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Assessment of Domestic Pollution Load from Urban Agglomeration in Ganga Basin: Haryana

GRBMP: Ganga River Basin Management Plan

by

Indian Institutes of Technology



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Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin Management Plan (GRBMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin Environment Management Plan (GRBMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin Management Plan (GRB EMP). The overall Frame Work for documentation of GRBMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRB EMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who have contributed directly and those who have taken lead in preparing this report is given on the reverse side.

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1. Introduction:

Haryana is among the most prosperous states in India, having one of the highest per-capita-income in the country, and its capital is Chandigarh. Haryana is home of epic battle of Mahabharata and recital of Bhagavad Gita by Lord Krishna. It shares border with Punjab and Himachal Pradesh in the North, and with Rajasthan in the West and South and East with Uttarakhand. Haryana has the total area of 44,212 sq. km, which is about 1.34 % of the total area of the country. Haryana has the total 19 districts and the 17th largest populated state. Haryana has a catchment area of 21265 km² for river Yamuna and 79.5% cultivable land in Haryana under Ganga river basin.

River Yamuna touches the Haryana near Kalesar (Yamuna Nager) and shares eastern boundary with Uttar Pradesh and then finally enters to Delhi. The salient features of some major tributaries contributing directly or indirectly to the Ganga basin in the state of Haryana are presented in Table 1.

Table 1: The Salient Features of Tributaries of the Ganga River Basin Contributing to the River Ganga in the State of Haryana

Characteristics	Yamuna
Position	Right bank
Region of origin	Yamunotri glacier at Bandar Punch
Mouth	Ganga
Total length (km)	1376
Total catchment area (sq km)	366,223
Catchment area in Haryana (sq km)	21,265
River bed/ Soil texture	Alluvial about 42% of the basin area, followed by medium black soil 25.5% and mixed red and black soil 15%

The total annual average rainfall in the state of Haryana is in the order of 619 mm and it contributes approximately 1.6% of the total rainfall in the catchment of the Ganga basin. Ganga basin and Haryana state boundaries are shown in Figure 1, and the Yamuna basin in Haryana state is shown in Figure 2.

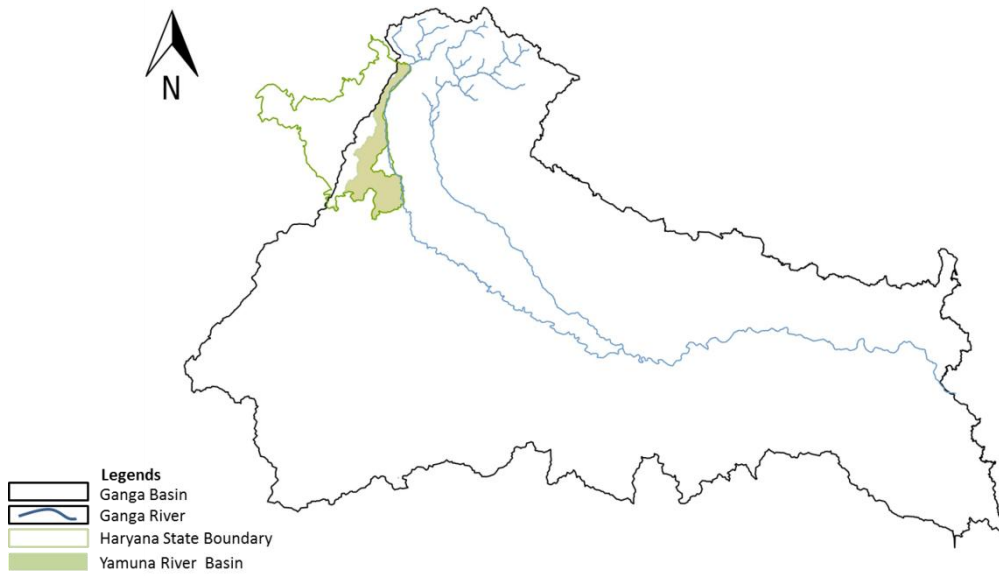


Figure 1: Ganga River Basin the Indian Territory and Haryana State

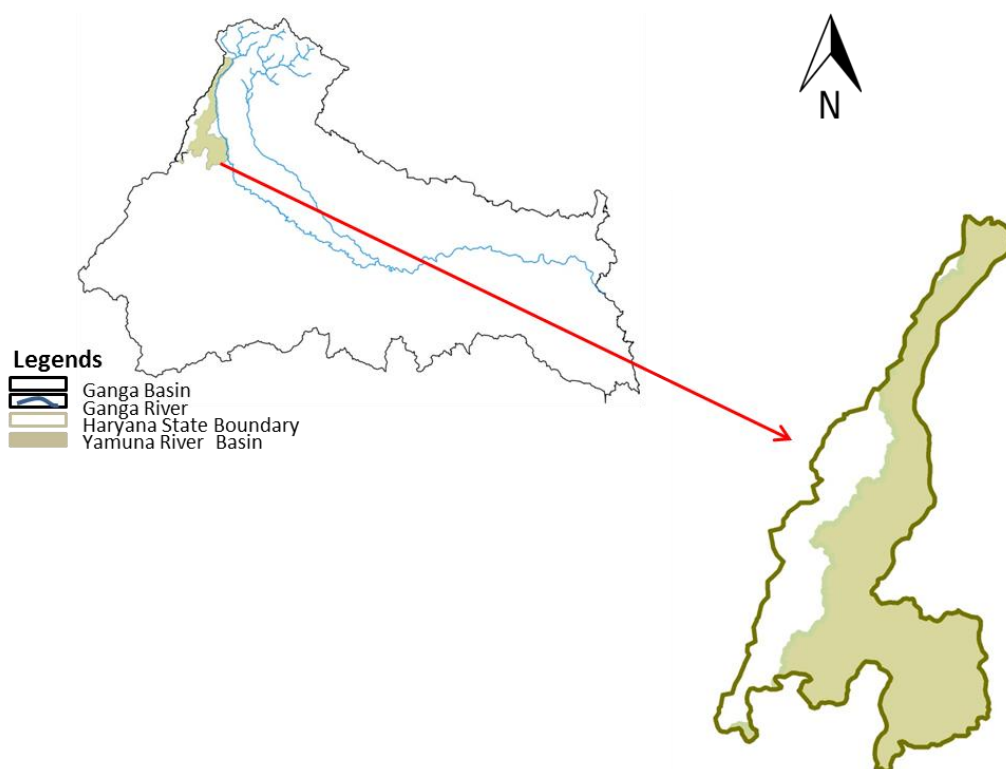


Figure 2: Major Sub-Basins or their Portions under the Ganga River Basin in the State of Haryana

2. Major Obstruction and Abstraction Projects on the Tributaries of the River Ganga Executed in the State

The natural flow regime in the river Yamuna has been altered due to construction of number of dams and barrages in the Haryana state. Haryana has 1 Dams, 5 Barrages under Ganga basin. These Dams and barrages are essentially for irrigation and domestic water supplies. Kaushalya Dam at Pinjore has 34 meter height. The list of the major dams on Ganga River and its tributaries in Haryana are mentioned underneath.

Table 2: Details of the Major Dams on the River Ganga and Her Tributaries in the State of Haryana (WRIS-wiki)

Projects	River	Year of Completion	Remark
Kaushalya Dam	Kaushalya	2011	Major Irrigation Project

Dadupur Barrage	Yamuna	1890	Major Irrigation Project
Hathini Kund Barrage	Yamuna	1999	Major Irrigation Project
Masani Barrage	Yamuna	Not Avialable	Major Irrigation Project

3. Demographic Profile of Ganga Basin in the State

Haryana has 11 Class I cities, 5 Class II cities and 21 Class III cities under Ganga basin (Figure 4-6). The total population of the state according to the Census 2011 is 25.35 million out of which 34.88% belong to the urban area. The density in the state is about 573 people per square kilometer. According to the Population Census 2011, some of the Class I cities are Bahadurgarh, Faridabad, Gurgaon, Jagadhri, Karnal, Palwal, Panipat, Rewari, Rohtak, Sonipat, and Yamunanager. The details of the area, population and the major river systems of all the Class I, II and III cities are presented in Table 3-5, respectively.

Figure 3 shows the population distribution of Class I cities, Class II and III towns in the Ganga basin in the Haryana state and along the main stream of the river Yamuna. Map in the Figure 4, 5 and 6 showing the distribution of Class I cities, Class II, and Class III towns respectively in the state under Ganga River Basin. The average population of class I town in the state is 0.39 million, approximately six times and thirteen times higher than the population of class II and class III towns, respectively. Faridabad is the highly populated class I city having the population of 1.4 million, while Jagadhri is the least populated (0.12 million) class I city. Narnaul and Hodal are the cities having maximum and minimum population under class II towns, contains 0.074 and 0.05 million, respectively. In class III towns where the population is less than 0.05 million, the maximum population is in the Jhaggar town (0.048 million), while minimum is in the Pataudi (0.02 million).

