ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 2, Issue 1 , January 2015

Water Quality of River Ganga – Pre and Post GAP: A Review

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ABSTRACT : Ganga is considered sacred by people for providing life-sustainance to environment and ecology. But, Ganga, which is the national river of India, now is depleted in flow and polluted due to discharge of untreated municipal and industrial wastes, dams and barrages, floral offerings, cremation of dead bodies on its bank. The Ganga Action Plan has served as a remedy to deterioration of River Ganga. The present review highlights that, despite the problems of operation and maintenance, the river water quality shows discernible improvement (in terms of DO and BOD) over the pre-GAP period. The success of GAP has been in preventing further deterioration of water quality, generally maintaining it and improving it in some places, even though the pollution load draining into the river has substantially increased due to population growth, rapid industrialization and urbanization.

KEY WORDS: Ganga Action Plan, BOD, DO, Pollution

I. INTRODUCTION

Ganga is India's largest river that covers 26 per cent of the country's landmass and supports 43 per cent of its population, according to Subhajyoti Das, 2011 [1]. It has a course of about 2525 km length, winding through the states of Uttarakhand, Uttar Pradesh, Bihar, West Bengal, and draining parts of Himachal Pradesh, Haryana, Punjab, Rajasthan and Madhya Pradesh before debouching in to the Bay of Bengal. According to reports of Union Ministry of Water Resources, the average annual flow of the river is 5,25,023 MCM, while the live storage capacity of barrages, completed, and under construction totals 63736.84 MCM only, and additional storages of 30617.05 MCM are under consideration, leaving a huge balance in the river flow (Source: Water and Related Statistics, Central Water Commission, 2004). The self purifying capacity of the Ganga is derived from its unusually high ability to retain dissolved oxygen (DO) inherited from this environment. Lack of adequate 'dissolved oxygen' leads to septic condition and rise in biochemical oxygen demand (BOD) in the river.

II. LITERATURE SURVEY

According to a World Bank Sponsored Study (State of Environment Report- U.P.) (In: Mallikarjun, 2003), pollution levels in the Ganga are contributing 9-12% of total disease burden in Uttar Pradesh (U.P.). The coliform bacteria levels are in excess of 2 lakh MPN as against the national water quality standard of 5000, as reported by Mallikarjun, 2003 [2]. The report estimated total health damage on account of water pollution in up to is around 6.4 million daily. The Ganga Action Plan (GAP) primarily addressed itself to the interception and diversion for treatment of the targeted municipal sewage of 873 mld. GAP I was declared complete on 31.03.2000 with an expenditure of Rs. 452 crore. According to a report by Rai, 2013 [3], GAP I addressed only a part of the pollution load of Ganga, hence GAP II was launched in stages between 1993 and 1996, 59 towns along the main stem of river Ganga in five States of Uttarakhand, U.P., Jharkhand, Bihar and West Bengal are covered under the Plan and included the following tributaries of the Ganges, Yamuna, Gomti, Damodar and Mahananda. According to report of Water Resources Planning Commission (May, 2009) [4], the programme GAP and NRCP has been positive.

III. POLLUTION STATUS : RIVER GANGA

According to Markandya and Murty (2004) [5], 1.3 billion liters of sewage, 260 million liters of industrial waste, runoff from 6 million tonnes of fertilizers and 9000 tonnes of pesticides used in agriculture, and large quantities of solid wastes, are daily released into the river . The total annual volume of untreated household, and industrial effluents in the Ganga river basin amounts to 328.9 million kiloliters as given in the Report by MoEF, 1999 [6]. The major water polluting industries include chemicals, textiles, pharmaceuticals, cement, electrical and electronic equipment, glass and

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 2, Issue 1 , January 2015

ceramics, pulp and paper board, leather tanning, food processing, and petroleum refining. Reportedly, the discharge of sewage into the Ganga is responsible for 75% of its pollution with nearly 3000 mld (million litres per day) of sewage generated in the towns along the Ganga. This quantity is too large for self-purification by the Ganga. Nearly 50% of waste waters are discharged untreated. According to a World Bank Sponsored Study (State of Environment Report-U.P.), pollution levels in the Ganga are contributing 9-12% of total disease burden in Uttar Pradesh . The Coliform bacteria levels are in excess of 2 lakh MPN as against the national water quality standard of 5000 as evidenced by Mallikarjun, 2003 [2]. The report estimated total health damage on account of water pollution in UP to be around 6.4 million DALYS (Disability Adjusted Life Year).

