

Water Quality Assessment

1.1. National Water Quality Monitoring Programme (NWMP)

Water quality monitoring helps in evaluating the nature and extent of pollution control required, and the effectiveness of pollution control measures being implemented. It also assists in presenting water quality trends and prioritizing pollution control efforts. The Central Pollution Control Board (CPCB), the State Pollution Control Boards (SPCBs) and the Pollution Control Committees (PCCs) are responsible for restoration and maintenance of the wholesomeness of all aquatic resources. To ensure that the water quality is being maintained or restored to desired quality SPCBs and PCCs regularly monitor water quality. The rationale behind this exercise is:

For rational planning of pollution control strategies and their prioritizations;

- ✓ To assess nature and extent of pollution control needed in different water bodies or their part;
- ✓ To evaluate effectiveness of pollution control measures already in existence;
- ✓ To evaluate water quality trend over a period of time;
- ✓ To assess assimilative capacity of a water body thereby reducing cost on pollution control;
- ✓ To understand the environmental fate of different pollutants.
- ✓ To assess the fitness of water for different uses.

Keeping the above objectives in mind, the CPCB established a network of water quality monitoring stations across the country. Presently the water quality monitoring network is being operated under a three-tier programme viz.

- Global Environmental Monitoring System (GEMS) ;
- Monitoring of Indian National Aquatic Resources System (MINARS) and
- Yamuna Action Plan (YAP).

At present the network comprises of 1245 stations spread over the country in 27 States and 6 Union Territories. Most of the sampling is done on either on a monthly or quarterly basis for surface water bodies and on half yearly basis for ground water quality. Out of 1245 stations 695 are on rivers, 86 on lakes, 19 on drains, 19 on canals, six tanks, 12 on creeks/seawater, 26 ponds and 382 are groundwater stations. Water quality of 293 rivers in major, medium and minor basins is observed in the country. There are significant numbers of stations on main streams of the major river basins. Table 1.1.1 displays the nation wide water quality network.

State	River	Lake	Tank	Pond	Canal	Creek/ Sea water	Drain	Well	Total
ANDHRA PRADESH	27	4	4	-	-	-	-	24	59
ASSAM	43	2	1	23	-	-	-	32	101
BIHAR	16	-	-	-	-	-	-	20	36
CHANDIGARH	-	1	-	-	-	-	3	7	11
CHHATISGARH	23	-	-	-	-	-	-	4	27
DADRA AND NAGAR HAVELI	2	-	-	-	-	-	-	-	2
DAMAN & Diu	2	-	-	-	-	-	-	1	3
DELHI	4	-	-	-	2	-	9	-	15
GOA	17	2	-	-	3	1	-	6	29
GUJARAT	49	14	1	2	2	2	1	42	113
HARYANA	8	2	-	-	11	-	2	-	23

State	River	Lake	Tank	Pond	Canal	Creek/ Sea water	Drain	Well	Total
HIMACHAL PRADESH	31	3	-	-	-	-	-	20	54
JAMMU & KASHMIR	7	2	-	-	-	-	-	-	9
JHARKHAND	9	-	-	-	-	-	-	-	9
KARNATAKA	43	2	-	-	-	-	-	-	45
KERALA	30	10	-	-	-	-	-	15	55
LAKSHDWEEP	-	-	-	1	-	-	-	15	16
MADHYA PRADESH	69	18	-	-	-	-	-	18	105
MAHARASHTRA	83	-	-	-	-	9	1	30	123
MANIPUR	11	4	-	-	-	-	-	5	20
MEGHALAYA	5	3	-	-	-	-	-	5	13
MIZORAM	4	-	-	-	-	-	-	2	6
NAGALAND	8	-	-	-	-	-	-	-	8
ORISSA	39	-	-	-	-	-	-	15	54
PONDICHERRY	1	2	-	-	-	-	-	13	16
PUNJAB	35	2	-	-	-	-	-	6	43
RAJASTHAN	7	7	-	-	-	-	-	37	51
SIKKIM	14	-	-	-	-	-	-	-	14
TAMIL NADU	27	3	-	-	-	-	-	2	32
TRIPURA	3	2	-	-	1	-	-	7	13
UTTAR PRADESH	44	1	-	-	-	-	3	25	73
UTTRAKHAND	14	1	-	-	-	-	-	1	16
WEST BENGAL	20	1	-	-	-	-	-	30	51
Total	695	86	6	26	19	12	19	382	1245

Table: 1.1.1 CPCB's water quality network

Water samples are analyzed for 28 physico-chemical and bacteriological parameters besides, 9 trace metals and 28 pesticides are also analyzed for some selected samples. Some major cations, anions and micro pollutants (toxic metals & POP's) are also being analyzed once a year to keep a assess water quality over large period of time.

