

## Water Quality Assessment of Nandini River (Nasardi) ,Nashik.

Kathe Shubham <sup>1</sup>, Tidake Sakshi <sup>2</sup>, Maniyar Hrushikesh <sup>3</sup>, Tajane Vaibhav <sup>4</sup>, Surade Neha <sup>5</sup>, Gaikwad Prajakta <sup>6</sup>, HOD. Dhande Bhagyashree <sup>7</sup>.

<sup>1,2,3,4,5,6</sup>Student, Dept of Civil Engineering, MET's Bhujbal knowledge City, Institute of Technology (Polytechnic) Nashik-3,422003, Maharashtra, India

<sup>7</sup>HOD, Dept of Civil Engineering, MET's Bhujbal knowledge City, Institute of Technology (Polytechnic) Nashik-3,422003, Maharashtra, India

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**Abstract** - As the main source of water for Nashik city is River Godavari. It becomes a priority to keep Godavari River clear and free from impurities. The river Godavari is second largest river in India, which is 82 percent polluted considerably.

So, in supplementary to the river Godavari, Nandini River (wellknown as River Nasardi) also originates from Nashik. The River Nandini rises from hilly areas in Trimbakeshwar Nashik and it meets to river Godavari in Tapovan Nashik. Travelling from the heart of Nashik the river Nandini is mostly served as a waste discarding river although river Nandini has a considerably good quality of water which can be consumed or utilized for daily activities.

In this project we are going to focus on the river Nandini, its route of travel, its major and minor location of exposure, its utilization, and the various factors which makes it one of the most polluted river in India. We are going to conduct detail analysis of River Nandini on the basis of calculating its, ph, percentage of total hardness, total solids, suspended solids, dissolved solids, alkalinity, conductivity, temperature, dissolved oxygen percentage, chemical oxygen demand, turbidity and colour.

By conducting above mentioned test on river Nandini we will get to know the various location across its journey, where the river Nandini gets polluted. And necessary measures can be implemented to avoid pollution of river Nandini and eventually river Godavari.

Such type of water quality assessment has not been conducted on river Nandini before. So , our research will help in emphasizing the knowledge of river nandini to the citizens and to aware citizens to avoid pollution of river Nandini and river Godavari.

**Key Words:** Nandini River, Godavari River, pH, Chemical Oxygen Demand, Conductivity, Alkalinity, Temperature, Colour, Dissolved Oxygen, Suspended solids, Dissolved Solids, Total Solids, Turbidity, Hardness.

### 1.INTRODUCTION

Water is an important natural resource and precious national assets. It forms the chief constituent of ecological system. Everyone knows that water is essential to `and personal usage. Big amount of water is often required for industrial and commercial uses such as fisheries, hydropower generation. In some parts of the country, large quantities of water for irrigation are necessary to support agriculture. Water sources may be mainly in the form of rivers, lakes, ground water etc. The availability and quality of water either surface or ground, is getting deteriorated due to some important factors like increasing human activities at the water bodies, sewage discharge, Agricultural effluents, industrialization, urbanization etc. Surface water pollution with chemical, physical and biological contaminants by anthropogenic activities is of great environmental attention all over the world. Rivers play an important role in carrying off municipal and industrial wastewater and run-off from agricultural land. Rivers are one of the most susceptible water bodies to pollutants. Rivers are the main water sources for domestic, industrial and agricultural irrigation purposes in a region. River water quality is one of important factors directly concerning with health of human and living beings. Therefore, it is important to have reliable information on characteristics of water quality for effective pollution control and water resource management. (Bhukya Ramakrishna,2017)

From time immemorial, the rivers are said to be the lifeline for living beings, as all types of developments, directly or indirectly relate to them. That is why all the oldest civilizations developed at the bank of rivers e.g. Indus Valley at Indus, Egypt at Nile, Babylon at Tigris, Mesopotamia between Euphratus and Tigris. Even the old cities were located at the bank of rivers considering river as lifeline. Being so close to human activities, rivers are sink of terrestrial and aquatic pollution. Water contamination weakens or destroys natural ecosystems that support human health, food production and biodiversity. Livelihoods such as agriculture, fishing and animal husbandry are affected by poor water quality. Biodiversity, especially of

fresh water ecosystems is under threat due to water pollution. The most polluting source for rivers is the city sewage and industrial waste discharge. Agricultural run-off, or the water from the fields that drains into rivers, is another major water pollutant as it contains fertilizers and pesticides.

