

The status and effects of the Yamuna Action Plan (YAP)

Deepshikha Sharma and Arun Kansal, TERI University

1. Introduction

In 1977-78, CPCB initiated a study to assess the status of pollution of Yamuna River over its 1200 km course. The study examined the topography of the drainage basin, base flow, population, land use pattern, industries, and agriculture practices and estimated the pollution load from activities in the basin. Study conducted by the CPCB indicated that the major cause of pollution is the discharge of domestic wastewater into the river which is about two-third of the pollution load. The remaining pollution is contributed by industries and agriculture. Based on the findings of this study, the Government of India (GoI) decided to take up water quality restoration measures named as Yamuna Action Plan (YAP) under the mega project of the Ganga Action Plan (GAP) phase-II. The Government of Japan provided loan assistance for implementation of YAP in December-1990. YAP was formally launched in 1993, now called as YAP phase I (YAP I). Subsequently, the work continued with the launch of YAP phase II (YAP II) in the year 2001(CPCB, 2006). In India the rivers has been classified into five classes as shown in table 1. Figure 1 describes the various segments of River Yamuna with major townships and canals. It depicts the total flow and BOD loads at various locations where YAP has been implemented. The values are as of 1996 levels.

Table 1: Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms (TC) Organism MPN/100ml shall be 50 or less; pH between 6.5 and 8.5; Dissolved Oxygen (DO) 6mg/l or more; Biochemical Oxygen Demand (BOD)5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	TC Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5; DO 5mg/l or more; BOD 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	TC Organism MPN/100ml shall be 5000 or less; pH between 6 to 9; DO4mg/l or more; BOD 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5; DO 4mg/l or more; Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5; Electrical Conductivity at 25°C micro mhos/cm Max.2250; SAR Max. 26; Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

