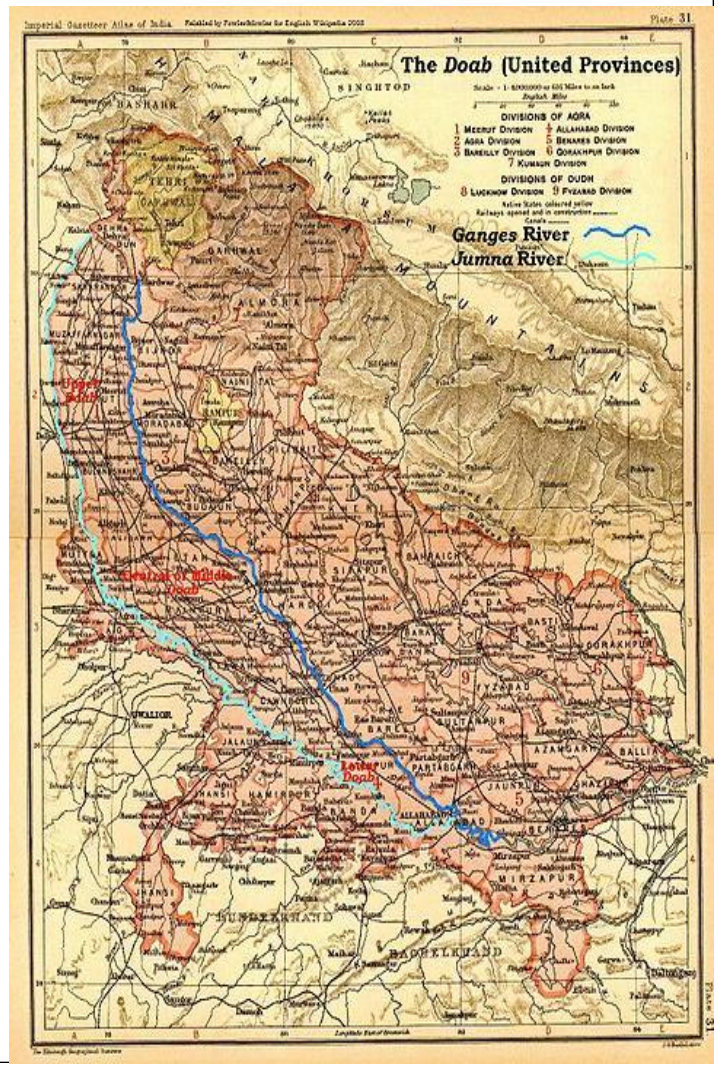
RIVER YAMUNA IN DELHI- POLLUTION & ITS CONTROL

DELHI GOVERNMENT
TEAM DELHI MAKING THROUGH HAPPEN

Department of Environment
Govt. of NCT of Delhi

RIVER YAMUNA

- Source : Yamunotri Glacier
  - Location : Banderpooch peaks, Uttarkashi district, Uttarakhand, India
  - Elevation : 6,387 m (20,955 ft)
  - Coordinates : 38°59′N78°27′E38.983°N 78.45°E
- Length : 1,370 km
- Basin : 366,220 km^2
- Merges with River Ganga at Triveni Sangam, Allahabad



RIVER YAMUNA- SEGMENTS

Distinguished Independent Segments of River Yamuna

Himalayan Segment	From origin to Tajewala Barrage	(172 kms)
Upper Segment	Tajewala Barrage to Wazirabad Barrage	(224 kms)
Delhi Segment	Wazirabad Barrage to Okhla Barrage	(22 kms)
Eutriphicated Segment	Okhla Barrage to Chambal Confluence	(490 kms)
Diluted Segment	Chambal Confluence to Ganga Confluence	(468 kms)

Catchment Area of River Yamuna

Name of State	Total Catchment Area in Yamuna (in Sq. Km.)	%age contribution
UP (including Uttranchal)	74208	21.5
Himachal Pradesh	5799	1.6
Haryana	21265	6.5
Rajasthan	102883	29.8
Madhya Pradesh	14028	40.6
Delhi	1485	0.4

Source : CWC

RIVER YAMUNA IN DELHI

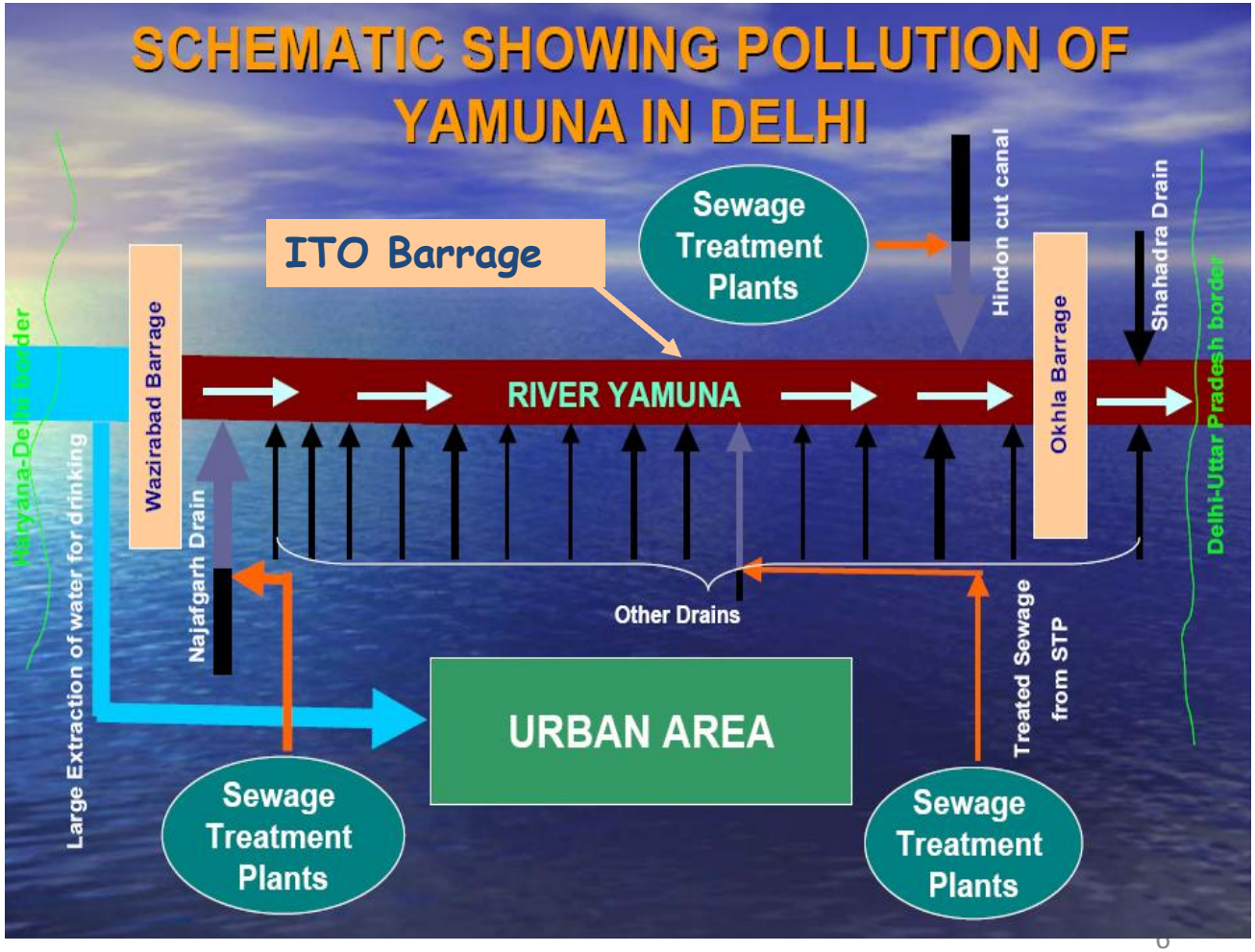
- River Yamuna enters Delhi from Palla Village
- Length : 48 km
- Widhth : 1.5Km to 3.0 Km
- Floodplain area: 97 Sq Km
- Polluted stretch within City:22 Km (from Wazirabad to Okhla)
- Number Drains falling into Yamuna: 22

