A thesis submitted to the Department of Environmental Sciences and Policy of Central European University in part fulfilment of the Degree of Master of Science

Water: Struggle for equal share
A Case study of urban poor in Delhi

Neha MITTAL

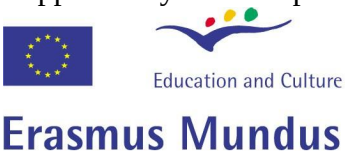
May, 2009

Budapest

Erasmus Mundus Masters Course in Environmental Sciences, Policy and Management
MESPOM

This thesis is submitted in fulfillment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).

Supported by the European Commission's Erasmus Mundus Programme



Author's declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Neha Mittal

CENTRAL EUROPEAN UNIVERSITY

ABSTRACT OF THESIS submitted by: Neha MITTAL
for the degree of Master of Science and entitled: Water: Struggle for equal share A Case study of urban poor in Delhi

Month and Year of submission: May, 2009

Recent study suggests that inadequate access to water among the urban poor is mainly due to socio-economic segmentation. Despite their willingness to pay and participate for the improvement of supply services, access to water is everyday struggle for them due to social exclusion. Community based discussion was carried out to reach the maximum number of people in two different types of urban poor settlements in south Delhi. It was examined that socio-economic exclusion is linked with insecurity of land tenures, enormous user charges and incapability of the urban poor to participate in decision making. Lack and inadequacy of public water supply in these illegal settlements has led to the emergence of unregulated water privatization. Private borehole owners supply untreated groundwater at huge cost to the city dwellers and the urban poor population. Mismanagement of available water resource and lack of involvement of all the sectors in decision making is also responsible for the depletion of groundwater to significant depth especially in south Delhi.

Keywords: inadequate water access, urban poor, socio-economic exclusion, insecure land tenures, illegal water privatisation, groundwater depletion

Acknowledgements

I am thankful to number of people, without their help this work would not have been completed in time. My gratitude goes to my supervisors Dr. Tamara Steger and Dr. Prem.S. Vashishtha for their constant guidance through out the research period. I owe great respect to Dr. Tamara for her valuable suggestions and ideas which helped me to bring clarity and precision in my work.
I would like to convey many thanks to Prof. S.R. Hashim, Prof. S.K Goyal and other faculty members at Institutional Studies for Industrial Development for encouraging me and providing the excellent research environment. I am also grateful to the respondents from slum settlements for their cooperation during the survey.
Thanks to the 'team' MESPOM 2007-09 for making this learning period more beautiful and memorable.

Neha Mittal
26 May 2009
Budapest

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List of Abbreviations

BSUP	Basic Services to the Urban Poor
CBOs	Community Based Organisations
CGWA	Central Groundwater Authority
CPHEEO	Central Public Health and Environmental Engineering Organisation
CV	Contingent Value
DDA	Delhi Development Authority
DJB	Delhi Jal Board
EIUS	Environmental Improvement of Urban Slums
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussion
GNCTD	Government of the National Capital Territory of Delhi
GPCD	gallon per capita per day
IHSDP	Integrated Housing and Slum Development Programme
JJ	*Jhuggi-Jhompri*/ Slums
JNNRUM	Jawaharlal Nehru National Urban Renewal Mission
Kl	Kilolitres
LIFE	Local Initiatives for the Urban Environment
LAP	Local Area Plan
lpcd	litres per capita per day
MC	Municipal Corporation
MCD	Municipal Corporation of Delhi
MCM	Million cubic meters
MDG	Millennium Development Goal
mbgl	meters below the ground level
MGD	Million gallons per day
MoU	Memorandum of Understanding
NCT	National Capital Territory
NDMC	New Delhi Municipal Council
NGO	Non-government Organisation
NSDP	National Slum Development Programme
PSP	Public Stand Post
RWA	Regional Welfare Associations
UBSP	Urban Basic Services for Poor
UNDP	United Nations Development Programme
ULB	Urban Local Body
UN	United Nations
WDC	Ward Committees
WTP	Water Treatment Plant

1. Introduction

1.1 Water insecurity and economic development

Urban areas have been the main centres of employment and income opportunities in developing societies. This has led to the migration of people from rural to urban areas. Migration is an important component of urban growth rate. According to 2001 census, out of 17 million people in Delhi, 5 million are migrants (Singh 2009). Majority of migrants who cannot afford formal shelters, thus pushed to illegal and informal settlements called 'slums' as housing is cheap and settlement is closer to their work place but certainly lacks water and sanitation infrastructure. This is not in support of the idea that incidence of poverty is higher among the migrants (Singh 2009). It is important to realise that slums do not house all the urban poor nor are all slum dwellers always poor. According to Baud et al. (2008) areas with poor living conditions are commonly designated as 'slums'. The basic threshold for adequate water provision is 50 litres1 per person a day below this level people are constrained to maintain their physical wellbeing and the dignity that comes with being clean (HDR 2006). But water use averages 10-12 litres a day in these informal settlements in Delhi.

Rich and poor divide

As it is difficult for rich countries to imagine what water insecurity means in a developing country. Similarly, it is difficult for people residing in affluent residential areas of city to understand what the value of water means to the urban poor. The coverage level of water rise with income, the more socio-economically influential the colony the greater the coverage. The pricing of water is not seriously applied to rationalise its use which leads to demand based excessive consumption by connected households. In comparison the urban poor can hardly collect few litres of water through community supply. "Public Stand Posts (PSPs)" are provided only in notified slum areas (Kundu. A 2009). The water supply is highly inadequate as the number of persons per PSP often exceeds the norms of 150 per PSP. Inadequacy leads to the wastage of time on an average 3 hours a day while waiting for water supply and later, collecting it. In response to inadequacy and unavailability urban poor have to pay much higher for the alternative source of water (Llorente and Zerah 2003). Private borehole owners are making the most out of this socio-economical water crisis by supplying water at huge costs. Due to commoditisation of groundwater, there has been significant decline in water

[1] Norms set out by the "World Health Organisation (WHO)" and the "United Nations Children's Fund (UNICEF)",factoring in drinking, personal hygiene, bathing and laundry.

table over the years through out the city. This has grown a great concern for environmental justice which calls for equal distribution of environmental harms and benefits among the masses irrespective of socio-economic status.