<www.cpcb.nic.in>, Accessed on 8th November 2010

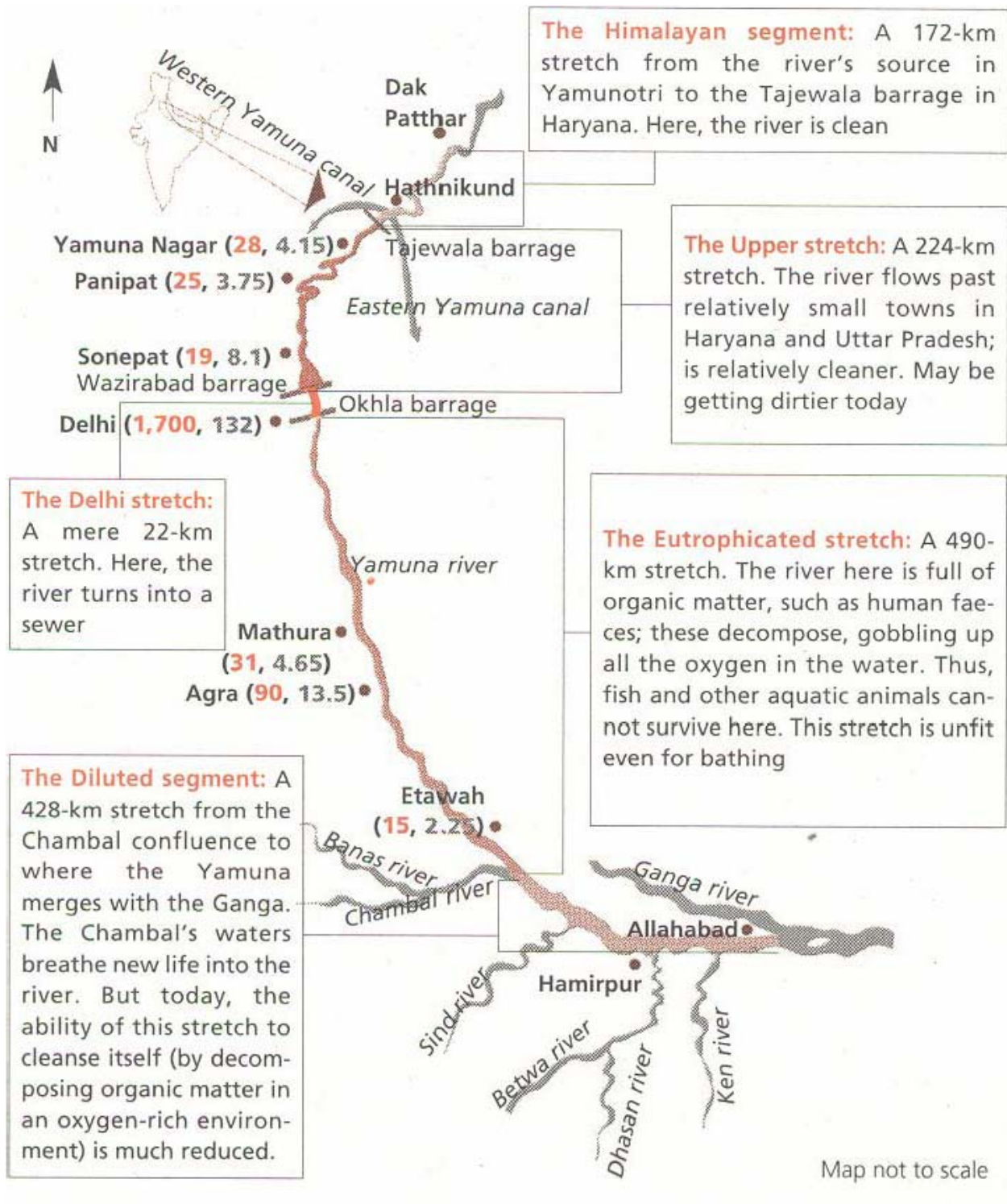


Figure 1: Segments of river Yamuna

(All figures are 1996 levels. a= flow in MLD; b: BOD load in T/d, Source: CPCB (1996), adapted from CDP, 2005-06, JnNURM)

2. YAP I

2.1 Financial outlay

The YAP I was initiated by GoI in April 1993 to abate the pollution and improve the water quality of river Yamuna. YAP I was scheduled for completion in April, 2002, but the planned projects continued until 2003. The year 2002-03 is called as *extended phase* of YAP-I. YAP was entrusted under the National River Conservation Directorate (NRCD) in Ministry of Environment and Forests (MoEF). Along with NRCD other Project Implementing Agencies (PIAs) were Uttar Pradesh Jal Nigam (UPJN), the Public Health Engineering Department (PHED) in Haryana, the Delhi Jal Board (DJB) and the Municipal Corporation of Delhi (MCD) in Delhi. The financial assistance was provided by the Japan Bank for International Cooperation (JBIC) in the form of soft loan amounting to Yen 17.77 billion for pollution abatement works in 15 towns. Beneficiary states were Haryana (Yen 6 billion), Uttar Pradesh (U.P.) (Yen 8 billion) and Delhi (Yen 3.77 billion). However, in April 1996, on the directions of the Supreme Court (apex court in India), six additional towns of Haryana were included. Finally, YAP I covered pollution abatement works in 21 towns. The approved cost of YAP I was INR.5.09 billion. A saving of Yen 8 billion (equivalent to about INR.3 billion) was available in the JBIC assistance package due to the appreciation of Yen against Rupee). These were given by JBIC for additional works in the same 15 towns and thereafter YAP I was extended upto February, 2003. In May, 2001, an additional amount of INR.2.22billion was also approved for the extended phase under this proposal. Of this amount, INR.222.8 million was allotted to Haryana, INR. 1.66 billion to Delhi and INR.296.5 million to U.P. In addition, an amount of INR.40.5 million has been provided for fees payable to Indo-Japanese consultant consortium. The total cost of YAP I along with the additional package was INR.7.32billion. The funding of action plan was shared equally between the Central and State Governments. However, the funding by the Central Government was doubled when in 2001, the contribution of State Governments also increased by 30% (Planning Commission, 2007).