  (18 major drains fall directly into river and 4 through Agra and Gurgaon canal)
- Caters for 70 % of Delhi's water supplies

RIVER YAMUNA IN DELHI

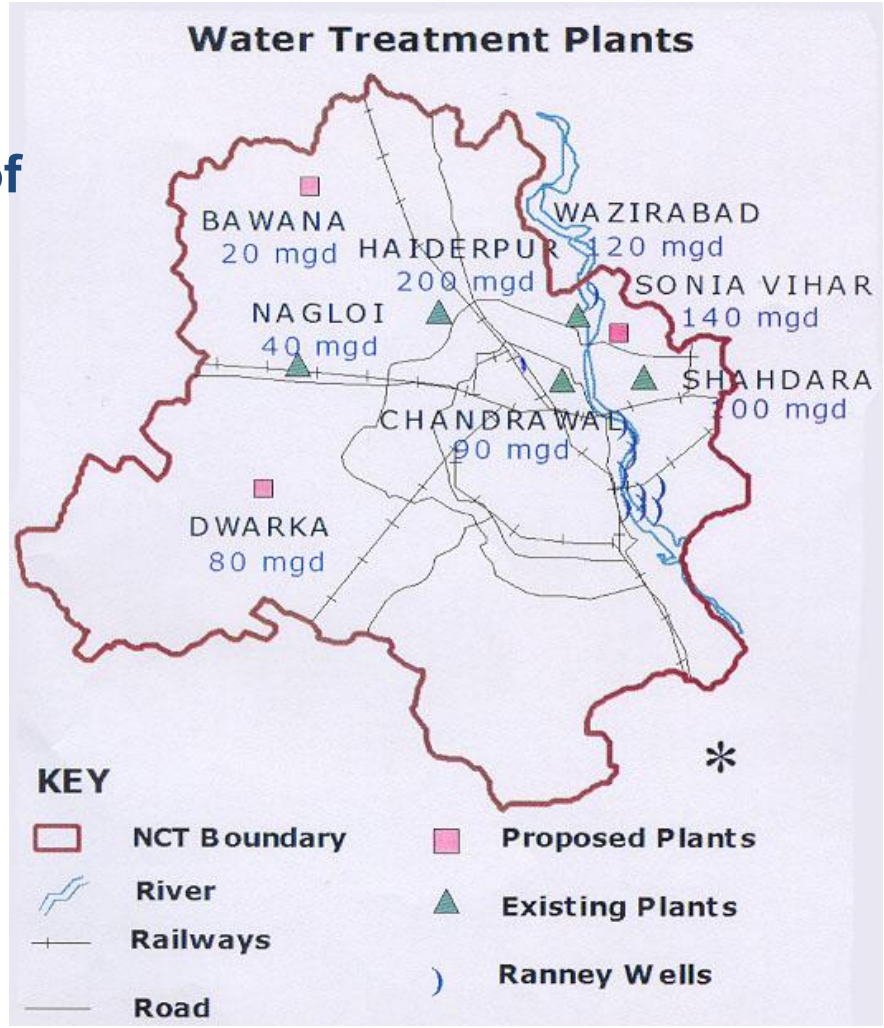
Flow of River Yamuna within Delhi is regulated by 3 barrages:

