Private Supply of Water in Delhi

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Pure drinking water is a luxury in India today. However, in case of Delhi, it is just drinking water. Thus , people have begun to realise that in order to enjoy this luxury, they have to pay a price. The people of Delhi are paying exorbitant prices for this luxury. National Capital Territory of Delhi, the capital city of India cannot boast of supplying sufficient water, a basic necessity of life, to all its citizens. Every year people have to spend thousands of rupees in order to acquire drinking water. Purity takes a back seat in the situation of this severe crisis. Every year there are protests on the streets of Delhi and the citizens raise only one question that why can't the authorities meet their basic demands.

Delhi Jal Board (DJB) is the sole government agency responsible for meeting water demands of the city. It has the capacity of supplying 650 million gallons water per day (MGD). If we account for 20% transit losses, DJB supplies around 520 MGD water. The city demands 830 MGD water approximately[1]. Thus, there is a shortage of almost 300 MGD water, which is met by two private sources:

- Privately owned borewells and tubewells
- Private suppliers of water, which again are of two types:
  a) Private Water Tankers
  b) Packaged water suppliers

Water Supply in Delhi

Delhi receives raw water from the following main sources:

- River Yamuna: Delhi's share of this river's resources, as per inter-state agreements, is 4.6%.[2]
- Groundwater: The hydrogeological situation characterised by occurrence of alluvial formation and quartzitic hard rocks controls the availability of groundwater in the National Capital Territory of Delhi.
- Rainwater: Delhi receives a normal rainfall of 611.8 mm in 27 rainy days.[3]

Apart from these the Bhakra storage and the Upper Ganga Canal also provide water.

Delhi Jal Board

DJB is responsible for production of drinking water in Delhi and its distribution in the areas under the control of the Municipal Corporation of Delhi (MCD). It supplies water in bulk to New Delhi

[1] B K Gupta, Engineer Officer (EO), Delhi Jal Board.
[2] *Delhi Water Situation: New Sources of Water Vital for Delhi's Health*. Accessed on 14 July 2003 at http://www.teri.res.in/teriin/news/terivsn/issue35/water.htm
[3] *Delhi Water Situation: New Sources of Water Vital for Delhi's Health*. Accessed on 14 July 2003 at http://www.teri.res.in/teriin/news/terivsn/issue35/water.htm

Municipal Corporation (NDMC) and Delhi Cantonment Board (DCB) for further distribution in their respective areas.

Raw water is lifted from the river/ canal. The water is pre-chlorinated to destroy the algae and bacteria present in it and then taken to clarifloculators. In clarifloculators, water is cleaned through a process of sedimentation. After that, water is passed through a series of filters in order to remove remaining impurities. Once that is over, water is chlorinated again to kill any remaining germs. This treated water reaches all parts of the city through a network of about 9,000 kilometres of water mains/ lines[4]. Water from the tubewells and ranney wells is just chlorinated and not filtered because groundwater is naturally filtered.

The following table reveals the water treatment capacity of DJB and hence the total amount of surface water treated and supplied by DJB:

Table 1

Serial No.	**Source of raw water**	**Name of the Plant**	**Installed capacity as on 31-03-2002 in MGD**
1.	River Yamuna	Chandrawal I & II	90
2.	River Yamuna	Wazirabad I & II	120
3.	Bhakra Storage/ Yamuna or Western Yamuna Canal	Haiderpur I & II	200
4.	Bhakra Storage	Nangloi	40
5.	Upper Ganga Canal	Gokulpuri	100
Total			550

Source: B K Gupta, Engineer Officer, Delhi Jal Board.

Details about the DJB were provided by Mr. B K Gupta, the Engineer Officer of DJB. Generally, Chandrawal Water Plant is able to produce 100 MGD water. In addition, Haiderpur Plant exceeds its capacity and provides around 210 MGD water. On the other hand, Nangloi Plant produces around 20 MGD water only. This keeps the grand total intact and the amount available from the surface water remains unchanged. DJB extracts sub surface water through a network of ranney wells and tubewells. Groundwater provides almost 100 MGD water. DJB has 2300 tubewells. Thus, the total supply capacity of DJB is 650 MGD water, which sometimes goes upto 670 MGD in case of over production from any of the its production sources.