In developing countries like India, water governance can play a major role in correcting market distortions, perverse incentives, and pricing that shuts out the poor. It ensures that private and public supply systems can meet the need of the poor without falling into corruption (UNDP 2004).

1.2 Adequate water: A necessity

According to FAO (2004), water security is defined as ''sufficient access by all people, at all times, to adequate water for an active and healthy lifestyle''. In November 2002, different components of slums were defined officially for the purposes of UN monitoring of the MDGs (UNDP 2004). These are Insecure residential status, Inadequate access to safe water, Inadequate access to sanitation and other infrastructure, Poor structural quality of housing, Overcrowding. Inadequacy of water and sanitation are two of the five main areas that describe life in slums. Access to adequate water supply ensures healthy and hygienic sanitation conditions. This in return helps to combat water borne diseases such as diarrhoea, dysentery, typhoid etc. Improving the access to water for poor is crucial in eradicating poverty, as poverty is linked to water availability, its quality and quantity. Thus water security can contribute in meeting;

Goal 1: Eradicate extreme poverty and hunger

Goal 4: Clean water will reduce child mortality

Goal 6: Help combat major diseases

Goal 7, Target 10 and 11: To halve the proportion of people without sustainable access to safe drinking water by 2015 and to achieve a significant improvement in the lives of at least 100 million slum dwellers respectively.

Costs more than money

Not only adequate access but equitable access to the water distribution system can help in ensuring the social inclusion of urban poor population. Studies have shown that emotional distress is significantly associated with the access to the water supply (Wutich and Ragsdale 2008). People have to spend long hours while waiting and collecting water. Due to

inconsistent supply timings and irregular supply, they usually remain preoccupied on daily basis over the water insecurity.

1.3 Urban Governance and Elite Capture

In order to bring integrity in urban development and improve the living conditions of the slums by providing them basic amenities, land security etc, various schemes and programmes have been launched under the joint control of Central and State Government. The role of Central Government is limited to allocating funds, sponsoring improvement and poverty alleviation schemes, issuing guidelines for their implementation. These schemes are implemented by the Local Government, the State Government only oversee and disburse funds. With the emergence of local governmental bodies such as "Ward Committees (WDCs)", many private sector companies; "Community based organisations (CBOs)"; "Non-government organisations (NGOs)" and "Regional Welfare Associations[2] (RWAs)" have gain power to take part in decision making at local level. It involves not only management of urban services and infrastructure but also capital investment and participation in designing city development plans. The functioning of RWAs, which are based in high and middle income residential areas, has serious affects on the living of the urban poor. The urban poor are considered as illegal settlers who occupy city area, which can be used for other development purposes. Illiteracy and poor economic status has left them out of participation in social society and its activities (Harris 2007).

1.4 Secure land tenure: Gap in access to water

In the post independence period poor gained the entry into the urban areas but are still recognised as illegal settlers. They are living in temporary squatters which are prone to eviction. The insecurity of land tenures discourages the government departments to invest for the improvement of their living standards. They constitute huge vote bank for WDCs, besides providing extensive labour for construction and maintenance of development projects. Slum clearance for the development and beautification of the capital has often resulted in pushing the urban poor population to the periphery without ensuring adequate housing and basic amenities. Other reason for the evacuation is that the value of the land occupied by the JJ clusters in the city is much higher than that in the relocation sites (Khosla and Jha 2005). Some of the settlements which still exist within the city either constitute some major political

[2]RWAs, The regional welfare associations, also called the *bhagidars* or partners in the Bhagidari (citizen-government partnership) scheme. The active RWAs are required to sign a MoU with MCD to carry out the functions. They are socio-economically influential people of the society

constituency or have links with government functionaries and politicians (Singh and Shukla 2005). This support has allowed them to get employed, start their informal small entrepreneurs and access few basic services while staying close to the formal settlements.

1.5 Purpose and Objective

The aim of the research is to analyse the nature and extent of gaps in water distribution among urban poor communities in Delhi. Inadequate access to water in these settlements has resulted in poor sanitation conditions. Slum dwellers usually use water stored in empty cans under unhygienic conditions. Illegal private borehole owners play a major role in distribution of water in the settlements where households are not connected through public water supply. Mismanagement of available water resources, interest to serve the wealthy residential colonies and out casting of the urban poor has resulted in the depletion and contamination of water table to a significant extent especially in south Delhi. The urban poor are not involved in decision making as other socio-economically influential people of the city therefore local government is incapable of assessing their needs and monitor the existing facilities. This survey brings up their existing problems regarding inadequate access to water and their willingness-to-pay for the improved supply services. Further involvement of the urban poor in decision making and regularisation of private vending of water can help the poor in having affordable and adequate access to water.

1.6 Research Question

Towards achieving the above-mentioned objective, this study intends to focus on the following research questions:

- What is current situation regarding the access to water supply in two different urban poor settlements in south Delhi?
- What are the factors responsible for the inadequate access to the water supply among the urban poor?
- How these factors are responsible for the overexploitation of groundwater in south Delhi?