Bio-monitoring is also carried out on specific locations. The water quality data are reported as CPCB publications as Water Quality Status Year Book and is also displayed in CPCB's website. The details of new monitoring stations added during 2008 are presented at Table 1.1.2.

STATE	NO. OF STATIONS
Andhra Pradesh	37
Kerala	55
Jharkhand	27
Uttar Pradesh	1 (Monitored by CPB Zonal Office)
Daman & Diu	19
Pondicherry	6
Orissa	39
TOTAL	184

Table: 1.1.2. National Water Quality Monitoring Stations added during 2008

1.2. Water Quality Trend

The water quality monitoring data obtained from various monitoring stations between years 1995 to 2008 indicate that the organic and bacterial contamination continue to be critical in water bodies. This is mainly due to discharge of domestic wastewater mostly in untreated form from the urban centres of the country. The municipal corporations at large are not able to treat the increasing load of municipal sewage flowing into water bodies without treatment. As a result, the organic and bacterial pollution is posing a health threat which gets further aggravated due low availability of water in the rivers. The water quality monitoring data has been analyzed for biochemical oxygen demand (BOD) an indicator of organic matter and for total coliform and faecal coliform which are indicators of pathogenic bacteria .The water quality data of rivers monitored under the network is evaluated against the water quality criteria and the monitoring locations in exceedence with respect to BOD is assessed and action plan for restoration of water quality are formulated.

During year 2008, BOD was observed to be very high at major rivers / canals , the stations listed in listed in descending order of concentration is : River Markanda D/s Kala Amb (590 mg/l) followed by Kali (Western) D/s Muzaffarnagar (364 mg/l), River Amlakhadi at Ankleshwar(353 mg/l), Western Yamuna Canal D/s Yamuna Nagar (247 mg/l), River Kali (Eastern) at Gulawati (183 mg/l), River Yamuna at Okhla after meeting Shahdara drain(70 mg/l), River Betwa at Nayapur D/s (58 mg/l) and River Yamuna at Nizamuddin Bridge (55 mg/l).

1.3. Water Quality of River Ganga

Water quality monitoring of the river Ganga and its tributaries is carried out in the State (s) of Uttaranchal, Uttar Pradesh, Bihar and West Bengal at 39 locations by CPCB’s North Zonal Office - Lucknow. The ranges of water quality observed in rivers Ganga with respect to BOD, Dissolved Oxygen (DO), Total Coliform and Faecal Coliform are calculated and presented as minimum, maximum and mean value to assess the extent of water quality variation throughout the year. The status of water quality of river Ganga in U. P. for Biochemical Oxygen Demand (BOD) is provided below.

