### **CHAPTER 13**

#### WATER SUPPLY AND SANITATION

1. Delhi had 18.62 lakh households (94.21 lakh population) in 1991. There were 18.02 lakh residential houses of which 1.82 lakh were kaccha constructions. In the urban area, 78.37% of the households had piped water supply, 17.88% depended on hand-pumps or tube-wells and the remaining 3.75% households used wells, rivers and canals for their drinking water. In the rural areas, 48.38% of the households had piped water supply, 42.62% depended on hand-pumps or tube-wells and the remaining 9% used wells, rivers and canals for drinking water. Thus, in aggregate, 75.72% of the households in Delhi had piped water supply, 20.06% depended on hand-pumps/tube-wells and the remaining 4.22% used wells, rivers and canals for drinking water in 1991 (Table 13.1).

#### Water Consumption

2. The pattern of water consumption in Delhi since 1976-77 is given in Table 13.2. The number of metered water supply connections in Delhi increased from 3.55 lakh in 1980-81 to 8.53 lakh in 1995-96. There were 9.58 lakh metered water connections as on 31.3.99. At the same time, the number of unmetered water connections also increased sharply from 0.13 lakh in 1980-81 to 3.16 lakh in 1995-96 but has since reduced to 2.97 lakh as on 1.4.99. The pattern of water consumption shows that the share of domestic water consumption increased from 75% in 1976-77 to 88% in 1995-96. Per capita consumption of water per day increased from 32.07 gallons during 1980-81 to 49.03 gallons in 1990-91 but dropped to 43.76 gallons in 1995-96. The per capita consumption was 43 gpcd as on 31.3.99.

#### **Zone Wise Distribution**

3. Unequal distribution of water in different zones of Delhi is evident from Map 13.1

## Water Requirements

4. The population projections by the Registrar General of India indicate that the population of Delhi was around 134 lakh in March 1999. Based on a norm of 70 gallon per capita per day prescribed by MPD-2001, the water requirement for this population in 1999-2000 would be 939 Million Gallon Daily (MGD). Even if the water requirement for the population in rural areas and JJ clusters, which is estimated at about 43 lakh, is calculated at the lower norm of 30 gallons per capita per day, the demand for water in Delhi in 1999-2000 comes to 643 MGD. The water treatment capacity was 591 MGD in 1998-99. The target of 650 MGD in 1999-2000 is adequate in this context (Table 13.3)



5. Delhi Jal Board has estimated that if the norm of 60 gpcd for planned colonies, 34 gpcd for Regularised-unauthorized colonies and 11 gpcd for other areas is adopted, the water requirement for the present population of Delhi will be about 440 MGD as against present capacity of 591 MGD. Following these norms, water requirement for the projected 22 million population of Delhi in 2021 will be about 747 MGD which can be met through availability of 300 cusecs (140 MGD) of raw water from Tehri Dam. Ministry of Urban Development, Government of India has recently announced the water supply norm of 37 gpcd for metro cities which is lower than 43 gpcd availability of water at present in Delhi.

## Water Supply Target, 1999-2000

6. The DJB has proposed to increase the water supply capacity from 591 MGD in March 1999 to 650 MGD by March 2000, by recycling 40 MGD of wastewater at the existing water treatment plants at Chandrawal, Haiderpur, Wazirabad and Bhagirathi and 19 MGD from Ranney wells/tubewells. This capacity could be increased further if raw water is made available for the 40-MGD water treatment plant at Nangloi and 20-MGD water treatment plant at Bawana either through western Yamuna Canal or through construction of parallel channel from Munak to Haiderpur or from Bhakra-Beas Management Board.

## **Ground Water Level**

7. The falling ground water level in Delhi has become a matter of concern. At some places in south and south west Delhi, Water level has gone down to 20-30 meter below the land surface. The quality of underground water is deteriorating and in several places it has been found to be unfit for human consumption. The salinity of ground water is increasing in south-west and north-west Delhi. In some areas of Shahdara and Kanjhawala, nitrate contents have been found to be more than 1000 mg/litre. Fluoride and chemical concentrations, more than prescribed limits, have also been found in ground water at various locations in Delhi. To tackle these problems, the Central Ground Water Board has taken steps to regulate the number of tube-wells being commissioned in Delhi. Studies have been conducted to obtain details of the ground water level in Delhi. Steps to improve the ground water level in Delhi include widening and deepening the Najafgarh drain between the Kakrola-Dhansa Regulator, preserving and developing old lakes, preserving and developing the forest area in Delhi, developing water bodies at Asola Wild Life Sanctuary and planting trees. A

beginning has also been made towards harvesting of roof top rain water and waste water re-cycling in Delhi.