With a view to rationalise the distribution of water DJB has drawn up an elaborate plan for construction of Under Ground Reservoirs (UGR) and Booster Pumping Stations (BPS). During 2000-2001, the following major UGR/BPSs have been completed and commissioned[5]:

- G T Road Shahdara
- Yamuna Vihar

Water crisis: Demand exceeding Supply

With the population of Delhi increasing from 0.4 million in 1911 to 9.4 million in 1991 to 14 million[6] approximately, there has been an ever-increasing pressure on the water resources. As a consequence

[4] Source: Delhi Jal Board.
[5] Source: Delhi Jal Board
[6] *Delhi Water Situation: New Sources of Water Vital for Delhi's Health*. Accessed on 14 July 2003 at

of rapid urban development, much due to unplanned and uncontrolled growth of unauthorised colonies and annual influx of migrants, water supply infrastructure has come under severe pressure. Though the per capita availability of water in Delhi is still the highest in the country, the inadequacy is mainly on account of inequitable distribution of water and loss of water through leaking pipes. According to a report by Central Ground Water Board (CGWB), DJB is supplying water at the rate of 232 litres per capita per day (lpcd). The current demand is assessed to be around 250 lpcd. The present requirement of water is about 800 MGD (for all uses) based on MPD-2001 norm of 363 lpcd for urban population and 100 lpcd for rural population (Ground Water in Delhi). However, according to DJB the demand for water is around 830 MGD water. If we account for 20% losses during transit then DJB actually supplies 520 MGD water. Surprisingly, DJB does not have data related to the zonal division of demand. Mr. Gupta was unable to furnish me with the details regarding residential water demand and industrial water demand and also the distribution of demand across districts. Water crisis in Delhi is a highly politicised issue and so the officers of DJB are very reluctant in divulging any information about it, especially about the demand for water. However, approximately there is a shortfall of almost 300 MGD of water.

Not only is there a shortage of water but also there is uneven distribution of the available water resources. A document published by NCR Planning Board in 1999 gives water supply for different parts of Delhi.

It provides the following very interesting information:

Table 2

District	**Water supply in Litres per capita per day (lpcd)**
Mehrauli	29
Narela	31
Najafgarh/Dwarka	74
Shahdra	130
New/ South Delhi	148
Paharganj	201
West Delhi	202
Civil Lines and Rohini	274
City	277
Karol Bagh	337
NDMC	462
Cantonment	509

Source: Delhi 1999- A Fact Sheet, NCR Planning Board as cited in *Status Report for Delhi 21: Delhi Urban Environment and Infrastructure Improvement Project (DUEIIP).* 2001.

On studying this table, one can note a few things:

- The level of supply in the Cantonment is the highest and is almost 18 times the level of supply in the Mehrauli area.
- The overall low level of supply in Narela and Mehrauli is to some extent logical since these areas include a large number of rural villages where the supply norm is less than for planned colonies. However, a very low level of 29 and 31 lpcd cannot be justified for any part of Delhi.

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http://www.teri.res.in/teriin/news/terivsn/issue35/water.htm

- The level of supply in South Delhi is too low (148 lpcd) considering the high demand expected from a largely medium/ high-income residential area.

We can also look at this problem from a different angle. Different segments of the population demand different amounts of water for consumption. However, DJB has failed to supply these segments adequate water, whether we talk about people living in slums or people living in bungalows, or we talk about supply of water in residential areas or in industrial areas. It is evident from the following table that although production of treated water is adequate, 10% of Delhi population has no piped water supply and 30% of population has grossly inadequate water supply. This demands serious overhaul of the supply management. Even planned areas of MCD with house connections have a shortfall of 42%.

Table 3

S.No.	Type of Settlement	Population in lacs	Demand in million litres per day (MLD)	Supply in MLD	Shortfall/ Excess
1.	JJ Cluster, Designated Slum Area and unauthorised colony (I)	13.96	59.33	No piped supply	(-) 100%
2.	JJ Cluster, Designated Slum Area and unauthorised colony (II)	40.80	173.40	20.43	(-) 88%
3.	Planned Area (H.C) (MCD)	75.50	1698.75	990	(-) 42%

Source: Status Report for Delhi 21: Delhi Urban Environment and Infrastructure Improvement Project (DUEIIP).