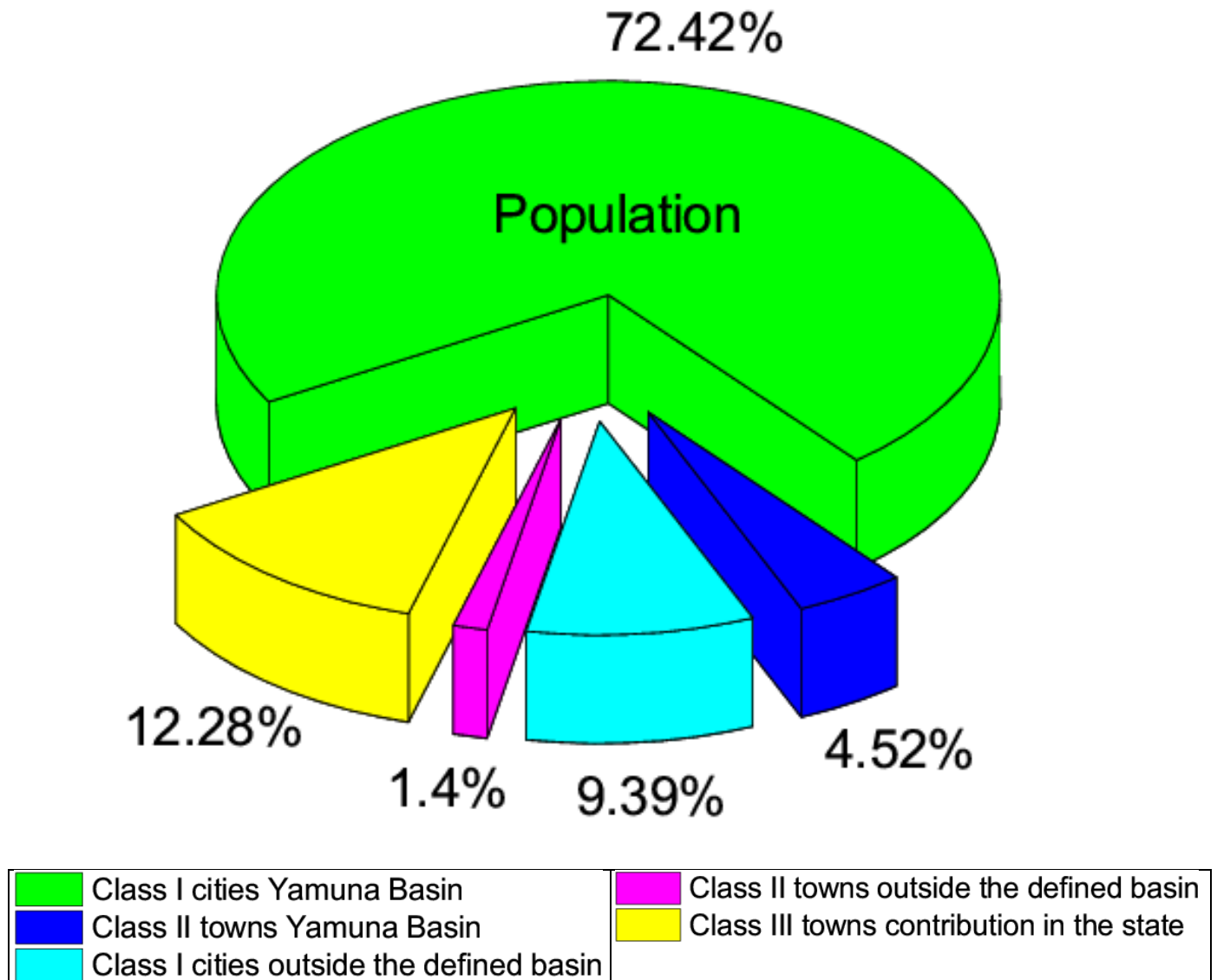


Figure 3: Population Distribution of Class I Cities and Class II, Class III Towns in the Major Basins in the State.

Table 3: Demographic details of Major urban centers (Class I) in Haryana.

SNo.	Name	River System	Total Area (sq km)	Population (as in 2011)
1	Bahadurgarh (M CI)	Yamuna River	29.5	170767
2	Faridabad (M Corp.)	Yamuna River	204	1414050
3	Gurgaon (M Corp. + OG)	Yamuna River	184.59	886519
4	Jagadhri (M CI)	Yamuna River	24.8	124894
5	Karnal (M CI + OG)	Yamuna River	29.46	302140
6	Palwal (M CI + OG)	Yamuna River	8.42	131926
7	Panipat (M CI + OG)	Yamuna River	21.86	295970
8	Rewari (M CI)	Yamuna River	22.5	143021
9	Rohtak (M CI)	Yamuna River	72.18	374292
10	Sonipat (M CI + OG)	Yamuna River	42.61	289333
11	Yamunanagar (M CI + OG)	Yamuna River	16.48	217071

Table 4: Demographic details of class II cites in Haryana.

SNo.	Name	River System	Total Area (sq km)	Population (as in 2011)
12	Charkhi Dadri (MC)	Yamuna River	5.42	56337
13	Gohana (MC)	Yamuna River	11.51	65708
14	Hodal (MC)	Yamuna River	5.39	50143
15	Narnaul (M CI)	Yamuna River	12.67	74581
16	Panipat Taraf Makhdum Zadgan (CT)	Yamuna River	6.54	67998

Table5: Demographic details of class III cites in Haryana.

SNo.	Name	River System	Total Area (sq km)	Population (as in 2011)
1	Dharuhera (MC)	Sahibi River	11.49	30344
2	Ferozpur jhirka (MC)	Yamuna River	8.86	24750
3	Ganaur (MC)	Yamuna River	9.06	35603
4	Gharaunda (MC)	Yamuna River	12.98	37816
5	Hailey Mandi (MC)	Yamuna River	16.27	20906
6	Jhajjar (MC)	Yamuna River	36	48424
7	Kalanaur (MC)	Yamuna River	6.85	23319
8	Kharkhoda (MC)	Yamuna River	1.63	25051
9	Kundli (55) (CT)	Yamuna River	7.9	21633
10	Manesar (154) (CT)	Yamuna River	14.7	23448
11	Palwal (Rural) (Part) (73) (CT)	Yamuna River	20.1	23072
12	Panipat Taraf Ansar (CT)	Yamuna River	7.88	42877
13	Panipat Taraf Rajputan (CT)	Yamuna River	5.1	28803
14	Pataudi (MC)	Yamuna River	13.51	20418
15	Punahana (MC)	Yamuna River	10.12	24734
16	Safidon (MC)	Yamuna River	9.48	34728
17	Samalkha (MC + OG)	Yamuna River	4.66	39710
18	Sampla (MC)	Yamuna River	17.83	20563
19	Sasauli (CT)	Yamuna River	2.88	22479
20	Sohna (MC)	Yamuna River	9.7	36552
21	Taoru (MC)	Yamuna River	4.52	22599

