

Assessment of Domestic Pollution Load from Urban Agglomeration in Ganga Basin: Ramganga, Kali and Gomati Sub-Basin

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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Introduction

Ramganga River is a tributary of river Ganga. It originates at a place known as “Diwali Khal” at an elevation of 2926 meters in the Himalayas. The total length of the river course from its origin up to its confluence with Ganga River is about 600 km. The river flows through the districts of Bijnor, Moradabad, Rampur, Shahjahanpur, Farukhabad and Hardoi before joining with Ganga River. The catchment area of the basin is about 32,493 sq. km. The major tributaries which join Ramganga river are the Khoh, Gagan, Kosi, Dhela, Bhakara, East Begul, West Begul and Deoha (Garra). These tributaries carry the wastewater and industrial effluents from different towns and industrial units in the basin. Table 1 shows the demography of the major cities situated along river Ramganga and its tributaries.

City	Tributary	Area (sq.km)	Population (as in 2011) in lakhs
Moradabad		80	8.78
Bareilly		106.43	9.1
Shahjahanpur	Garra	11.37	3.32
Rampur	Koshi	20.20	3.8

Table 1: Demography of major cities on river Ramganga and its tributaries

Major Dam

Ramganga River Valley Project's dam is situated about 3 km upstream of Kalagarh village in the district of Pauri Garhwal of the present Uttarakhand state. The reservoir has a live storage of 2195.5 m cu.m. Utilizable for the development of command area of and drinking water supplies to Delhi Nagar Nigam. The water is being utilized for irrigating 5.90 lakh hectares of command area in the Ganga – Yamuna basins through a network of canals. This added irrigation is spread over 16 Districts of Uttar Pradesh extending from Saharanpur to Allahabad.

Pollution Load on River Ramganga

As per the data available from Jal Nigam/Nagar Nigam, all the major cities situated on the river Ramganga use ground water as the sole source for meeting the domestic demand. *Figure 1* shows the ground water extracted and the corresponding sewage generated in all the major cities

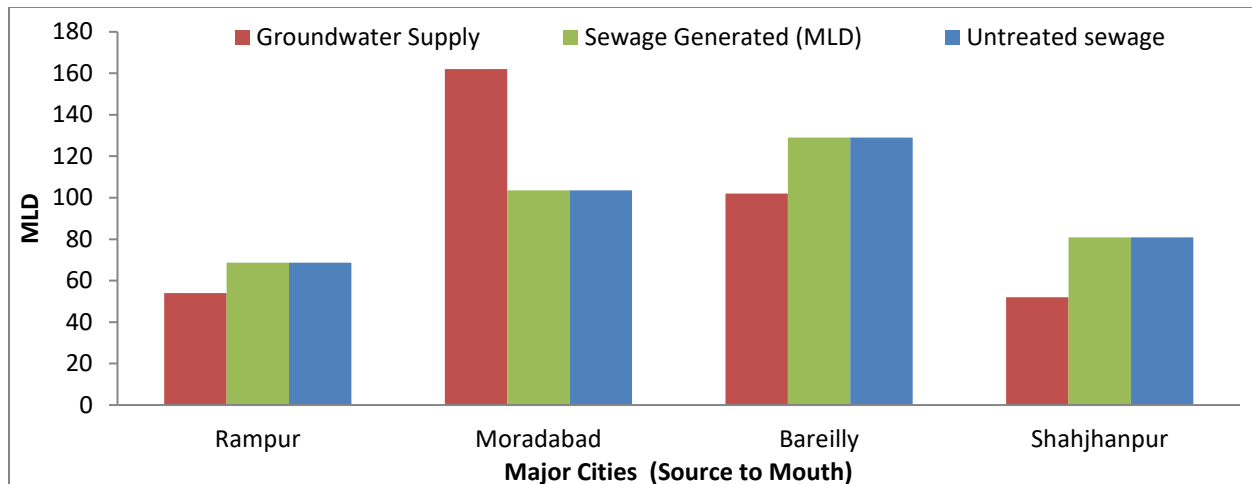


Figure 1: Ground water utilization and Sewage Generation (in MLD)

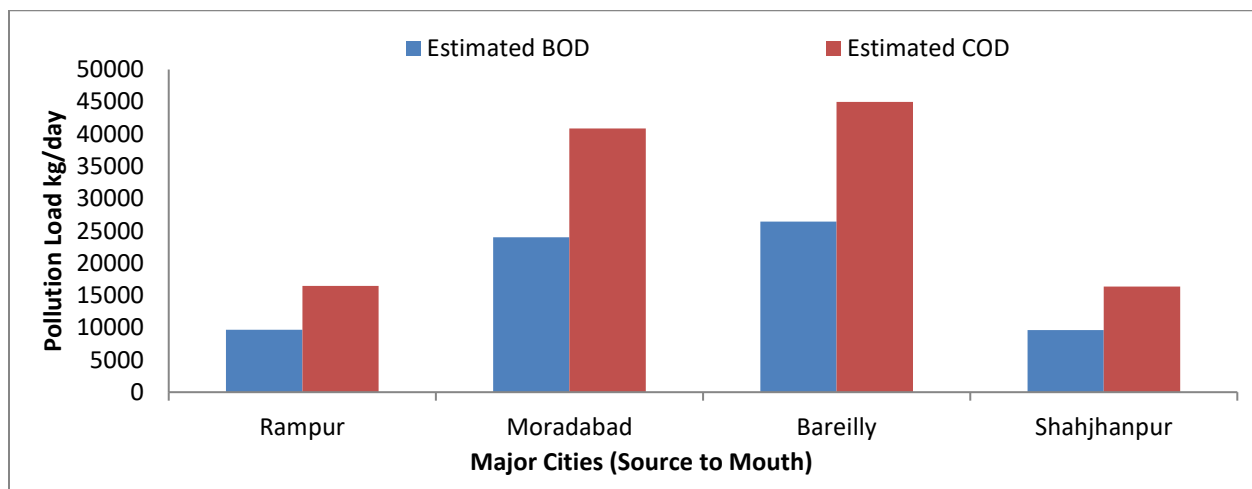


Figure 2a: Spatial distribution of estimated pollution load on Ramganga River.

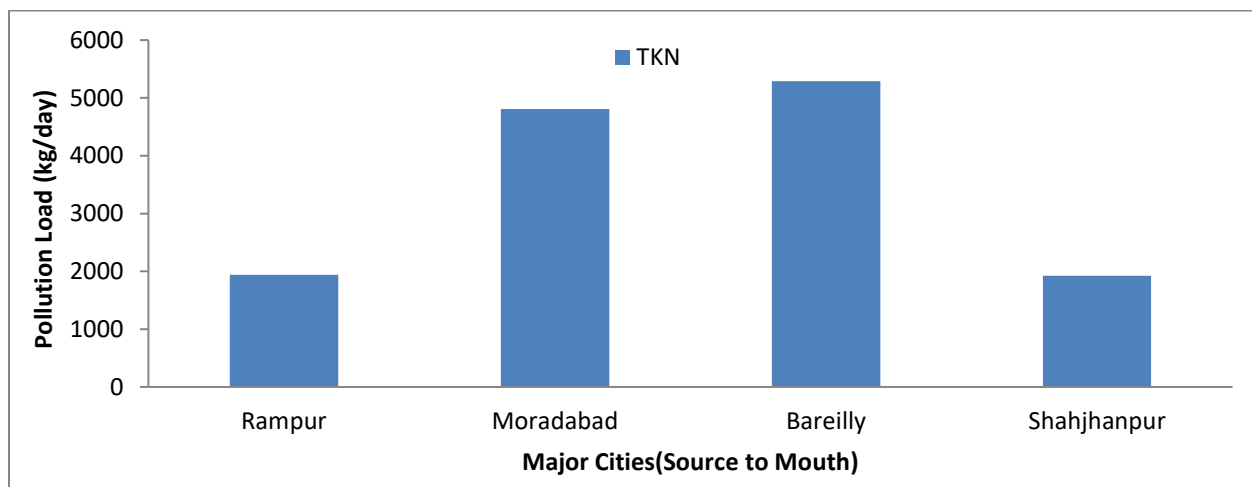


Figure 2b: Spatial distribution of estimated pollution load on Ramganga River.