2.2 Activities planned

Under YAP I, broadly two types of activities were taken up. One includes sewerage schemes wherein the construction of 29 STPs (with a total capacity of about 726 MLD), 58 pumping stations, and 179 km of sewers was proposed. In another scheme the installation of non-sewerage facilities such as 1282 public toilet complexes, 96 crematoria, River front development, plantation and public awareness and participation were proposed. YAP I also included construction of 5 mini sewage treatment plants and 10

micro sewage treatment plants for some of the community toilet complexes (CTCs) to examine viability of decentralized sewerage system and on-site treatment of sewage, respectively. The other component was on public participation and awareness program involving several NGOs. This was also supplemented by carrying out river pollution study to estimate future pollution loads into river Yamuna from different sources in 33 major towns of the Yamuna river basin (www.adb.org/Documents/Books/AWDO/2007/gp03.pdf). Thus, the total sewage treatment capacity created under YAP I was 750MLD (Planning Commission, 2007).

The main activities covered under YAP for Haryana, Delhi and U.P were interception and diversion works, pumping stations, STPs, low cost toilet complex, crematorium, plantation, bathing ghat / river front development, public participation and awareness and computer networking system. . Other supplementary work includes sludge drying beds, rising mains, replacement of old pipes, installation of dg sets, fire fighting systems, lining of pond. The extended phase addressed the non-sewerage related aspects, including public participation and capacity building works (www.pmc4yap2.com).

2.3. Effects of YAP I

The main activities under YAP I focused upon improvising the collection and treatment of wastewater i.e. capacity building exercises. According to a report by World Wide Fund for nature (WWF) India, 'Haryana fared better than U.P. as infrastructure work has been completed and is working well, with plants having insufficient sewage to treat. Treated effluents are discarded into drains or canals and biogas utilization is poor. In both states improved wood-based crematoria haven't taken off which were intended to reduce the wood use and time taken by half. In Delhi, the plan's outcome is yet invisible, even after so much money has gone into it.' (<wwfenvis.nic.in/pdf/yam.pdf>).

The sewerage component of Delhi was under-estimated and the STP capacity created by the city government concurrently with YAP remains under-utilized to the extent of 25-45%. This is due to limitations of the collection system resulting in the flow of untreated sewage into the river. Similarly, STPs in other reaches were under-utilized due to a combination of limitations in the collection system and power availability. YAP-I did not adequately address non-point sources of pollution. Moreover, Indian wastewater discharge standards did not mandate STP effluents to comply the Coliform reduction. Therefore, STPs did not include disinfection treatment. Sewage treatment capacity under YAP-I were formulated for 1997 population loads without considering any population projection. For example, YAP-I was able to create 3.5 million Population Equivalent (PE) of net STP capacity in 14 towns in Haryana and

U.P. However, by 2002, the total population of these towns was close to 6.7 million creating a shortfall of 3.2 million PE (www.pmc4yap2.com).

3. YAP II

In order to achieve the desired river standards MoEF, GOI, India launched YAP II in December 2004. It was scheduled to be completed by September, 2008. JBIC signed a new loan agreement with MoEF on March 31, 2003 based on the works accomplished under YAP I and sanctioned 13.33 billion Yen which was 85% of the total cost estimated to complete YAP II. The total budget sanctioned for YAP II was INR. 6.24 billion which was distributed to Delhi (INR. 3.87 billion); U.P. (INR.1.24 billion) and Haryana (INR. 630 million) and for Capacity building exercises (INR. 500 million) (PMC-TEC consortium, 2005). Since the work was not completed therefore, YAP II has been extended till March 2011. The total STP capacity sanctioned was 189 MLD. Table 2 describes the various works done under YAP II in Delhi, Haryana and U.P. (NRCD 2010).

Table 2: Activities under YAP-II

Name of the State/Scheme
<i>Delhi</i>
Physical Work: Okhla STP; Keshopur STP; Bela Road Trunk Sewer; Wazirabad Road Trunk Sewer; Ring Road Trunk Sewer
Preparation of Master Plan (M/P), Feasibility Study (F/S), Detailed Project Report (DPR) for YAP-III: Decentralized Wastewater Treatment for Water bodies (including Pilot Project); Dairy Farm Waste Management (including Pilot Project); Dhobighat Sudhar Yojna (including Pilot Project); Slaughterhouse Modernisation and Waste Management; Antim Niwas Sudhar Yojna (including Pilot Project); Slum Rehabilitation Study
Public Participation & Awareness (PP&A); Public Relations (PR); Institutional Strengthening & Capacity Building of MCD; Public Participation & Awareness (PP&A); Public Relations (PR); Institutional Strengthening & Capacity Building of MCD
<i>Uttar Pradesh</i>
Physical Works Implementation: Sewerage Works (Sewers, Sewage Pumping Stations, Rising Mains, STPs) in Northern & Western zones at Agra ;