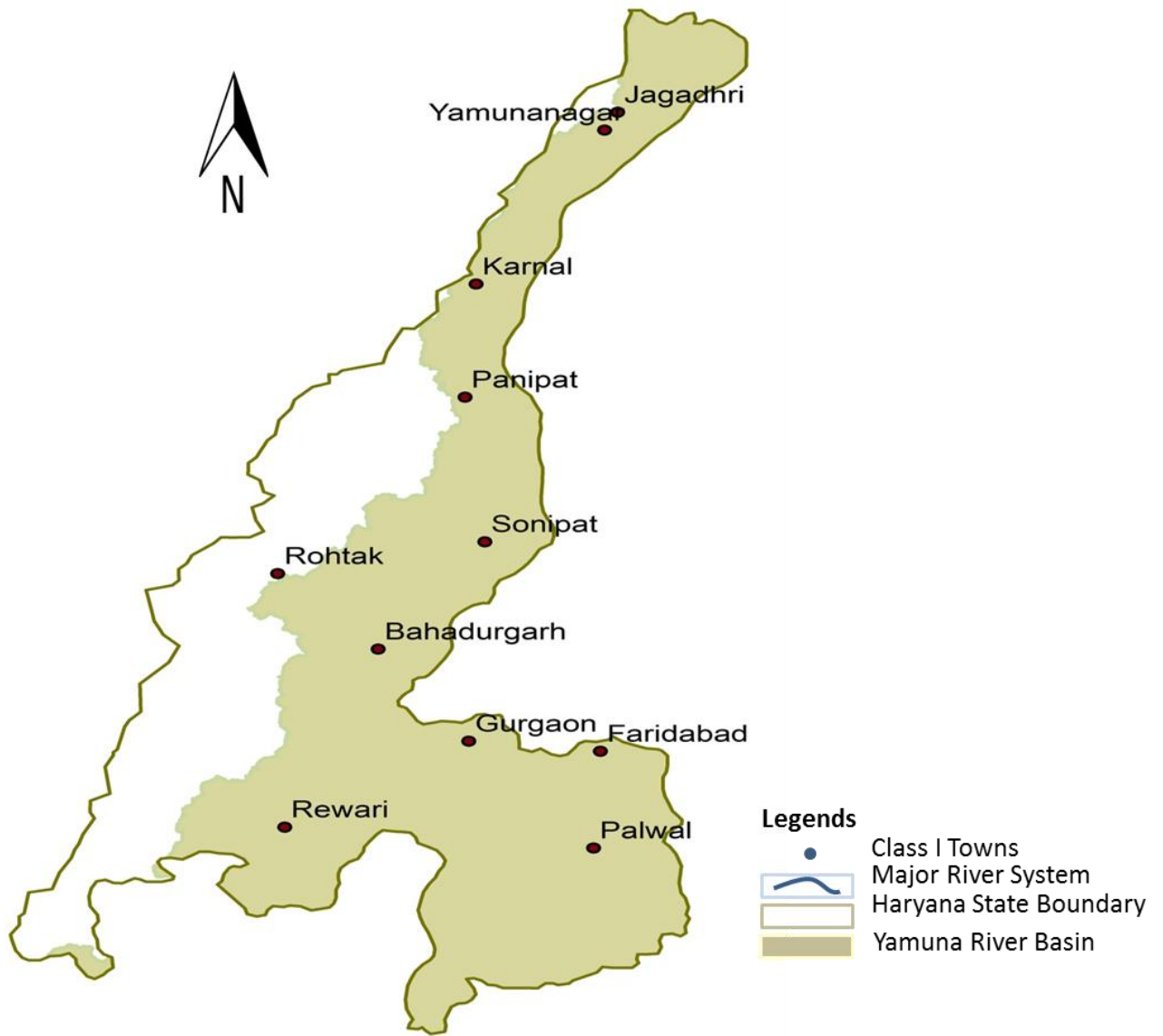


Figure 4: Class I Cities in the state of Haryana under Ganga River Basin

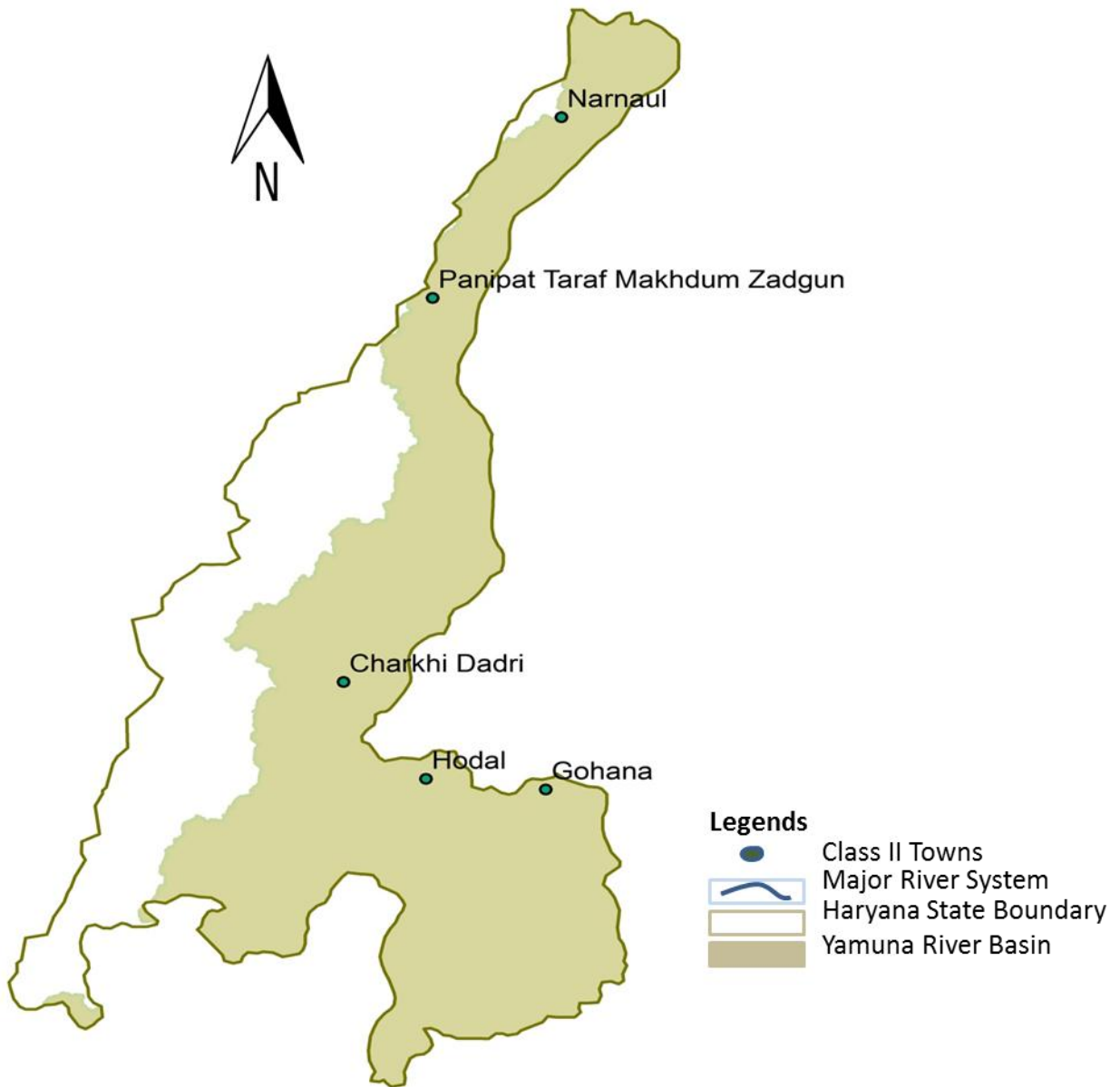


Figure 5: Class II Cities in the state of Haryana under Ganga River Basin

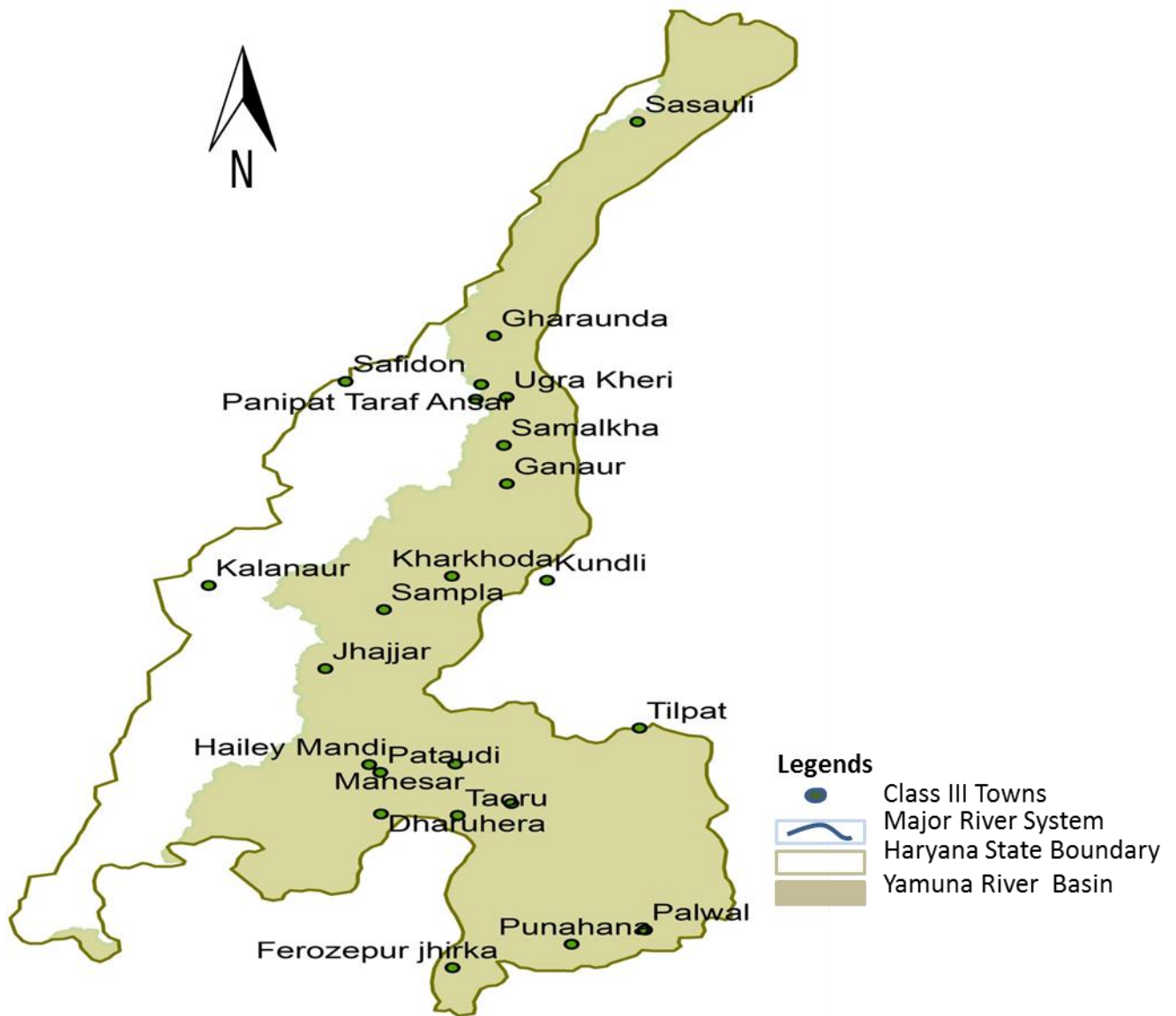


Figure 6: Class III Cities in the state of Haryana under Ganga River Basin

4. Pollution Load

The major pollution load in the area of basin under the state is due to point and nonpoint sources. Discharges of untreated/partially treated sewage from urban centers, discharge from open drain carrying sewage, discharges from the tributaries and discharge of untreated/partially treated wastewater from industrial units are the major point sources that contribute to the pollution load in the state. The major cities contributing the wastewater discharge of approximately 239 MLD in river Yamuna are in Faridabad, Karnal, Panipat, Sonipat, Gurgaon (CPCB, 2013). The report published by CPCB in 2009 revealed that the total sewage generation of class I cities in whole Ganga basin is 15,305.55 MLD while its treatment capacity is only one third (32%) of the total sewage generation (4,886.28 MLD). The situation getting more critical in the class II towns as the difference between the sewage generation (1,083.85 MLD) and its treatment capacity (91.82 MLD) increased.