## **Raw Water Arrangements**

#### **Construction of a Parallel Channel**

8. At present, Haiderpur, Wazirabad and Chandrawal water treatment plants, which have a total capacity of 410 MGD, get raw water from the Yamuna River. The raw water is discharged and regulated from the Tajewala Head-Work which is 224 km upstream of Wazirabad. It is estimated that 30% of the raw water discharged from Tajewala Head-Work is lost in the present water carrier system through the Yamuna River and Western Yamuna Canal System. To prevent this loss, a parallel channel is proposed to be constructed from Munak to Haiderpur. Under an agreement signed with the Haryana Government, the Delhi Government paid an advance of Rs. 5 crore to the Haryana Irrigation Department in 1994-95 to execute the work. However, the Haryana Government has not yet started construction. Water availability will increase by 120 MGD on construction of this parallel channel.

#### **New Water Treatment Plants**

9. A 40-MGD water treatment plant was constructed at Nangloi in 1998-99. The plant is yet to be commissioned due to non-availability of raw water. Another water treatment plant of 20 MGD is being constructed at Bawana. A 40 MGD plant is proposed at Okhla. These 3 new water treatment plants will get sufficient raw water when the parallel channel from Munak to Haiderpur is constructed. Raw water for these new plants can be arranged through Bhakra Beas Management Board but the surplus water has to be carried to these plants only through the Western Yamuna Canal. The Haryana Government has not allowed surplus water to be carried through the Western Yamuna Canal system so far.

10. Another alternative source of raw water for the water treatment plants is the Western Yamuna Canal System itself. The Delhi Government has requested the Haryana Government to use treated wastewater from sewage treatment plants for irrigation instead of utilising raw water from the Western Yamuna Canal. However, the Haryana Government is yet to accept this proposal.

## Tehri Dam

11. Delhi has been allocated 300 cusecs of raw water from Tehri dam, which is expected to be available by March 2002. A new 140 MGD water treatment plant is proposed at Sonia Vihar-Shahdara for this purpose. Construction work is expected to begin shortly. The Uttar Pradesh Jal Nigam will lay a conduit to carry raw water from Murad Nagar to Sonia Vihar. Land has been acquired for the project and work is expected to start in the current year. The cost of the conduit (Rs. 63.12 crore) will be borne by DJB.

#### Yamuna Water Sharing Agreement

12. An Inter-State Agreement to share the water of the Yamuna River was signed by the Chief Ministers of Uttar Pradesh, Haryana, Himachal Pradesh, Rajasthan and Delhi on May 12, 1994. Under the agreement, Delhi was allocated 0.724 BCM of water from the Yamuna to meet its drinking water requirements. Delhi is presently availing 0.55 BCM out of its allocated share. The balance is expected on completion of the Renuka Dam by the Himachal Pradesh Government and the Kishau and Lakhawar-Vyasi Dam by the U.P. Government. Himachal Pradesh has agreed to start construction on the Renuka Dam in the current financial year and the Delhi Government has to contribute Rs. 1,110.17 crore for 500 cusecs of raw water from this reservoir. By 1997, the Delhi Government has already contributed Rs. 3.45 crore for the project. The Kishau reservoir and Lakhwar-Vyasi reservoir projects are still to be approved by the CWC. When the projects are completed, Delhi will receive 372 cusecs of water from the Kishau reservoir and 250 cusecs from the Lakhwar-Vyasi reservoir (Ref. Map 13.2).

## Sewerage System

13. Delhi has different types of colonies: approved colonies, regularized-unauthorized colonies, unauthorized colonies, JJ resettlement colonies, JJ clusters, and urbanized and rural villages. By March 1999, sewerage systems were laid in all approved colonies, 84 urban villages, 294 regularized-unauthorized colonies and 27 JJ resettlement colonies. Some JJ clusters and unauthorized colonies use low-cost local sanitation systems. At present about 55% of the population is provided with sewerage facilities. The distribution of the sewerage system by type of colony is given in Table 13.4.

## Sewage Treatment Capacity

14. The sewage treatment capacity of the Delhi Jal Board was 284 MGD in 1997. The capacity increased to 344 MGD by March, 1999 with the commissioning of 5 new sewage treatment plants at Ghitorni, Vasant Kunj, Dr. Sen Nursing Home Nallah, Yamuna Vihar and Najafgarh. Sewage treatment capacity will reach 417 MGD by March 2000.

15. The water requirement for the projected population of 13.4 million in 1999 is estimated at 643 MGD based on the norm of 70 gallon per capita daily for urban areas and 30 gallon per capita per day for rural areas and JJ clusters. The sewerage treatment requirement is estimated at 514 MGD for this level of water supply against which the treatment capacity is expected to reach 417 MGD by March, 2000 leaving a gap of about 19%.