Preparation of Master Plan (M/P), Feasibility Study (F/S), Detailed Project Report (DPR) for YAP- III (8 towns)

Public Participation & Awareness (PP&A)

Institutional Strengthening & Capacity Building of 7 ULBs and Noida Authority

Haryana

Engineering Technology Transfer (ETT) to ULBs (6 towns)

Preparation of Master Plan (M/P), Feasibility Study (F/S), Detailed Project Report (DPR) for YAP- III (8 towns)

Public Participation & Awareness (PP&A)

Institutional Strengthening & Capacity Building of 6 ULBs

CAPACITY BUILDING OF NRCD

MIS, Accounting & state-of-art equipments etc.

Water Quality Monitoring Programme

Source: http://www.pmc4yap2.com/yap2_major_activities.htm, accessed on 7th November 2010

4. Status of YAP I and II

The total number of schemes and expenditure done till 31/12/2009 is described in table 3. it shows distribution of cost and schemes sanctioned and completed under YAP I and II for Delhi, Haryana and U.P. <<http://envfor.nic.in/nrcd/NRCD/table.htm>>. Table 4 detail out the status of progress of STPs under NRCP (MLD) in all the three states covered under YAP I and II. The STPs capacity created are as on 30/9/2009. It shows that under YAP II no new STP capacity has been created as been sanctioned in Delhi and Haryana.

Table 3: State wise investments and schemes under YAP I and II

	YAP I			YAP II		
	Delhi	Haryana	U.P.	Delhi	Haryana	U.P.
Cost sanctioned	1.80	2.42	2.82	4.69	6.34	1.15
No. of Schemes	12	111	146	11	16	5

Sanctioned						
No. of Schemes Completed	12	111	146	0	6	1
Funds released by GoI	1.77	1.78	2.40	1.21	0.48	0.58

Table 4: Status of progress of STPs under NRCP (MLD)

Action Plan / State	STP Capacity Sanctioned(31.12.2009)	STP Capacity Created(30.09/2009)
<u>YAP I</u>		
DELHI	30.00	30.00
UTTAR PRADESH	401.25	401.25
HARYANA	322.00	322.00
<u>YAP II</u>		
DELHI	135.00	0.00
UTTAR PRADESH	54.00	0.00
HARYANA	0.00	0.00
TOTAL (YAP)	942.25	753.25

Table 5 describes the water quality in 1996 and 2009 at various locations in Haryana, Delhi and U.P. The highlights if YAP I and II are as follows:

- In Haryana, the river quality was maintained as per standards with DO values above 5.0 mg/l and BOD values less than 3.0 mg/l. For example, the DO value at Kalanaur (2009) is 9.1 and BOD values is 2.33.
- In Delhi the river quality is still poor and not meeting the required standards with DO values < 5.0 mg/l and BOD values >3.0 mg/l.
- The poor quality trend continues D/S Delhi with values of DO and BOD fluctuating upto Majhawali and also d/s Agra. However, the values improved at Auraiya.
- The effect of NRCD activities shows negative results from Delhi to Udi making it the critical stretch in the year 2009 (table 4) where the water quality is not meeting the standards <<http://envfor.nic.in/nrcd/NRCD/Yamuna.htm>>.