The maximum sewage generated by class I cities and class II towns of Haryana are 592 and 34 MLD. The comparison of the total sewage generation and sewage treatment capacity of the class I cities and Class II towns of the states lying under Ganga basin has been represented in Figure 8. The trends of the data Haryana depicted that the maximum share of sewage generation (88.33%) is from class I cities followed by class II and III towns, 10.12 and 4.89%, respectively (Figure 7). The BOD and COD load for Class I cities, Class II and Class III towns are in the range of 81.8, 12.28 and 5.92%, respectively. The TKN load almost showing the same trend as BOD and COD load.

The assessment of the total water supply and total sewage generation of class I cities in the state revealed that the maximum sewage generation is in Faridabad 152.7 MLD, approximately 79.9% of the water supply. In case of the class II towns the sewage generation in Namaul is maximum 8.1 MLD, ~80.4% of its total water supply. The total BOD and COD load in Kg/day has been estimated on the per capita basis in Class I towns and its average are approximately 10.6 and 18.1 tons/day, respectively. The average BOD and COD load from the Class II towns is 1.7 and 2.9 tons/day, respectively whereas Class III towns contribute approximately 0.9 tons/day and 1.55 tons/day of BOD and COD, respectively. The maximum and minimum BOD and COD contributing cities in Class I towns are Faridabad and Jagadhri, respectively. In Class II towns

maximum BOD and COD is from Namaul, whereas minimum BOD and COD are from Hodal. In class III towns maximum and minimum BOD and COD is from Jhajjar and Pataudi respectively.

The total TKN in metric tons/day contributed by Class I, Class II and Class III towns are approximately 2.1, 0.33 and 0.15 tons/day, respectively. The maximum and minimum contribution of TKN from class I towns are from Faridabad and Jagadhri respectively. The maximum and minimum contribution of TKN from class II towns is from Namaul and Hodal, respectively while the maximum and minimum contribution of TKN from class III towns is from Jhajjar and Pataudi, respectively. The estimates of total water supplied, total sewage generated, BOD, COD and TKN loads are summarized and illustrated in Figures (8-10) for class I cities and class II towns. The comparative account of all the classes (I, II and III) for its population, sewage generation, water supply and BOD, COD and TKN load are presented in Figure 11.

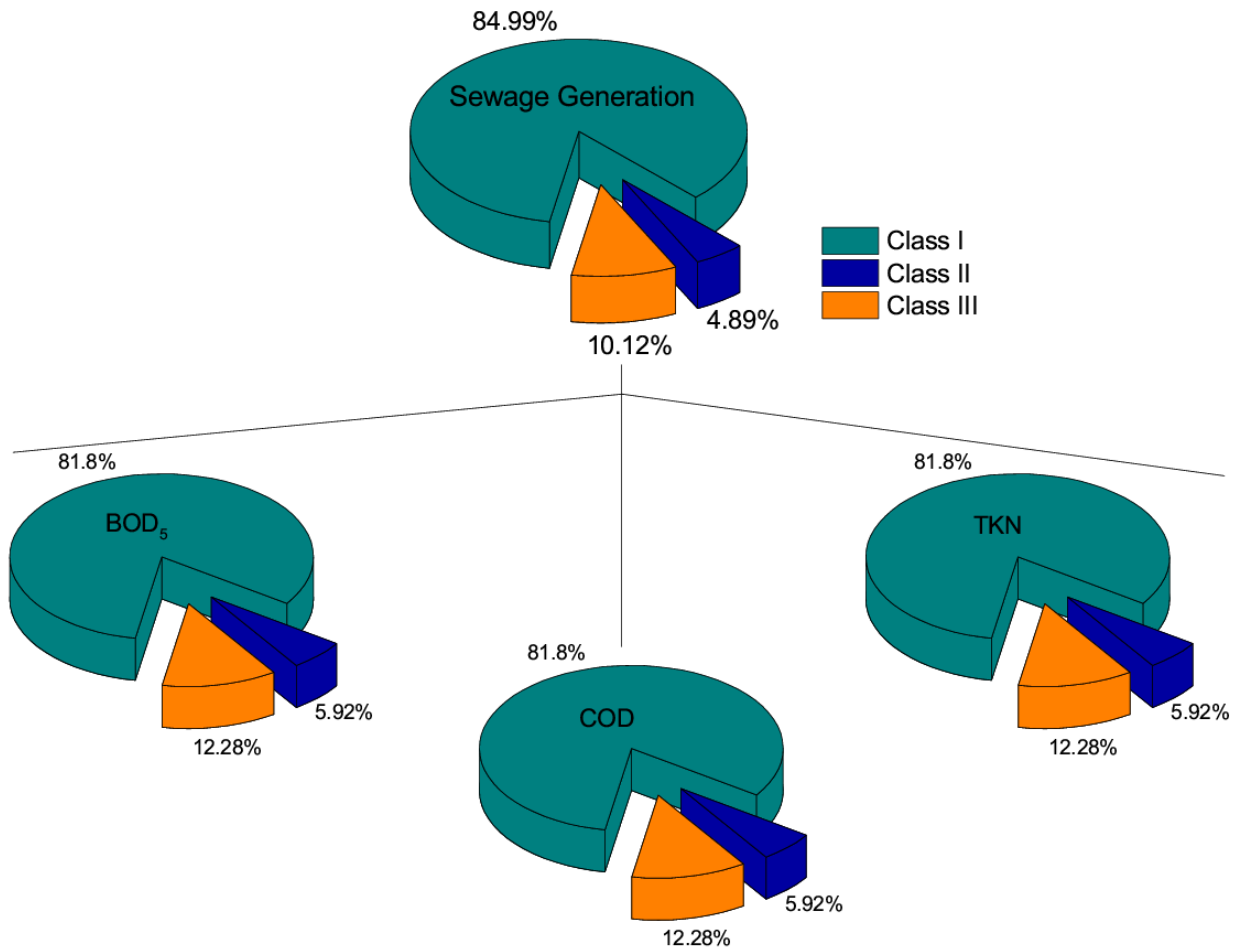


Figure 7: Distribution of Pollution Load of Class I Cities and Class II, Class III Towns in Haryana

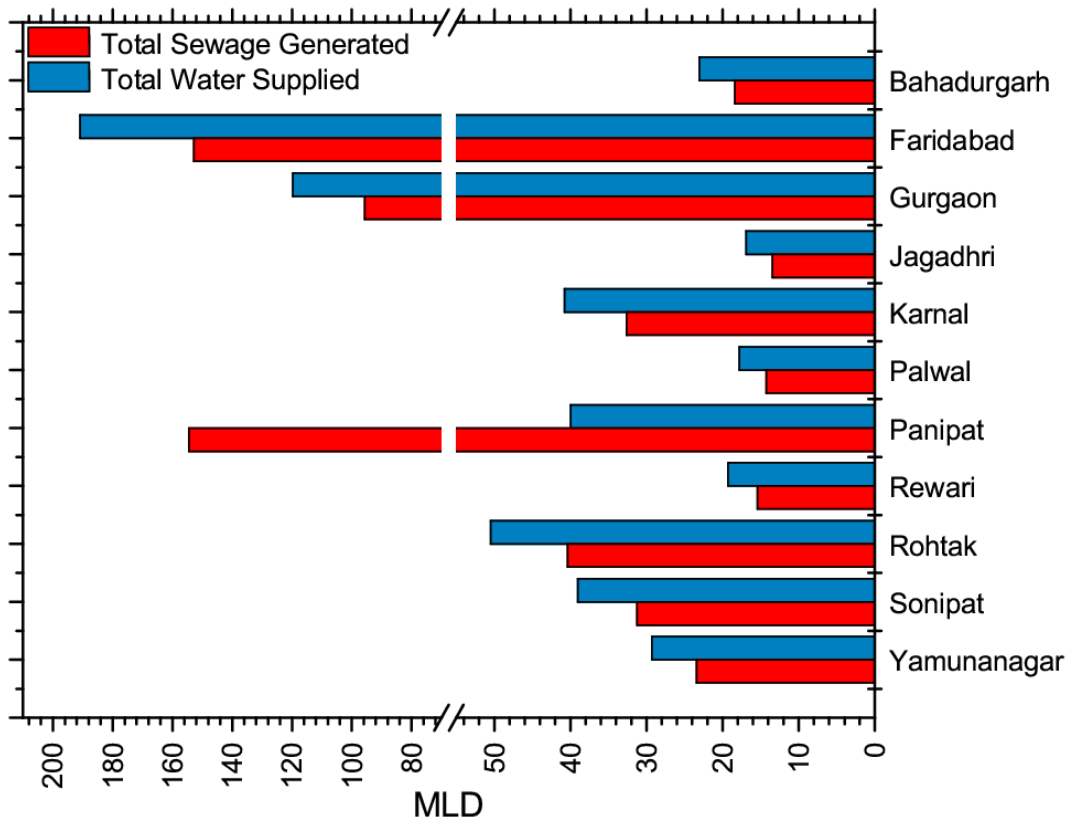


Figure 8a: Assessment of Water Supply and Sewage Generation (MLD) in Class I Cities in the Ganga River Basin Lying in the State of Haryana