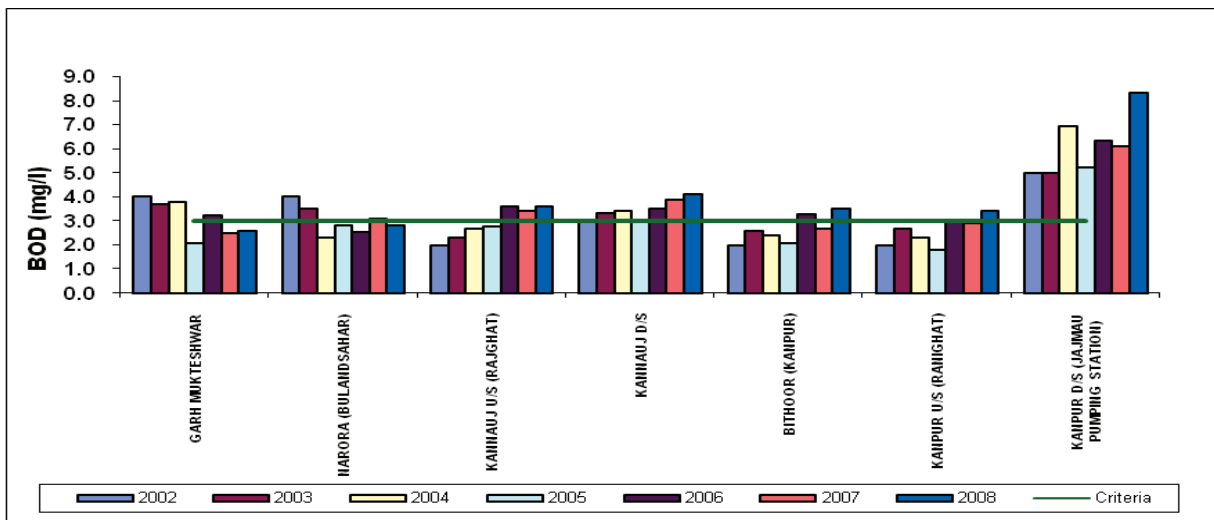


Figure: 1.3.1. Water Quality of River Ganga , BOD, (U. P. Upper Segment)

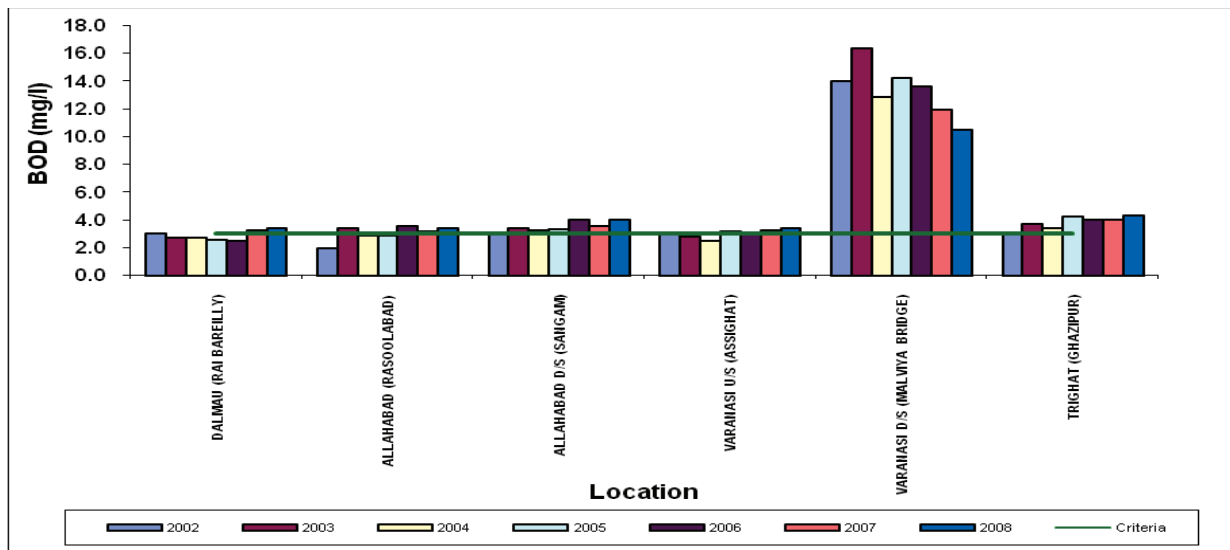


Figure: 1.3.2. Water Quality of River Ganga, BOD (U. P. Lower Segment)

1.4. Water Quality Status of River Yamuna

The entire stretch of river Yamuna (1376 km) is being regularly monitored by CPCB on a yearly frequency at 20 locations, quarterly frequency at three locations, while on a monthly frequency at other locations. The water quality trend of the river during the last five years (2004-2008) in terms of Dissolved Oxygen (DO) Bio chemical Oxygen demand (BOD), Total Coliform (TC) and Faecal Coliform (FC) is presented below. In year 2008 slight improvement in river water quality was observed probably due to prolonged rainfall. However, significant water quality deterioration was observed in the 580 km river stretch between downstream (d/s) Wazirabad barrage till Chambal river's confluence at Panchnada , very high BOD and Coliforms counts observed even during the monsoons.