In India, most of the major rivers are badly polluted resulting in non-compliance of the water quality standards specified for best designated uses of the specified river stretches. Almost 70 percent of the surface water resources and groundwater reserves are contaminated by inorganic, biological, toxic and organic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities. Due to draught conditions and limited releases from dams in the downstream river stretch during non-monsoon months, the minimum required flow in the river is not maintained at many places. The degraded water quality and inadequate quantity contribute to water scarcity and ecological stress.

Water is the most vital factor for the existence of all living organisms. Discharge of Industrial effluents, domestic waste and sewage without any treatment into the water bodies has resulted in deterioration of the quality of aquatic habitat. Indiscriminate discharge of industrial effluents is toxic to aquatic environment, creates water pollution, making water unfit for drinking, agriculture and for aquatic life (Sukumaran, 2002; Patil and Lohar, 2009). World Water Assessment Programme indicates that, in next 20 years the quality of water available to everyone is predicted to decrease by 30% (WWDR, 2003). Monitoring and assessment with the help of water quality analysis techniques provide basic information on the condition of our water bodies. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know information about different physico-chemical parameters before it is used for different purposes. In developing countries such as India the most of the rivers e.g. Godavari, Ganga etc. are the ends of effluents and sewage discharged from urban as well as industrial areas.

The objective of the present study will be, to evaluate the physico-chemical parameters of Nandini river of Nashik City

## 2. Literature review

There was no water quality assessment work done on Nandini River . But similar work was done on Godavari River.

1. S.E Pote et.al (2012) have studied assessment of surface water quality of Godavari river at Aurangabad .According to them Rivers are under increasing stress due to urbanization and other anthropogenic activities, leading to their over-exploitation and degradation. Godavari originates near Triambak in the Nasik district of Maharashtra, and flows through Madhya Pradesh, Karnataka, Orissa and Andhra Pradesh. Although its point of origin is just 80 km away from the Arabian Sea, it journeys 1465 km to fall into the Bay of Bengal. Like most other rivers, domestic pollution is the biggest polluter of the river Godavari, accounting for 82% of total pollution, whereas industrial pollution accounts for about 18%. The study covers 78 km of the river starting from the Kaigaon Toka to Shahagad. Six locations were selected for collection of water samples from the river and were analysed for water quality parameters in the environmental laboratory of Maharashtra Pollution Control Board (MPCB), Aurangabad. This data as well as the data from the Central Pollution Control Board were used to compute the National Sanitation, Foundation Water Quality Index (NSFWQI), which is generally applicable in USA and India. The results of the NSFWQI of Godavari River indicates its water quality as bad-medium over the stretch. Based on the results, the existing conservation measures have been reviewed and additional measures are suggested. The study concludes that major stress is industrial effluents and domestic pollution.
2. Jyotiprakash Girdharilal Nayak et. al (2016) had done the study which covers about 24 km of Godavari river starting from Gangapur dam to Dasak village. Fifteen locations were selected for collection of water samples from the river and water samples were analysed for water quality parameters. It was observed that untreated or partially treated sewage alongwith industrial wastewater is entering into the river at twelve prominent locations in the study stretch. This data was used to compute the value of National Sanitation Foundation Water Quality Index(NSFWQI), mostly applicable in USA and India. The results of NSFWQI of Godavari river indicates that its water quality as 'Good' (70-90) from Gangapur dam to Someshwar, 'Bad' (25-50) from Aanadwalli bridge to Samtanagar and 'Very bad' (0-25) at Agartakli STP downstream. Based upon the results, the existing conservation measures have been reviewed and additional measures are suggested. The study concludes that infiltration of sewage is the main precursor of Godavari river pollution and available sewage treatment facilities in the region are inadequate