1.7 Rationale of the study

Choice of study area

The study is focused on the distribution of inadequate water among the urban poor population. The water crises are predominant in whole of Delhi but the urban poor sector remains the most affected. The availability of water is different in different types of urban poor settlements. In order to compare the factors responsible for the access of water, two different slum settlements of south Delhi were surveyed. One of the survey areas, *Jagdamba Camp* in *Sheikh Sarai* is the largest notified slum population in south Delhi. Similarly, *Sangam Vihar* is the largest unauthorised urban poor settlement in Delhi. Being the largest of their types, the inadequate supply of water affects significant number of people. Moreover, the overexploitation and contamination of groundwater is a major environmental concern in south Delhi. But the unserved urban poor population and nearby influential and wealthy colonies are the main business zones for illegal private water vendors. These middle and high income residents constitute majority of the RWAs based in south Delhi.

Focus group

Findings of this research can be useful for MCD and WDCs to know about the present status of water supplies in both the settlements. Their willingness-to-pay and participate for improvement of supply services. Urban poor should be provided with some minimum amount of water for free, above that everyone can be charged. This will not only help Delhi Jal Board to revise user charges to overcome the present losses but will also bring urban poor to an equal socio-economic status with other residents. Considering the fact that out of 16 million, urban poor constitutes 3 million[3] of Delhi's population, changes in the water governance for the provision of adequate water among the urban poor will bring improvement in the health and environment of large city area.

1.8 Research Approach and Methodology

A participatory approach was considered in order to identify and understand the magnitude of water supply problems faced by urban poor. It provides an opportunity to the community people to share and discuss their problems and to facilitate a realistic assessment of issues.

[3] The last comprehensive enumeration of JJ clusters conducted by the slum and JJ department dates back to 1994. Thereafter, till 1998, estimates were provided on the basis of the 1994 data and projected growth. In fact, until 2007, no new figures for the last few years were made available by the slum and JJ department.

The research is based on active participation of all sections of the community including women, children, youth, aged, and service providers through participatory research techniques of Community based Assessment: "Focus Group Discussion (FGD)" and "Contingent Value (CV)" Survey.

Familiarisation Process

The survey process was initiated by getting familiar with the settlement and the community by identifying its extent and understanding its environment. During this phase, the aims and objectives of the research were shared with the community in order to seek their help and cooperation in undertaking the research. This process was very effective in building a positive understanding with the community in order to analyse their knowledge, experiences and perceptions about their own situations.

Focus Group Discussion

FGD was aimed at ascertaining the type of housing and the level of provision of water supply at individual and community level. Also to ascertain the type of local institutions and organisations present to respond to local water supply needs and grievances. Slum Profile used as research tool was in the form of a questionnaire through which information on the settlement such as location, land ownership, year of establishment, total number of houses and population; details on housing such as size of dwelling, area and building material; access and nature of water supply system was collected based on the response of community members. Based on the literature review a questionnaire was developed to know the level of provision of water in the study area. The slum profile questionnaire has been attached with this report as Annexure I.

Contingent Value Survey

Another assessment tool, CV survey was used to assess the willingness of the community to pay for improved facilities and to explore the level of willingness and the ability of the community to take up the roles for the Operation and Maintenance of the Community based water supply system. CV Survey is used to estimate the economic value of nonmarket goods; in this case it is groundwater. To address the potential problem of inaccurate bids (Mansfield 1998) during the public response, a Community Managed Pro-poor Demand Responsive Initiatives successfully taken in State of Madhya Pradesh, India was taken as baseline for CVs. The questionnaire can be found as Annexure II

1.9 Limitations of the study

Lack of personal communication

After going through various official documents regarding the recent changes in the water tariffs by Delhi Jal Board and development policies of slums it seems that situation regarding the distribution of water has not changed at all. In order to get information on their implementation strategies and to know if the reforms have been translated into action or not, it was essential to consider their views. It was difficult to get appointments due to communication and access problems. As a result, the study had to narrow down to the existing situation and survey analysis.

Response based analysis

Secondly, FGD and CV Survey are not based on the implementation of analytical tool. It is dependent on the majority of responses recorded during FGD and CV among all the participants. As majority of them were illiterate, questions were verbally asked for their response.

Lack of updated data

Finally, it was difficult to access the overall affected number of Slum dwellers with accuracy as the last officially published data provided by the slum and JJ department of the "Municipal Corporation of Delhi (MCD)" dates back to 1994. Thereafter, in all the official documents published by the planning department of the Government of the "National Capital Territory of Delhi (GNCTD)", including in the most recent ones such as Socio Economic Profile of Delhi 2006-07, the Delhi Tenth Five-Year Plan (2002-07) or the Delhi Annual Plan (2006-07), the same broad estimate of three million population in *Jhuggi-Jhompri* clusters can be found. The City Development Plan of Delhi, released in 2007 under the "Jawaharlal Nehru National Urban Renewal Mission (JNNURM)", also provides figures based on estimations.

1.10 Thesis Outline

The introduction provides a general view of the existing situation and problem under investigation. It brings up importance of the issue studied during the research. This part includes the justification to study undertaken, its goal and limitations encountered during the study.

Chapter 2 includes the literature review from various journal articles, government documents, newspaper articles, annual reports of development organisations etc. It takes into account similar studies conducted in other developing countries regarding the access to water among the urban poor. It further analyses the pro-poor water management tools suggested and successfully implemented internationally.

Chapter 3 focuses on the study area as a whole. The present status regarding the water availability and its access to the city residents and the role of institutions involved.

Chapter 4 presents the research methodology, the procedure followed to conduct the study. It highlights the study objectives and based on them the justification for the research method followed. The chapter discusses the method of familiarisation and data collection during the area visits.

Chapter 5 outlines the findings of the study. These are analysed and discussed in this chapter.