Table 5: Water quality data for River Yamuna (Summer Average i.e. March-June)

Station/Location	1996		2009	
	DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)
<u>HARYANA</u>				
Tajewala	11.70	1.20	9.22	1.25
Kalanaur	10.40	1.05	9.10	2.33
Sonepat	9.75	3.00	7.60	7.00
Palla	13.95	6.00	7.10	2.50
<u>DELHI</u>				
Nizamudin	0.30	25.00	0.0	23.00
<u>UTTAR PARDESH</u>				
Agra Canal	0.35	26.50	0.00	14.75
Majhawali	0.50	22.00	2.75	16.75
Mathura	8.10	4.00	5.28	8.50
Mathura D/S	8.50	2.50	6.30	8.75
Agra U/S	10.65	4.50	7.67	9.25
Agra D/S	1.65	9.00	4.67	16.25
Batteshwar	13.90	11.00	8.95	13.75
Etawah	11.16	7.00	10.88	11.25
Udi	9.71	2.00	9.00	1.00
Auraiya Juhika	8.14	5.00	11.05	4.75

(Sources: CPCB, <<http://envfor.nic.in/nrcd/NRCD/Yamuna.htm>>)

Figure 2 shows the total load in river Yamuna. It has been observed that despite of the continuous efforts to minimize the pollution load still the BOD is increasing. Figure 3, gives the comparison of BOD load vs. investments done in YAP to restore the water quality. It shows the increment in BOD load from 130 to 270 T/day and the total investment of INR.5.68 billion for YAP I and II. River Yamuna have not been able to achieve the desired river standards after completion of YAP I and YAP II which has lead to extension of YAP II (refer paper 1).

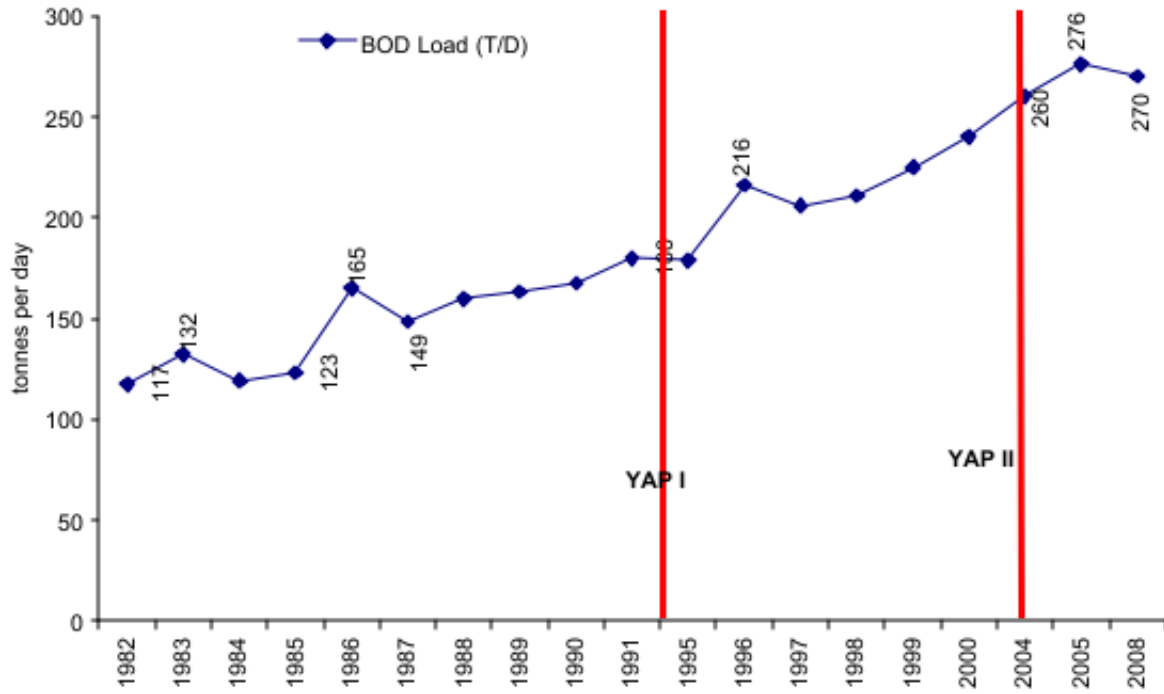


Figure 2: BOD load in the Yamuna 1983-2008

Source: Compiled from the water quality monitoring reports of CPCB; National River Conservation Directorate and Delhi Jal Board (taken from CSE, 2009)