Water is a basic requirement for human survival. A certain minimum quantity of potable water is essential for all types of human settlements. In a huge city like Delhi, different levels of supply to different types of settlements are natural. When this gap is too wide it puts a question mark on the overall supply scenario. About 40% of Delhi's population lives in JJ Clusters, Slum Designated Areas and Unauthorised colonies. About 10% of the people of Delhi have no access to piped water supply and 30% of the population is getting a very low level of supply (4-10 lpcd) through stand-posts against a planned level of 42.5 lpcd.

How is this demand-supply gap filled?

Necessity is the mother of invention. When DJB fails to quench the thirst of the city, people find alternative means legal as well as illegal to acquire their water supply. After all DJB does not leave them with many choices. People fill in the gap left unfilled by DJB in three ways:

- Boring their own tubewells and borewells
- Purchasing water from private water tankers
- Purchasing bottled water

Private tubewells and borewells

Invariably, almost every colony or complex in Delhi has a borewell or a tubewell to augment water supply. Legally, the borewells have to be registered with Central Ground Water Authority (CGWA). Laws however, are seldom practised and the borewells are never registered. This phenomenon is

more prominent in South Delhi, which has acute water shortage. People in these areas rely more on groundwater than on the water supplied by DJB. CGWA is the authority in charge of groundwater but it does not have complete information about the number of borewells and tubewells in the city because they are seldom registered. CGWA has forbidden the extraction of groundwater in some 'notified' areas but people still continue to drill borewells and tubewells illegally.

Private Water Tankers[7]

There are approximately 250 private water suppliers supplying water through tankers in Delhi. They are local in origin. In other words, most of the water suppliers come from Delhi, Noida, Gurgaon and other adjacent areas. The water tankers supply untreated or non-potable water and they do not take responsibility for its quality. These suppliers get water for sale by drilling borewells and tubewells. They rely heavily on the groundwater for their business.

Private water tankers have come into existence precisely due to failure of the government to meet the water demand of the city. This is evident form the fact that in spite of supplying untreated water, the business of water tankers has grown over the years. They supply water to South Delhi areas like Vasant Vihar, Vasant Kunj, Greater Kailash and other areas, which suffer from acute water crisis. In the rural areas the groundwater from Narela belt to Kapashera belt is not fit for any purpose: drinking, construction or industrial. People there have to rely on exterior water sources like DJB or private tankers. Apart from that, they also supply water on behalf of DJB to several places like: slum areas and rural areas of Delhi, colonies under Delhi Development Authority (DDA), regularised colonies, and upcoming societies. To places, where on account of low pressure adequate water does not reach the houses. To places, where DJB cannot supply water due to repair works of supply lines. Apart from that, they also supply water on behalf of DJB to government hospitals, central jail, congested colonies and heavy construction works like the metro projects.

Private water suppliers assume greater importance during hot summer months when the demand for water is the highest. Not only do they supply water to private individuals but also on behalf of DJB to those areas where DJB fails to supply the required amount. During period of shortages, DJB hires 200-400 water tankers from private parties. Even During emergencies like breaking down of epidemics, DJB hires as many as 100-150 tankers.

It does not take much to venture into this business. Cost of installing a simple bore well varies from Rs 30,000-40,000 to Rs 2.5 lacs. One can bore borewells in any part of Delhi without many hassles. In order to bore a tubewell or a borewell in a 'Notified Area' one has to acquire permission from the Central Ground Water Authority (CGWA). Given the laxity in enforcement of the laws by CGWA, the private water suppliers are able to bore tubewells in notified as well as unnotified areas with equal ease. Fleet size of a water supplier varies from 2-25 tankers depending upon the size of his business. Thus, it is not surprising to find the water tanker owners minting money during hot summer months.

Packaged Water

There was a time in the recently liberalised past when people did not quite know how to refer to a new product called drinking water. They would use the terms 'bottled water' and 'mineral water' interchangeably, referring to water sold in containers in the market. It used to be quite confusing. People were not used to drinking water that had to be bought. They however, are now gradually getting used to paying more money for water than they do for milk everyday.