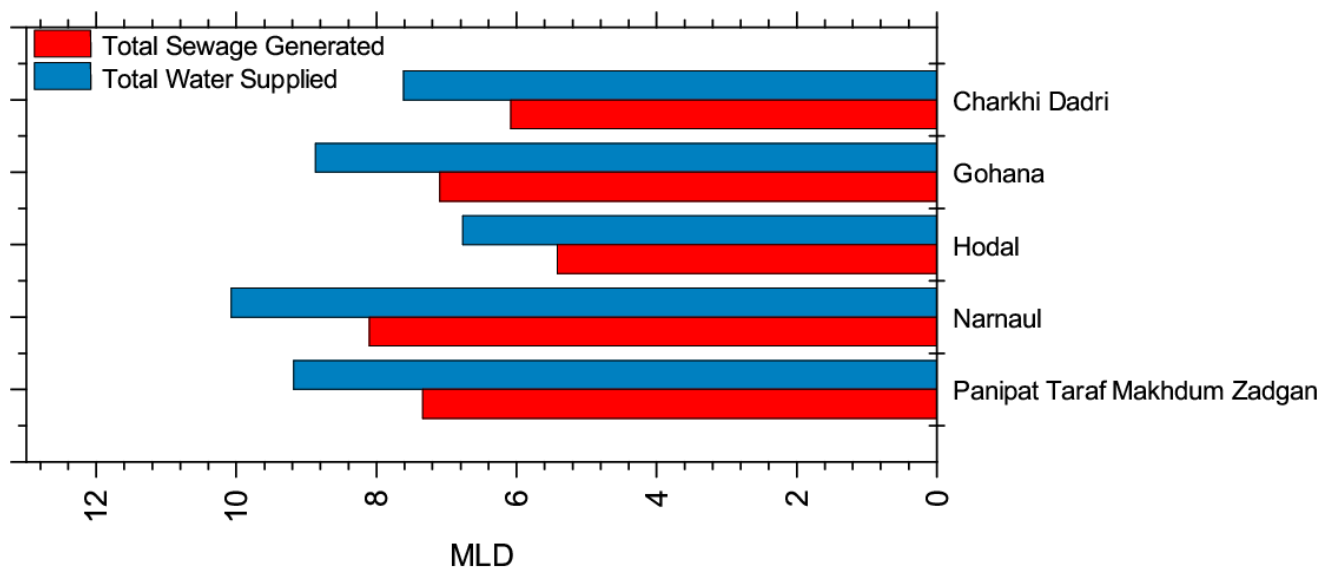


Figure 8b: Assessment of Water Supply and Sewage Generation (MLD) in Class II Towns in the Ganga River Basin Lying in the State of Haryana

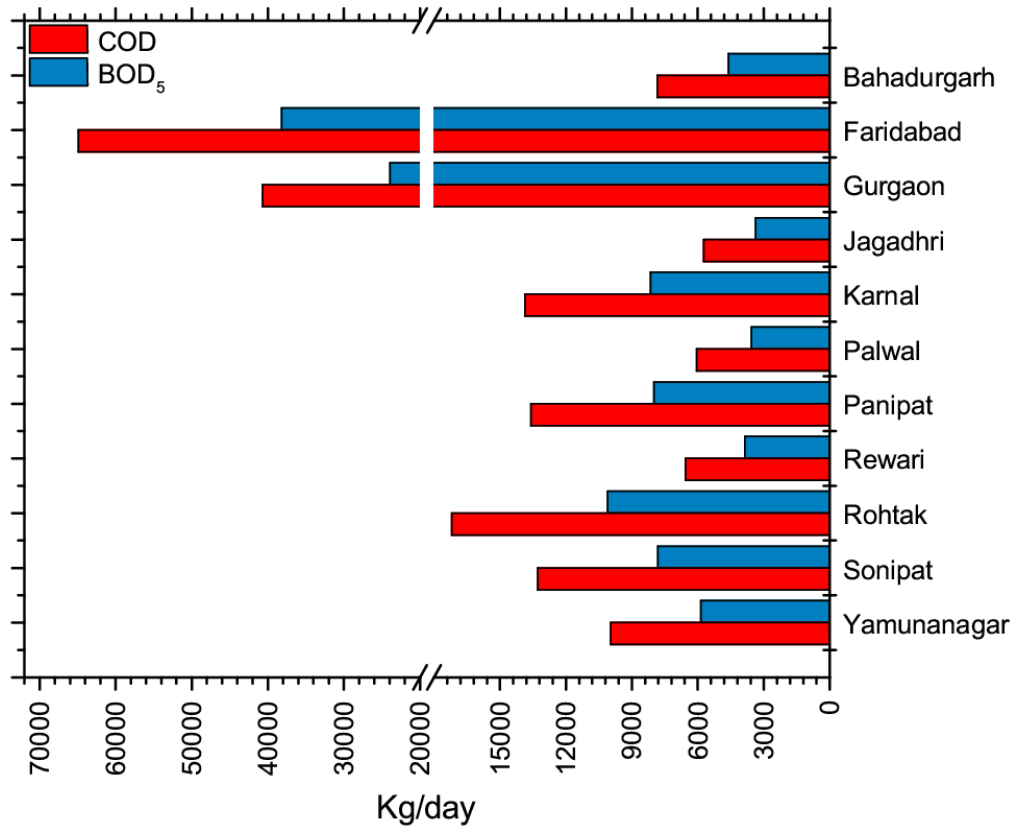


Figure 9a: Assessment of Organic Pollution Load (kg/day) from Class I Cities in the Ganga River Basin lying in the State of Haryana

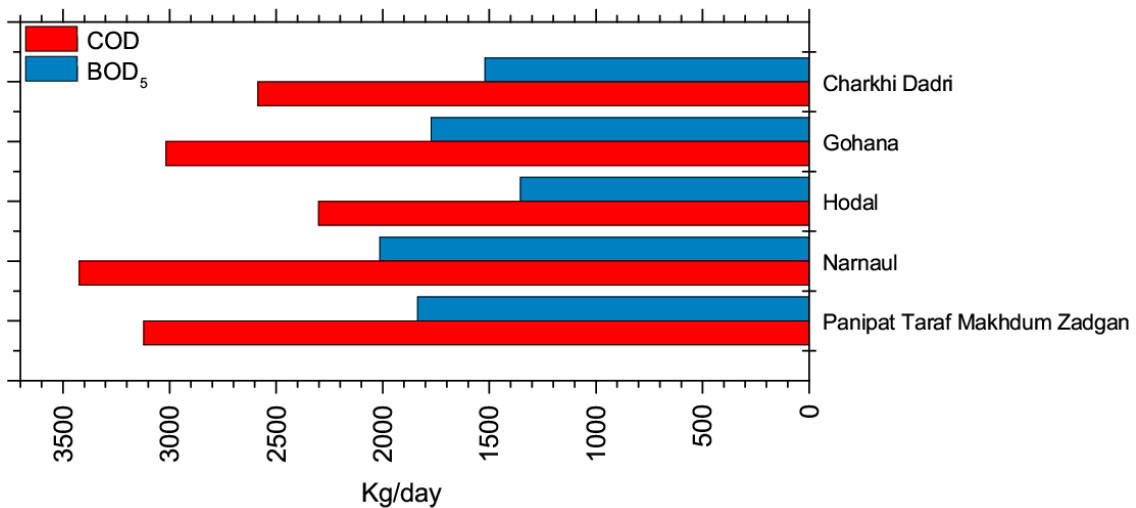


Figure 9a: Assessment of Organic Pollution Load (kg/day) from Class II Towns in the Ganga River Basin lying in the State of Haryana