As per the data available from Jal Nigam/Nagar Nigam none of the major cities situated along the river Ramganga have an installed STP. Based on the actual field survey and flow measurements of sewage in major drains in the major cities the total untreated sewage discharge into the river Ramganga is estimated to be about 342 MLD. The river receives the domestic sewage through a network of 29 major drains. Due to the discharge of rainwater runoff in the domestic drains the sewage generated is more than the groundwater supply in the cities of Rampur and Bareilly.

The pollution load on the river in terms of BOD₅, COD and TKN is estimated based on the per capita contribution for all the major cities. *Figure 2a & 2b* shows the spatial distribution of the pollution load on the river from source to mouth.



Figure3: Major drains disposing sewage into River Ramganga



Figure4: Major Cities on River Ramganga

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Bareilly		State: Uttar Pradesh	
1	Total Area (sq km)		106.43
2	Population as in 2011		979933
3	Population Growth Rate as in 2011 (%)		36.10
4	Total Number of Wards		70
5	Population per Ward (Thousands)		10,286
6	Total Number of Household as in 2011		82105
7	Number of Household per Ward		1173
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		102
10	Number of Bore Wells		49
11	Ground Water Extraction per Bore Well (MLD)		2.081
12	Number of Hand Pumps/ Tubewells		3122
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		103.6
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		105.7
19	Total Sewage Generation (MLD)*		129.0
20	Per Capita Sewage Generation (lpcd)*		131.7
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	26458.19
		COD	44978.92
		TKN	5291.64
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Ramganga River
32	Number of Drains/Nallah for Wastewater Disposal		11
33	Number of Water Bodies		164
34	Gross Area of Water Bodies (Hectare)		43.43
35	Area of Water Bodies as % of Total Area		<<< 1

*Estimation based on one time survey by IIT, Kanpur team on 13 July, 2011 at 3:30 PM.

Remark- Because of rainy season flow in drain is more than water supply into the city.

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Moradabad		State: Uttar Pradesh	
1	Total Area (sq km)		80.00
2	Population as in 2011		889810
3	Population Growth Rate as in 2011 (%)		38.69
4	Total Number of Wards		70
5	Population per Ward (Thousands)		12,712
6	Total Number of Household as in 2011		129101
7	Number of Household per Ward		1844
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		162
10	Number of Bore Wells		83
11	Ground Water Extraction per Bore Well (MLD)		1.95
12	Number of Hand Pumps/ Tubewells		4098
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		182.1
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		164.0
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		184.4
19	Total Sewage Generation (MLD)*		103.5
20	Per Capita Sewage Generation (lpcd)		116.3
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	24024.9
		COD	40842.3
		TKN	4805.0
30	Wastewater Disposal Means		River
31	Name of River/Streams for Wastewater Disposal		Ramganga
32	Number of Drains/Nallah for Wastewater Disposal		7
33	Number of Water Bodies		71
34	Gross Area of Water Bodies (Hectare)		15.14
35	Area of Water Bodies as % of Total Area		<<< 1

**Estimation based on one time survey by IIT, Kanpur team on 21-22 July, 2011 at 06:30 PM to 07:30 PM & 09:30 AM to 10:30 AM.*

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Rampur		State: Uttar Pradesh	
1	Total Area (sq km)		20.20
2	Population as in 2011		359062
3	Population Growth Rate as in 2011 (%)		27.56
4	Total Number of Wards		43
5	Population per Ward (Thousands)		6,546
6	Total Number of Household as in 2011		40000
7	Number of Household per Ward		930
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		54
10	Number of Bore Wells		26
11	Ground Water Extraction per Bore Well (MLD)		2.076
12	Number of Hand Pumps/ Tubewells		1222
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		150.39
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		54.6
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		152.1
19	Total Sewage Generation (MLD)*		68.6
20	Per Capita Sewage Generation (lpcd)		NA
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	9694.7
		COD	16480.9
		TKN	1938.9
30	Wastewater Disposal Means		River
31	Name of River/Streams for Wastewater Disposal		Koshi River
32	Number of Drains/Nallah for Wastewater Disposal		5
33	Number of Water Bodies		NIL
34	Gross Area of Water Bodies (Hectare)		NIL
35	Area of Water Bodies as % of Total Area		<<< 1
<i>*Estimation based on one time survey by IIT, Kanpur team on 20 July, 2011 at 6:30 PM.</i>			
Remark- Because of rainy season flow in drain is more than water supply into the city.			

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Shahjahanpur		State: Uttar Pradesh	
1	Total Area (sq km)		11.37
2	Population as in 2011		356103
3	Population Growth Rate as in 2011 (%)		19.90
4	Total Number of Wards		44
5	Population per Ward (Thousands)		6,750
6	Total Number of Household as in 2011		51000
7	Number of Household per Ward		1159
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		52
10	Number of Bore Wells		19
11	Ground Water Extraction per Bore Well (MLD)		2.737
12	Number of Hand Pumps/ Tubewells		2500
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		146.03
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		53.3
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		149.5
19	Total Sewage Generation (MLD)*		80.9
20	Per Capita Sewage Generation (lpcd)		227.2
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BO	NIL
		CO	NIL
		TK	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BO	9614.8
		CO	16345.1
		TK	1923.0
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Khanaut & Garra
32	Number of Drains/Nallah for Wastewater Disposal		9
33	Number of Water Bodies		1
34	Gross Area of Water Bodies (Hectare)		1.25
35	Area of Water Bodies as % of Total Area		<<< 1
<i>*Estimation based on one time survey by IIT, Kanpur team on 07 July, 2011 at 5:30 PM</i>			
Remark- Because of rainy season flow in drain is more than water supply into the city.			

Kali river Basin:

The Kali River is a tributary of river Ganga. It originates near Khatholi town and flows through the districts of Muzaffarnagar, Modinagar, Meerut, Hapur, Bulandshahr, and Kasganj finally merges with river Ganga at Kannauj. The river has a total length of approximately 550 km from origin till confluence. Muzaffarnagar, Modinagar, Meerut, Hapur, Bulandshahr, Kasganj, Kannauj are the major urban settlements along the course of the river Table 1 shows the demography of the major cities situated along river Kali.

City	Area (sq.km)	Population (as in 2011) in lakhs
Muzaffarnagar	12.04	3.16
Modinagar	14.0	1.82
Meerut	41.94	14.24
Hapur	42	2.62
Bulandshar	32.5	2.22
Kasganj	7.10	1.01
Kannauj	70.70	0.71

Table 2: Demography of major cities on Kali River

Pollution Load on the River Kali

As per the data available from Jal Nigam/Nagar Nigam, all the major cities situated on the river Kali use ground water as the sole source for meeting the domestic demand. *Figure 1* shows the ground water extracted and the corresponding sewage generated in all the major cities.

Based on the actual field survey and flow measurements of sewage in major drains in the major cities the total untreated sewage discharge into the river Kali is estimated to be about 346MLD. The river receives the sewage through a network of 24 major drains along its course. As observed in Modinagar, the sewage flow in the domestic drains was very high as compared to the ground water supply. This is due to the discharge of industrial wastewater into the domestic drains.

As per the data available from Jal Nigam/Nagar Nigam Muzaffarnagar is the only city on the river that has one operating STP which handles about 75% of the generated sewage. None of the other major cities situated along the river Kali have an installed STP. All the sewage carried by the domestic drains is discharged into the river without any treatment.