[7] This is based on an interview.
Agarwal Naresh, General Secretary of Water Tankers Owners' Association. 2003. Interview by author. Verbal. WZ-32, Punjabi Bagh. 28 May.

Actually technical terms for two hot-selling products; packaged drinking water (PDW) and packaged natural mineral water (PNMW) differ according to the product specifications. PDW is nothing but ordinary water treated to meet certain quality standards and packaged natural mineral water (PNMW) is that which is bottled at the source without any treatment. In other words, clean spring water. However, these terms have been fused completely and incorporated into the vocabulary and the lives of the people. Delhi is no exception. The manufacturers of packaged water are making soaring profits from the existing water crunch in Delhi. National brand like Bisleri is the market leader, followed by international brands like Kinley and Aquafina. Apart from those there are some local brands like Hello and Paras, which sell packaged water to the industrial areas.

Available in pouches, cups, bottles and bulky transparent jars, people buy the packaged water not only because they are health conscious but also to stock drinking water in their houses when DJB supply falls short. Industries also purchase packaged water in bulk in order to meet drinking water requirements. Since packaged water is treated, it is preferred to water supplied by the tankers.

Any manufacturer who wishes to produce bottled water has to pass through a licensing procedure. He needs to have proper infrastructure facilities in place. There must be in-house testing laboratories to conduct on-site tests: daily bacteriological analysis, the ability to check the physical and chemical properties of the water being processed for bottling, or any factor that could compromise the nature of the product (total dissolved solids, pH, turbidity, conductivity or colour). Licenses are granted only if the infrastructure is satisfactory.

Most companies use borewells and tubewells to pump out groundwater, purify the water and sell it in the market. Companies like Bisleri and local companies like Paras have their borewells in and around Delhi. A range of purification methods are used by the various companies. To remove microorganisms, two techniques are commonly used: chemical disinfection and Ultra Violet (UV) light (irradiation). Chemical disinfection uses disinfectants such as chlorine (most common), chloramines, ozone and chlorine dioxide that bump off pathogens in raw water. UV light irradiated into the water is effective against various kinds of bacteria and virus. Membrane technology is used for this purpose. This involves filtering the water by using membranes with ultra-small pores.

The bottled water industry is governed by the Prevention of Food Adulteration (PFA) Act, 1954 and Bureau of Indian Standards (BIS). The water sold by these companies has to meet the standards laid down by the BIS. It is mandatory for the products to have ISI certification. Initially, the scheme was voluntary in nature, aimed at providing third party assurance to customers. Then on September 29, 2000, the Union Ministry of health and family welfare-reacting to the boom in the packaged water segment of the beverages market- issued a notification (no 759 (E)) amending the PFA Rules, 1954. Effective from 29 March, 2001- BIS certification mark became mandatory for PDW and PNMW[8]. There now exists separate standards for both respectively: IS 14543:1998 and IS 13428:1998. The manufacturer is required to meet not only the quality standards but also the packing and labelling standards.

DJB also supplies packaged water under the brand name of 'Jal'. Priced at Rs 15 per 20 litres, the packaged drinking water conforms to the standards laid down by BIS.

Consequences of indiscriminate extraction of groundwater

"It just takes *2,600 hand pumps running for ten hours* to suck Delhi dry of all its groundwater. Delhi's 3,000 unauthorised colonies, which do not receive municipal supply, sink deep borewells. In the Sainik Farms area, for instance, borewells have caused the water table to drop to 250 feet. 'And people spend Rs 20,000 every year to deepen the borewells,' said Eklavya Prasad of the Centre for Science and Environment. 'Some residents said that ten years ago they got water at 50 feet. The decline in the

[8] Gulp. 2003. *Down to Earth*, 15 February, Volume 11, Number 18: 32.

water table is alarming,' Prasad said."[9] Groundwater is one of the most important sources of water. According to a study: *Ground Water in Delhi*, March, 2003, groundwater is contributing 100 MGD water to the water supply system of DJB. It is being extracted through a network of tubewells and ranney wells in Yamuna Flood Plain and number of tubewells located in south and south-west districts of Delhi. Moreover, another 250 MGD of ground water is being exploited by individual private tubewells to meet the demand-supply gap in water supply. The dynamic groundwater resources have been assessed as 292 million cubic metres (MCM) and at present withdrawal of groundwater is mainly in south, south-west, New Delhi and central districts of the city. The growing population has exerted undue pressure on the groundwater resources. Over exploitation of groundwater has now become an issue of great concern, given the fact that the demand for water is increasing phenomenally every year. It is giving the Central Ground Water Board and the Central Ground Water Authority many sleepless nights.