3. Bhukya Ramakrishna(2017) et.al have carried out systematic study to assess the water quality of Godavari River at Basara. Water samples from seven sampling stations were collected and physical and chemical parameters were analyzed by the standard methods. In this study Water Quality was determined on the basis of twelve parameters like PH, Electrical Conductivity, Alkalinity, Hardness, TDS, TSS, TS, DO, BOD, COD, Fluorides, Nitrates. The pollution level over a period of time is increasing on the river water mainly due to industrial and other waste waters are directly discharge in the river. The aim of the study was to examine the water quality of the Godavari River and to evaluate the impact of such contaminated water.
4. Prof.P.M.Pathak et.al (2016) carried the study assess the impact of mass bathing on water quality of river Godavari River during Kumhmela 2015 at Nasik. The Godavari river water samples collected from three different selected sites at different times of the day. The physico-chemical and biological parameters were analyzed such as Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), pH, Chlorides, Conductivity, Turbidity, Hardness and Most Probable Number (MPN). Few parameters were within the permissible limit but it is also observed that water is not fit for drinking purpose. The parameters were compared with BIS standards (2012). The turbidity and MPN was also observed more than permissible limit.
5. Pande Lahanuet.al (2016) was found out the parameters like temperature, turbidity, chlorides, residual chlorides, chlorine demand, BOD, fluoride, total hardness, total alkalinity, ph, total dissolved solids at four location of Godavari river at nashik. the water quality of the samples is compared with standard values given by WHO to understand the use of water for drinking and irrigation purpose. River are currently degraded by both natural and artificial activities, which deteriorate the water quality, affecting the ecological balance, pushing them to brink of extinction in the process of unplanned development, giving rise to planning suitable conservation strategies. On this background to know the present status of sources and degree of pollution of Godavari river. The analysis was carried out in terms of physico-chemical parameters on seasonal basis. Nasik Municipal Corporation is suggested to device strategies to arrest further pollution of Godavari river and use of river water for drinking purpose after conventional treatment and disinfection. A systematic study has been carried out to assess the water quality at downstream of Godavari river at Nasik city. The pollution level over a period of time is increasing on the river water mainly due to sewage, industrial and agricultural purpose and huge amount of water is also utilized by Nashik city. Hence the present study is aimed to examine the water quality of Godavari River and to evaluate the impact of such contaminated waters.
6. Manjusha Bhoret.al (2013) have studied the physico-chemical properties of river Godavari at Ramkunda, Nashik. Water quality is assessed during months of June to October 2012, to ascertain the impact of human activities, particularly due to floating population. Temperature, pH, Chlorides, Total Suspended Solids (TSS), Total Dissolved Solid (TDS), Total Hardness (TH), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) was determined. The result of the study shows that, the river is polluted at Ramkunda Nashik; it is believed that continuous pollution of the water sources by various human activities may lead to some health problems to human. The analysis of the water quality parameters of River Godavari water from three (03) different stations in Nashik city shows that the pH, Chloride ion, Total Hardness, Calcium values are not well within the permissible limits. The TDS of Ramkund was well above the desirable limit and the average of alkalinity has exceeded the desirable limits which are due to improper drainage system of the different units. In conclusion from the analysis results of the present study it may be said that the River water of Ramkund is not fit for domestic and drinking purpose need treatments to minimize the Contamination especially the alkalinity. The values of correlation coefficients and their significance levels will help in selecting the proper treatments to minimize the contaminations of River water of Godavari at Ramkund.
7. Kolhe Bharati G. et.al (2014) In the present study physico-chemical parameters such as, Temperature pH, Electrical conductivity, Total dissolved solid, Suspended solids, Total hardness and Total alkalinity, Dissolved oxygen, Biological oxygen demand and Chemical oxygen demand of Godavari river water samples were analyzed. Samples were collected monthly from May 2009-April 2010 from study station Ramkund of Nashik City. An attempt has also been made to establish coefficient of correlation ( $r$ ) between above parameters to identify water quality. Monthly variations appeared to have influenced on water parameters. Statistical analysis shows that many of the parameters bear a good positive correlation and some bears a negative correlation. The physico-chemical parameters showed significant monthly variations. These temporal fluctuations were either by various physico-chemical parameters which were positively or negatively correlated to each other. In present investigation, water samples collected from Ramkund were below permissible limit as per WHO standards except pH in April and DO in August.