IV. GANGA ACTION PLAN

The Ganga Action Plan Phase I (GAP I) was started in 1985 to improve the water quality of river Ganga to acceptable standards by preventing the pollution load reaching the river. The main focus of the Plan was on interception, diversion and treatment of municipal sewage draining into the river, which accounted for about 75% of river pollution. The Ganga Action Plan (GAP-I) had selected 25 towns located along the river in Uttar Pradesh, Bihar and West Bengal. In August 2009, the Union government re-launched the Ganga Action Plan with a reconstituted National Ganga River Basin Authority (NGRBA). Under the notification, dated February 20, 2009, the government gave the river the status of a National River. The objective was to ensure abatement of pollution and conservation of the river. The key difference between the first Ganga Action Programme and now, is the recognition that the entire basin of the river has to be the basis for planning and implementation as given by Sunita Narain, 2014 [7].

Under GAP I, only a part of the pollution load of river Ganga was addressed. Therefore, the Plan was extended to GAP II, which was approved in stages between 1993 and 1996. Besides Ganga, GAP II included its major tributaries viz. Yamuna, Gomti and Damodar. Subsequently, Mahananda was also added. 59 towns along the main stem of river Ganga in the 5 States of Uttarakhand, UP, Bihar, Jharkhand and West Bengal are covered under GAP II. A sewage treatment capacity of 130 MLD has been created under the Plan. In response to demands from many States, the Ganga Action Plan was expanded in 1996 to the National River Conservation Plan (NRCP) to include other rivers in the country. Presently polluted stretches of 36 rivers in 20 States are covered under NRCP as given by Markandya and Murthy, 2004 [5].

A. OBJECTIVES OF GAP:

The objective, at the time of launching the Ganga Action Plan in 1985, was to improve the water quality of Ganga to acceptable standards by preventing the pollution load from reaching the river. Later, in 1987, on the recommendations of the Monitoring Committee of GAP, the objective of the Plan was modified to restoring the river water quality to the Designated Best Use class of Ganga, which is “Bathing Class”, The standards are given below as mentioned in the Report by MoEF, 1999 [8].

Water quality standards for out door bathing :

pH :	6.5 – 8.5
Dissolved Oxygen (DO) :	5 mg/l or more
Biochemical Oxygen Demand (BOD) :	3 mg/l or less
Faecal Coliform : MPN/100 ml:	500 MPN / 100 ml (Desirable) 2500 (Max. Permissible)

ISSN: 2350-0328

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Vol. 2, Issue 1 , January 2015