Pre-monsoon depth of water levels during 2002 in the National Capital Territory of Delhi can be divided into six zones i.e. 5m, 5-10m, 10-20m, 20-30m, 30-40m and 40-50m below the ground level (bgl). The deeper water levels i.e. in the range of 40-50 bgl are found in parts of south district (Tughlakabad, Lado Sarai and Vasant Kunj areas). All along the Yamuna River and most parts of north-west district, water levels are shallow within 5m bgl. In the central part of south-west district, water levels are in the range of 10-20m bgl. In 1960's water levels in large parts of the NCT, Delhi were shallow, the shallowest depth to water level recorded was 0.47bgl. By and large during 1960, the water level was within 4-5m bgl. In some parts water logged conditions existed necessitating pumping of water to save the foundations of buildings in the area. Gradually with the increase of pressure on land, groundwater began to deplete at an accelerating rate. Groundwater was intensively developed for irrigation and for domestic use in the residential areas.

The following table reveals the fall in the depth to water levels over the years in different parts of the city:

Average Pre-monsoon ground water levels in different districts of NCT, Delhi (m bgl)

Table 4

Year	North-west and west districts	North, central and New Delhi Districts	South district	South-west District	East and north-east Districts
1960	2.00	5.00	10.00	2.00	2.00
1977	2.50	5.00	13.00	4.00	3.00
1983	4.00	5.00	15.00	6.00	3.00
1995	4.50	8.00	20.00	9.00	4.00
2000	5.90	1.63	24.05	10.47	5.50
2002	6.55	14.12	33.38	12.69	6.45

Source: As cited in Ground Water in Delhi. March 2003.

It is evident from the table that groundwater is found at very deep levels in south and south-west districts of Delhi. These are the very places with severe water shortage and this depth is largely the consequence of indiscriminate extraction of water.

[9] Accessed on 1 July at http://www.the-week.com/22may26/events12.htm

Quality of Groundwater

Not only is the depletion of groundwater raising questions about future availability of water in the capital city but also the quality of water. Chemical quality of groundwater in Delhi varies with depth and space. Brackish groundwater mainly exists at shallow depths in north-west west and south-west districts with minor patches in north and central districts. In alluvial formations, the quality of ground water deteriorates with depth, which varies in different areas. The groundwater is fresh at all depths in the areas around the ridge falling in central, New Delhi, south and south-west districts and also Chattarpur basin. In the areas west of the ridge, in general the thickness of fresh water aquifers decreases towards north-west; the thickness of freshwater zones is limited in most parts of west and south-west. In the flood plains of Yamuna, in general, fresh water aquifers exist down to 30-45m.

Salinity of groundwater in different districts is found in the decreasing order as south-west> west> north-west> north-east and east districts. Extremely saline groundwater is of Na-Cl[10] type and moderately saline groundwater is of Na-Mg-Cl[11] type. The salinity of water increases with depth. Occurrence of moderately to highly saline groundwater and increase in salinity with depth suggests that the groundwater flushing is incomplete and amount of contemporary recharge is very limited or even absent in many places. Salinity of groundwater makes the citizens even more dependent on private suppliers of water. Once again, not only is water found at very deep levels but is also very saline in the southern part of the city where water supply is as it is highly inadequate.

Central Ground Water Authority

In order to put a check on indiscriminate extraction of groundwater, Central Ground Water Authority was made in-charge of the ground water in Delhi. "Central Ground Water Authority (CGWA) has been constituted under sub-section (3) of the section 3 of the Environment (Protection) Act, 1986, vide notification no. S.O.38 (E) dated 14.01.97 for the purposes of regulation and control of ground water development and management." [12] It was always easy to extract groundwater in Delhi until the last few years when CGWA realised that ground water is depleting at a fast rate and something needs to be done about it. They realised that not only is the depth of the water levels increasing but the quality of the water is also deteriorating.