### 3.Methodology.

The present study includes field investigations, water sampling of identified polluted stretches on Nandini river and its detailed analysis .It would be carried in the seasons of pre-monsoon (March - June), Monsoon (July - October), Post monsoon (November

- February). The detailed analysis include physical and chemical characteristics of sample water. In order to achieve the objectives mentioned above following appropriate techniques was used. The data collection was done to cover the best possible data for every polluted stretch. Data generation is done by two techniques,

Primary data generation and Secondary data generation.

To assess the river water quality field visits, sample collection and focus group discussion were carried out at all locations. The sample collection, preservation and analysis of samples were done as per methods given in the manual of American Public Health Association (APHA, 2001) and IS each water sample were analyzed for below physico-chemical parameters. The parameters assessed

1. Total Dissolved Solids (TDS)
2. Total Suspended Solids (TSS)
3. Total Solids (TS)
4. pH
5. Dissolved Oxygen (DO)
6. Conductivity
7. Determination of Total hardness
8. Turbidity
9. Temperature
10. Chemical oxygen demand (COD)

Then it is divided as per the seasons considered viz. pre-monsoon (March - June), Monsoon (July - October), Post monsoon (November - February). The data include physico-chemical and biological parameters.

#### 4. Results.

**Table -1:** Observations Recorded During Carrying Out Assessment Of Nandini River.

Physical Parameter		P1	P2	P3	P4	P5	P6	P7	P8	P9
1	Temperature	14.8	14.6	19.4	19.2	20.2	32	26	12	9
2	Turbidity	3.4	30.1	11.3	8.8	8.0	0.1	3.1	0.2	4.1
3	pH	8.40	7.57	7.60	7.68	7.75	7.78	8.23	8.20	7.85
4	Total Dissolved Solid (TDS)	130	274	288	164	181	278	389	291	183
5	Total Suspended Solid (TSS)	59	189	203	171	217	109	135	196	153
6	Total Solids(TS)	189	463	491	335	398	387	524	487	336
7	Dissolve Oxygen(DO)	7	3	5.6	2	4	2.2	4.7	5.1	5.7
9	COD	128	192	288	64	32	192	224	288	160
10	Conductivity	0.2	0.8	0.5	0.4	0.5	0.6	0.4	0.4	0.5
11	Alkalinity	0.1   1.1	0   2.5	0   1.4	0   1.4	0   2	0   1.9	0   2.5	0   1.5	0   1.9
12	Hardness	0.157	0.345	0.172	0.180	0.336	0.220	0.272	0.292	0.344

## 5. CONCLUSIONS

Based on the various test results of present experimental study, the following conclusion will be made

- 1) Water of Nandini river is polluted.
- 2) 100% collection of wastewater from the Nasik Municipal area and Trimbakeshwar area should be achieved in order to avoid any wastewater directly entering into the river.
- 3) Wherever collection process is not feasible in short time, in situ nalla treatment should be adopted.
- 4) Prior to awarding permission for development of new residential areas in the outskirts of the city, there should be provision of sewerage network and STP of appropriate capacity and accordingly authorities should take prompt action for construction of new STP.
- 5) It is recommended to have soak pits for villages in close proximity of river in order to avoid direct discharge of sewage in to the river.
- 6) Presently, Satpur MIDC area does not have Common Effluent Treatment Facility to treat their effluent. Hence in order to treat effluent generated from Satpur MIDC area Common Effluent Treatment facility should be provided on top priority.
- 7) Reuse and recycle of treated wastewater for construction, gardening etc. Purposes should be implemented through formulation of new byelaws.
- 8) Activities such as soil excavation, washing of clothes and animals on the bank of river is seriously affecting the quality of river water, Hence such activities should be strictly prohibited upto 500 m. from high flood line.
- 9) It is recommended to implement River Regulation Zone policy strictly to restrict activities in the river bank.
- 10) Encroachments, depositions, construction or any kind of developmental activities on the bank of rivers should be banned.

From the present assessment study, It is concluded from the that if above recommendations are implemented within the administrative boundaries it will be helpful in maintaining river water quality of river Nandini.

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