Chapter 6 follows the discussion and recommendation based on the analyses.

CHAPTER 2 – A LITERATURE REVIEW

2.1 Overview

The literature review highlights Decentralisation and Environmental Justice as important factors responsible for the inequitable and inadequate distribution of water among the urban poor. Analysing the loopholes in the decentralised system regarding socio-economic segmentation leads discussion to environmental injustice among different classes of society. Insecurity of land tenure and insufficient funds have been the main constraints of the policy structures designed so far for eliminating socio-economic inequality. Apart from regularisation of land tenures, the efficient services of water supply department and involvement of the urban poor in undertaking community based projects can help in ensuring adequate water supply.

2.1.1 Decentralisation and access of water among the urban poor

Based on the hypothesis, the participatory local government is better informed about the local issues and needs and hence can better design strategies that can bring efficiency in public-service delivery (Mathur 2009). The decision making and monitoring at local community level gives more responsibility and accountability to the elected local government (Narayanan 2005). The 74th Constitutional Amendment in 1992, empowered municipalities with financial resources and responsibilities. It has expanded their functional horizon to urban planning, regulation of land use, environmental protection, slum improvement and poverty alleviation through socio-economic development. This enables people especially poor to actively participate in setting up a democratic institution where they can participate in decision making and can lobby for their interests (OECD 2005). But the effects of decentralisation are based on the degree of devolution of powers and resources to the local government (Narayanan 2005). The problem of expenditure control has led to the marginalisation of poor due to dominance of high and middle income class, which is socio-economically influential (Mathur 2009). The studies conducted in three Indian states by (Narayanan 2005) have also suggests social capital, power relations and structure of governance as important factors that influence citizen's participation in governance mainly the urban poor.

Social Networks

The civil society through social networking, interaction and civic engagement can help in effective functioning of public institutions in providing basic services (Majumdar 2000). This pattern of socialising works among high and middle income group people but it certainly excludes urban poor group of the society. This is further explained that the existence of a strong network amongst a particular group of people can be a very important resource for them but it might entail social exclusion for the non members (Harris 2001). Also the relevance of social capital cannot be fully assessed unless one considers the power relations that mediate social interactions (Harris 2001).

Internal mobilization of funds by the rich

It has been observed that people constituting the WDCs are economically powerful if not socially. In NCT of Delhi, there are over 1400 welfare groups mainly called as RWAs, registered with Delhi government under citizen-government scheme, none of them is based in urban poor community (Kundu 2009). In this case, the urban poor have been totally segmented from the local community with no participation in the decision making process (Narayanan 2005). RWAs in Delhi are involved in maintenance as well as in making capital expenditure for infrastructure. In 2004, RWAs with the involvement of DJB has extended water supply connections in one of their influential residential colony by paying for the project. The price charged by DJB was half of the regular installation prices (Kundu 2009).

2.1.2 Environmental Justice and access to water

In a review of work on environmental Justice regarding Roma population in Central and Eastern Europe, Steger (2007) suggests that the incidence of inadequate or non-existent access to water is often high among the poor due to the unequal distribution of environmental harms and benefits, non recognition of these communities and prohibition to participate in decision making. David (2004) also suggested that the social and economic inequality offers only the minimal benefits to these least well off urban settlements. Similarly, Ennis-McMillan (2001) explains that, rather than distress over water scarcity itself, suffering from water is an expression of distress over social inequalities in the distribution of water. Considering this social injustice and divide, Bartelmus (1994) points out that both poverty and affluence are driving forces behind environmental exploitation and resource depletion.

2.1.3 Repercussions of Social Inequality

2.1.3.1 Land Tenure Insecurity

Recognised as poor illegal migrant settlers, the people in these informal communities are not provided with secure land tenure which makes them vulnerable to eviction anytime. Robinson (2002) regarding water inequity in Zambia and Zimbabwe states that legal land tenure provides people and communities with official status and documentation to live in their settlement or land and right to access the essential services such as water supply. Same trend has been observed in case of Roma population in Slovakia, where they have been removed from the town centres and relocated within the inferior environmental conditions on the periphery (European Roma Rights Centre 1999). The houses are illegally built, water supply pipelines are not connected to the Roma houses as studied by Filcak (2007). Whereas there are studies of cities in Mozambique where most of the informal settlements initially considered illegal were become part of the new municipalities but there are still restrictions to access the piped water due to lack of pressure in nearby network (Matsinhe et al. 2008).

Evictions in Delhi

In case of Delhi main problem of regularising squatter settlements lies with reluctance of land-owning agencies to part with the encroached land and due to directives of the courts to discourage the regularisation of encroachers (Rishbud 2009). Around 1.5 million people have been evicted in Delhi (Urquhart 2006) and there are around 11 relocation sites in Delhi (Department of Urban Development 2006).

Approximately 2 million people are residing in 44 resettlement colonies. The main pockets from where JJ Cluster was relocated are Central, South and East Delhi areas as shown in figure 1. During 1999-2000, 3741 squatter households from the JJ clusters were moved to Narela and Rohini in North Delhi. At Bhalswa resettlement site in North Delhi, communities were relocated in November 2000. Study conducted by Singh and Shukla (2005) in these areas shows that community supply of water is highly inadequate and poor in quality. People have to queue up for long hours to collect water from tankers; there are conflicts and altercations Also, the majority of the relocated sites are constructed in the most polluted and high risk areas. Significant number of people lives near hazardous landfills on the outskirts of North Delhi. Being on the outskirts the distance from their original work place has increased making access to transportation and hence employment difficult.