- Wazirabad Barrage
- ITO Barrage
- Okhla Barrage



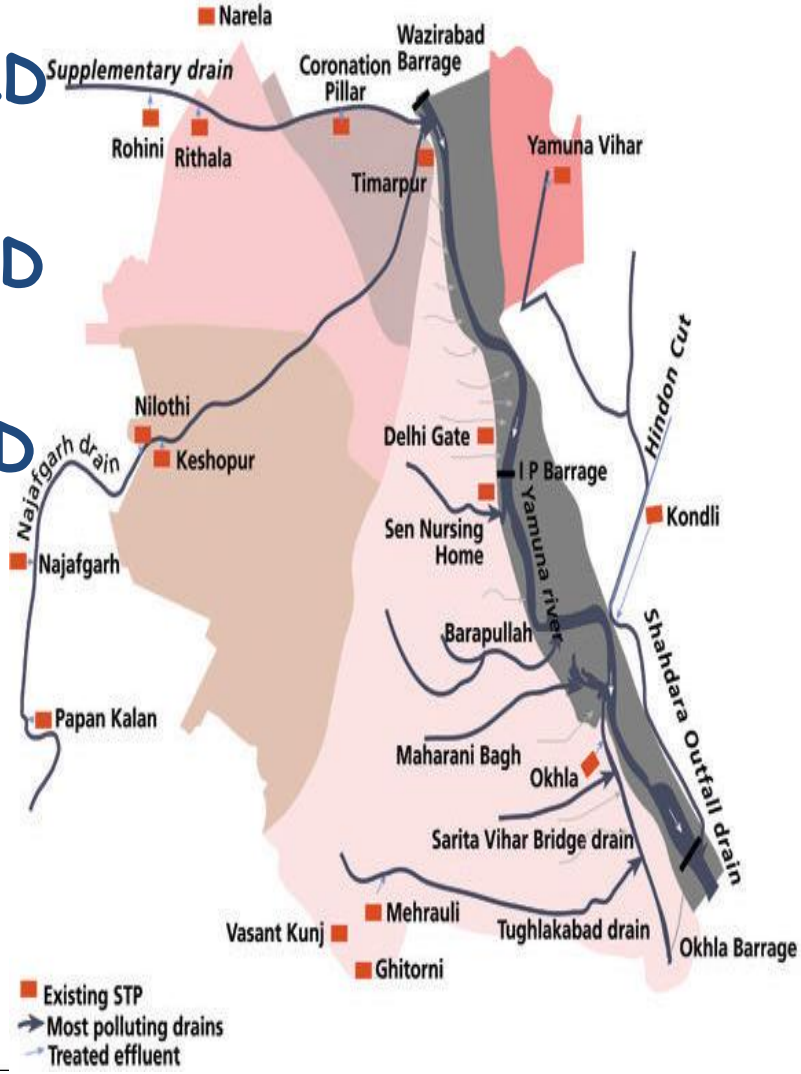
WATER TREATMENT PLANTS IN DELHI

- ✓Delhi's share of Yamuna river's total water is 4.6%.
- ✓810 MGD is the installed capacity of WTPs
- ✓Yamuna water is the direct water supply source to :
  - ✓Chandrawal I & II WTP
  - ✓Wazirabad I, II & III WTP
  - ✓Bawana WTP



SEWAGE TREATMENT PLANTS IN DEHLI

- Sewage generation : 3800 MLD
- Installed treatment capacity : 2330 MLD
- Treated sewage : 1575 MLD
- Capacity utilized : 70 %
- Sewage treated : 48 %



DETAILS OF STP

S.No.	Name of STP	Capacity(MGD)
1	Dr. Sen Nursing Home	2.2
2	Delhi Gate	2.2
3	Kondli Phase-I	10
	Kondli Phase-II	25
	Kondli Phase-III	10
4	Oxidation pond (Nehru Vihar)	6
5	Keshopur	60
6	Mehrauli	5
7	Yamuna Vihar Ph-I	10
	Yamuna Vihar Ph-II	10
8	Rithala Ph-I	40
	Rithala Ph-II	40
9	Pappan kalan	20
10	Najafgarh	5
11	Nilothi	40

DETAILS OF STP (contd…)

S. No.	Name of STP	Capacity (MGD)
12	Rohini	15
13	Coronation Pillar	40
14	Vasant Kunj (Plant 1 & 2)	5.2
15	Narela	10
16	Okhla (Plant -I, II, III IV & V)	140
17	Gitorni	5
18	Bakarwala (MCD)	3 MLD
19	Molarband (MCD)	3 MLD
20	Holambi (MCD)	2 MLD
21	Tikri khurd (MCD)	2 MLD

CETPS IN DELHI

- No. of operational CETPs : 11
  Capacity of operational CETPs : 155.7 MLD
- No. of CETPs kept in abeyance by EPCA :3
- Monthly Monitoring of inlet & outlet effluent of all CETPs
- Quarterly Inspection of all operational CETPs

STATUS OF CETPs

S. No.	Name of CETP	Industrial Area Served	Installed Capacity (MLD)
1	Badli	Badli Indl. Area	12.0
2	G.T.Karnal	G.T.Karnal Road Indl. Area	6.0
3	Jhilmil	Jhilmil Indl. Area & Friends Colony Indl. Area	16.8
4	Lawrence Road	Lawrence Road Indl. Area	12.0
5	Mangolpuri	Mangol Puri Ph. I & Ph. II	2.4
6	Mayapuri	Mayapuri Ph. I & Ph.II	12.0
7	Nangloi	Udyog Nagar Nangloi & DSIDC Complex Nangloi	12.0
8	Okhla Indl. Area	Okhla Indl. Area Ph.I and Ph. II	24.0
9	S.M.A.	S.M.A., S.S.I. & Rajasthan Ud.Ngr Indl Areas	12.0
10	Wazirpur	Wazirpur Indl. Area	24.0
11	Narela	Narela Indl. Area	22.5

Sources of Water Pollution

Domestic Sewage (about 80%) →

Industrial Wastewater →

Sources of Water Pollution

Dumping of Garbage into drains

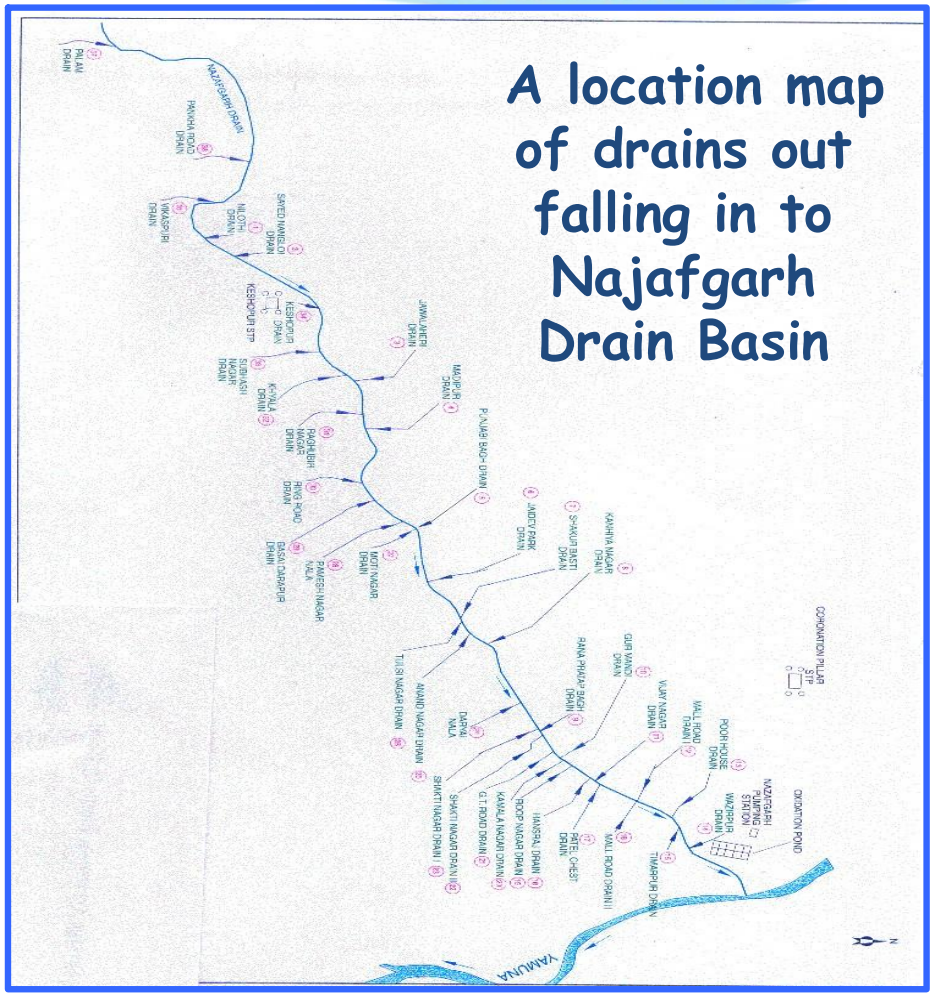
Dumping of Disposable Puja material into river/drains alongwith plastic bags

