

IMPACT OF AGRICULTURE ON THE WATER QUALITY OF RIVER WAINGANGA OF BHANDARA REGION.

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Received September 9, 2009; accepted after revision December 10, 2009.

ABSTRACT:

Along with the other sources of organic and inorganic pollution, the non-monsoon river basin agriculture in Wainganga river is deteriorating the precious water source. The direct mixing of decaying biological manures is polluting the water to a great extent. During the study period of two years, the weekly sampling of physico-chemical parameters showed significant depletion of oxygen levels beyond the permissible limits. Dissolved oxygen and carbon dioxide ranged between 5.23 mg/l to 3.45 mg/l and 8.38 mg/l to 22.9 mg/l respectively. Temperature of water ranged between 31.9 mg/l to 34.5 mg/l whereas conductivity and BOD ranged from 397 μ mho/cm to 567 μ mho/cm and 21.1 mg/l to 63.1 mg/l respectively. The paper discusses some aspects of agricultural waste and its impact on river ecology.

Key words: River basin pollution by agriculture activities

INTRODUCTION

Water has many uses and since everybody uses it, a study of water from different aspects becomes important. Although the percentage of utilization of water resources for purposes other than irrigation is low at present, this is expected to rise appreciably in the future with increasing industrialization and power generation. The conservation and efficient utilization of available water resources need maximum emphasis. Since, the volume of wastes and wastewaters have increased considerably, there is a need to give serious consideration while making decisions, (Rogers, 1991). Nature plays major role to lower the water pollution but the process is very slow (Pande and Sharma, 1999). The potential of pollution contributed by runoff waters originating from rural communities, cattle farming and agricultural drainage should not be underestimated. The non-monsoon agricultural practices inside the river basin in Wainganga river is the concern of serious threat, as the direct mixing of fertilizers and manures from the crop fields pollutes the water.

In the present situation the plantation of crop fields of water melon, muskmelon and other vegetables in the middle of river basin, is deteriorating the river water continuously during the summer season. However, comparatively less flow of river during the post winter and summer seasons, fails to stabilize the pollutants, as the quantity of pollutants becomes more.

MATERIAL AND METHODS:

The river water is continuously polluted with the decaying cow dung used to manure the watermelon and muskmelon plantation in side the river basin. The organic matter is continuously flows in the main stream of river water. The farmers convey the small streams through their basin farms, which runs through farm and carry the organic matter in the main stream, however, input of domestic sewage also contributes the nutrients in the river. Though the activities are limited at any one specific spot, the pollution caused does not remain confined to the spot, but contaminates whole stretch of river. In view of prepared agricultural farms in side the river basin, four stations are selected. Station S1 is located far away from the localities of the town and considered to be pollution free, while station S2, S3 and S4 receives the organic manure in river water. The analysis of all parameters were performed using the standard methods given by NEERI (1986).

RESULTS AND DISCUSSION:

Naturally the temp of river water changes with seasonal change in atmospheric temperature, however it increases from up stream station S1 to down stream station S4, with load of increasing organic matter, Mahadevan and Krishnaswamy (1983) have quoted the range of temperature 27°C to 34.5°C for polluted stations. The decaying cow dung manures from agricultural farms located in the river basin mixes the

plenty of organic matter in the main stream of river. The intensive microbial activities during summer and their enhanced rate of decomposition processes increase the temperature at down stream stations S2, S3 and S4.

Less flow of river during summer offers more concentration to the suspended particles in the water. In association with the pollutants from basin farms, the other secondary sources increase the suspended particulate matter in the river water and intern turbidity. It is evident from present study that values of TDS gradually increases from the month of February to May, with decrease of water flow in river. Carbonates and bicarbonates of sodium, calcium, potassium and chlorides from organic pollutants enhance the values of dissolved solids in water, Narayan and Chauhan (2000) have recorded similar findings.

Increased enzymatic activities of micro fauna during hot days and increased rate of biodegradation activities essentially enhance the chlorides in the river water. Viet and Bhargava (1989) have recorded parallel findings in Saigon river. Lowered rate of photosynthetic activities of aquatic fauna in turbid water, reduces the assimilation of CO₂ in river water may be the cause of increased concentration in the water, (Hymavathi *et al.* (1999). However the lowered rate of bicarbonate assimilation by plants in water may be responsible to deflect the alkalinity and hydrogen ion concentration values in river water. The extent of turbidity in water may

derive the values of Carbon dioxide, pH and Alkalinity in river water.

From the present investigation it is concluded that dissolved oxygen varies in the seasons. Minimum concentration of dissolved oxygen occurs during summer. It is attributed to increase temperature of river water which increases the rate of microbial activities and their oxygen consumption, (Thomas *et al.*, 2001). The rich supply of organic matter is conveyed in the main stream of river water, however it increases the requirement of oxygen for stabilizing the biodegradable organic matter in the river. In addition to it the less flow of water again offers the more concentration to the organic pollutants and increases the BOD values.

The depletion of O₂ is occurred at the down stream station below the permissible limits (4.0 mg/l), during the summer days, with increase in temperature of river water. During the present two year study period of river water, it is concluded that the river basin agriculture practices deteriorates the quality of river water during summer season. Increased values of temperature, biochemical oxygen demand and carbon dioxide may causes the depletion of oxygen in river water below 4.0 mg/l. increased agricultural practices in the river basin all over the study area harms the river ecosystem and intern affects the riverine fisheries. Mostly it even deteriorates the potable water quality of Wainganga..

Table -1
Physico-chemical status of Wainganga river water,
during the year 2000

Parameters	Parameters	Stations			
		S1	S2	S3	S4
Temperature	Temperature	31.9± 1.2	32.7± 1.5	33.1± 2.5	33.5± 1.3
Conductivity	Conductivity	415±2 1	590±0 4	614±1 4	667±1 0
Turbidity	Turbidity	13.7± 2.6	17.5± 3.1	23.3± 3.0	28.0± 3.1
TDS	TDS	291±2 0	297±0 8	508±0 6	553±0 8
Chlorides	Chlorides	31.4± 1.7	35.5± 1.9	36.3± 2.1	45.9± 1.5
CO ₂	CO ₂	9.14± 0.9	14.4± 0.9	16.2± 1.4	22.9± 0.6
pH	pH	7.44± 0.14	7.49± 0.17	7.60± 0.15	7.79± 0.26
Alkalinity	Alkalinity	40.46 ±2.7	43.95 ±1.5	46.39 ±1.6	52.66 ±3.3
DO	DO	5.23± 0.34	4.90± 0.54	3.95± 0.61	3.63± 0.48
BOD	BOD	21.0± 0.66	45.4± 3.1	52.4± 4.2	59.4± 2.8