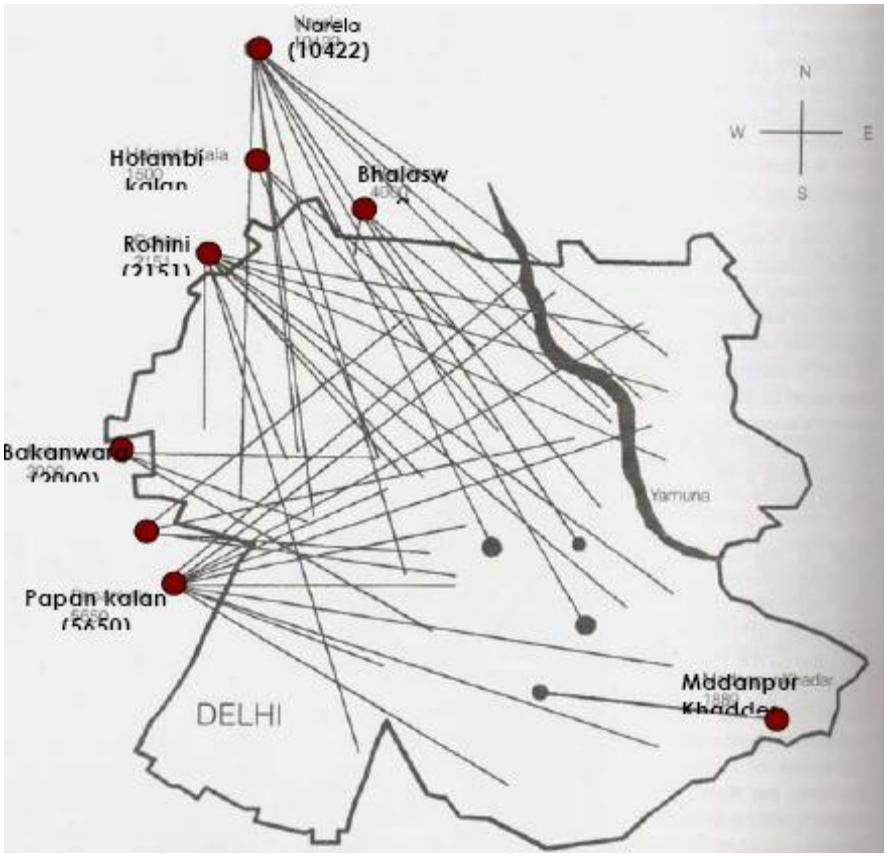

Figure 1: Displacement and Resettlement of slum Settlements from the core of the city to the peripheral areas[4]
Source: Department of Urban Development 2006

High land prices and urban politics

The basis of relocation and slum clearance from the places of 'larger public interest' shows little interest and injustice towards the evicted families. Dupont (2008) considers economic rational for the demolition of slums and their relocation in distant peripheral zones as the value of the land occupied by the JJ clusters in the city is much higher than that in the relocation sites. Cost benefit study conducted by the Centre for Urban and Regional Excellence also supports the same argument (Khosla and Jha 2005). Importantly, in Delhi, RWAs have been participating in making decisions regarding illegal encroachments and the land use in the city (Kundu 2009). According to new land-use notification of DDA, RWAs would be consulted before formulating and implementing "Local Area Plans (LAP)" (Ministry of Urban Development 2006).

[4] Red areas shows the resettlement sites while the grey areas are the evicted sites from the centre of the city.

2.1.3.2 Enormous User Charges

The urban poor population being the most affected from the inequitable distribution has to rely either on the inadequate water supply or on the private water tankers. They have to queue for hours to get water from tankers. Robinson (2002), Cain (2004) and Sal-consultores (2005) finds out that user charges these people pay for informal vending is much higher, almost three times or even more than paid by the connected consumers with individual piped water supply. Similarly, study conducted by Bouselly, Gupta and Ghosh (2006) shows that dwellers of urban poor settlement in Delhi are paying approximately 7- 8 Euros per month to illegal private borehole owners to access water. Apart from these, there are significant intangible user charges the poorest pay through ill-health, queuing and carrying (UNCHS 2003). One study has found that with the provision of piped water supply, reduction of over 80 percent in expenditure on water which can result in the development of sustainable livelihoods through small businesses (Weitz and Franceys 2002). The per capita water consumption in case of urban poor is low, even when water is given free to them (Kundu 2009). On the other hand the rich get a smaller subsidy per unit of water but since their total consumption is very high, total subsidy comes out to be very high. The residents usually pay some fixed amount of 1 Euro every month irrespective of the consumption. Even after revising the user charges in 20075, the existing water tariff structure is too low to cover the operating costs. The cost of production of water by DJB is more than 3 Euros/30 Kilolitres, which is more than the revised tariff for the consumption of same amount of water (Department of Planning, Economics & Statistics 2007-08). Poor cost recovery has resulted in lack of maintenance and inadequate distribution especially among the urban poor.

Inadequate supply of water

Supporting the fact of inequitable distribution of resources among the rich and the poor it was found that the regularised and formal settlements have individual level water supply while resettlement colonies and JJ clusters have access to community level water supply for few hours per day provided by tube well bored by DJB (Department of Planning, Economics & Statistics 2007-08). DJB supplies treated water in bulk to the "New Delhi Municipal Council (NDMC)" and to the "Delhi Cantonment Board (DCB)", both of which is responsible for the distribution of water within their own territories. Rest of the MCD area is the responsibility of DJB (Department of Planning, Economics & Statistics 2007-08).

[5] Refer Appendix III for revised user charges but they are not implemented yet due to defective meter system and unmetered households.