The pollution load on the river in terms of BOD₅, COD and TKN is estimated based on the per capita contribution for all the major cities. *Figure 2a & 2b* shows the spatial distribution of the pollution load on the river from source to mouth.

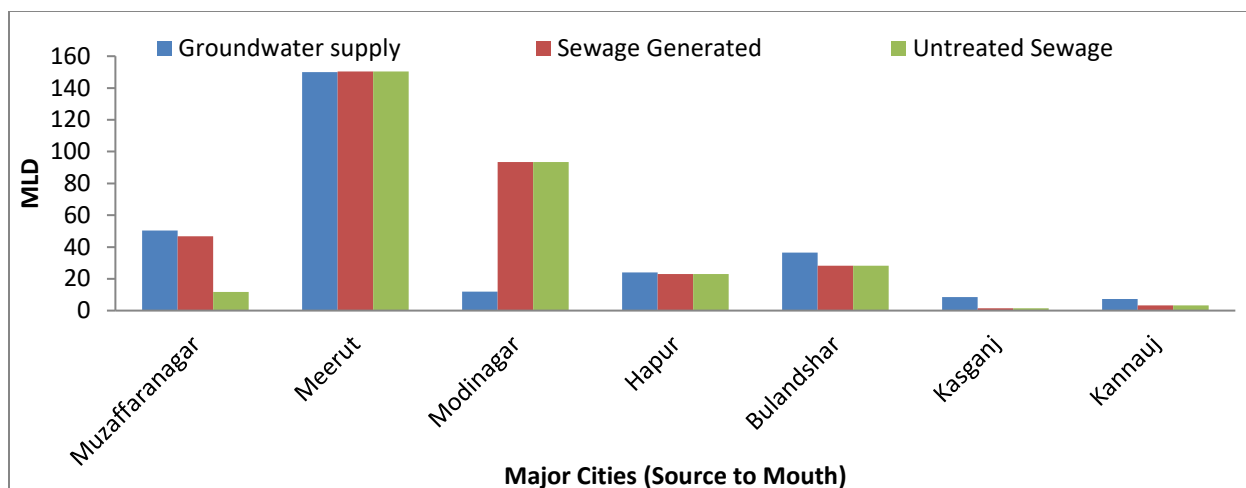


Figure 1: Ground water utilization and sewage generation (in MLD)

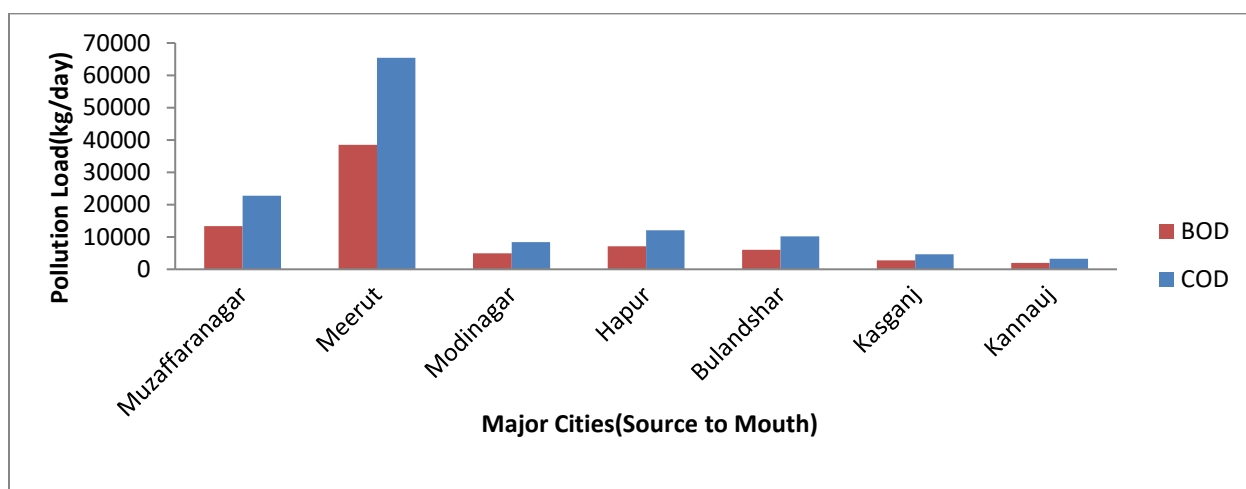


Figure 2a: Spatial distribution of estimated pollution load on Kali River.

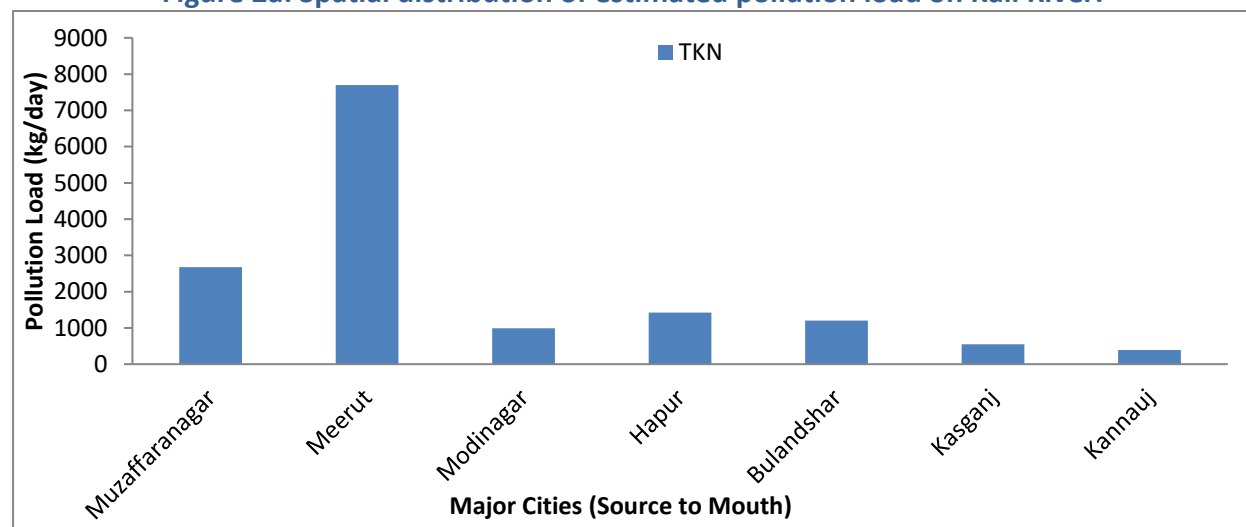


Figure 2b: Spatial distribution of estimated pollution load on Kali River.



