

## **FACTORS AND IMPACTS OF WATER POLLUTION: ISSUES AND CONCERN OF GODAVARI RIVER**

**Mr. Ramesh Gavit**

*Assistant Professor, University of Mumbai*

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### **Abstract**

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*The Godavari River is a major waterway in central part of the India, its originated from Western Ghats Trimbakeshwar in the Nashik District Of Maharashtra and flowing eastward across the Deccan Plateau through the state of Maharashtra. It is known as dakshin ganga (Southern Ganges). In the last two decades urbanization takes place very rapidly in Nashik Municipal Corporation area. All the set of residential, agricultural and MIDC, source of water is Godavari River. Holistic Godavari River flows mid of town and gets polluted due to sewage, industrial and other wastewaters are directly discharge in the river. This paper is based on secondary data to examine causes and water quality of Godavari River at Nasik city area in three source point. Table, graph are used for Representation of data.*

**Keywords:** *Water pollution, anthropogenic, Godavari River, DO, BOD, COD.*



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### **Introduction:**

Water pollution is a major global problem. Water is typically referred to as polluted when it is impaired by anthropogenic contaminants. Natural phenomena such as volcanoes, algae blooms, storms, and earthquakes also cause major changes in water quality and the ecological status of water. The use of partially treated wastewater and water supplies, contaminated with sewage for irrigation has been implicated as one of the highest sources of pathogenic micro-organisms, in addition to heavy metals contaminating vegetables and other agricultural settlements may pose serious health hazards (Doyle, 1990; Assadian et al., 2005; Singh K.P. et al., 2004; Okafo et al., 2003; Rai and Tripathi 2007).

Water-borne diseases continue to pose a major threat to public health both in the developed and developing world (Ford, 1990). It has been estimated that 50,000 people die daily in the world as a result of water related disease (Chalekamp 1990).

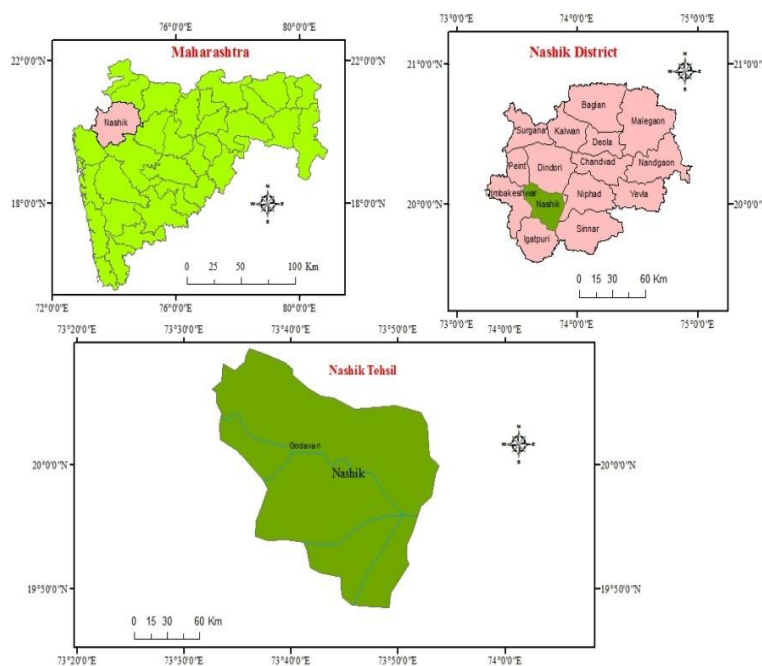
The enormous exploitation which is caused due to human interventions has led to the degradation of the water quality and quantity and increase in the content of pollutants (Jyotiprakash Nayak et, al. 2015). The main sources of Godavari river water pollution identified as sewage constitute 84-92% and industrial waste 8-16% (Dhirendra, 2009).

This paper is based on secondary data to examine factors and impacts water pollution of Godavari River in Nashik city. The Godavari is second longest river after the Ganga in India. It originated from Western Ghats Trimbakeshwar in the Nashik District Of Maharashtra and flowing eastward across the Deccan Plateau through the state of Maharashtra. It is known as *dakshin ganga* (Southern Ganges). In the last two decades urbanization takes place very rapidly in Nashik Municipal Corporation area. All the set of residential, agricultural and MIDC, source of water is Godavari River. Nashik Municipal Corporation was formed on 7<sup>th</sup> November 1982. NMC serves an area approximately 259 sq. km. including the city and its peripheral areas and provides civic services to 1,561,809 citizens (Census 2011). Most of cases sewage is partly or fully treated or untreated which is directly discharged into the streams and rivers.

