC	33	26.5
2	pH	---	7.39	6.23
3	Conductivity	µmho/cm	680	655
4	Total Dissolved Solids	mg/l	430	420
5	Dissolved oxygen	mg/l	1.1	1.9
6	Turbidity	NTU	45	42
7	Color	---	Brownish	Greenish

Graphical Representation of Qualitative Physico-Chemical Parameters

Physico-chemical parameters of Nag River analysed during existing work are presented graphically and some qualitative physicochemical relationships are assessed.

Temperature

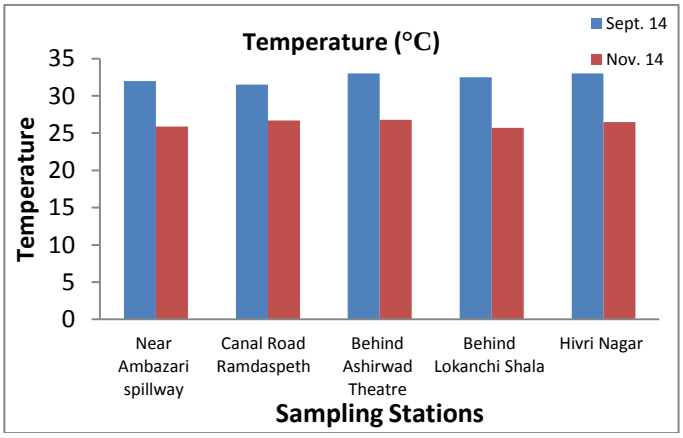

Fig. II Graphical presentation of Temperature, Temperature varied during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

pH

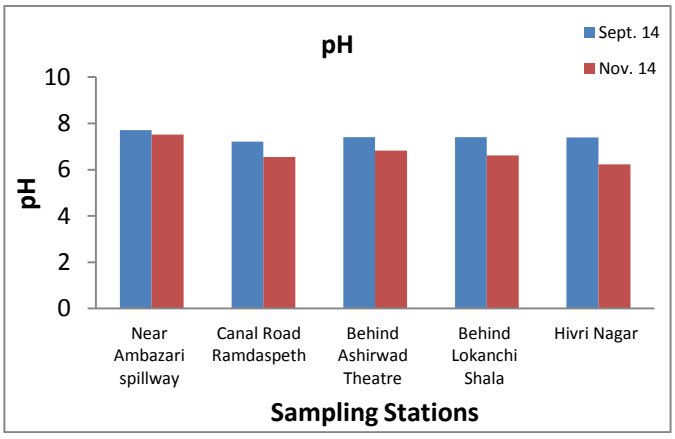

Fig. III Graphical presentation of pH, pH analysed during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

 ISSN: 2321-8169
041– 045

Conductivity

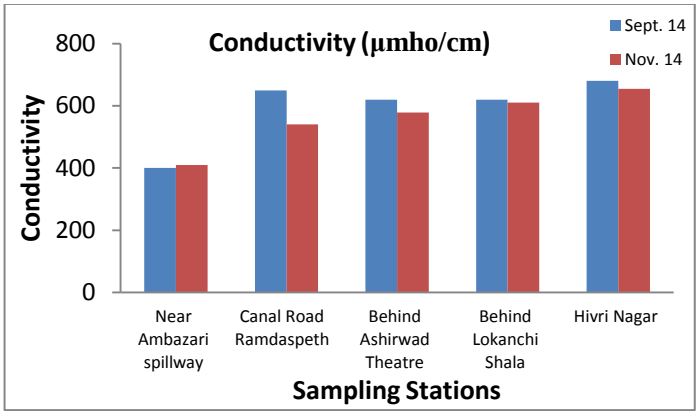

Fig. IV Graphical presentation of conductivity, Conductivity observed during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

Total Dissolved Solids

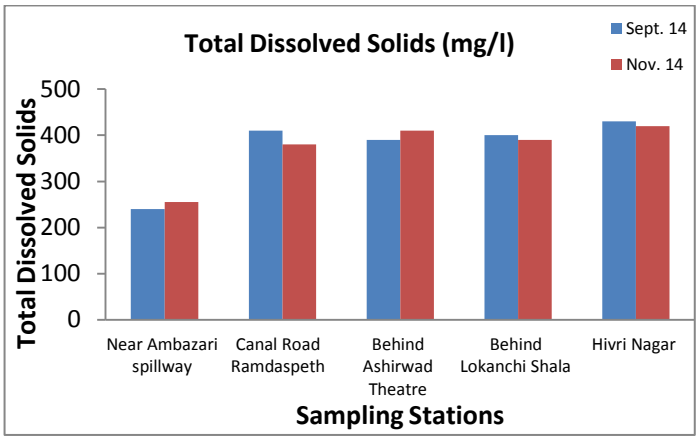

Fig.V Graphical presentations of Total Dissolved Solids, Total Dissolved Solids diverse during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