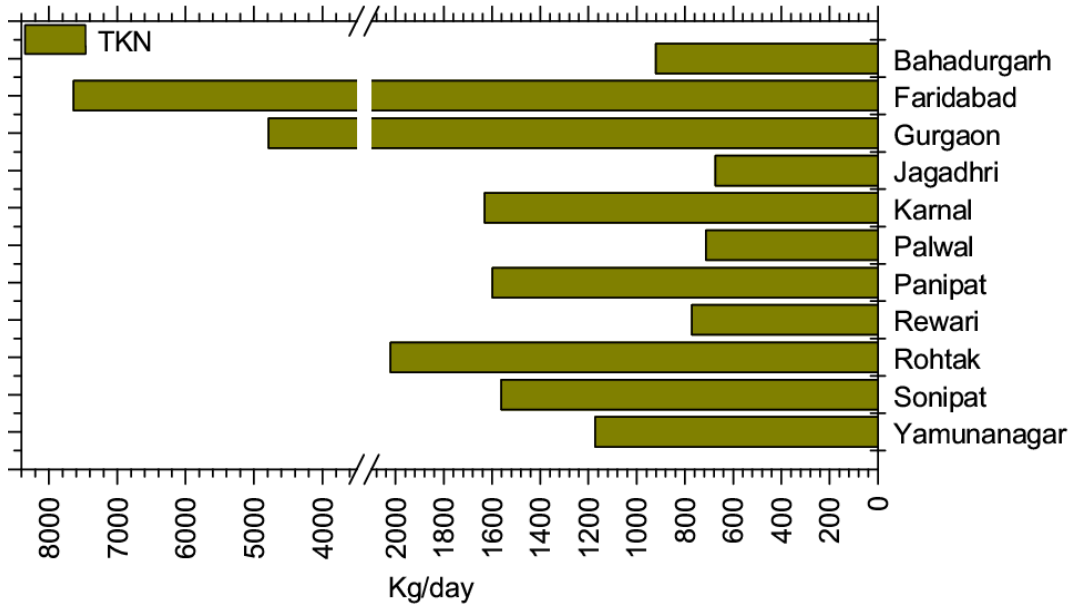


Figure 10a: Assessment of TKN Load (kg/day) from Class I Cities in the Ganga River Basin Lying in the State of Haryana

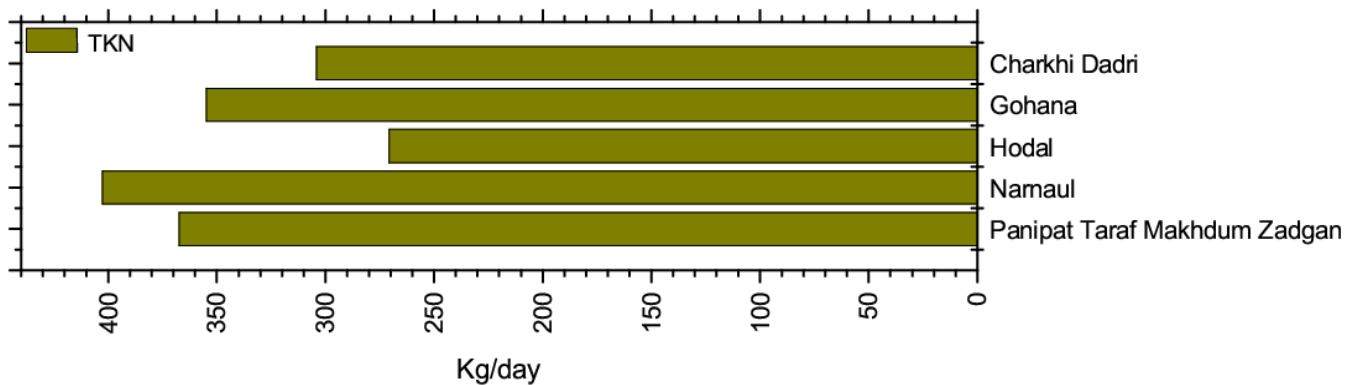


Figure 10a: Assessment of TKN Load (kg/day) from Class II Towns in the Ganga River Basin Lying in the State of Haryana

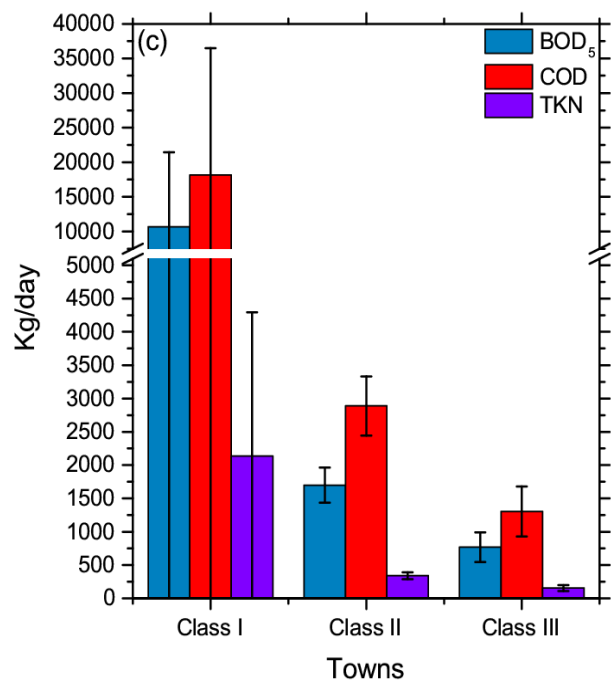
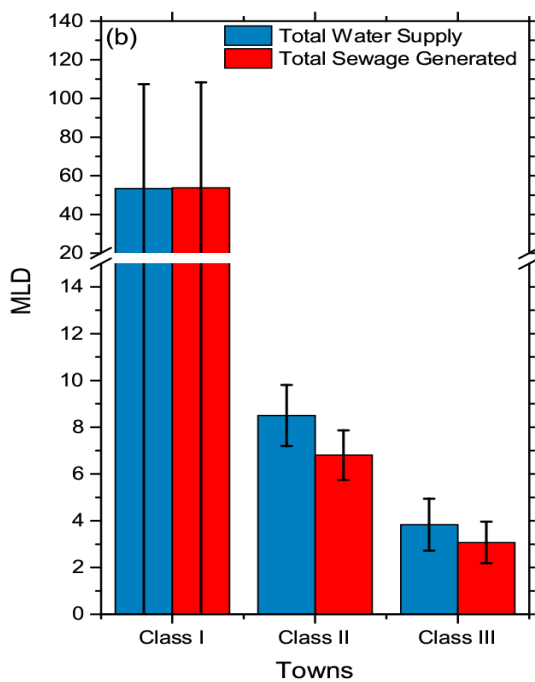
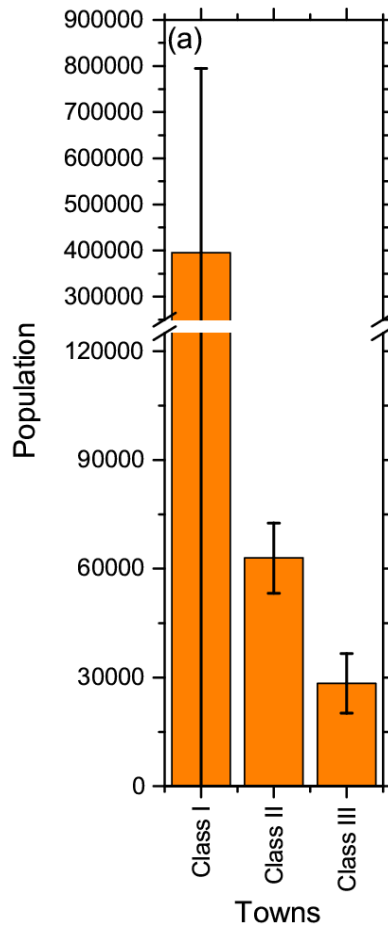


Figure 11: Comparative Analysis of Class I, Class II and Class III Cities/Towns Lying Under the State: (a) Population (b) Total Water Supply and Sewage Generation (c) Pollution Load