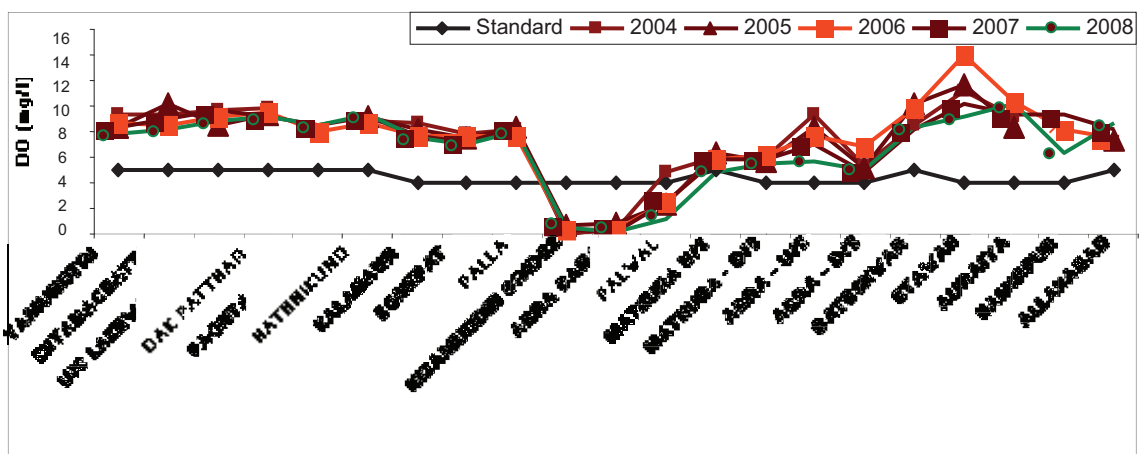


Figure: 1.4.1: Water Quality Trend of River Yamuna in Terms of Dissolved Oxygen (DO)