Dissolved oxygen

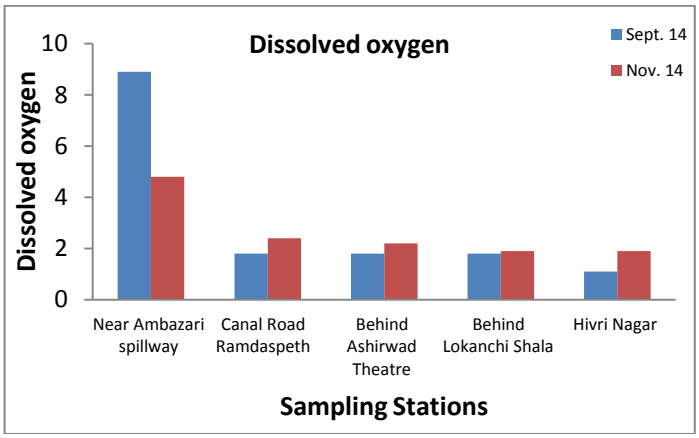

Fig.VI Graphical presentation of Dissolved oxygen, Dissolved oxygen analysed during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

Turbidity

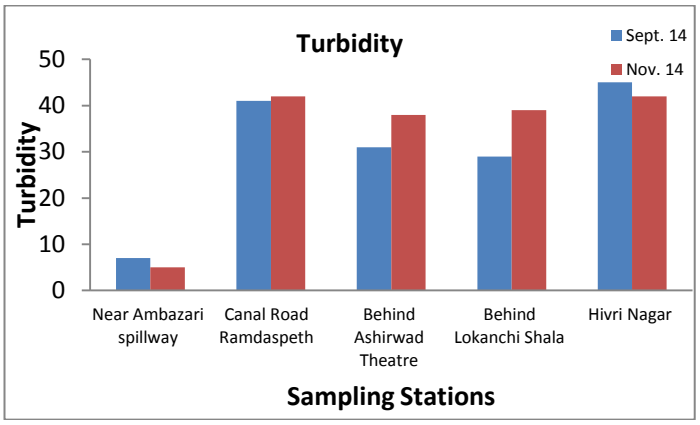

Fig.VII Graphical presentation of Turbidity, Turbidity found during the study period of Sept.14 to Nov. 14 according to respective sites with their month of collection

VI. DISCUSSION

1. Temperature:

Temperature was found to be range between 31.5 to 33 °C with slight changes at all the sites impinging solar radiations and atmospheric temperature brings interesting spatial & temporal changes in natural water.

2. Color:

The waste water analyze for the purpose and at most of the sites it was noted as light brown/ greenish or brown color as water is contaminated, having continuous disposal of sewage including domestic activities. The identification of sample is done on the basis of visual inspection.

3. pH

pH of water body is very important in determination of water quality since it affects other chemical reactions such as solubility & metal toxicity. The pH value range from 7.21 to 7.71 during work. The minimum & maximum value of pH is in the range of alkaline. The pH of the water under study is within the WHO standards of 6.50 to 8.50.

4. Conductivity:

Conductivity values were minimum at Ambazari overflow station of Nag River (400 µmho/cm) and maximum at behind KDK college (680 µmho/cm) during the sampling. In the present study, the conductivity values were higher than the recommended values as per WHO & hence the water is unsafe to be use for domestic & agriculture purpose.

5. Total dissolved Solids

TDS depends on various factors such as geological characteristics of watershed, rainfall and amount of surface runoff and gives an indication of degree of dissolved substances. The observed TDS values were comparatively lower at Ambazari station (240 mg/l) and higher at behind KDKCE (430 mg/l).

6. Dissolved Oxygen

DO content play a vital role in supporting aquatic life & is susceptible to slight environmental changes. DO content varied from 8.9 mg/l to 1.1 mg/l. It was found below the WHO

permissible limit and hence not recommended for drinking purpose.

7. Turbidity

The turbidity at Nag River was lowest in during sampling. Maximum turbidity 45 NTU was observed in behind KDKCE and lowest i.e. 7 NTU at Ambazari site. It is because; the quantity of water is more when the sampling was done at Ambazari.

VII. CONCLUSION

1. Physico-chemical parameters were analyzed during project.

2. The relationship between some qualitative parameters was studied for selected sampling stations.

3. The water near Ambazari overflow can be use for drinking purpose as well as domestic purposes.

4. As the distance increases from the Ambazari overflow, the quality of water is deteriorating and not permitted for any use.

REFERENCES

[1] Joshi Dhirendra Mohan, Kumar Alokand Agrawal Namita (2009), Studies On Physicochemical Parameters To Assess The Water Quality Of River Ganga For Drinking Purpose In Haridwar District, Rasyan, J. Chem, 2(1), pp 195-203.
[2] K. Saravanakumar and R. Ranjith Kumar (2011), Analysis of Water Quality Parameters of Groundwater Near Ambattur Industrial Area, Tamil Nadu, India; Indian Journal of Science and Technology, Vol. 4 No. 5 (May 2011), ISSN 0974-6846, pp.660-662.
[3] P.C. Sujitha, Mitra Dev D., Sowmya P.K. Mini Priya R.(2012), Physico-chemical Parameters of Karamana River Water in Trivandrum District, Kerala, India, International Journal of Environmental Sciences, 2(3),pp.1417-1434.
[4] Varunprasath K. and Nicholas A. Daniel (2010), Physico-chemical Parameters of River Bhavani in three stations, Tamilnadu, India, Iranica Journal of Energy & Environment, 1(4),pp.321-325.
[5] Water supply Engineering by B. C. Punmia, Laxmi Publication.
[6] www.google.co.in/maps
[7] http://en.wikipedia.org/wiki/Nagpur
[8] Yadav R.C. and Srivastava V.C.(2011), Physico-chemical Properties of the Water of River Ganga at Ghazipur, Indian J.SCI.Res.,2(4),pp 41-44.