Other Sources of Water Pollution

- Untreated/Partial Treated Domestic and industrial Waste-Water (45% Delhi is unsewered)
- Pressure on Sewerage infrastructure due to Population Growth
- Siltation and Collapsing of Sewerage System
- Unauthorized Human settlement
- Encroachment near Yamuna River Bank
- Cattle wading & Dairy Waste
- Open defecation
- Other non-points source(Slaughter house, washing, etc.
- Over exploitation of fresh water from the River.

POLLUTED DRAINS

Najafgarh Drain is the major polluting drain of Yamuna River in Delhi contributing about 40.3% of total pollution to river followed by Shahdara drain



A location map of drains out falling in to Najafgarh Drain Basin

Critical Water Quality Parameters for River Monitoring

Parameters

- pH
- Dissolve Oxygen (mg/l)
- Bio-Chemical Oxygen Demand(mg/l)
- Total Coliform Organism (MPN/100 ml)

Water Quality Criteria for Designated Best Use

Class A : Drinking Water Source without conventional treatment

Class B : Outdoor bathing

Class C : Drinking Water Source with conventional treatment

Class D : Wildlife, Fisheries

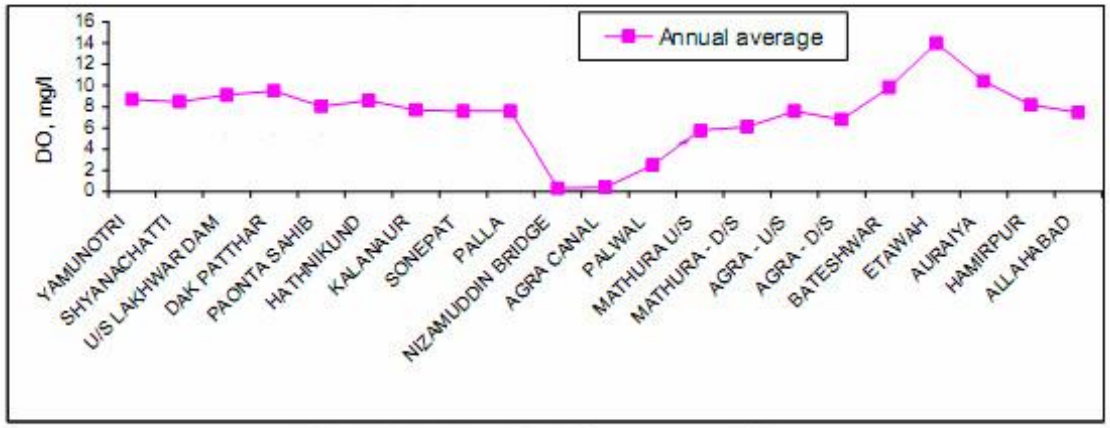
Class E : Recreation and Aesthetics, Irrigation, Industrial cooling.

Criteria	Class A	Class B	Class C	Class D	Class E
DO (mg/l)	6	5	4	4	-
BOD (mg/l)	2	3	3	--	-
Total Coliform Organism (MPN/100 ml)	50	500	5,000	--	-
pH	6.5-8.5	6.5-8.5	6-9	6.5-8.5	6.5-8.5

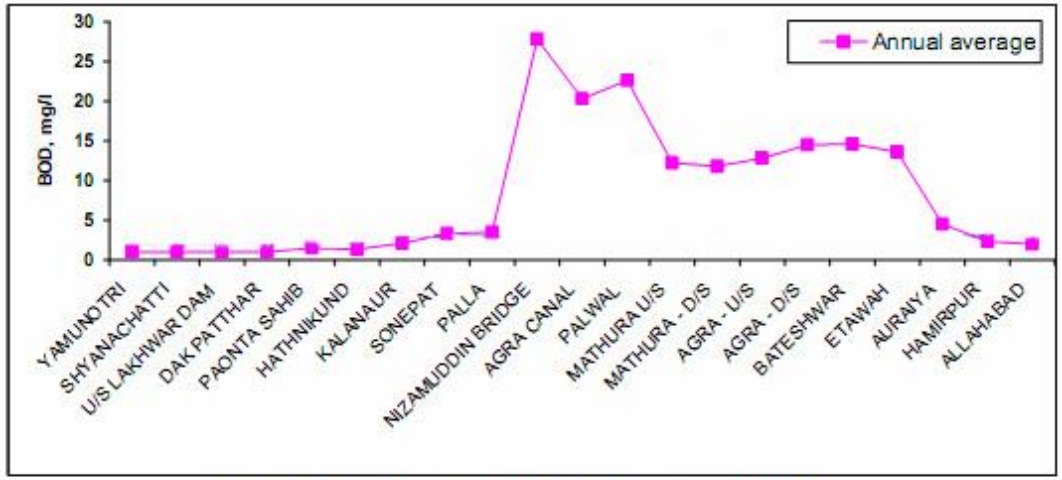
SOURCE: CPCB

WATER QUALITY PROFILE OF RIVER YAMUNA FOR CRITICAL PARAMETERS

Water Quality Profile of River Yamuna during year 2006
(from Yamunotri to Allahabad)