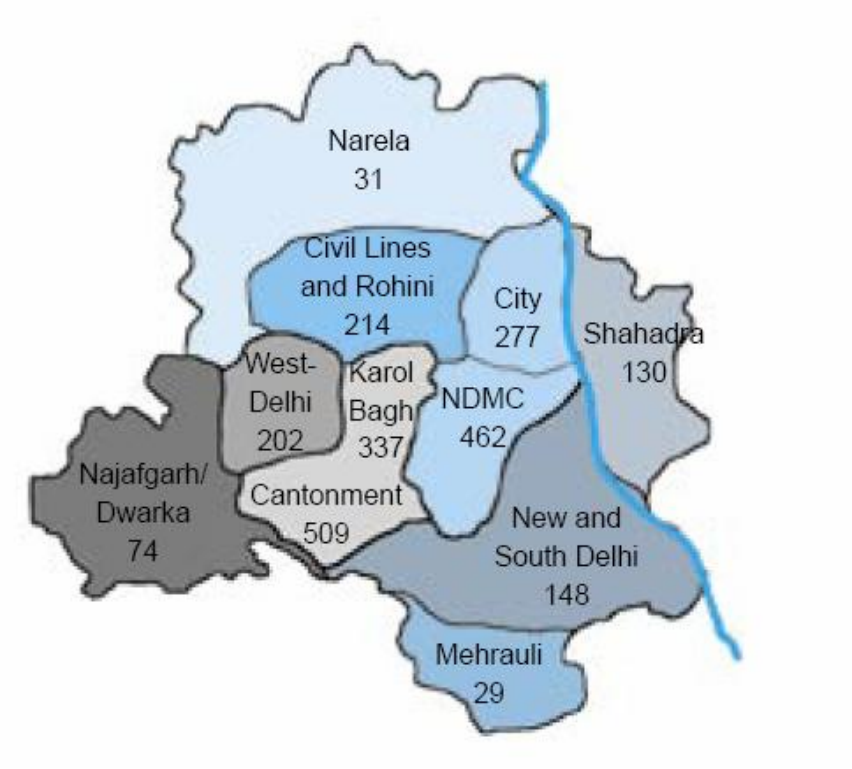

Figure 2: Distribution of water in different parts of Delhi
Soucre: Shukla and Singh, 2005

Inequitable Distribution

The peripheral areas of the city, Narela and Mehrauli, with maximum informal settlements, have very low levels of water supply, at 31 and 29 lpcd[6] respectively.

In comparison to the demand from high income residential areas, the level of water supply in south Delhi is low as well but it is being compensated by water from private boreholes. The urban poor population therefore in these peripheral areas are relying on at least two sources of water, inadequate DJB water supply and supply from private water tankers in return of enormous user charges for few litres.

2.1.3.3 Sinking water table

Filcak (2007) mentions that problems of water inadequacy were solved by drilling one or more wells in the Roma settlements of Slovak Republic, whereas non Romani communities are well connected by the supply infrastructure. Accounting for the social and economic inequality, research in Villa Israel has shown that households with greater economic assets and more access to water vendors were significantly less vulnerable to water insecurity than households with fewer assets and less access (Wutich 2007). Another study in villa Israel

[6] Norms for water supply in upgraded JJ clusters and notified slum settlements are 150 lpcd

(Wutich & Ragsdale 2008) states that residents who access water through market system have to beg and argue with the private owners, who prefer wealthier customers. Moreover, majority of these private service providers are illegal and their activities are not regulated (Matsinhe, Juízo, Macheve and Santos 2008).

Table 1: Average Pre-monsoon ground water levels in different districts of NCT, Delhi (mbgl)

Year	North-west and West Districts	North, central and New Delhi Districts	South Districts	South-west Districts	East and Northeast 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	9.00	24.05	10.47	5.50
2002	6.55	14.12	33.38	12.69	6.45

Source: Ground Water in Delhi. March 2003

Due to unregulated extraction of groundwater by private borehole owners, there has been depletion and contamination of water table mainly is south Delhi (Niebergall, Loew and Mauser 2007). The water table in south and southwest districts has gone 40-50 meter below the ground level as shown in figure 3, the decline all over city is listed in table 1. The "Central Ground Water Board (CGWB)" assessed the total groundwater potential to be 292 million cubic meters (MCM) in 2003 as compared to 428.07 MCM in 1983, showing an overdraft and reduction of around 130 MCM over the past 20 years (Master Plan Delhi 2021). The quality of underground water is deteriorating due to increase in salinity, fluoride and nitrate content at different places (Department of Planning, Economics & Statistics 2007-08). Except along the river Yamuna, Ground water level in the district is declining with rates varying between 1 to 4m per year (Maria 2008).