Figure3: Major drains in various cities along River Kali



Figure4: Major Cities on River Kali

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Muzaffarnagar			State: Uttar Pradesh
1	Total Area (sq km)		12.04
2	Population as in 2011		316729
3	Population Growth Rate as in 2011 (%)		56.22
4	Total Number of Wards		45
5	Population per Ward (Thousands)		10,995
6	Total Number of Household as in 2011		65000
7	Number of Household per Ward		1444
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		50
10	Number of Bore Wells		40
11	Ground Water Extraction per Bore Well (MLD)		0.429
12	Number of Hand Pumps/ Tubewells		858
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		101.0525635
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		50.4
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		101.9
19	Total Sewage Generation (MLD)		46.7
20	Per Capita Sewage Generation (lpcd)		94.3
21	Sewage Collection (MLD)		22.0
22	Percentage of Sewage Collection (%)		47.13
23	Number of STPs		1
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		35.0
26	Percentage Utilization of Installed Capacity (%)		62.86
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		12
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	13359.4
		COD	22711.0
		TKN	2671.9
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Kali
32	Number of Drains/Nallah for Wastewater Disposal		2
33	Number of Water Bodies		2
34	Gross Area of Water Bodies (Hectare)		12.50
35	Area of Water Bodies as % of Total Area		<<< 1
	<i>*Estimation based on one time survey by IIT, Kanpur team on 19 April, 2012 at 01:00 PM to 02:00 PM.</i>		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Modinagar		State: Uttar Pradesh	
1	Total Area (sq km)		14.00
2	Population as in 2011		182811
3	Population Growth Rate as in 2011 (%)		61.47
4	Total Number of Wards		26
5	Population per Ward (Thousands)		7,031
6	Total Number of Household as in 2011		23085
7	Number of Household per Ward		888
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		12
10	Number of Bore Wells		17
11	Ground Water Extraction per Bore Well (MLD)		0.71
12	Number of Hand Pumps/ Tubewells		780
13	Ground Water Extraction per Hand Pump (lpd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpd)		65.64
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		12.4
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpd)		67.8
19	Total Sewage Generation (MLD)*		93.4
20	Per Capita Sewage Generation (lpd)*		510.7
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	4935.9
		COD	8391.0
		TKN	987.2
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Kali River
32	Number of Drains/Nallah for Wastewater Disposal		2
33	Number of Water Bodies		NIL
34	Gross Area of Water Bodies (Hectare)		NIL
35	Area of Water Bodies as % of Total Area		<<< 1
<i>*Estimation based on one time survey by IIT, Kanpur team on 30 June, 2011 at 09:04</i>			
<i>Note:-Due to Industrial wastewater discharge into the domestic drains the flows in drains were very high.</i>			

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Meerut		State: Uttar Pradesh	
1	Total Area (sq km)		41.94
2	Population as in 2011		1424908
3	Population Growth Rate as in 2011 (%)		33.32
4	Total Number of Wards		80
5	Population per Ward (Thousands)		17,811
6	Total Number of Household as in 2011		280000
7	Number of Household per Ward		3500
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		150
10	Number of Bore Wells		122
11	Ground Water Extraction per Bore Well (MLD)		1.23
12	Number of Hand Pumps/ Tubewells		7500
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		105.27
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		153.8
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		107.9
19	Total Sewage Generation (MLD)*		150.4
20	Per Capita Sewage Generation (lpcd)		105.5
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	38472.5
		COD	65403.3
		TKN	7694.5
30	Wastewater Disposal Means		River
31	Name of River/Streams for Wastewater Disposal		Kali River
32	Number of Drains/Nallah for Wastewater Disposal		4
33	Number of Water Bodies		161
34	Gross Area of Water Bodies (Hectare)		43.04
35	Area of Water Bodies as % of Total Area		<<< 1
	<i>*Estimation based on one time survey by IIT, Kanpur team on 21-22 August, 2011 at 05:30 PM.</i>		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Hapur			State: Uttar Pradesh
1	Total Area (sq km)		42.00
2	Population as in 2011		262801
3	Population Growth Rate as in 2011 (%)		24.05
4	Total Number of Wards		36
5	Population per Ward (Thousands)		7,300
6	Total Number of Household as in 2011		42000
7	Number of Household per Ward		1167
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		24
10	Number of Bore Wells		18
11	Ground Water Extraction per Bore Well (MLD)		1.33
12	Number of Hand Pumps/ Tubewells		932
13	Ground Water Extraction per Hand Pump (lpd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpd)		91.3
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		24.5
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpd)		93.1
19	Total Sewage Generation (MLD)*		22.9
20	Per Capita Sewage Generation (lpd)		87.1
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	7095.6
		COD	12062.6
		TKN	1419.1
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Kali River
32	Number of Drains/Nallah for Wastewater Disposal		3
33	Number of Water Bodies		NIL
34	Gross Area of Water Bodies (Hectare)		NIL
35	Area of Water Bodies as % of Total Area		<<< 1
<i>*Estimation based on one time survey by IIT, Kanpur team on 30 June, 2011 at 09:04</i>			
<i>Note:-Due to Industrial wastewater discharge into the domestic drains the flows in</i>			

Water Balance & Pollution Load (Domestic) Fact Sheet			
City: Bulandshahar			State: Uttar Pradesh
1	Total Area (sq km)		32.50
2	Population as in 2011		222826
3	Population Growth Rate as in 2011 (%)		26.30
4	Total Number of Wards		32
5	Population per Ward (Thousands)		6,963
6	Total Number of Household as in 2011		46000
7	Number of Household per Ward		1438
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		36
10	Number of Bore Wells		30
11	Ground Water Extraction per Bore Well (MLD)		1.2
12	Number of Hand Pumps/ Tubewells		926
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		161.5610387
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		36.5
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		163.6
19	Total Sewage Generation (MLD)*		28.3
20	Per Capita Sewage Generation (lpcd)		126.8
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	6016.3
		COD	10227.7
		TKN	1203.3
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Kali River
32	Number of Drains/Nallah for Wastewater Disposal		8
33	Number of Water Bodies		31
34	Gross Area of Water Bodies (Hectare)		6.23
35	Area of Water Bodies as % of Total Area		<<< 1
	*Estimation based on one time survey by IIT, Kanpur team on 17 August, 2011 at 05:30 PM.		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Kasganj		State: Uttar Pradesh	
1	Total Area (sq km)		7.10
2	Population as in 2011		101241
3	Population Growth Rate as in 2011 (%)		9.40
4	Total Number of Wards		30
5	Population per Ward (Thousands)		3,375
6	Total Number of Household as in 2011		24000
7	Number of Household per Ward		800
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		8.3
10	Number of Bore Wells		14
11	Ground Water Extraction per Bore Well (MLD)		0.59
12	Number of Hand Pumps/ Tubewells		350
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		82.0
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		8.5
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		83.7
19	Total Sewage Generation (MLD)*		1.4
20	Per Capita Sewage Generation (lpcd)		13.9
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	2733.5
		COD	4647.0
		TKN	546.7
30	Wastewater Disposal Means		Land/ River
31	Name of River/Streams for Wastewater Disposal		Land/ Kali River
32	Number of Drains/Nallah for Wastewater Disposal		4
33	Number of Water Bodies		0
34	Gross Area of Water Bodies (Hectare)		0.00
35	Area of Water Bodies as % of Total Area		<<< 1
	<i>*Estimation based on one time survey by IIT, Kanpur team on 20 October, 2011 at 3.30 PM.</i>		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Kannauj		State: Uttar Pradesh	
1	Total Area (sq km)		70.70
2	Population as in 2001		71727
3	Population Growth Rate as in 2001 (%)		2.60
4	Total Number of Wards		30
5	Population per Ward (Thousands)		2,391
6	Total Number of Household as in 2001		11856
7	Number of Household per Ward		395
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		7.29
10	Number of Bore Wells		19
11	Ground Water Extraction per Bore Well (MLD)		0.38
12	Number of Hand Pumps/ Tubewells		8
13	Ground Water Extraction per Hand Pump (lpcd)		34800
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		101.7
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		7.3
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		101.8
19	Total Sewage Generation (MLD)*		3.3
20	Per Capita Sewage Generation (lpcd)		46.2
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		12
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD ₅	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD ₅	1936.6
		COD	3292.3
		TKN	387.3
30	Wastewater Disposal Means		River & Land
31	Name of River/Streams for Wastewater Disposal		Kali River
32	Number of Drains/Nallah for Wastewater Disposal		4
33	Number of Water Bodies		17
34	Gross Area of Water Bodies (sq km)		5.70
35	Area of Water Bodies as % of Total Area		<<<1
	*Estimation based on one time survey by IIT, Kanpur team on 11 November, 2011 at 04:00 PM.		