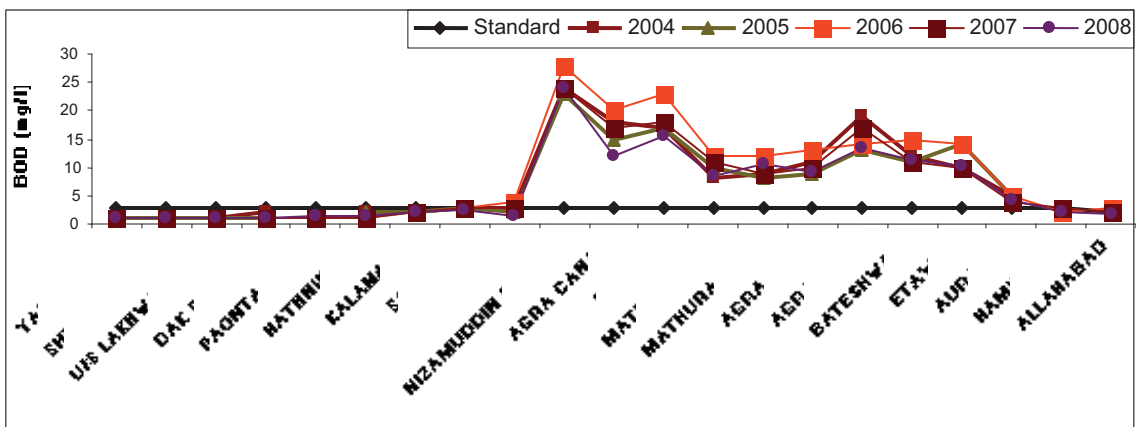


Figure: 1.4.2. Water Quality Trend of River Yamuna in Terms of BOD

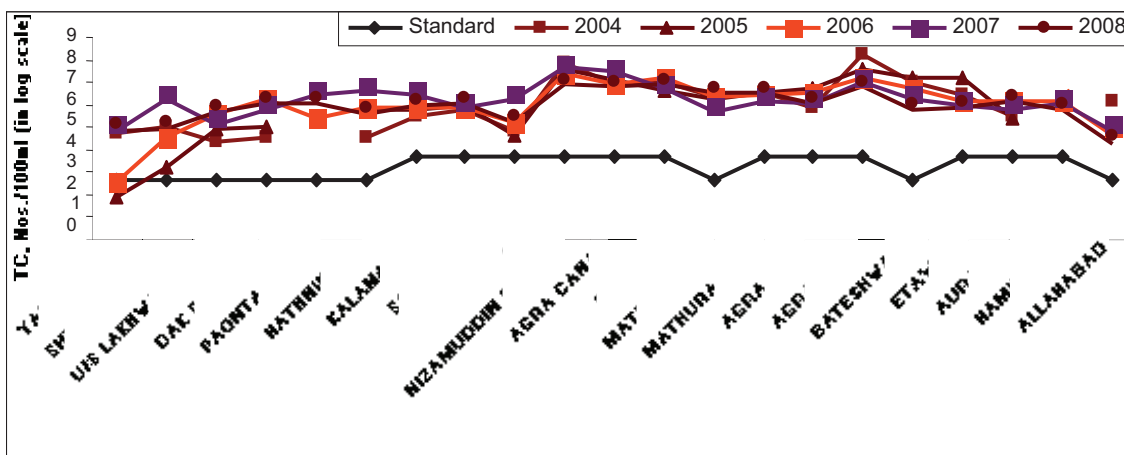


Figure: 1.4.3. Water Quality Trend of River Yamuna in Terms of Total Coliform

1.5. Water Quality of River Gomti

Gomti River, a tributary of the river Ganga contributes to about 15 % flow of Ganga. The average dry weather flow of this river is reported to be 1500 MLD, which become as high as 55000 MLD during monsoon season and as low as 500 MLD during the summer. Water quality of River Gomti was monitored in 2008 from Sitapur upto confluence of river Ganga. Monitoring results are given below.

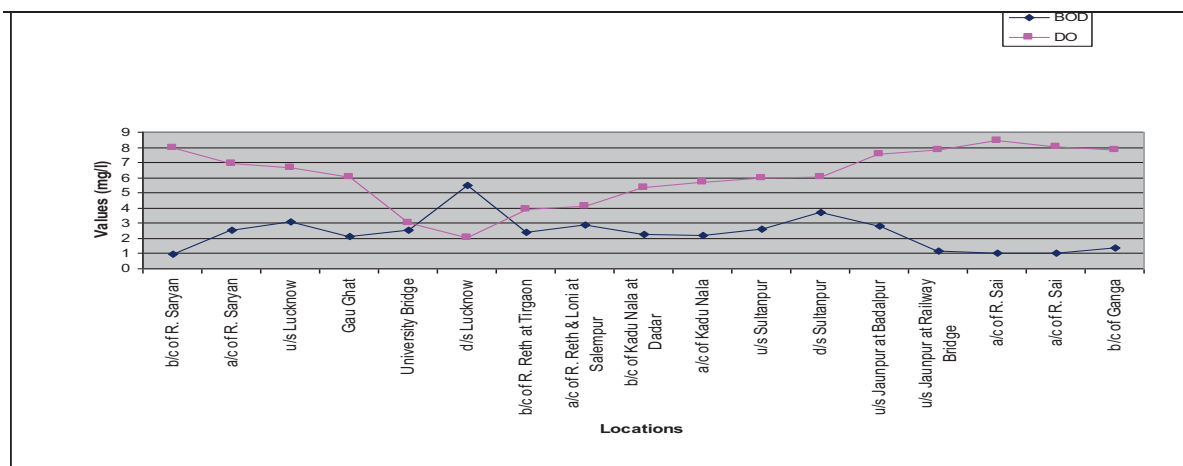


Figure: 1.5.1. DO and BOD profile of River Gomti

1.6. Inter State River Water Quality Monitoring

Several incidences of river pollution are observed particularly at interstate borders. Some states receiving water through various rivers have complained the quality of water they receive from the upstream states. Under Water (Prevention & Control of Pollution) Act, 1974, CPCB is responsible for resolving interstate disputes on water quality under the Section 16 2(b) of the Water (Prevention and Control of Pollution) Act, 1974. Realizing the gravity of the problem, the issue has been discussed with the State representatives in the 51st Conference of Chairman & Member Secretaries held on February 14-15, 2005. CPCB is monitoring the water quality of rivers at these disputed locations since year 2005. At present, the monitoring is carried out 4 times in a year at 76 locations spread over 36 rivers.