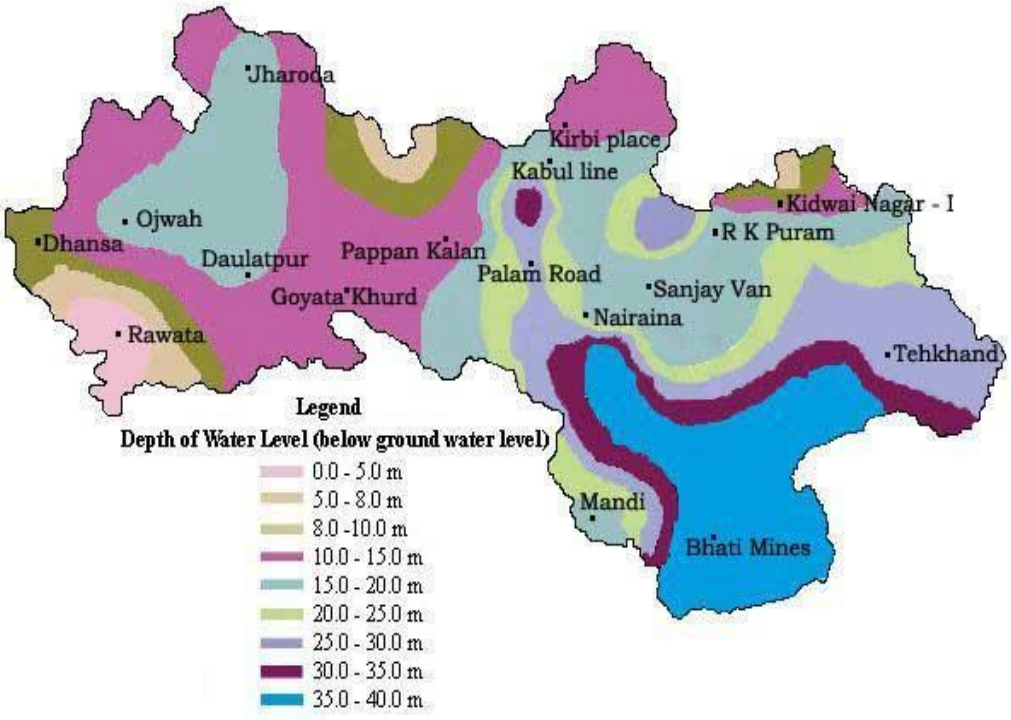

Figure 3: Map showing depth of water table in south District, Delhi
Source: Centre for Science and Environment 2003

2.1.4 Policy Initiatives and the Urban Poor

2.1.4.1 Recent Reform: Tenure security and financial ring-fencing for the urban poor

In order to make cities inclusive to the poor and to channelize finances properly to minimize its diversion, the "Jawaharlal Nehru National Urban Renewal Mission (JNNURM)" was launched in 2005. It requires the provision of basic services including security of tenure, adequate water supply to the urban poor as an integral part of city development under Integration of "Basic Services to the Urban Poor (BSUP)" and "Integrated Housing and Slum Development Programme (IHSDP)" (Risbud 2009). It focuses on increasing the efficiency of local government by combining grants-in-aid component with urban sector reforms to ensure the flow of investment into the development of urban infrastructure, to bring fiscal viability among municipalities, to safeguard the interests of urban poor by allotting sufficient funds for municipal expenditure (Mathur 2009). The main challenges in its effective implementation are the unavailability of size of the problem as mentioned by (Dupont 2008). The data

regarding the actual population of urban poor and the extent and type of problems they are dealing with, is not available. Secondly, the increased sensitivity of City Development Plan in regard to the squatter settlements and further involvement of RWAs in land use planning. RWAs have been successful in displacing the urban poor to the peripheral areas for clearing the expensive city land for their own needs (Kundu 2009) and finally, the unavailability of land to the Urban Local Bodies to be able to supply to the urban poor (Risbud 2009)

2.1.4.2 Present Approach

In 1990-91, the government of Delhi adopted a "three-pronged strategy" for dealing with squatter settlements, which was approved by the DDA in 1992, and included the following (DEPARTMENT OF URBAN DEVELOPMENT 2006)

- In situ up-gradation for the clusters
- Relocation of *jhuggi-jhompri* clusters that are located on land required to implement projects in the "larger public interest"
- Environmental improvement of urban slums, based on the provision of basic amenities for community use

Other policy initiatives where the main constraint boils down to the illegality of the settlements and inadequate financial support while providing even the minimum level of necessities (Spodek, 1983).

Table 2: Recent Policy Initiatives for the urban poor and shortcomings

Policy Initiative	Year	Reform	Shortcomings
Environmental Improvement of Urban Slums (EIUS)	1978	Provision of basic amenities for improving environmental conditions	Lack of financial support and updated city data
National Housing and Habitat Policy	1998	Low cost funds for the housing	Lack of secure land tenure
Urban basic Services for the poor (UBSP)	1990	Community involvement while integrating social services and environmental improvement	Lack of financial support, coordination, monitoring for planned activities
National Slum Development Programme (NSDP)	1997	States/UTs grants for under additional central assistance	Lack of secure land tenure and apprehensive loan recovery
National Slum Policy	2001	Integrating slum settlements into the urban areas	Lack of secure land tenure

Source: Mehta 1993, Wishwakarma and Gupta 1994 and Risbud 2009

2.1.5 Access and Equity: The Management Tools

Literature review suggests that strategic intervention through network of NGOs, community based organisations and WDCs can address the water supply problems among the urban poor. Efficient functioning, improved management and tariff reforms on part of water supplying agency can help in cost recovery and adequate distribution of water among the poor. Considering the current tariff level in India, Singh, Upadhyay and Mittal (2005) suggests that improved cost recovery will improve the financial status of the water utilities. Also, subsidies, if designed suitably and are well targeted, would serve the concerns of the economically weaker sections. The social inclusion of urban poor in decision making is essential to understand their local issues of water inadequacy, to implement the suitable tariff structures and other improvement strategies.

Cross-subsidisation

As suggested by Robinson (2002), Daniere and Takahashi (1999) & Rao (2009), sustainability of services can be maintained by the recovery of total cost within the system through cross-subsidisation from large consumers to the poor borne by wealthier households who would have to pay more for their extra consumption of water. Such reform process would eventually lead to socio-economic sustainability.

Usage based tariff

Recognising the role of water pricing for managing water resources in case of Beijing liu (2002) proposed the importance of justifying water prices in phased manner and eventually towards full cost pricing. This can help in alleviating the demand and supply gap due to sustainable use of water by end users. The urban poor should not be paying more for the inadequate water supply than connected households. According to a study in Bangkok, community participation rates and the willingness to pay for improvement were found out to be highest in the poorest and the wealthiest income group (Daniere and Takahashi, 1999).