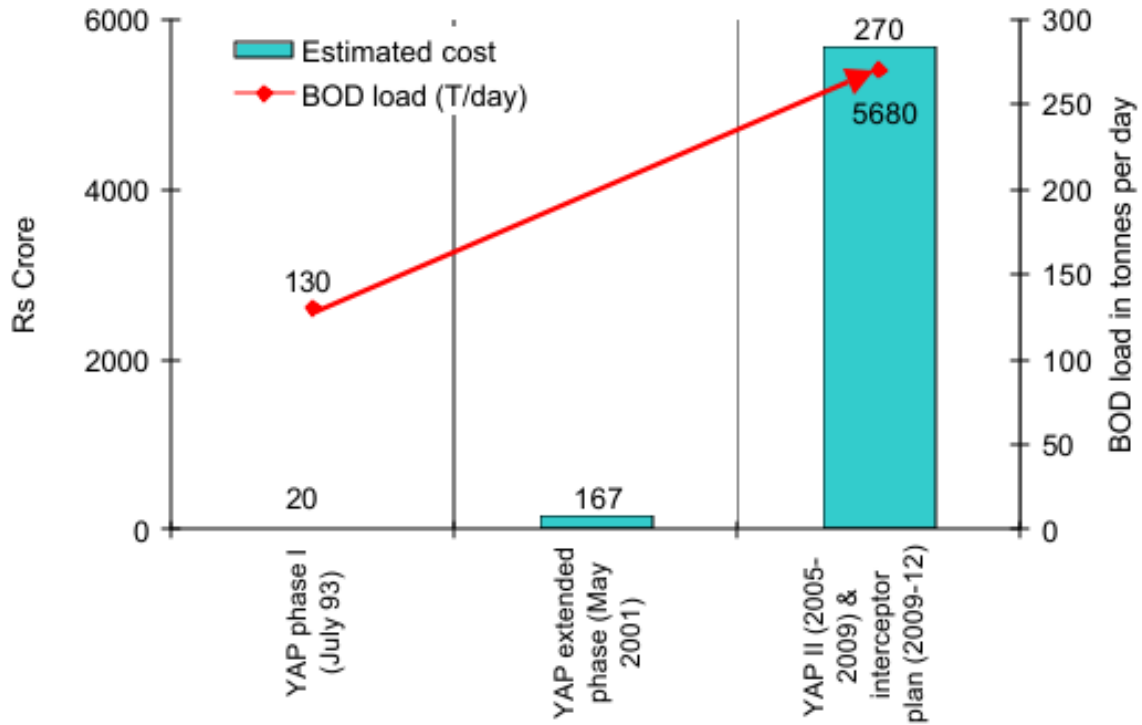


Figure 3: Comparison of investments and pollution load in Yamuna

Note: 270 tonnes per day corresponds to Year 2008; Source: 1. National River Conservation Directorate; 2. Central Pollution Control Board; 3. Delhi Jal Board (taken from CSE, 2009)

4. YAP I and II vs. Delhi pollution levels

After YAP I and YAP II the desired standards of the river has not been met in Delhi (Figure 4).

