

# BACTERIOLOGICAL ASSESSMENT OF RIVER GANGA, YAMUNA AND TONS AT ALLAHABAD

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## ABSTRACT

*The present study comprises the part of a thesis work done during the period 1985-1988. Seasonal variations in bacterial population of three rivers- Ganga, Yamuna and Tons waters have been studied round the year at the Allahabad with reference to urban and industrial effluents, before and after it joins them. Total bacterial population denoted a definite seasonal pattern unlike total coli forms except non polluted zone and polluted zone of Ganga. Rainy season recorded maximum population during the course of present study. The population of three bacteria was comparatively higher in civic sewage than that of the industrial effluents. Thus, river water at Allahabad is not fit for either drinking or bathing.*

**Key words :** Bacterial population, River water, sewage.

## INTRODUCTION

The bacterial and/or biological monitoring of an aquatic environment for exceeds the physicochemical monitoring (Bilgrami, 1988). Since bacteria play a significant role as decomposers in the ecosystem they are decisive in determining the water quality (singh, 1989). Microbiological study of the Indian rivers is scanty (Sharma 1981, Bilgrami and Dutta Munshi 1985, Venkateshwarlu 1986). The estimation of organisms in water will facilitate the evaluation of water quality from the limnological and sanitary standpoint (Selvanayagan and Vijaya 1987). Present study attempts to explore the existing population of total bacteria and total coliform bacteria in civic sewage and industrial effluents, before and after it joins the rivers Ganga, Yamuna and Tons with reference to its seasonal variation.

## MATERIAL AND METHODS

Bacterial analysis of river water of Ganga, Yamuna and Tons is based on the samples collected from thirteen different stations during different seasons. On the basis of the discharges and its points of confluence with the river, four zones were categorized for the present study as summarized following **(figure- 1; sites of reverine ecosystem at Allahabad)**