Legally all the borewells and tubewells need to be registered with the CGWA, but in actual practice CGWA does not have the manpower to enforce the law. The Supreme Court did give CGWA the authority to enforce registration of borewells and tubewells but at the same time, the Court was cognisant of the fact that CGWA does not have the infrastructure to do so . It is a technical department meant for conducting studies on groundwater and advising the concerned departments on how to conserve the ground water, which is fast depleting. There are 100,000 registered borewells. However, CGWA believes that there are almost 300,000 borewells being used in Delhi approximately[13]. Registration was introduced in order to estimate the number of borewells in the city. In 2000, it notified areas in order to put a check on arbitrary extraction of ground water. This means that:

1. CGWA imposes prohibition in the area on the construction and installation of any new structure for extraction of groundwater resource without prior specific approval of the Authority.
2. The owners of all the existing groundwater structures (wells, tubewells, borewells and any other form of groundwater abstraction structure whether used for drinking or domestic, industry,

[10] Na-Cl stands for Sodium Chloride/ Common salt
[11] Na-Mg-Cl stands for Sodium Magnesium Chloride
[12] Public Notice No 6 of 2000 issued by Central Ground Water Authority, Ministry of Water Resources.
[13] Dr S B Singh, Research Officer, Central Ground Water Authority.

irrigation or any other purpose) are directed to register these structures with the Authority on the prescribed proforma accompanied with the requisite fee within three months of issuance of this notice.

3. The industry should re-circulate the water used in the industry.

It issued Public Notice No. 6 of 2000 stating:
"… has declared Najafgarh block, Mehrauli block and Vasant Vihar and Vasant Kunj areas of NCT, Delhi as 'Notified Area' on block/area wise basis vide public notice dated 1.4.98, 24.12.99 and 25.4.99 respectively in view of depletion in groundwater resources due to its over-development/ incidence of upconing of saline ground water.

However, due to administrative exigencies, the notified areas have been re-organised on district basis. Now, therefore in exercise of the aforesaid powers and in partial modification of the earlier notices, the Authority after considering the need for protecting the groundwater resources and to ensure further development activities in consistent with protection and preservation of the groundwater resources, hereby declare whole of South and South-West districts of NCT Delhi as 'Notified Areas' and imposes prohibition and restriction in these districts on the construction and installation of any new structure for extraction of ground water resources, to avoid further depletion and deterioration in water quality in the said districts.

Further, henceforth, no person/organisation/ agency (Govt. or Non-Govt.) shall undertake any scheme/ project of groundwater development and management in the above-said districts without prior permission of the Authority. Any contravention of the above notice shall be dealt with in accordance with the provisions of Environment (Protection) Act,1986."

Generally, when CGWA gets to know of any illegal borewell, it informs the District Commissioner and then the District Commissioner follows the case right from the inspection to filing a case in the court. If the concerned party is found guilty then the amount of fine can go up to Rs 100,000[14].

Not only has CGWA notified areas in Delhi but also made Roof Top Rainwater Harvesting mandatory in order to recharge groundwater. CGWA issued Public Notice No. 20/ 2001 stating:
"Attention is invited to the Public Notice No. 16/ 2001 issued by the Authority in the second week of September, 2001 in the leading newspapers directing all Residential Societies/ Institutions/ Schools/ Hotels/ Industrial Establishments located in notified areas of south and South West districts of NCT, Delhi…who are exploiting groundwater to adopt the Roof Top Rain Water Harvesting System for groundwater recharge in their premises by 31st December, 2001. Owners of Farm Houses are also similarly directed to adopt these systems by 31st December 2001.

It is once again brought to notice that if the roof top rain water harvesting system is not adopted within the specified period as given above, the existing tubewells in the premises will be sealed and will also attract penal action under section 15 of the Environment (Protection) Act, 1986."