Gomti River Basin:

The Gomti is one of the tributaries of the Ganga. It originates near Mainkot, from a lake–‘Fulhar Jheel’ in Madhotanda about 30 km east of the Pilibhit town in Uttar Pradesh. The river flows through the districts of Sitapur, Lucknow, Barabanki, Sultanpur, Jaunpur and confluences with River Ganga in Kaithi, Ghazipur bordering Varanasi. The total length of the river from source to mouth is about 960km. The total catchment area of the river is 30,437 sq. km. The main tributaries of the river are Kathina, Bhainsi, Sarayan, Gon, Reth, Sai, Pili ,Ull and Kalyani. Sai River is its major tributary having catchment area of 12,900 sq. km, approximately 43% of the total catchment area of River Gomti. On the banks of the river, Sitapur, Lucknow, Sultanpur, and Jaunpur, are the major urban settlements. Among these Lucknow is a major city with the highest population as well as the administrative capital of the state of Uttarpradesh. Table 1 shows the demography of the major cities situated along river Kali.

City	Tributary	Area (sq.km)	Population (as in 2011) in lakhs
Lakhimpur	Ull	10.20	1.65
Sitapur	Sarayan	35	1.88
Lucknow		330	29.01
Barabanki		3.87	1.54
Sultanpur	Sar	16.00	1.16
Jaunpur		20.00	1.68
Faizabad	Sai	16.6	2.59
RaeBareilly	Sai	34	1.91

Pollution Load on the River Gomati

As observed from Table 1, the city of Lucknow has an area and population greater than all the other cities combined. Therefore, it can reasonably be assumed that Lucknow is a major contributor to the pollution load on the River Gomati.

Pollution Load on the River Gomati from Lucknow:

As per the data available from Jal Nigam/Nagar Nigam, both groundwater and surface water from River Gomati are used for meeting the domestic demand of Lucknow City. Figure 1 shows the ground and surface water extracted and the corresponding sewage generated in Lucknow. Based on the actual field survey and flow measurements of sewage in major drains in Lucknow the total sewage generation is estimated to be about 1010 MLD. As per the data available from Jal Nigam there are two sewage treatment plants operative in Lucknow. The details of both the STPs are provided in Table 2. The combined treatment capacity of the STPs is about 400 MLD which is about 40% of the total sewage generation. The remaining untreated sewage is discharged into the River Gomati through a network of 23 major drains. The pollution load on the river in terms of BOD₅, COD and TKN is estimated based on the per capita contribution. Figure 2a & 2b shows the pollution load on the river Gomati from Lucknow.

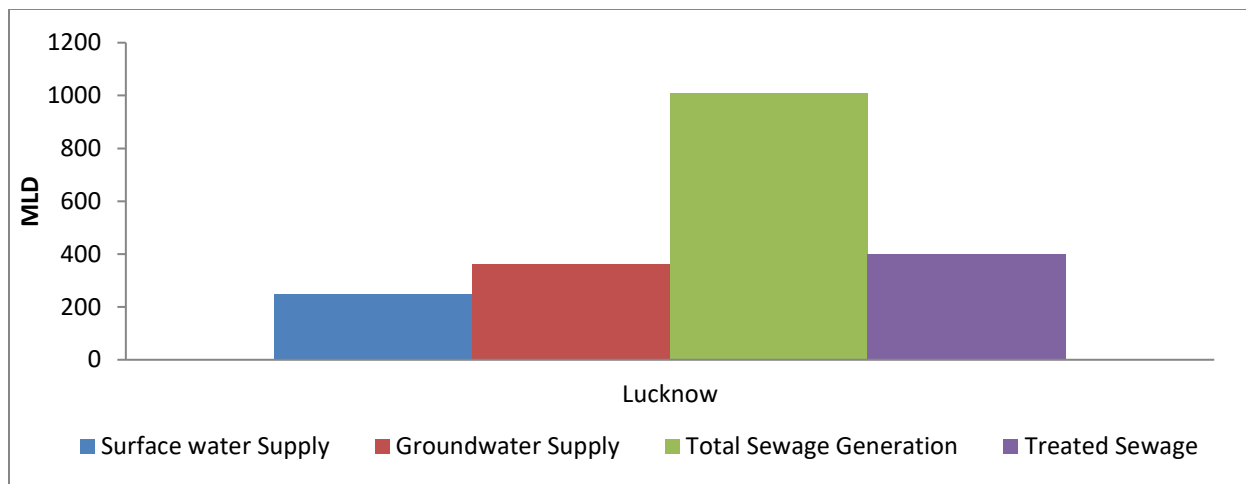


Figure 1: Surface and ground water utilization and sewage generation (in MLD)

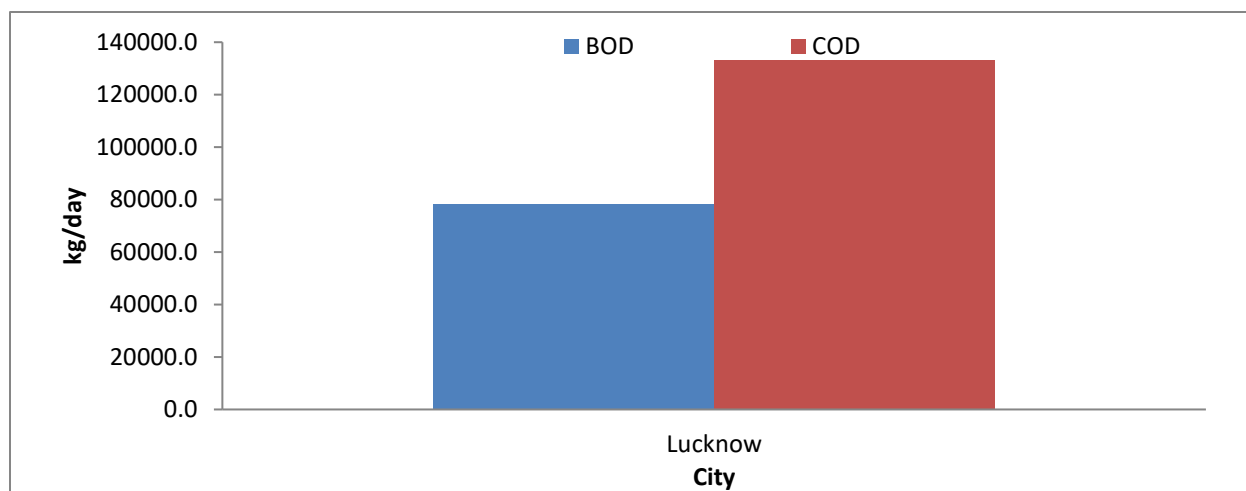


Figure 2a: Pollution load on Gomati River

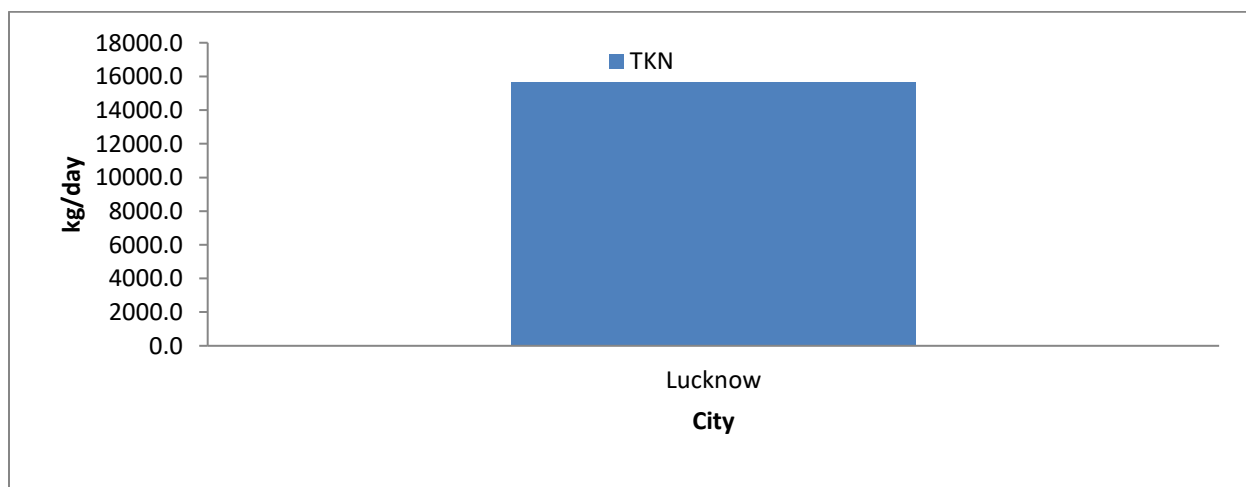


Figure 2b: Pollution load on Gomati River

Details of Sewage Treatment Plants: (Source: Jal Nigam/Parallel Organization)									
SNo.	Place	Location		Year of Construction	Year of Commissioning	Installed Capacity (MLD)	Current Utilized Capacity (MLD)	Adopted Technology	Effluent Disposal
		Latitude (N)	Longitude (E)						
1	Bharwara	26°50'16.0"N	81°02'17.4"E	2008	2011	345	345	UASB	Gomti River
2	Daulatganj	26°52'58.1"N	80°54'5.4"E	2002-03	2003	56	56	FAB	Gomti River