### Study area:

Nashik is a Religious and industrial town situated at Latitude - 19° 33' N to 20° 53' N, and Longitude - 73° 16' E to 75° 6' E in north-west region of Maharashtra, at a height of 565 meters above mean sea level. The Godavari River flows through the city and has a length of 18 km. in the area of Nashik Municipal Corporation.

### Location Map



### Objectives:

The objectives of the study are as follows:

1. To study factors/causes and impacts of water pollution.

2. To examine water quality

### **Methodology:**

The study would require variety of data, which cover the various aspect of water pollution; the data were collected from the following sources:

1. For the investigation secondary data is used.
2. Three sampling stations were selected in order to get representative samples of Godavari River.
3. Six parameter are use to determine water quality.
4. Table and figure are used for representation of data
5. GIS 10.2.2 software for location map making and Microsoft-excel is used to data analysis.

### **Definition of water pollution:**

Water pollution refers to the contamination of water bodies such as rivers, oceans, lakes, and groundwater caused by human activities. As per Water Act 1974, water pollution means such alteration of the physical, chemical or biological properties of water or discharge of any sewage or industrial waste or any other liquid, gaseous or solid substances into water which may or is likely to create a nuisance or render such water harmful or injurious to public health or safety or to domestic, commercial, industrial, agricultural or other legitimate uses or to the life and health of animals or plants or of aquatic organisms.

### **Causes of water pollution:**

There are various causes of water pollution of river. These causes can be divided broadly in two divisions, namely: a) Natural causes and b) Man-made causes.

#### **a) Natural causes:**

The biodegraded portions of plants and animals mix with water and pollute it. Erosion of river banks caused siltation and this silt sometimes hamper aquatic lives. Many kinds of natural salts and other substances mix with rain water and finally fall in the rivers and ponds.

#### **b) Man-made causes:**

The major portion of water pollution of Godavari river occurred by man-made causes. Industrious wastes, agricultural wastes, domestic wastes, excess use of fertilizer, pesticides etc. are notable man made pollutants. Water is seriously polluted by these pollutants. Water, polluted by such types of pollutants, is very harmful for both human and aquatic lives.

**Table: 1. Designated Best Use Classification of Surface water**

Sr. No	Designated best use Quality	Class	Primary Water Quality Criteria
1.	Drinking water source without conventional treatment but with chlorination	A	Total coliform organisms (MPN*/100 ml) shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6 mg/l or more, and Biochemical Oxygen Demand 2 mg/l or less
2.	Outdoor bathing (organized)	B	Total coliform organisms(MPN/100 ml) shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5 mg/l or more, and Biochemical Oxygen Demand 3 mg/l or less
3.	Drinking water source with conventional treatment	C	Total coliform organisms(MPN/100 ml) shall be 5000 or less pH between 6 and 9 Dissolved Oxygen 4 mg/l or more, and Biochemical Oxygen Demand 3 mg/l or less
4.	Propagation of wildlife and fisheries	D	pH between 6.5 and 8.5 Dissolved Oxygen 4 mg/l or more, and Free ammonia (as N) 1.2 mg/l or less
5.	Irrigation, industrial cooling, and controlled disposal	E	pH between 6.0 and 8.5 Electrical conductivity less than 2250 micro mhos/cm, Sodium Absorption Ratio less than 26, and Boron less than 2 mg/l.