CGWA also issued Public Notice No. 25/ 2001, stating:
"...in order to preserve and protect ground water resources, and in exercise of powers conferred under section 5 of the Environment (Protection) Act, 1986, hereby imposes ban on abstraction of ground water for sale & supply by private agencies/persons from above said "Notified areas" except Yamuna flood plain area, NCT Delhi and issues warning to all private agencies/persons engaged in sale and supply of ground water that abstraction of ground water for sale and supply in the above "Notified areas" shall amount to contravention of the directions issued by the Authority."

[14] Dr S B Singh, Research Officer, Central Ground Water Authority.

This clearly shows that CGWA is not really worried about the areas where groundwater is available at shallow levels. In other words, Yamuna Flood Plain area has not been notified much to the advantage of the private individuals. Private suppliers of water and packaged water suppliers generally bore tubewells in this region.

How pure is the water?

Water shortage seems to have become a perpetual phenomenon in Delhi. In such a situation, purity of water ceases to become a chief concern of the consumers. Yet, every year there is outcry that DJB does not supply clean water. This induces the citizens to buy packaged water. However, recently a study conducted by Centre for Science and Environment (CSE) shattered the myth that packaged water is impure and safe.

Water supplied by DJB conforms to the standards laid down by the Ministry of Urban Affairs and Employment. The BIS has provided standards for drinking water and but compliance is voluntary. On talking to officers at DJB, they claimed that water supplied by DJB conforms to the standards laid down. The quality of water is checked at every stage of treatment - from raw water stage to storage reservoirs and also in the distribution system at the consumer's end. Water being supplied from ranney wells and tubewells is also tested on regular basis to ensure that no contamination takes place during transmission of water through water mains. Approximately 200 water samples are lifted daily from the distribution system, individual taps and public hydrants, etc[15]. In order to avoid contamination of water, all ground reservoirs, overhead tanks and dead ends in the distribution system are flushed and cleaned periodically.

Water supplied by private tankers is untreated and they do not claim the water to be clean. They are not liable to meet any quality standards.

Packaged water manufacturers have to conform to the standards laid down by BIS. Study conducted by CSE on 17 brands of bottled water in Delhi revealed some horrifying facts. Each bottle of clean water was a cocktail of tiny amounts of organochlorine and organophosphorus pesticides. The top seller, Bisleri, was the third worst brand out of the 17 brands tested. Worst brand was Aquaplus- manufactured in Burari area of northwest Delhi and mostly bought by the Railways. For the last few years the market for bottled water has grown immensely. Tired of illness, the citizen became a consumer willing to pay for water said to be pure. The citizen had to turn to packaged water; there was no choice. But what did the people get in return?

What does the future look like?

At present, the population of Delhi is 137.83 lac (Census of India, 2001). Decennial population growth from 1991 to 2001 was 4,362,332 in absolute terms and 46.31 percentage wise. With this growth rate, it is projected that by 2011 population of Delhi will reach 195.1 lac and cross the two crore mark by the end of 2021[16]. This raises serious questions concerning the availability of water in the future.

DJB is undertaking measures to increase its water supply capacity. The construction work of 20 MGD water treatment plant at Bawana is in its final stage of completion. The construction work of 140 MGD water treatment plant at Sonia Vihar has started and is likely to be completed by December 2003. Simultaneously, UP Jal Nigam has also started the work of laying raw water conduit from Murad Nagar to Sonia Vihar. On commissioning of these water treatment plants, the filter water supply in Delhi will improve[17]. There are some proposed long-term projects at Tehri Dam (160 MGD),

[15] Accessed on 30 June 2003 at http://www.delhijalboard.com/w_treatment.htm

[16] Government of India. 2003. *Ground Water in Delhi.* Central Ground Water Board, Government of India.

[17] Delhi Jal Board, Achievements in Brief

Kishau Dam (370 MGD) and Renuka Dam (275 MGD)[18]. CGWA is undertaking measures to conserve and recharge groundwater. Rainwater Harvesting is being promoted by the government authorities in full swing. It is believed that it will reduce the supply-demand gap to some extent.

The failure of DJB to satisfy the water needs of the city acts as a boon to the private suppliers of water. They play a significant role in filling up the gap but at a price. Citizens of Delhi have to rely on them willingly or unwillingly. However, with the groundwater table falling deeper and deeper, there is a greater concern about the future of Delhi, given the fact that the existence of private sources is incumbent on groundwater.

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