Dissolved Oxygen profile



Biochemical Oxygen Demand profile

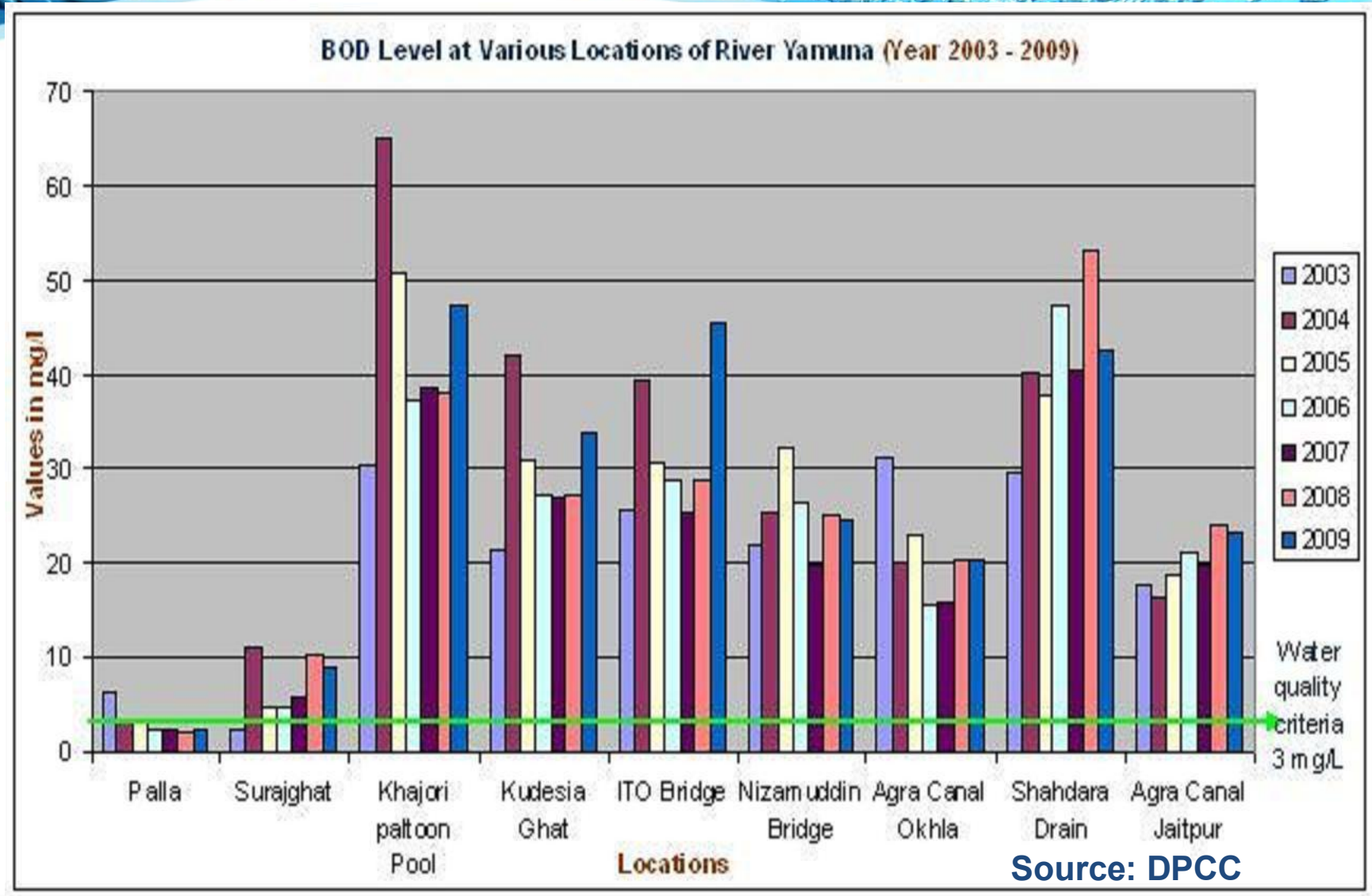
Source:CPCB

WARTER QUALITY OF RIVER YAMUNA AT LOCATIONS IN DELHI STRETCH

SAMPLING LOCATIONS	CRITICAL PARAMETERS (Annual Average- 2009)			
	DO (mg/l)	BOD (mg/l)	TC (No./100ml)	FC (No./100ml)
PALLA	7.3	2.0	3,11,167	16,117
NIZAMUDDIN	0.0	23.0	9,71,91,667	57,99,167
AGRA CANAL	0.1	15	3,87,27,273	30,94,545

Source:CPCB

WATER QUALITY OF RIVER YAMUNA AT VARIOUS LOCATIONS IN DELHI



AGENCIES INVOLVED FOR RIVER MANAGEMENT IN DELHI STRETCH

S.No	Name of Agency	Functions
1.	DDA	Determining Land Use & Enforcing Land Use
2.	CPCB/DPCC	Testing & monitoring water quality
3.	I&FC	Flood Control Works
4.	Industries Dept.	Management of industrial effluents
5.	DJB	Management of Domestic Waste & Use of raw water
6.	Local Bodies (MCD/NDMC)	Management of storm water drains

INITIATIVES TAKEN BY DEHLI GOVT.

- Enforcement of Stringent Norms for treated Sewage Water Quality and effluent water quality.
- Installation of Sewage Treatment Plants(STP)
- Installation of Effluent Treatment Plants (ETP)
- Installation of Common Effluent Treatment Plants
- Yamuna Action Plans (YAP)
- Environmental Awareness Campaign

INITIATIVES TAKEN BY DEHLI GOVT. (contd…)

- Regular water quality monitoring is carried out by DPCC at:
  - drains(24 Nos.),
  - river (9 locations),
  - Water bodies,
  - STPs (17 Nos.)
  - CETPs (11 Nos.),
  - WTPs (06Nos.),
  - ground water(34 locations)
- Mandatory Rain Water Harvesting for ground water recharge.

On-site STPs at various Establishments

- Directions issued for installation of on-site STPs/ETPs in Shopping Malls, Hotels, Hospitals, Institutes, Universities, Housing projects etc to reduce load on sewer and at the same time conserve water by treated wastewater reuse for flushing, cooling, horticulture etc.