(Source: CPCB, 1978)

**Table: 2. Source of water Sample at Gangapur dam (S1)**

Months	Parameters					
	pH	Dissolved Oxygen (mg/l)	B.O.D. (mg/l)	C.O.D. (mg/l)	Nitrate(mg/l)	Fecal Coliform (MPN/100ml)
Jan	8.06	7	3	16	1.654	21
Feb	7.84	6.9	3	16	1.073	21
Mar	7.61	6.9	3	12	2.49	22
Apr	7.81	6.8	3	12	0.593	30
May	7.48	6.9	3	16	0.704	34
Jun	7.69	6.2	2	16	0.418	33
Jul	7.78	6.6	2.4	18	0.0759	11
Aug	7.29	7	2.4	20	1.08	22
Sep	8.11	6.6	2.4	20	0.87	22
Oct	8.08	5.7	2.8	24	0.49	22
Nov	7.38	7.1	2.2	20	0.72	22
Dec	7.8	5.9	2	20	0.51	40

(Source: MPCB, 2013)

**Table: 3. Source of water sample at Ramkund (S2)**

Months	Parameters					
	pH	Dissolved Oxygen (mg/l)	B.O.D. (mg/l)	C.O.D. (mg/l)	Nitrate(mg/l)	Fecal Coliform (MPN/100ml)
Jan	7.86	6.7	6	24	2.763	70
Feb	7.65	4.8	6	28	--	110
Mar	7.37	6.7	4	16	4.61	110
Apr	7.22	5.2	6	28	0.466	90
May	7.59	6.9	4	28	4.54	90
Jun	7.39	6.1	4.2	36	0.512	110
Jul	8.04	6	3	32	0.1139	110
Aug	7.74	6.9	2.6	36	1.93	110
Sep	7.66	5	3.8	36	2.11	110
Oct	7.73	4.5	3.4	32	0.94	110
Nov	7.59	6.8	2.2	28	1.57	90
Dec	7.82	5.7	2.2	32	1	110

(Source: MPCB, 2013)

**Table: 4. Source of water sample at Amardham (S3)**

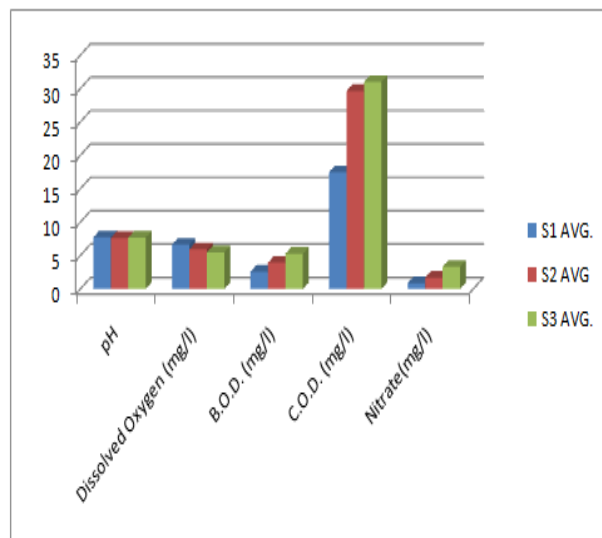
Months	Parameters					
	pH	Dissolved Oxygen (mg/l)	B.O.D. (mg/l)	C.O.D. (mg/l)	Nitrate (mg/l)	Fecal Coli form (MPN/100ml)
Jan	7.64	6.4	8	32	2.35	21
Feb	7.6	4.2	8	32	--	21
Mar	7.63	6	5	20	7.97	34
Apr	7.64	4.8	8	32	14.34	26
May	7.71	5.9	6	32	4.656	27
Jun	7.41	6.3	5.4	40	3.181	26
Jul	8.13	5.2	6	36	0.1343	22
Aug	7.99	6.5	3.2	32	0.97	140
Sep	7.59	4.4	5.5	40	2.29	140
Oct	7.86	4.5	3.2	36	1.8	110
Nov	7.39	6.6	2.4	16	1.57	110
Dec	7.84	5.2	2.8	24	0.8	170

(Source: MPCB, 2013)

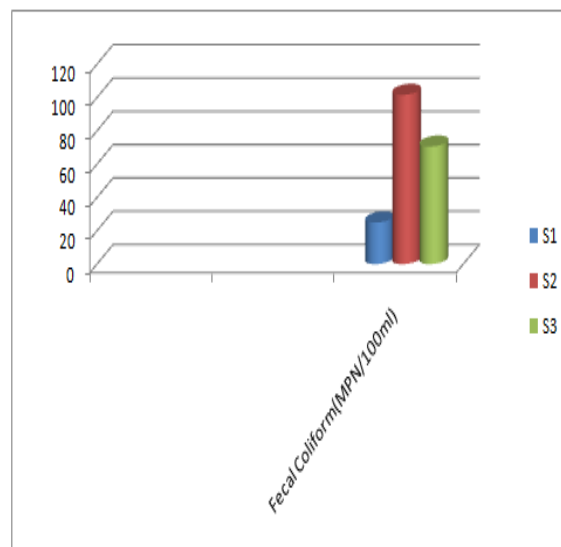
**Table : 5. Min.Max. and Average of S1,S2,S3.**