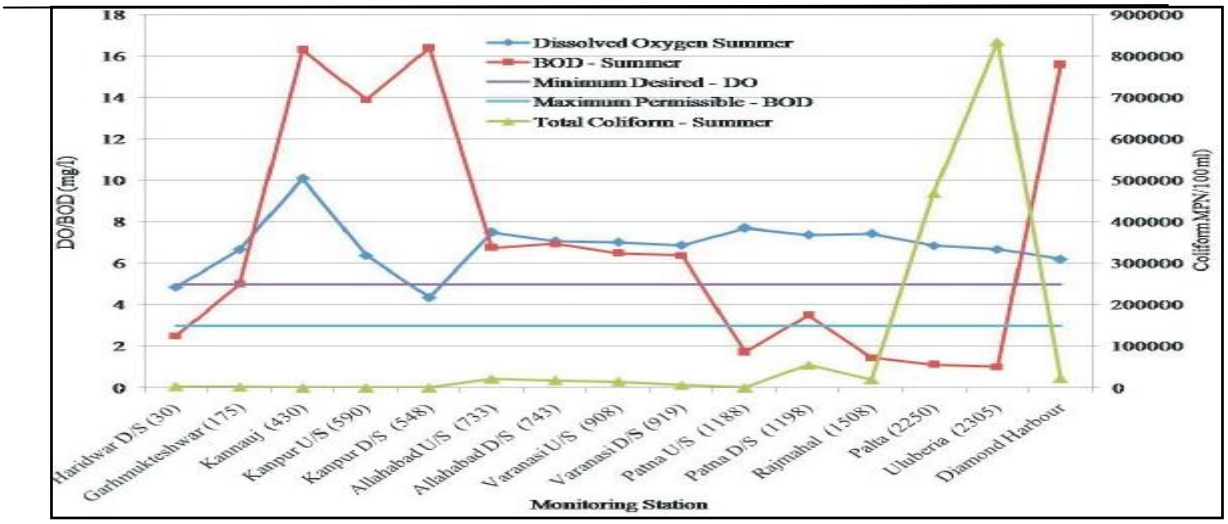

Fig 1: Parametric values of Ganga Pre GAP at selected Stations

B. IMPACT OF GANGA ACTION PLAN ON RIVER QUALITY :

It is observed that in 1986, Bio-chemical Oxygen Demand (BOD), ranged from 5.5 to 15.5 mg/l in the critical stretch from Kannauj to Varanasi. As against this, BOD values in 2008 in the stretch Kannauj to Kanpur and Allahabad to Varanasi are 2.9-4.1mg/l and 2.2-4.8 mg/l respectively, indicating improvement. Dissolved Oxygen (DO) levels (in the Allahabad-Varanasi stretch) were in the range of 5.9 to 6.6 mg/l in 1986. In 2008, the range had improved to 7.3 to 8.4 mg/l. These values of DO are averages for the critical months of March to June, when temperatures are high and the flows in the river are low as given by Status paper : State of Environment and water quality, 2009 [9].

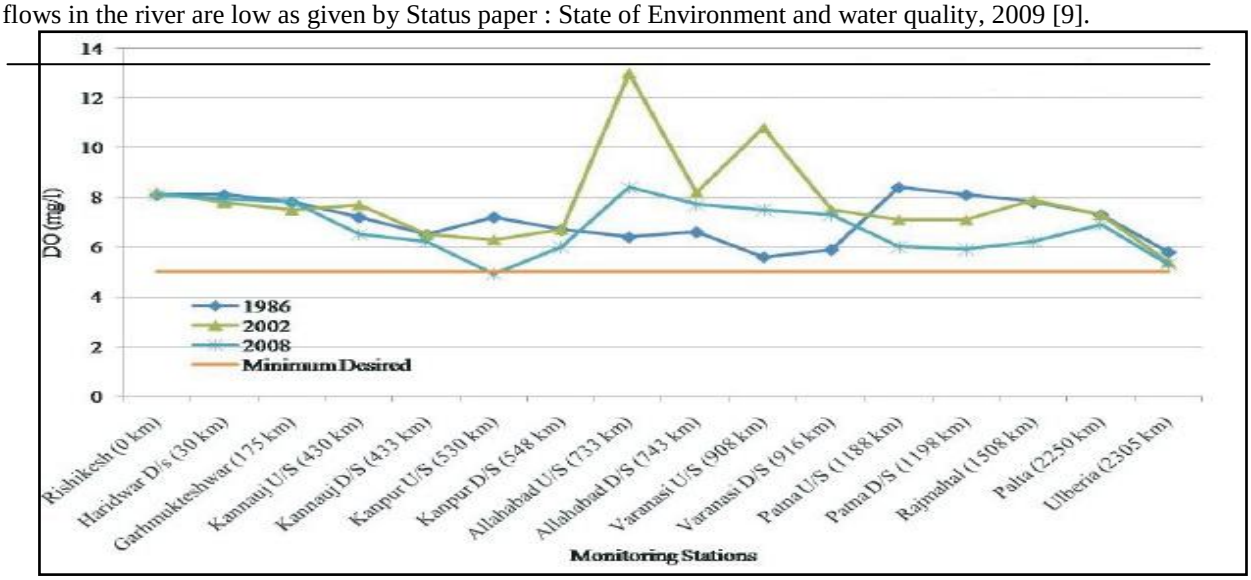

Fig 2 : Water quality data for river Ganga (summer average i.e. March- June)

V. SUMMARY

A comparison of pre-GAP and post-GAP values of the three critical parameters, namely DO, BOD and Coliforms reveals the following, as mentioned in Status Paper : State of Environment and water quality, 2009 [7]:

- Dissolved Oxygen is largely within acceptable limits.
- In the upper Ganga, from origin to Haridwar, the water quality is more or less of Bathing Standards.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

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- Higher levels of coliform are present almost throughout Ganga. GAP has not been able to adequately address the issue of coliforms.

- The stretch from Kannauj to Kanpur and Allahabad to Varanasi remains critical and needs focused attention. Apart from higher levels of coliforms, the norms for BOD indicating organic pollution are also exceeded in this stretch.

- A study on development of scenarios on comparison of river water quality with and without GAP (Markandya & Murthy, 2004) showed that a stretch of about 740 km (out of total 1520 km) between Rishikesh and Rajmahal would have violated the BOD limit of 3 mg/l without GAP. The study also indicated that stretch of about 437 km had a BOD level above the permissible limit of 3 mg/l after GAP I.

Globalisation is leading to private profit making interests taking over river and its management. The people or the stake holders, should now come together to raise the voice of conscience, infuse life to the dying regime and mother earth. Thus the much needed course of actions involves a multilateral approach which needs constitution of an autonomous central authority, established by law and armed with executive and financial powers, which will be responsible for controlling Environmental Problems.

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