- <u>Outcome:</u>
  - 47 ETPs installed in Health care units & 40 in process
  - STPs installed in over 150 Shopping Malls
  - More than 40 STPs installed in 4 & 5 star hotels.
  - 1200 industrial units have set up ETPs
  - Mandatory condition of wastewater treatment & its reuse in all 26 Environmental Clearances issued so far by SEAC/SEIAA-Delhi.

INITIATIVES TAKEN BY GOVT.

- Yamuna Action Plan – Phase –I (YAP-I)
- Yamuna Action Plan Extended Phase –I

(April 1993 – extended till February 2003)

- Yamuna Action Plan Phase –II (YAP-II)

(December 2004 - completion scheduled for March 2011)

Yamuna Action Plan – Phase –I (YAP-I) & Extended Phase –I (January 2001 onwards)

Facilities Provided under YAP– 1 at Delhi:

1 No. STP each of 10 MLD - Sen Nursing Home Drain - 6.21 Crores

1 No. STP each of 10 MLD Delhi Gate Drain. - 7.57 Crores

1 No. Electric Crematoria – Sarai Kale Khan. - 4.14 Crores

Total 17.92 Crores

Yamuna Action Plan – Phase –I (YAP-I) & Extended Phase –I (January 2001 onwards)

Facilities Provided under Extended YAP-1 at Delhi

Sanctioned Project Cost	- Rs. 152.71 Crores
Community Toilet Complex	- 961 Nos (27000 Seats)
Mobile Toilet Vans	- 174
Mini STPs	- 4 (10 MLD)
Micro STPs	- 10 (150 Cum/day)
Sewer Cleaning Machines	- 19
Electric Crematorium (Lodhi Road)	– 1
Public Awareness Program	

Yamuna Action Plan Phase –II

- Yamuna Action Plan Phase-II (YAP-II) has been formulated by Ministry of Environment and Forests, GOI. (January 2007 onwards in Delhi)

- Total project cost sanctioned is Rs. 387.17 Crores, which to be shared on 85%:15% basis between Govt. of India and Govt of Delhi.

APPROVED PROJECTS UNDER YAP-II

S.No	Projects	Sanctioned Cost (Rs. in Crore)	Revised Completion Date
1.	135 MLD STP at Okhla	65.034	March 2011
2.	Rehabilitation of Ring Road Trunk Sewer	87.67	December 2010
3.	Rehabilitation of Bela Road	36.66	December 2010
4.	Rehabilitation of 324 MLD STP at Keshopur	169.85	December 2010
5.	Laying of Wazirabad Road Trunk Sewer	92.34	March 2011

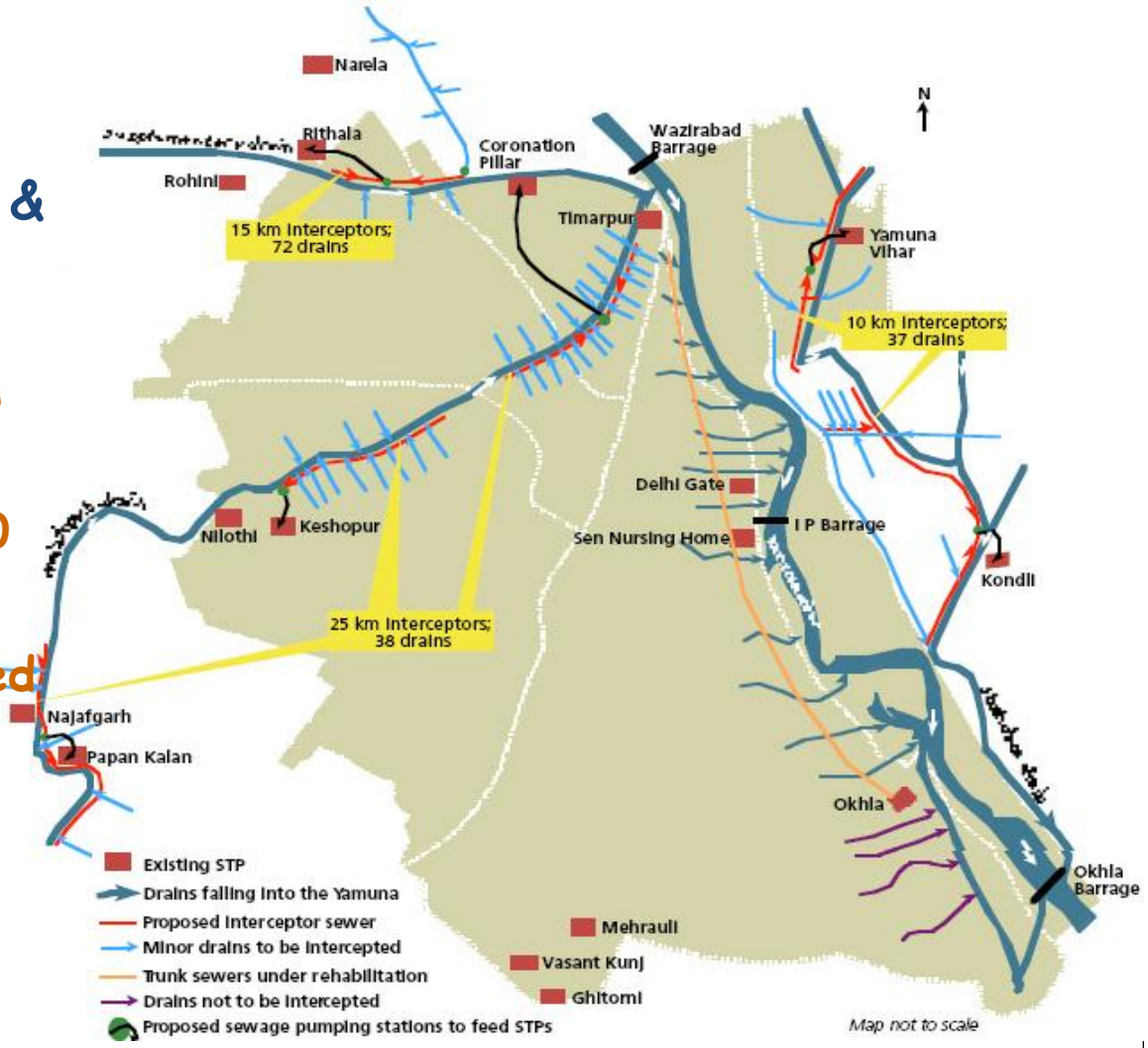
ZONAL DEVELOPMENT PLAN – ZONE "O"

- ✓Delhi Development Authority is charged with the responsibility of planning the development of entire river stretch in Delhi which is designated as ZONE"O".
- ✓River basin in Zone"O" is being used for horticulture, agriculture and has a wealth of flora and fauna
- ✓DDA is responsible for effectively securing the designated land use
- ✓It has been resolved that river zone is a vulnerable area and therefore , PSP facilities of any kind should not be permitted in this zone.
- ✓Zonal Development Plan- Zone "O" is yet to be notified by Ministry of Urban Development, GOI

INITIATIVES TAKEN BY DEHLI GOVT.