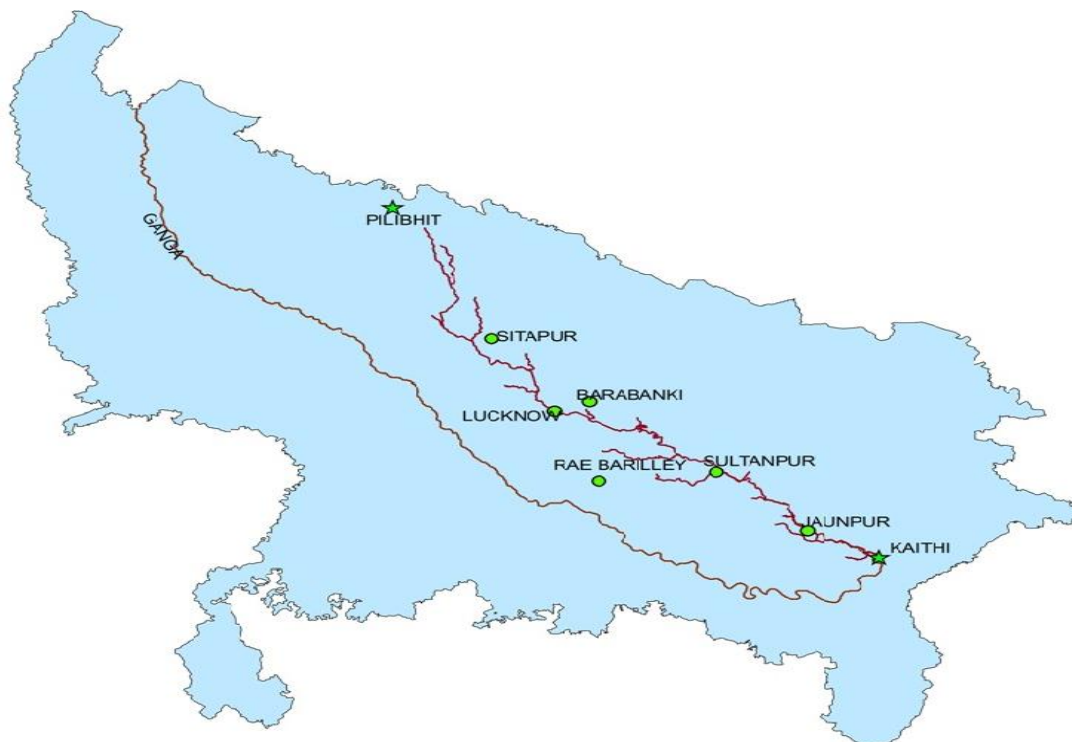


Figure 5: Major cities situated on River Gomati

Pollution load on River Gomati from Other Cities

As per the data available from Jal Nigam/Nagar Nigam, barring Jaunpur all the major cities situated on the river Gomati use ground water as the sole source for meeting the domestic demand. Jaunpur city is supplied with both ground and surface water from the River Gomati to meet the domestic demand. Figure 3 shows the ground water extracted and the corresponding sewage generated in all the major cities.

Based on the actual field survey and flow measurements of sewage in major drains in the major cities the total untreated sewage discharge into the river Gomati is estimated to be about 100 MLD. The river receives the sewage (directly and indirectly from its tributaries) through a network of 25 major drains along its course.

As per the data available from Jal Nigam/Nagar Nigam Sultanpur is the only city on the river that has one operating oxidation pond which handles about 5 MLD of the generated sewage. None of the other major cities situated along the river Gomati have an installed STP/treatment facility. All the sewage carried by the domestic drains is discharged into the river without any treatment.

The pollution load on the river in terms of BOD₅, COD and TKN is estimated based on the per capita contribution for all the major cities. Figure 4a & 4b shows the spatial distribution of the pollution load on the river from source to mouth.

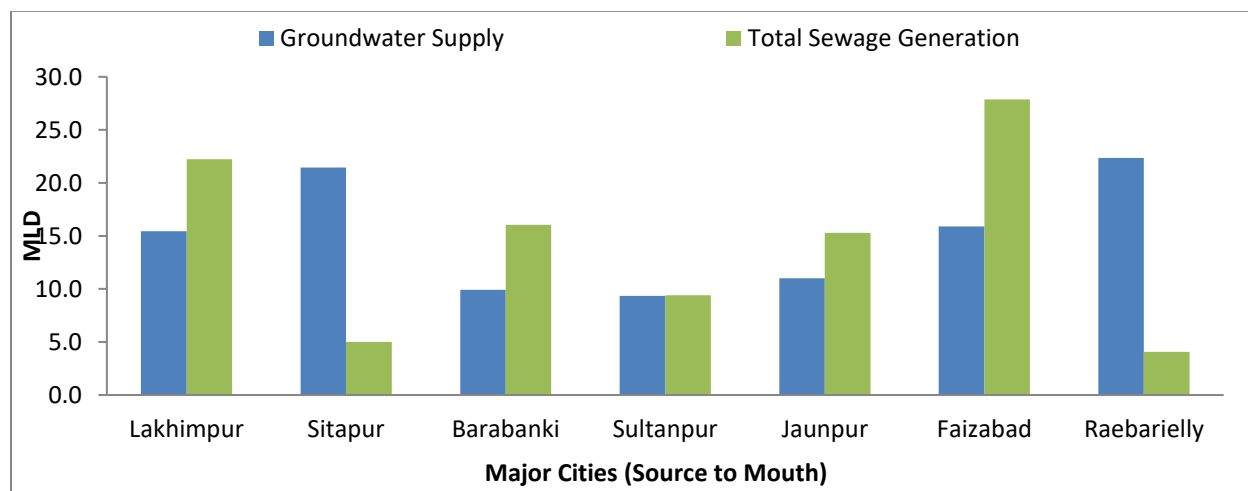


Figure 3: Water utilization and sewage generation (in MLD)