16. About 60-80% of the Trunk Sewer system in Delhi (124 kms length) is silted. This system has also collapsed at many points. Due to this situation the installed capacity of Sewage Treatment Plants is not being fully utilized. A proposal is under consideration to rehabilitate 90.91 km length of Trunk Sewers over a three year period at a cost of Rs. Rs. 436.25 crore, out of which Rs. 320 crore is expected to be received under the Yamuna Action Plan sponsored by the Ministry of Environment and Forests, Govt of India.

## Table 13.1

## **SOURCE OF DRINKING WATER - 1991 CENSUS**

Sources	Number of Households				
	Total	Rural	Urban		
1	2	3	4		
All Sources	1861576	163967	1697609		
	(100.00)	(8.81)	(91.19)		
Well	43513	5796	37717		
	(2.34)	(0.31)	(2.02)		
Тар	1409730	79327	1330403		
	(75.72)	(4.25)	(71.47)		
Hand Pump/Tube	373355	69896	303459		
Well	(20.06)	(3.76)	(16.30)		
Others including	34978	8948	26030		
River/ Canal/Tank	(1.88)	(0.48)	(1.40)		

Note : Figures in brackets shows percentage to total.

Source : Population Statistics - 1991, Directorate of Economics & Statistics, Govt. of NCT of Delhi.

## Table 13.2

## WATER CONSUMPTION IN DELHI

Year	Number of Connections		Domestic Consumption Lgd	Comm-erical/ Industrial Consmption Lgd	Total Cons- Umption Lgd	Per Capita Consumption Of Water (Gallons/Day)	
	Metered	Un- metered					
1	2	3	4	5	6	7	
1976-77	210931	28673	1174	387	1561	30.38	
1977-78	239854	22633	1414	364	1778	33.17	
1978-79	258307	20159	1529	352	1881	33.65	
1979-80	314763	16131	1519	364	1883	32.26	
1980-81	355157	13143	1542	411	1953	32.07	
1981-82	386167	12620	1556	509	2065	32.24	
1982-83	409184	11396	1648	490	2138	32.16	
1983-84	437251	11185	NA	NA	NA	NA	
1984-85	475009	10457	1929	507	2436	33.65	
1985-86	501174	10054	2524	513	3037	40.22	
1986-87	547000	26000	2918	483	3401	43.27	
1987-88	580000	30000	NA	NA	NA	NA	
1988-89	625000	126000	NA	NA	NA	NA	
1989-90	637914	206850	3534	523	4067	45.57	
1990-91	678461	226960	4013	527	4540	49.03	
1991-92	700923	245451	4049	556	4605	47.66	
1992-93	745029	253977	4082	567	4649	46.66	
1993-94	804180	294174	4087	424	4511	43.74	
1994-95	826624	311262	4057	433	4490	42.04	
1995-96	853807	315687	4114	627	4841	43.76	

LGD Lakh Gallons Daily.

*Source* : Delhi Statistical Abstract, Delhi Statistical Handbook, Dte. of Economics & Statistics, Govt. of NCT of Delhi

## Table 13.3

WATER SUPPLY IN DELHI

Plan Period	Population on March 1 (in lakh)	Water requirement @ 70 gallon per day per person	Water treatment capacity in MGD	Supply- demand gap In MGD
1	2	3	4	5
1951-56	21.66	152	60	92
1956-61	26.59	186	90	96
1961-66	32.88	230	130	100
1969-74	46.19	323	175	148
1974-79	57.13	400	240	160
1980-85	73.64	515	337	178
1985-90	90.48	633	437	196
1990-91	94.21	659	469	190
1991-92	97.56	683	472	211
1992-93	101.04	707	472	235
1993-94	104.65	733	525	208
1994-95	108.38	759	575	184
1995-96	112.24	786	575	211
1996-97	117.36	821	577	244
1997-98	122.82	860	580	280
1998-99	128.56	900	591	309
1999-2000*	134.18	939	650 (Target)	289

\*Projected Population. *Source* : Delhi Statistical Abstract, Delhi Statistical Handbook, Dte. of Economics & Statistics, Govt. of NCT of Delhi.

# Table 13.4

# SEWERAGE FACILITIES IN DIFFERENT TYPES OF SETTLEMENTS IN DELHI (MARCH, 1999)

SI. No.	Type of settlement	Total No. of settlements of different categories in the year		Sewerage facilities (Cummulative)			
		1997	1998	1999	1997	1998	1999
1	2	3	4	5	6	7	8
1.	Urban Villages	126	126	126	80	83	84
2.	RegularisedUnauthorised Colonies	567	567	567	292	292	294
3.	JJ Resettlement Colonies	44	44	44	22	24	27
4.	Unauthorised Colonies	1017	1017	1017			

Source : Delhi Jal Board.