Source of data →	S1			S2			S3		
Parameters ↓	Min.	Max.	AVG.	Min.	Max.	AVG	Min.	Max.	AVG
pH	7.29	8.11	7.74	7.22	8.04	7.64	7.39	8.13	7.7
D. O. (mg/l)	5.7	7.1	6.63	4.5	6.9	5.94	4.2	6.6	5.5
B.O.D. (mg/l)	2	3	2.6	2.2	6	3.95	2.4	8	5.29
C.O.D. (mg/l)	12	24	17.5	16	36	29.67	16	40	31
Nitrate(mg/l)	0.07 6	2.49	0.89	0.113 9	4.61	1.71	0.1343	14.34	3.34
Fecal Coliform (MPN/100ml)	11	40	25	70	110	101.67	21	170	70.58

Source: Compile by researcher



F.C



**Fig.1. Average of all parameters**

## **Results and Discussion:**

Best water uses of water classification given in table no. 1 and collection of data with 6 parameter of three stations (S1,S2,S3) is given in table no. 2, table no. 3, table no. 4, respectively. Table no. 5 represents min., max and average of six parameters, fig.1 shows graph of average of six parameters. In the present study at various sampling sites S1, S2, S3, the pH value observed between 7.22 to 8.13, it is increase slightly in month of January, September and October.

The concentration of dissolved oxygen in the Godavari river water ranged from 5.5 to 6.9 mg/l. it decline at S2 and S3. The depletion of DO values indicates that the Godavari river was polluted. The low DO values were observed in the Godavari River in MERI report, (2001). Higher values of BOD and lower values of DO indicate more amount of organic matter present in sewage (Wagh Vaishali, 2005). The same was observed in the present research work. The concentration of BOD in the Godavari river water ranged from 2.6 to 5.29 mg/l at various sampling sites. The concentration of COD of the Godavari river water ranged from 17.5 -31 mg/l at various sampling sites. The high value of COD is due to mixing of domestic and industrial effluent in the river water. The concentration of nitrate in the Godavari river water ranged from 0.89 -3.34 mg/lit at sampling sites. It is more observed at Ramkund (S2), and Amardham (S3).

### **Impacts of Water Pollution:**

#### **i) Impacts of Shortage of DO:**

A large amount of urea is used for cultivation. Only 40% of dissolved urea is absorbed by plants. Remaining is mixed with water. If caused quick growth of unexpected plants. For biodegrading of these plants oxygen is taken from water. As a result amount of dissolved oxygen (DO) is depleted.

#### **ii) Impacts of pH:**

There is no normal pH that applies to all fishes. Fish are originated in ponds, rivers, lakes, oceans that have different pH levels. But sudden change of pH can be harmful or even fatal to fishes. In the dry season The DO level becomes very low and the river becomes very toxic.

#### **Impacts of trace elements/ions:**

Arsenic, lead, mercury, cadmium, chromium, nitrates etc. are mix with water directly may be produced from the pollutants. However exceeding limit of this trace elements or ions caused various harm for human and other living beings

iii) Impacts of germs/micro-organisms:

The people who are living by the river which is polluted by various germs and micro-organisms are severely suffering from various diseases like cholera, diarrhoea etc.

iv) Impacts of silts:

Silt may cover the leaves of aquatic plants and increase the turbidity of water, as a result, sunlight cannot reach to the leaves of the plants and photosynthesis reaction is hampered. So, plants cannot produce oxygen and food for them. Consequently, ecosystem is hampered.

**Conclusion:**

The quality of the Godavari River is contaminated. The domestic wastewater of the city was a major factor that is responsible for the contamination of the Godavari river and can be recognized by the key parameters like DO, BOD, COD. At sampling stations no S2, S3, the water quality is decline low DO and high BOD was observed. The water Quality of Godavari River is not fit with water quality criteria of CPCB (1978). So it is very important to reduce the addition of untreated waste in River to improve it water quality.

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