Laying of Interceptor Sewerage System along Najafgarh, Supplementary & Shahdara Drains

- Laying of interceptor sewers in a 59 km.
- Total project cost: Rs 2411.60 Crores
- Environmental Clearance Granted



ADVANTAGES OF INTERCEPTOR PROJECT

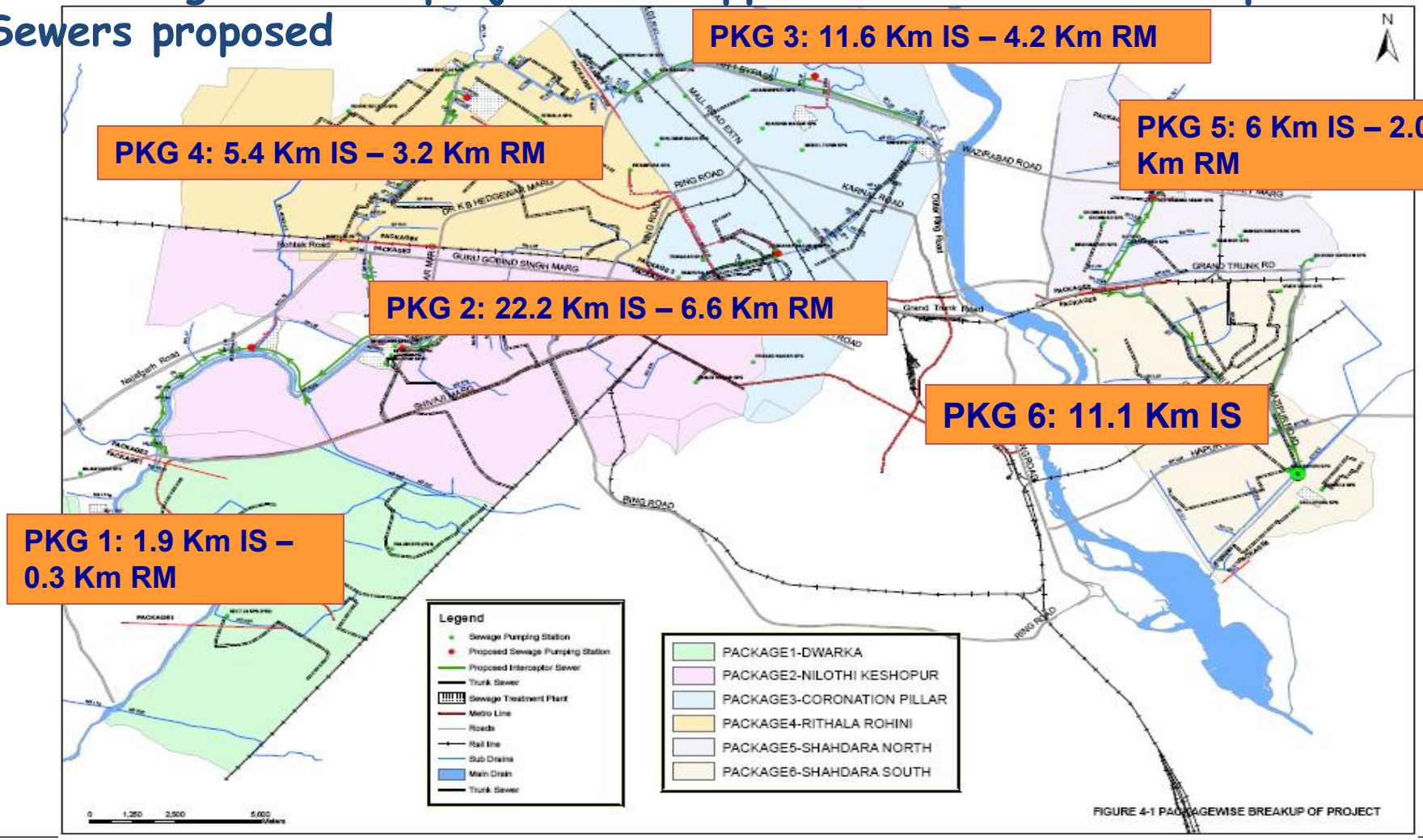
- ✓ -The project shall ensure protection of the river and the major drains from any untreated effluent.
- ✓ -There would be no duplication of effort regarding treatment of effluent as would be the case if STPs were set up at the mouth of the drain.
- ✓ -The sewage from over 1500 unauthorized colonies and other unsewered areas, including rural villages and J.J Clusters will be trapped before it is permitted to reach all major drains.
- ✓ -The interceptor sewers would be completely independent and neutral to time frame within which unauthorized colonies will be provided sewerage.

ADVANTAGES OF INTERCEPTOR PROJECT

- ✓Since new STPs will be put up after the existing capacity of the STPs is fully utilized, it will have a positive impact on the cost factor.
- ✓The interceptor sewer concept would need only two or three additional STPs in the course of the next 2-3 year for around only 70 MGD capacity.
- ✓This would ensure that the three major drains, which account for 75% of the pollution problem, the quality of water entering the river will improve.
- ✓ Augmentation of the existing capacity of STPs at the mouth of Delhi Gate and Dr. Sen Nursing Home drains constructed as pilot plant, from the existing 2.2 to 15 million gallons daily at each point.
- ✓ Interception of 13 small drains into Bela Road and Ring Road Trunk sewers after their rehabilitation.

