

POSITIONAL & PERIODIC VARIATION OF SOME PHYSICAL POLLUTION PARAMETERS OF GOMATI RIVER

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Gomati River has unique geographical signification due to its special situation bisecting the Jaunpur city into two almost equal halves. The river fulfills the water need of residents of the city on both sides. For the various uses and application of water its physico-chemical character plays an important role. The pH, total dissolved solid (T.D.S.), DO, BOD and COD are the major parameters of water to assess its quality.

In the present paper the estimation of above mentioned parameters has been done positionely and perodically. It has been found that the values from Chhatari to Ramghat is from entry to the exit side of the river vary in such a way that the situation changes from bad to worse, inspite of self-purification phenomenon rendered by the ecological factors of the river.

INTRODUCTION

Next to air, water is the important constituent of life support system and it is an important natural resource. Water is essential to all forms of life. A man on an average consumes about 2 litres of water every day and more than 70% of body weight is made up of water. Most of our water bodies as ponds, lakes, stream river, sea, oceans have become polluted due to industrial growth urbanization and over pollution. Many river of the world receive heavy flux of sewage, domestic wastes, industrial effluents, agricultural wastes etc. which contains substances varying from simple nutrients to highly toxic chemicals (heavy metals etc.). Fourteen major river viz.- Godawari, Ganga, Gomati, Cavery, Narmada, Damodar, Yamuna etc. in our country are facing pollution problem. A number of water born diseases are caused due to polluted water which results death in a large scale.

Water Pollutants –

The eight types of water pollutants are –

- Oxygen- demanding wastes, Disease causing agent, Synthetic organic compounds, Plant nutrients, Inorganic chemical and mineral substances, Suspended solids, Radioactive wastes and Thermal discharges

Oxygen-Demanding–Wastes include domestic sewage, industrial discharges and biodegradable organic compounds. These wastes are decomposed by the bacterial population, which in turn deplete the O₂ from the water are harmful to aquatic life.

Disease causing agents are various pathogenic micro-organism which enter in the bodies through sewage or other wastes *e.g.* viruses, bacteria etc.

Synthetic organic compounds are the chemical substances manufactured for various purposes *e.g.* Pesticides, synthetic detergents etc. These chemicals enter into hydrosphere either during transport and uses or by accidental or intentionally disposal from manufacturing units and are potentially toxic to plants, animals and humans.

Plant nutrients mainly nitrogen and phosphorous that are drained from agricultural lands or from other source which promote the algal growth and degrade the water value.

Inorganic chemicals and mineral substances include various metals and metallic compounds released from human activities.

Suspended solids consists of mainly of sand, silt and minerals eroded from land. A part from filling up the reservoirs and harbours the suspended solids in water bodies may block the sunlight required for photosynthesis by the bottom vegetation.

The eight most common heavy metal pollutants listed by the Environmental Protection Agency (EPA) are :

As, Cd, Cr, Hg, Ni, Pb and Zn.

Drinking being one of the rate of intake of heavy metals into the human body; it has drawn special attention of health managers. In natural water bodies, there are several sources of input of heavy metals and non-heavy metals and other chemicals which in very small quantities are required for good growth of plants and animals.

There has been a sharp increase of heavy metals in the environment since last century (Worlden and Soften 1974, Peter 1974, Kureishy *et. al.* 1979, Abhik & Sushmita 1990). Metal concentrations have probably been raised globally as a result of human activities (Polprasert 1982; Imboden and Stumm 1973; Habib and Minski, 1982). Nearly from 80,000 to 250,000 tonnes/year of copper reaches into the world environment as a result of natural weathering (Demayo *et. al.* 1983) which estimated nearly 40-60% of the total copper entering into the environment as a non anthropogenic source. Which zinc accounting for 7,20,000 tonnes/years (Taylor *et.al.* 1982). Anthropogenic emission to the atmosphere from antinock agents present in internal combustion engine fuel can contribute 3,33,000 tonnes/year.

METHODS & MATERIALS

All the methods employed for the estimation of pH, TDS, DO, BOD and COD are according to the techniques adopted by the research group of the authors (1-3).

Table : Physico-chemical parameters of Gomati River Positionally and Periodically

Parameters	1996-1997			2001-2002		
	$S_1 (a)$	$S_4 (b)$	Pollution Gradients $\left(\frac{a-b}{d^2}\right)$	$S_1 (a)$	$S_4 (b)$	Pollution Gradients $\left(\frac{a-b}{d^2}\right)$
pH	7.75	8.05	-0.075	7.56	7.81	-0.063
TDS	225.55	220.2	1.34	236.83	231.21	1.405
DO	5.6	5.0	0.15	5.43	4.85	0.145
BOD	10.5	22.225	-2.931	11.03	23.336	-3.077
COD	146.700	180.133	-8.36	151.101	185.536	-8.608

$d^* = 4\text{km}$

RESULTS & DISCUSSION

The analysis of data regarding the positional variation of water acidity it is evident that on passing from site S_1 to S_4 the pH value increases. It indicates that inspite of biopollutants expected from sewer drainage and domestic effluents acidity should increase contrary to the observation. This may be due to inflow of some alkaline materials in the river. It may also be due to the presence of some alkaline soluble rocks at the bottom of the river. The same trend has been observed in the beginning of the current century. The ascending gradient of pH will be a bit higher during 1996-1997 than in one 2001-2002. The total dissolved solids decrease as river passes from site S_1 to S_4 . The rate of increase of TDS positionally has a slight increasing trend. The concentration of dissolved oxygen in Gomati river decreases as it flows from west to east. This is undoubtedly due to input of decomposable materials, through drains and domestic urban effluents. The variation in DO is almost time independent.

The biological oxygen demand rapidly increases as Gomati river flows from site S_1 to S_4 . A large increase in BOD in crossing the river city area is due to huge input of organic matters through funeral centres. Slight enhancement of BOD with the lapse of time indicates that the river is regularly loaded with organic pollutants.

The last pollution parameter under study called the chemical oxygen demand appreciably increases as river passes from site S_1 to S_4 . The COD pollution gradient is about 3.5 times greater than the same value of BOD. It reflects that a large amount of oxidisable inorganic pollutants are poured into the river between S_1 to S_4 sites. The variation of COD from site S_1 to S_4 in the start of the new millennium is almost the same as in 1996-1997. The overall scanning of all the results lead to an important conclusion that the positional variation in physico-chemical parameters of the Gomati river has a remarkable dominance upon the periodic factor. The values of physico-chemical parameters and their variations are in accordance with the previous workers (4-14).

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