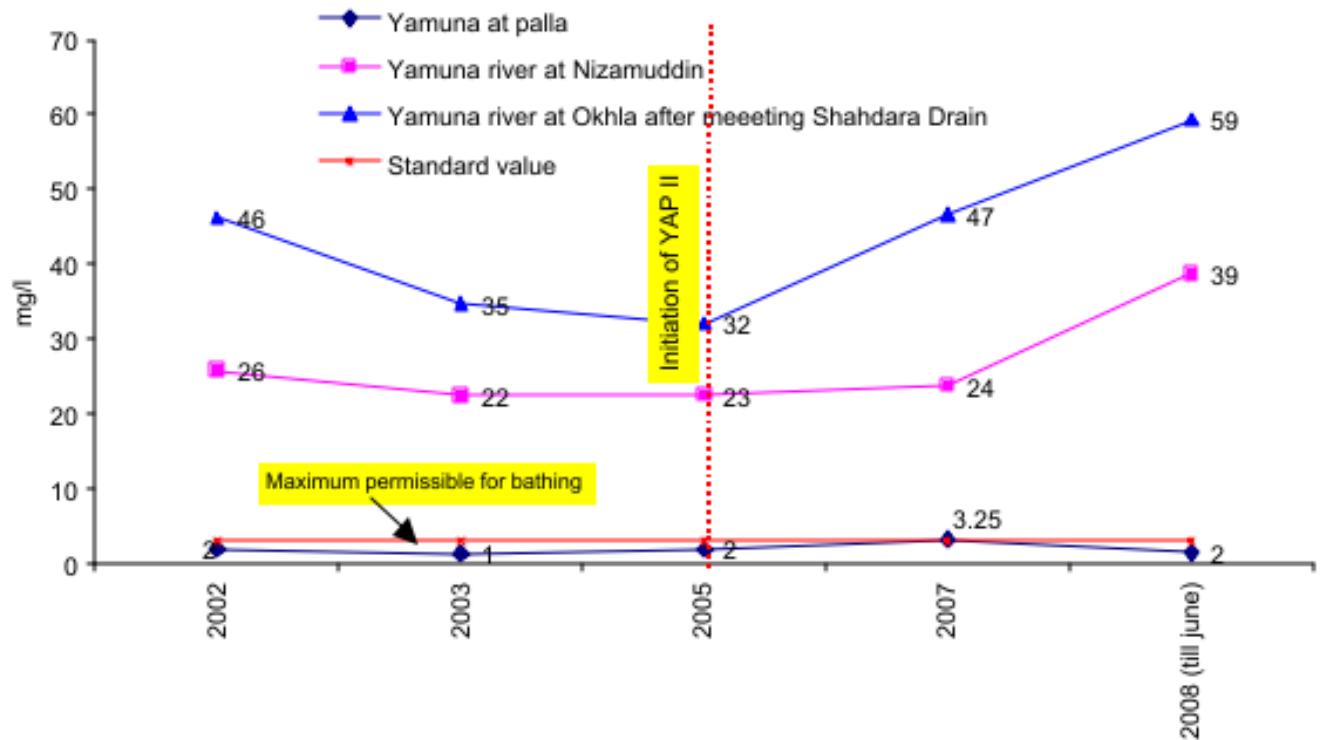


Figure 4: BOD levels in Yamuna in Delhi

Source: Compiled from the water quality monitoring reports of CPCB during 2002-2008, (taken from CSE, 2009)

In Delhi, the water quality has not improved D/S Wazirabad especially in terms of DO, BOD and bacterial contamination. Delhi has seen no improvement in terms of DO level in the river throughout the stretch and the levels of bacterial contamination is quite high from the standards (refer paper 1).

References

Asian Development Bank (ADB), N.A. Formidable challenge of river pollution and sanitation crisis.

Yamuna action plan, India. <www.adb.org/Documents/Books/AWDO/2007/gp03.pdf>

CDP, 2005-2006. City environment profile. JnNNURM.

CPCB, 2006, Water quality status of Yamuna River (1999 – 2005), Central pollution control board, Ministry of environment & forests, Assessment and development of river basin series: ADSORBS/41/2006-07

CSE, 2009. State of pollution in Yamuna, Centre for science and environment, Delhi, India

MoEF, National river conservation directorate (NRCD), Working for cleaning rivers.

<<http://www.envfor.nic.in/nrcd/NRCD/table.htm>>. Accessed on 10th 'December 2010

Planning Commission, 2007. Report of the working group on rivers, lakes and aquifers in Environment & Forests for the Eleventh Five Year Plan (2007-2012). GoI.

JBIC assisted Yamuna action plan phase II, Inception report, 2005. NRCD, MoEF, JBIC. Prepared by Project Management Consultants-TEC Consortium.

Project Management Consultants (PMC), N.A., Yamuna action plan: A bilateral project of governments of India & Japan on river conservation. < www.pmc4yap2.com>, Accessed on 7th November, 2010.

Areendran, G. N.A. Yamuna action plan, Indira Gandhi Conservation Monitoring Centre, World Wide Fund for Nature-India,< <http://www.wwfenvis.org>>, Accessed on 12th November 2010.