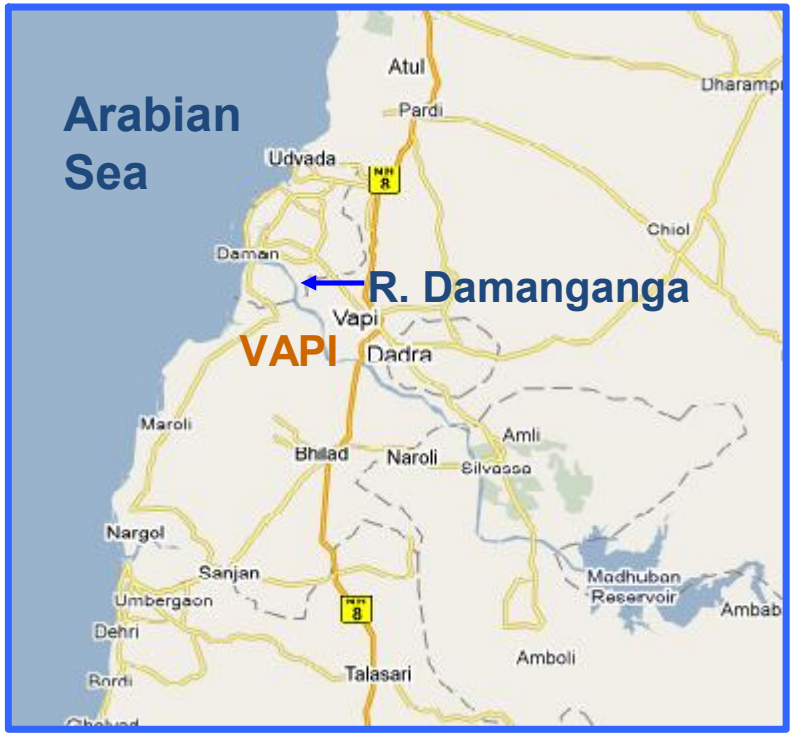
INTERCEPTOR SEWERAGE PROJECT

Six Packages of the project with approx. 60 Km of Interceptor Sewers proposed



WATER QUALITY MONITORING OF RIVER DMANAGANGA, VAPI- Case Study

- ✓River Damanganga is a perennial river flowing on the South of Vapi industrial area, which accommodates a major chemical industrial estate.
- ✓River carries the industrial effluent generated from The GIDC Vapi after treatment at CETP
- ✓It also receives effluent from two distilleries located at Daman, which further deteriorates its water quality.



RIVER DAMANGANGA

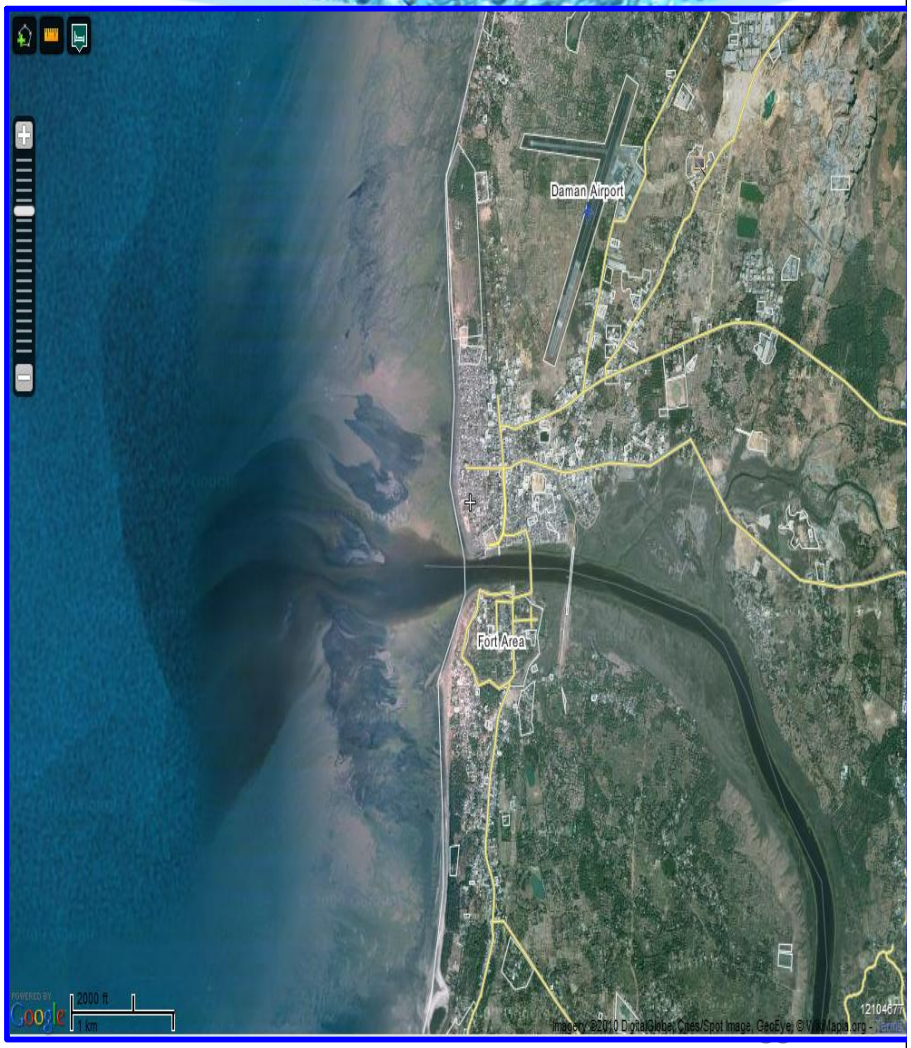
Water Quality Status of Damanganga Rriver, Vapi

Location	Parameters										
	pH	Cond.	TDS	Diss. O_2	COD	BOD	SO_4^{-2}	Total Hard-ness	NH_3-N	TKN	Cl^-
Upstream of CETP, Vapi	7.1-7.2	214-233	181-191	7.1-7.5	12-24	1.2-1.6	11-16	79-88	BDL	2.2-4.5	9.9-12
Downstream of CETP, Vapi	6.4-6.5	1679-1802	1064-1238	3.2	80-88	16	345-398	261-288	14-17	34-50	303-496

Source: CPCB, 2007

Pollution Assessment at Vapi & Daman

- ✓River is highly polluted due to heavy industrialization
- ✓UT of Daman & Diu and Dadar Nagar Haveli also reported occasional fish kills due to pollution in the river
- ✓CPCB alongwith Gujarat Pollution Control Board conducted surprise inspections of 34 industries of Vapi
- ✓River water quality was monitored at various locations & CETP discharge
- ✓Directions were issued to Chairman GPCB u/s 18(1)(b) of Water Act for issuing further directions to erring industrial units and also to M/s Vapi Waste & Effluent Management Company Ltd. (CETP) under section 5 of E (P) Act



Delhi

2010 Commonwealth Games

THE HOST CITY

THANK YOU