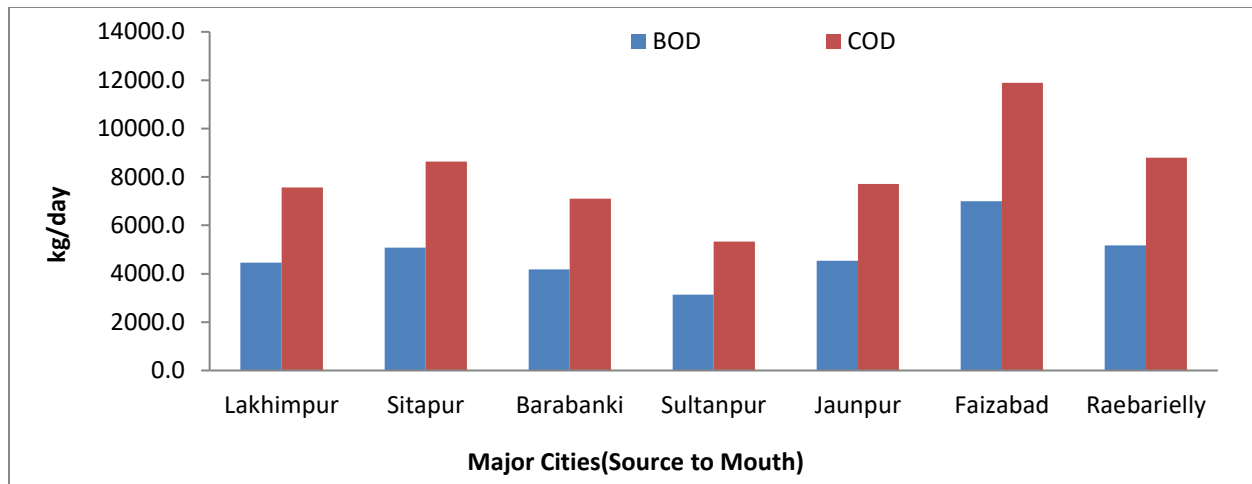


Figure 4b: Spatial distribution of estimated pollution load on Gomati River.

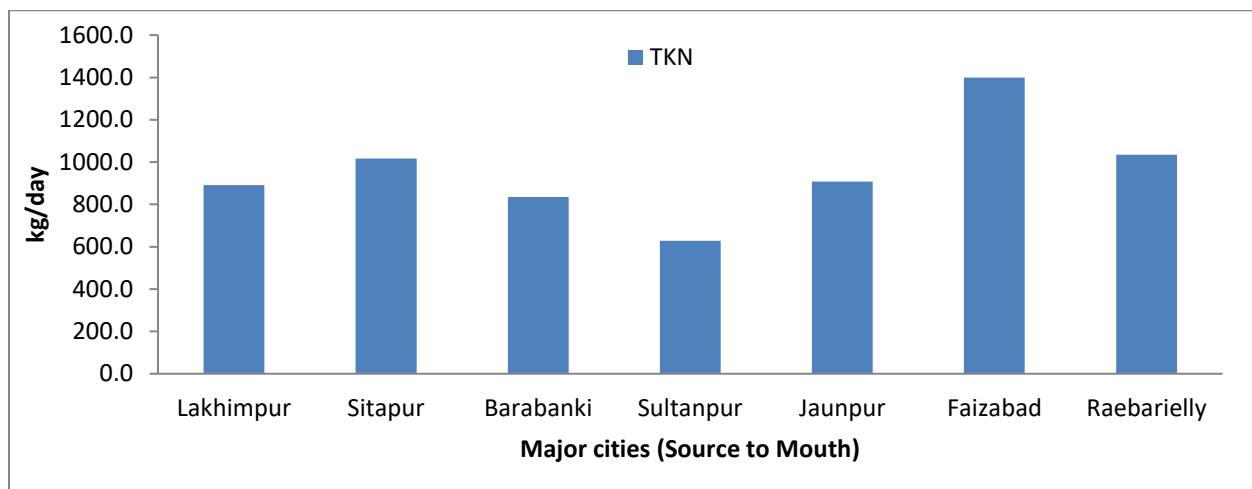


Figure 4b: Spatial distribution of estimated pollution load on Gomati River.

The pollution load on the river in terms of BOD₅, COD and TKN is estimated based on the per capita contribution for all the major cities. Figure 4a & 4b shows the spatial distribution of the pollution load on the river from source to mouth.



Figure5: Major drains disposing sewage into River Gomati

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Lakhimpur		State: Uttar Pradesh	
S. No.	Items		Value
1	Total Area (sq km)	:	10.20
2	Population as in 2011	:	164925
3	Population Growth Rate as in 2011 (%)	:	35.76
4	Total Number of Wards	:	27
5	Population per Ward (Thousands)	:	6,108
6	Total Number of Household as in 2011	:	25830
7	Number of Household per Ward	:	957
8	Surface Water Supply (MLD)	:	NIL
9	Ground Water (GW) Supply (MLD)	:	15
10	Number of Bore Wells	:	20
11	Ground Water Extraction per Bore Well (MLD)	:	0.75
12	Number of Hand Pumps/ Tubewells	:	900
13	Ground Water Extraction per Hand Pump (lpcd)	:	500
14	Number of Pumping Stations for Water Supply	:	NIL
15	Total Pumping Capacity (MLD)	:	NIL
16	Average Water Supply Rate from ULB Sources (lpcd)	:	90.95
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	:	15.5
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	:	93.7
19	Total Sewage Generation (MLD)*	:	22.2
20	Per Capita Sewage Generation (lpcd)	:	134.7
21	Sewage Collection (MLD)	:	NIL
22	Percentage of Sewage Collection (%)	:	NIL
23	Number of STPs	:	NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)	:	NIL
25	Current Utilized Capacity of STPs (MLD)	:	NIL
26	Percentage Utilization of Installed Capacity (%)	:	NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)	:	NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	4453.0
		COD	7570.1
		TKN	890.6
30	Wastewater Disposal Means	:	River Disposal
31	Name of River/Streams for Wastewater Disposal	:	Ull River
32	Number of Drains/Nallah for Wastewater Disposal	:	1
33	Number of Water Bodies	:	9
34	Gross Area of Water Bodies (sq km)	:	6.30
35	Area of Water Bodies as % of Total Area	:	<<<1
	*Estimation based on one time survey by IIT, Kanpur team on 17 November, 2011 at 05:00 PM.		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Sitapur		State: Uttar Pradesh	
1	Total Area (sq km)		35.00
2	Population as in 2011		188230
3	Population Growth Rate as in 2011 (%)		23.98
4	Total Number of Wards		30
5	Population per Ward (Thousands)		6,274
6	Total Number of Household as in 2011		20226
7	Number of Household per Ward		674
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		21.08
10	Number of Bore Wells		27
11	Ground Water Extraction per Bore Well (MLD)		0.36
12	Number of Hand Pumps/ Tubewells		719
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		112.0
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		21.4
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		113.9
19	Total Sewage Generation (MLD)*		5.0
20	Per Capita Sewage Generation (lpcd)		26.6
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	5082.2
		COD	8639.8
		TKN	1016.4
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Sarien River
32	Number of Drains/Nallah for Wastewater Disposal		6
33	Number of Water Bodies		6
34	Gross Area of Water Bodies (sq km)		2.30
35	Area of Water Bodies as % of Total Area		<<<1
	*Estimation based on one time survey by IIT, Kanpur team on 16 November, 2011 at 03:00 PM to 04:00 PM.		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Lucknow		State: Uttar Pradesh	
1	Total Area (sq km)	330.00	
2	Population as in 2011	2901474	
3	Population Growth Rate as in 2011 (%)	32.79	
4	Total Number of Wards	110	
5	Population per Ward (Thousands)	26,377	
6	Total Number of Household as in 2011	500000	
7	Number of Household per Ward	4545	
8	Surface Water Supply (MLD)	250	
9	Ground Water (GW) Supply (MLD)	NIL	
10	Number of Bore Wells	628	
11	Ground Water Extraction per Bore Well (MLD)	NIL	
12	Number of Hand Pumps/ Tubewells	9936	
13	Ground Water Extraction per Hand Pump (lpcd)	500	
14	Number of Pumping Stations for Water Supply	NIL	
15	Total Pumping Capacity (MLD)	250	
16	Average Water Supply Rate from ULB Sources (lpcd)	159.57	
17	Total Water Supply from ULB and Non-ULB Sources (MLD)	468.0	
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)	161.3	
19	Total Sewage Generation (MLD)		
20	Per Capita Sewage Generation (lpcd)		
21	Sewage Collection (MLD)		
22	Percentage of Sewage Collection (%)		
23	Number of STPs		
24	Total Installed Capacity of STPs under GAP & YAP I & II (MLD)		
25	Current Utilized Capacity of STPs (MLD)		
26	Percentage Utilization of Installed Capacity (%)		
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	78339.8
		COD	133177.7
		TKN	15668.0
30	Wastewater Disposal Means	River & Land	
31	Name of River/Streams for Wastewater Disposal	Gomati	
32	Number of Drains/Nallah for Wastewater Disposal	23	
33	Number of Water Bodies	924	
34	Gross Area of Water Bodies (Hectare)	286.88	
35	Area of Water Bodies as % of Total Area	<<< 1	