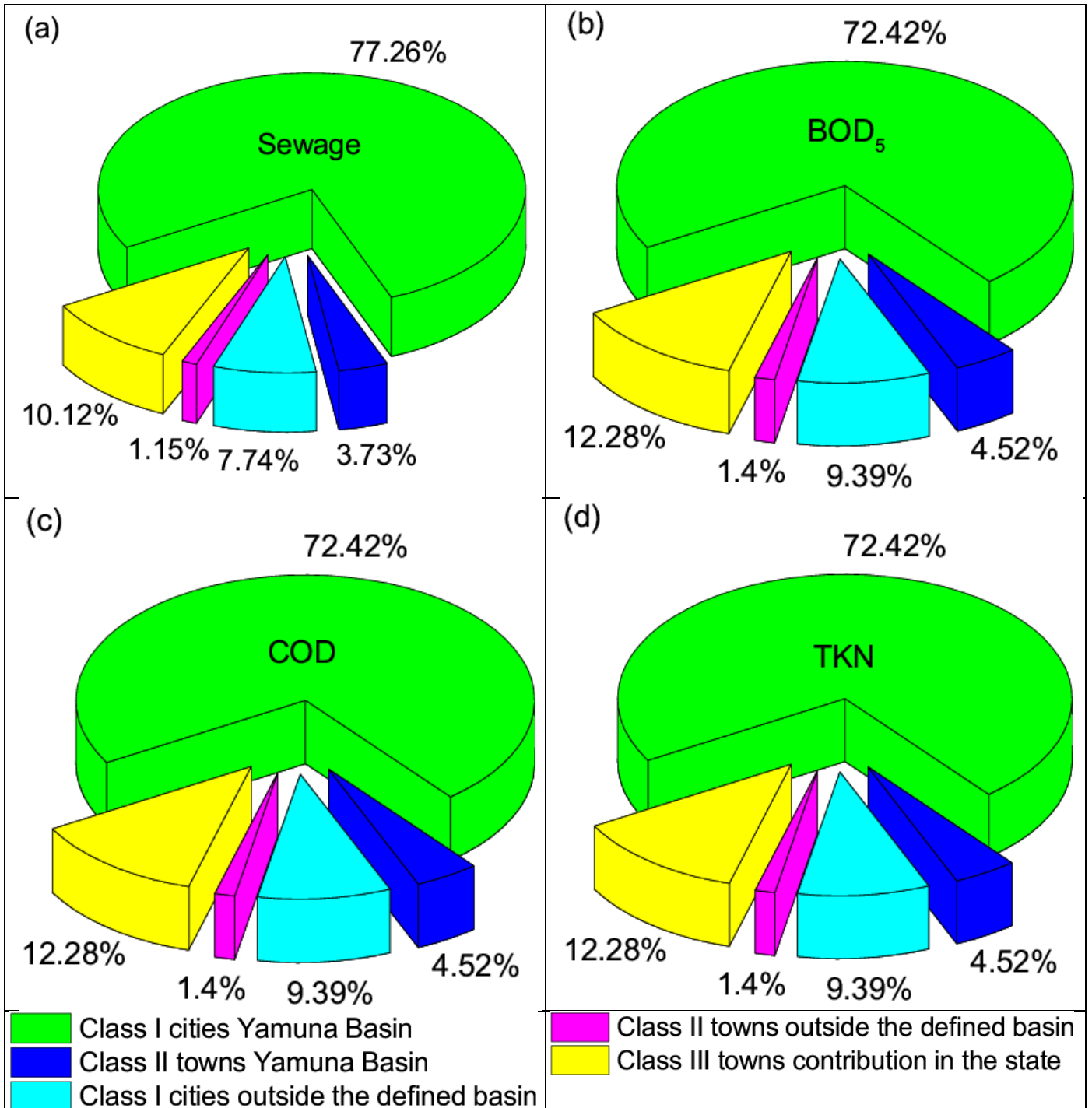


Figure 12 (a-d): Pollution load of Class I Cities and Class II, Class III Towns in the Major Basins in the State: (a) Sewage Generation; (b) BOD₅; (c) COD; (d) TKN

The results of the pollution load of Class I cities, Class II and Class III towns under the major basins of river Ganga in the state has been evaluated (Figure 12a-d) and the results revealed that the percentage of the total sewage generation is maximum in the Class I cities situated along the main stem of Yamuna (77.26%). The Class I cities and Class II towns outside the major defined basins combinedly release 8.99% of waste water. The percentage sewage generation by Class III towns of the entire state is 10.12% of the total sewage generated by the state.

The BOD, COD and TKN load contributed by Class I cities of the main stem of Yamuna is 72.42%. The Class II and Class III towns of the state imparted around 4.52% and 12.69% respectively of the total BOD, COD, and TKN load. The details of the BOD and COD load in the state are presented in Figure 12b and c.

5. Conclusions:

River Yamuna is the one of the main tributaries of River Ganga flows in the Indo-Gangetic plains. Yamuna flows from Yamunotri to Allahabad, and merge with river Ganga. During her course from Yamunotri to Allahabad, it passes through Himachal Pradesh, Uttarakhand, Haryana, Delhi and Uttar Pradesh. The catchment of the river addressed the load of 11 Class I cities, 5 Class II towns and 21 Class III towns, directly or indirectly. The scenario of water quality in the system is varies from bad to worse base on the spatial and temporal alterations. The multitudinous problems are also arising during lean season due to the continuous discharge of untreated and/or partially treated sewage and industrial wastewater.

The maximum sewage generation is in the Class I cities (77.26%) followed by Class III (10.12%) and Class II towns (7.74%). Pollution load (BOD, COD and TKN load) also follows the same trend with maximum values for Class I cities. Faridabad and Namaul are the Class I and Class II towns showing maximum amount of sewage generation in comparison to their water supply. The maximum BOD, COD and TKN contributing Class I cities, Class II and III towns are Faridabad, Namaul and Jhajjar respectably. All calculations related to pollution load were done on per capita basis. There is lack of real data (drains, water supply, etc.) for the Haryana state and real data collection is suggested to be done for more accurate pollution situation.

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Appendix-1

Compilation of Fact Sheets of Water Balance & Pollution Load (Domestic) of Major Class I Cities/Towns in Haryana

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Bahadur Garh			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	29.50
2	Population as in 2011	:	170767
3	Population Growth Rate as in 2011 (%)	:	29.44
4	Total Number of Wards	:	31
5	Population per Ward (Thousands)	:	5509
6	Total Number of Household as in 2011	:	34910
7	Number of Household per Ward	:	1126
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tube wells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NIL
15	Total Pumping Capacity (MLD)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	23.1
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.0
19	Total Sewage Generation (MLD)*	:	18.4
20	Per Capita Sewage Generation (lpcd)	:	108.0
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	3.0
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	18.0
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	1.0
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD	: 4610.7
		COD	: 7838.2
		TKN	: 922.1
30	Wastewater Disposal Means	:	River Disposal

31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	2
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Faridabad			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	204.00
2	Population as in 2011	:	1414050
3	Population Growth Rate as in 2011 (%)	:	33.91
4	Total Number of Wards	:	35
5	Population per Ward (Thousands)	:	40401
6	Total Number of Household as in 2011	:	290675
7	Number of Household per Ward	:	8305
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	190.90
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	152.72
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	142.3
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	4.0
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita)	BOD ₅	: 38179.4

	Contribution) (kg/d)	COD	:	64904.9
		TKN	:	7635.9
30	Wastewater Disposal Means		:	River Disposal
31	Name of River/Streams for Wastewater Disposal		:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal		:	4
33	Number of Water Bodies		:	4
34	Gross Area of Water Bodies (Hectare)		:	NA
35	Area of Water Bodies as % of Total Area		:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet				
City: Gurgaon			State: Haryana	
S. No.	Items			Value
1	Total Area (sq km)		:	184.59
2	Population as in 2011		:	886519
3	Population Growth Rate as in 2011 (%)		:	340.30
4	Total Number of Wards		:	74
5	Population per Ward (Thousands)		:	11980
6	Total Number of Household as in 2011		:	208229
7	Number of Household per Ward		:	2814
8	Surface Water Supply (MLD)		:	NA
9	Ground Water (GW) Supply (MLD)		:	NA
10	Number of Bore Wells		:	NA
11	Ground Water Extraction per Bore Well (MLD)		:	NA
12	Number of Hand Pumps/ Tubewells		:	NA
13	Ground Water Extraction per Hand Pump (lpcd)		:	500
14	Number of Pumping Stations for Water Supply		:	NA
15	Total Pumping Capacity (MLD)		:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		:	119.7
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		:	135.0
19	Total Sewage Generation (MLD)*		:	95.7
20	Per Capita Sewage Generation (lpcd)		:	108.0
21	Sewage Collection (MLD)		:	NA
22	Percentage of Sewage Collection (%)		:	NA
23	Number of STPs		:	3.0
24	Total Installed Capacity of STPs under GAP I & II (MLD)		:	148.0
25	Current Utilized Capacity of STPs (MLD)		:	NA
26	Percentage Utilization of Installed Capacity (%)		:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	:	NA
		COD	:	NA

		TKN	:	NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	:	23936.0
		COD	:	40691.2
		TKN	:	4787.2
			:	
30	Wastewater Disposal Means		:	River
31	Name of River/Streams for Wastewater Disposal		:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal		:	4.0
33	Number of Water Bodies		:	7.0
34	Gross Area of Water Bodies (Hectare)		:	NA
35	Area of Water Bodies as % of Total Area		:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet				
City: Jagadhari			State: Haryana	
S. No.	Items			Value
1	Total Area (sq km)		:	24.80
2	Population as in 2011		:	124894
3	Population Growth Rate as in 2011 (%)		:	23.30
4	Total Number of Wards		:	31
5	Population per Ward (Thousands)		:	4029
6	Total Number of Household as in 2011		:	26716
7	Number of Household per Ward		:	862
8	Surface Water Supply (MLD)		:	NA
9	Ground Water (GW) Supply (MLD)		:	NA
10	Number of Bore Wells		:	NA
11	Ground Water Extraction per Bore Well (MLD)		:	NA
12	Number of Hand Pumps/ Tubewells		:	NA
13	Ground Water Extraction per Hand Pump (lpcd)		:	500
14	Number of Pumping Stations for Water Supply		:	NA
15	Total Pumping Capacity (MLD)		:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)		:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		:	16.9
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		:	135
19	Total Sewage Generation (MLD)*		:	13.49
20	Per Capita Sewage Generation (lpcd)		:	108
21	Sewage Collection (MLD)		:	NA
22	Percentage of Sewage Collection (%)		:	NA
23	Number of STPs		:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)		:	NA
25	Current Utilized Capacity of STPs (MLD)		:	NA
26	Percentage Utilization of Installed Capacity (%)		:	NA