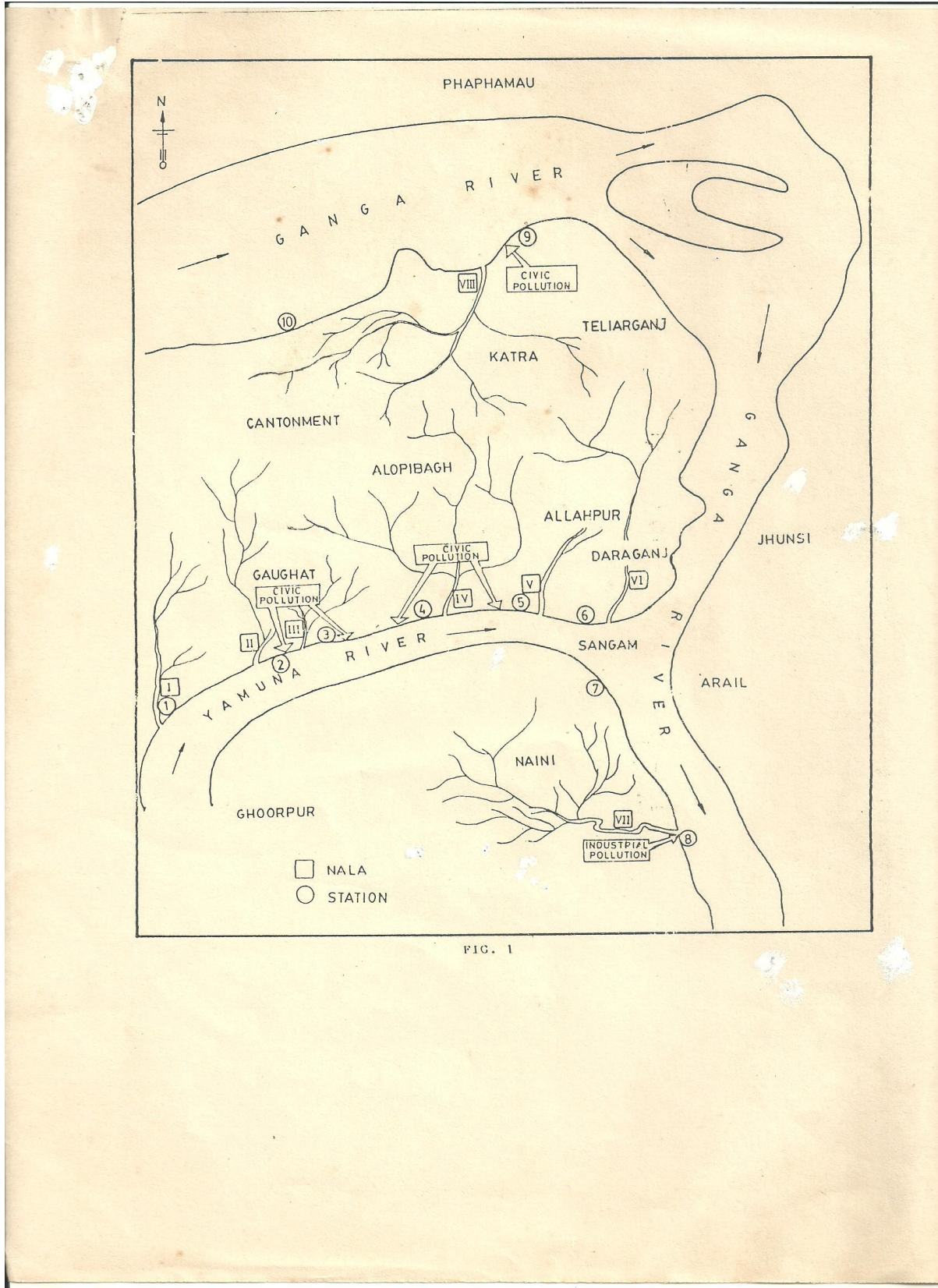
## LEGENDS TO FIGURE 1

Map showing the details of sampling stations (1-10) and sources of civic as well as industrial wastes (I-VIII): of Allahabad reverine ecosystem-

1. Karelabagh
2. Kakarahaghat

3. Baluaghat
4. Gaughat
5. Siwala
6. Kilaghat

7. Sangam
8. Maniya
9. Rasoolabad
10. Upstream : Rasoolabad.



**Zone-1-** Non-polluted i.e. free from discharge from any activity (Ganga: Kara, Sringvarepure, Ssirsa; Yamuna: Sujaowan and Tons: Kataka)

**Zone-2-** Polluted i.e. mixed effluent zones carrying a mixture of industrial wastes and sewage (Ganga: Rasoolabad and Yamuna: Karelabagh, Kakaraha, Baluaghat, Gaughat, Siwala and Kilaghat).

**Zone-3-** Civic sewage i.e. effluent containing only civic sewage (Ganga: Rasoolabad, Yamuna,

Karelabagh, Kakaraha Baluaghat, Gaughat, Siwala and kilaghat).

**Zone-4-** Industrial effluents i.e. the effluents contains only industrial discharges located at Maniya (Ganga).

The total bacteria and total coliforms in the wastes of above mentioned zones were estimated through standard plate count and MPN test as recommended by sirockin and Cullimore (1969), cruckshank et al (1975) and anonymous (1985).

**Table-1**

Population ( $1 \times 10^3/L$ ) of Total Bacterial and coliform Bacteria in Ganga, Yamuna and Tones Waters at four centres (non-polluted, polluted, civic and industrial sewage) during different seasons.

Study Zone	Total Bacteria			Total Coliform Bacteria		
	Summer	winter	Rainy	Summer	winter	Rainy
Non-Polluted Ganga	361.3	105.7	507.1	125.9	8.8	191.5
Yamuna	207.5	93.8	575.4	119.5	31.9	198.0
Tons	68.1	67.9	252.1	13.2	7.0	14.2
Polluted Ganga	834.3	361.8	1377.5	198.3	65.0	243.1
Yamuna	669.2	575.2	1085.2	296.5	208.0	168.9
Sewage: Civic	1408.3	1022.1	1745.5	393.1	430.7	541.9
Industrial	458.1	386.8	1283.6	408.1	50.7	240.0

## RESULTS AND DISCUSSION

The main emphasis in the present work has been given to the total bacterial and coliform qualities of three important rivers and impact of the urban and industrial effluents on them. The average population of these bacteria recorded at different zone of Ganga, Yamuna and Tons water has been presented in (Table-1) with reference to its seasonal variation. The population of total bacteria showed a definite seasonal trend viz winter<summer<rainy throughout

the course of investigation. The total coliform bacteria recorded similar pattern but in case of nonpolluted and polluted zones of the river Ganga while polluted zones of Yamuna River indicated its maximum and minimum population during the summer and rainy season respectively. The seasonal fluctuations in the population of total bacteria and various water bodies have been reported by Collins (1960, 1970). Chen (1968), Jones (1971), Tiwari and Mishra (1982) and Bilgrami and Datta Munshi (1985) with the highest number in rainy seasons. The

present findings are, however, in great conformity with these studies.

It is essential to mention that the civic sewage, overall, indicated the highest bacterial population in every seasons studied. Comparing its total bacterial population with industrial effluents, a significant, difference was marked correspondingly being about 3.07,2.64 and 1.36 fold decrease during summer, winter and rainy seasons respectively. In addition, the population of total coliforms also varied being equal in summer but about 8.5 and 2.3 fold decrease during winter and rainy seasons respectively. Since the Civic sewage has more capacity to host these bacteria, its discharges are potentially dangerous to human health. The study clearly reflects that the river waters are not suitable for either drinking or bathing.

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