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Barabanki		State: Uttar Pradesh	
1	Total Area (sq km)		3.87
2	Population as in 2011		154692
3	Population Growth Rate as in 2011 (%)		104.91
4	Total Number of Wards		25
5	Population per Ward (Thousands)		6,188
6	Total Number of Household as in 2011		13400
7	Number of Household per Ward		536
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		9.88
10	Number of Bore Wells		11
11	Ground Water Extraction per Bore Well (MLD)		0.0535
12	Number of Hand Pumps/ Tubewells		107
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		63.86884907
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		9.9
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		64.2
19	Total Sewage Generation (MLD)		16.0
20	Per Capita Sewage Generation (lpcd)		103.7
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	4176.7
		COD	7100.4
		TKN	835.3
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Reth River
32	Number of Drains/Nallah for Wastewater Disposal		1
33	Number of Water Bodies		2
34	Gross Area of Water Bodies (Hectare)		1.57
35	Area of Water Bodies as % of Total Area		<<< 1
	*Estimation based on one time survey by IIT, Kanpur team on 15 May, 2012 at 09:40 AM to 10:40 AM.		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Faizabad		State: Uttar Pradesh	
1	Total Area (sq km)		16.60
2	Population as in 2011		259160
3	Population Growth Rate as in 2011 (%)		79.10
4	Total Number of Wards		28
5	Population per Ward (Thousands)		9,256
6	Total Number of Household as in 2011		28000
7	Number of Household per Ward		1000
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		15.5
10	Number of Bore Wells		34
11	Ground Water Extraction per Bore Well (MLD)		0.46
12	Number of Hand Pumps		792
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		59.81
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		15.9
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		61.3
19	Total Sewage Generation (MLD)		27.9
20	Per Capita Sewage Generation (lpcd)		107.6
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	6997.3
		COD	11895.4
		TKN	1399.5
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Sai River
32	Number of Drains/Nallah for Wastewater Disposal		3
33	Number of Water Bodies		1
34	Gross Area of Water Bodies (Hectare)		0.45
35	Area of Water Bodies as % of Total Area		<< 1

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Jaunpur		State: Uttar Pradesh	
1	Total Area (sq km)		20.00
2	Population as in 2011		168128
3	Population Growth Rate as in 2011 (%)		5.04
4	Total Number of Wards		31
5	Population per Ward (Thousands)		5,423
6	Total Number of Household as in 2011		37000
7	Number of Household per Ward		1194
8	Surface Water Supply (MLD)		5.4
9	Ground Water (GW) Supply (MLD)		11
10	Number of Bore Wells		25
11	Ground Water Extraction per Bore Well (MLD)		0.44
12	Number of Hand Pumps/ Tubewells		844
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		97.54472783
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		16.8
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		100.1
19	Total Sewage Generation (MLD)*		15.3
20	Per Capita Sewage Generation (lpcd)		90.9
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	NIL
		COD	NIL
		TKN	NIL
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	4539.5
		COD	7717.1
		TKN	907.9
30	Wastewater Disposal Means		River Disposal
31	Name of River/Streams for Wastewater Disposal		Gomti River
32	Number of Drains/Nallah for Wastewater Disposal		9
33	Number of Water Bodies		3
34	Gross Area of Water Bodies (Hectare)		
35	Area of Water Bodies as % of Total Area		<<< 1
*Estimation based on one time survey by IT,BHU team on 18 Nov, 2011 at 1:30 PM.			

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Raibareilly		State: Uttar Pradesh	
1	Total Area (sq km)		34.00
2	Population as in 2011		191625
3	Population Growth Rate as in 2011 (%)		13.16
4	Total Number of Wards		31
5	Population per Ward (Thousands)		6,181
6	Total Number of Household as in 2011		37470
7	Number of Household per Ward		1209
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		20.64
10	Number of Bore Wells		37
11	Ground Water Extraction per Bore Well (MLD)		1.7
12	Number of Hand Pumps		3400
13	Ground Water Extraction per Hand Pump (lpd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		107.71
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		22.3
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		116.6
19	Total Sewage Generation (MLD)*		4.1
20	Per Capita Sewage Generation (lpcd)		21.2
21	Sewage Collection (MLD)		NIL
22	Percentage of Sewage Collection (%)		NIL
23	Number of STPs		NIL
24	Total Installed Capacity of STPs under GAP I & II (MLD)		NIL
25	Current Utilized Capacity of STPs (MLD)		NIL
26	Percentage Utilization of Installed Capacity (%)		NIL
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	5173.9
		COD	8795.6
		TKN	1034.8
30	Wastewater Disposal Means		River
31	Name of River/Streams for Wastewater Disposal		Sai River
32	Number of Drains/Nallah for Wastewater Disposal		1
33	Number of Water Bodies		179
34	Gross Area of Water Bodies (Hectare)		92.736
35	Area of Water Bodies as % of Total Area		>> 1
	*Estimation based on one time survey by IIT, Kanpur team on 19 November, 2011 at 03:30 PM.		

Water Balance & Pollution Load (Domestic) Fact Sheet

City: Sultanpur		State: Uttar Pradesh	
1	Total Area (sq km)		16.00
2	Population as in 2011		116211
3	Population Growth Rate as in 2011 (%)		16.14
4	Total Number of Wards		25
5	Population per Ward (Thousands)		4,648
6	Total Number of Household as in 2011		24000
7	Number of Household per Ward		960
8	Surface Water Supply (MLD)		NIL
9	Ground Water (GW) Supply (MLD)		9
10	Number of Bore Wells		22
11	Ground Water Extraction per Bore Well (MLD)		0.355
12	Number of Hand Pumps		710
13	Ground Water Extraction per Hand Pump (lpcd)		500
14	Number of Pumping Stations for Water Supply		NIL
15	Total Pumping Capacity (MLD)		NIL
16	Average Water Supply Rate from ULB Sources (lpcd)		77.45
17	Total Water Supply from ULB and Non-ULB Sources (MLD)		9.4
18	Average Water Supply Rate from ULB & Non-ULB Sources (lpcd)		80.5
19	Total Sewage Generation (MLD)		0.0
20	Per Capita Sewage Generation (lpcd)		80.3
21	Sewage Collection (MLD)		5.0
22	Percentage of Sewage Collection (%)		53.2
23	Number of STPs		1
24	Total Installed Capacity of STPs under GAP I & II (MLD)		5
25	Current Utilized Capacity of STPs (MLD)		0.0
26	Percentage Utilization of Installed Capacity (%)		0
27	Capacity of STPs Sanctioned under JNNURM & Others (MLD)		NIL
28	Pollution Load (Domestic) (Method 1: Actual Flow) (kg/d)	BOD5	0.0
		COD	0.0
		TKN	0.0
29	Pollution Load (Domestic) (Method 2: Per Capita Contribution) (kg/d)	BOD5	3137.7
		COD	5334.1
		TKN	627.5
30	Wastewater Disposal Means		River
31	Name of River/Streams for Wastewater Disposal		Sai River
32	Number of Drains/Nallah for Wastewater Disposal		4
33	Number of Water Bodies		1
34	Gross Area of Water Bodies (Hectare)		0.12
35	Area of Water Bodies as % of Total Area		<< 1.0