27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 3372.1
		COD	: 5732.6
		TKN	: 674.4
30	Wastewater Disposal Means	:	River
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	1
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Karnal			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	29.46
2	Population as in 2011	:	302140
3	Population Growth Rate as in 2011 (%)	:	36.57
4	Total Number of Wards	:	20
5	Population per Ward (Thousands)	:	15,107
6	Total Number of Household as in 2011	:	63280
7	Number of Household per Ward	:	11062
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	40.79
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	32.63
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	30.84
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	2.0

24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	48.0
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 8157.8
		COD	: 13868.2
		TKN	: 1631.6
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	1
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Palwal			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	8.42
2	Population as in 2011	:	131926
3	Population Growth Rate as in 2011 (%)	:	30.98
4	Total Number of Wards	:	32
5	Population per Ward (Thousands)	:	4,123
6	Total Number of Household as in 2011	:	23742
7	Number of Household per Ward	:	742
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tube wells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	17.81
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	14.25
20	Per Capita Sewage Generation (lpcd)	:	108.00

21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	1
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	9
25	Current Utilized Capacity of STPs (MLD)	:	9
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 3562.0
		COD	: 6055.4
		TKN	: 712.4
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	2
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Panipat			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	21.86
2	Population as in 2011	:	295970
3	Population Growth Rate as in 2011 (%)	:	10.07
4	Total Number of Wards	:	24
5	Population per Ward (Thousands)	:	12,332
6	Total Number of Household as in 2011	:	60905
7	Number of Household per Ward	:	2538
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tube wells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	2
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	40.0

18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.0
19	Total Sewage Generation (MLD)*	:	154.4
20	Per Capita Sewage Generation (lpcd)	:	88.2
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	2
24	Total Installed Capacity of STPs under GAP & YAP I & II (MLD)	:	45
25	Current Utilized Capacity of STPs (MLD)	:	45.0
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 7991.2
		COD	: 13585.0
		TKN	: 1598.2
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	2
33	Number of Water Bodies	:	3
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Rewari			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	22.50
2	Population as in 2011	:	143021
3	Population Growth Rate as in 2011 (%)	:	42.05
4	Total Number of Wards	:	31
5	Population per Ward (Thousands)	:	4614
6	Total Number of Household as in 2011	:	28702
7	Number of Household per Ward	:	926
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA

15	Total Pumping Capacity (MLD)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	19.3
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.0
19	Total Sewage Generation (MLD)*	:	15.4
20	Per Capita Sewage Generation (lpcd)	:	108.0
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 3861.6
		COD	: 6564.7
		TKN	: 772.3
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	NA
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Rohtak			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	72.18
2	Population as in 2011	:	374292
3	Population Growth Rate as in 2011 (%)	:	27.06
4	Total Number of Wards	:	31
5	Population per Ward (Thousands)	:	12074
6	Total Number of Household as in 2011	:	75528
7	Number of Household per Ward	:	2436
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA

13	Ground Water Extraction per Hand Pump (lpd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	50.5
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.0
19	Total Sewage Generation (MLD)*	:	40.4
20	Per Capita Sewage Generation (lpcd)	:	108.0
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	3
24	Total Installed Capacity of STPs under GAP & YAP I & II (MLD)	:	20
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	16.0
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 10105.9
		COD	: 17180.0
		TKN	: 2021.2
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	2
33	Number of Water Bodies	:	4
34	Gross Area of Water Bodies (Hectare)	:	6.88
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Sonipat			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	42.61
2	Population as in 2011	:	289333
3	Population Growth Rate as in 2011 (%)	:	28.55
4	Total Number of Wards	:	31
5	Population per Ward (Thousands)	:	9,333
6	Total Number of Household as in 2011	:	57740
7	Number of Household per Ward	:	1863
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA

10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	39.06
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	31.25
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	1
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	30
25	Current Utilized Capacity of STPs (MLD)	:	30
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 7812.0
		COD	: 13280.4
		TKN	: 1562.4
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	1
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Yamunanagar		State: Haryana	
S. No.	Items		Value
1	Total Area (sq km)	:	16.48
2	Population as in 2011	:	217071
3	Population Growth Rate as in 2011 (%)	:	14.43
4	Total Number of Wards	:	31
5	Population per Ward (Thousands)	:	7002
6	Total Number of Household as in 2011	:	45351

7	Number of Household per Ward	:	1463
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	29.3
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.0
19	Total Sewage Generation (MLD)*	:	23.4
20	Per Capita Sewage Generation (lpcd)	:	108.0
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	2
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	35
25	Current Utilized Capacity of STPs (MLD)	:	35.0
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 5860.9
		COD	: 9963.6
		TKN	: 1172.2
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	4
33	Number of Water Bodies	:	2
34	Gross Area of Water Bodies (Hectare)	:	3.70
35	Area of Water Bodies as % of Total Area	:	<<< 1

Appendix-2

Compilation of Fact Sheets of

Water Balance & Pollution Load (Domestic) of Major Class I Cities/Towns in Haryana

Class II towns list

Water Balance & Pollution Load (Domestic) Fact Sheet			
City : Charkhi Dadri		State: Haryana	
S. No.	Items		Value

1	Total Area (sq km)	:	5.42
2	Population as in 2011	:	56337
3	Population Growth Rate as in 2011 (%)	:	25.49
4	Total Number of Wards	:	19
5	Population per Ward (Thousands)	:	2965
6	Total Number of Household as in 2011	:	11074
7	Number of Household per Ward	:	583
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	7.61
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135
19	Total Sewage Generation (MLD)*	:	6.08
20	Per Capita Sewage Generation (lpcd)	:	108
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	1
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	9
25	Current Utilized Capacity of STPs (MLD)	:	5.9
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 1521.1
		COD	: 2585.9
		TKN	: 304.2
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	1
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet	
City: Gohana	State: Haryana

S. No.	Items		Value
1	Total Area (sq km)	:	11.51
2	Population as in 2011	:	65708
3	Population Growth Rate as in 2011 (%)	:	35.39
4	Total Number of Wards	:	21
5	Population per Ward (Thousands)	:	3,129
6	Total Number of Household as in 2011	:	12477
7	Number of Household per Ward	:	594
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	8.87
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	7.10
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 1774.1
		COD	: 3016.0
		TKN	: 354.8
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	NA
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Hodal			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	5.39
2	Population as in 2011	:	50143
3	Population Growth Rate as in 2011 (%)	:	30.89
4	Total Number of Wards	:	17
5	Population per Ward (Thousands)	:	2,950
6	Total Number of Household as in 2011	:	8579
7	Number of Household per Ward	:	505
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	6.77
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135
19	Total Sewage Generation (MLD)*	:	5.42
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 1353.9
		COD	: 2301.6
		TKN	: 270.8
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	NA
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Narnaul		State: Haryana	
S. No.	Items		Value
1	Total Area (sq km)	:	12.67
2	Population as in 2011	:	74581
3	Population Growth Rate as in 2011 (%)	:	20.14
4	Total Number of Wards	:	23
5	Population per Ward (Thousands)	:	3,243
6	Total Number of Household as in 2011	:	13990
7	Number of Household per Ward	:	608
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	10.07
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135
19	Total Sewage Generation (MLD)*	:	8.1
20	Per Capita Sewage Generation (lpcd)	:	108
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 2013.7
		COD	: 3423.3
		TKN	: 402.7
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River
32	Number of Drains/Nallah for Wastewater Disposal	:	NA
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA

35	Area of Water Bodies as % of Total Area	:	<<< 1
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Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Panipat Taraf Makhdum Zadgan			State: Haryana
S. No.	Items		Value
1	Total Area (sq km)	:	6.54
2	Population as in 2011	:	67998
3	Population Growth Rate as in 2011 (%)	:	93.42
4	Total Number of Wards	:	1
5	Population per Ward (Thousands)	:	67,998
6	Total Number of Household as in 2011	:	14066
7	Number of Household per Ward	:	14066
8	Surface Water Supply (MLD)	:	NA
9	Ground Water (GW) Supply (MLD)	:	NA
10	Number of Bore Wells	:	NA
11	Ground Water Extraction per Bore Well (MLD)	:	NA
12	Number of Hand Pumps/ Tubewells	:	NA
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NA
15	Total Pumping Capacity (MLD)	:	NA
16	Average Water Supply Rate from ULB Sources (lpcd)	:	NA
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	9.18
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	135.00
19	Total Sewage Generation (MLD)*	:	7.34
20	Per Capita Sewage Generation (lpcd)	:	108.00
21	Sewage Collection (MLD)	:	NA
22	Percentage of Sewage Collection (%)	:	NA
23	Number of STPs	:	NA
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NA
25	Current Utilized Capacity of STPs (MLD)	:	NA
26	Percentage Utilization of Installed Capacity (%)	:	NA
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NA
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	: NA
		COD	: NA
		TKN	: NA
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	: 1835.9
		COD	: 3121.1
		TKN	: 367.2
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Yamuna River

32	Number of Drains/Nallah for Wastewater Disposal	:	NA
33	Number of Water Bodies	:	NA
34	Gross Area of Water Bodies (Hectare)	:	NA
35	Area of Water Bodies as % of Total Area	:	<<< 1