Community participation

Apart from that the examples of "Upstream, Downstream, Upstream" initiative taken by LIFE's[7] in slums of Dhaka in Bangladesh, Cartagena in Colombia (UNDP 2008); has strengthened community-based organizations, NGOs, and local authorities to improve the quality of life of urban poor by providing water and sanitation services. Involvement of national level stakeholders helps to formulate strategy for the urban poor improvement which allocate grants and bring local community, service providers and NGOs together for joint efforts. Based on the improvements, policies are framed up for new community initiatives in a broader perspective. Similar "Community Managed Pro-poor Demand Responsive Initiatives" has been taken in State of Madhya Pradesh, India in partnership with UN-HABITAT, Municipal Corporation (MC) and the local community to improve the lives of the urban poor by connecting them to the safe drinking water at affordable costs (UN-HABITAT 2007)

[7]LIFE, Local Initiatives for the Urban Environment, UNDP's programme to promote local-local dialogue and partnership between NGOs, CBOs, Local Governments and Private Sector for improving the living conditions of the urban poor and influencing policies for participatory local governance.

CHAPTER 3 –WATER SUPPLY AND ITS ACCESS AMONG THE URBAN POOR IN DELHI

3.1 Overview

In examining the extent of the problems faced by urban poor to access water, it would be helpful to understand the existing water supply system in Delhi and state of urban poor in the city, which deeply affects their access to city's water supply. This chapter focuses on historical background of Delhi, which has played important role in shaping up present Delhi, its infrastructure facilitates and the water service delivery.

3.2 Delhi as a Capital

Delhi is located in the National Capital Territory (NCT) with urban sprawl extending its limits out of NCT with satellite cities like Gurgaon, Noida, Faridabad and Ghaziabad in the neighbouring States of Haryana and Uttar Pradesh. Located on the banks of the River Yamuna, Delhi is currently the fastest growing metropolis in India with annual growth rate more than 4 percent during the last decade (Maria 2008). The population of Delhi was 13.85 million people, according to 2001 Census. At present, Delhi with a population of over 17 million (Department of Planning, Economics & Statistics 2007-08) is the most densely populated city in India with average density of 9240 people per km^2 (Department of Planning, Economics & Statistics 2007-08). The state of Delhi occupies an area of 1483 km^2, of which urban area is 925 km^2 i.e. 62% of the total area (Department of Planning, Economics & Statistics 2007-08). Delhi has a distinction of being the most urbanised state in the country (Shukla and Singh 2005) with 93.18% of the total population living in urban areas (Department of Planning, Economics & Statistics 2007-08). There are three local bodies (statutory towns) namely, Municipal Corporation of Delhi (area is 1,397.3 km^2), New Delhi Municipal Committee (42.7 km^2) and Delhi Cantonment Board (43 km^2)

3.2.1 Past Shaped the Present Urbanised Delhi

Before being a capital to British Empire in 1911, Delhi has been the political capital of many dynasties between the 12th and 17th century. Even with remains of Mughal royalty and rising influence of British culture, the city continued to thrive on traditional arts and crafts, customs and literature. Major transformation in local administration took place in years following the revolt of 1857. The first Municipality and District Boards were established for the city and rural administration respectively. In 1911, a large area, almost three times the size of old

Delhi was acquired by the Delhi Municipal Committee for urban growth in and around old Delhi.

Growth of slum settlements in Delhi

As the formal settlements started growing, the demand for labourers and workers led to the growth of informal settlements as well. In 1924, the settlement of Basti Harphool Singh was declared as the first slum. It was resettled across the north part of Delhi along with the clearance of localities where artisans and service providers use to live for city beautification. In 1948, during partition there was huge influx of refugees from newly formed Pakistan which overloaded the civic services capacity of the city. To make up the housing shortfall, 567 unauthorised colonies were built for 1 million people. The government was compelled to regularise the colonies and provide them with municipal services as they constitute the major part of voting bank. In 1957, with the constitution of Delhi Development Authority (DDA), around 0.9 million people from the slum were evicted and resettled in Trans Yamuna area and on the peripheral areas of the city. Basic amenities like water, toilets, drainage and electricity were provided on a community level. In 1988, over 1200 people died of cholera (Delhi Environmental Status Report, WWF, 1995) these resettlement colonies due to the lack of adequate basic services but no concrete remediation was taken place. The situation got even worse when around 1 million labourers migrated into the city to construct infrastructure for 9th Asian Games, to be held in Delhi. These migrant labourers continued to stay in Delhi but there were no housing provisions for these labourers in the Second Master Plan for the city came into force in 1986. This population ended up squatting wherever empty space was available especially public land8 constructing their own houses called "*Jhuggi-Jhompri* (JJ)" clusters. Since then the situation has continued and has got even intense in term of land acquisition, availability of basic services and socio-economic status.

8 On the basis of data compiled from the slum and *jhuggi-jhompri* department of the Municipal Corporation of Delhi (MCD), the report of the Delhi Urban Environment and Infrastructure Improvement Project (DUEIIP) provides the following distribution for the year 1994: 83.7 per cent of the land occupied by squatter settlements was owned by DDA, 15.7 per cent by other public land owning agencies, and only 0.6 per cent by private owners [DUEIIP 2001: chapter 6, p 10].

Table 3: Status and Growth of JJ Clusters in Delhi

Year	JJ Clusters	No.of Jhuggis Hutments)	Population in million
1951	199	12,749	63,745
1961	544	42,815	0.214075
1971	1124	62,594	0.312970
1981	290	98,709	0.493545
1991	929	0.259344	1.296720
2001	728	0.429662	2.148310

Source: Department of Urban Development 2006, Shukla and Singh 2005

3.2.2 JJ/Slum Population and Access to Water

According to the documents from the Planning department of the "Government of the National Capital Territory of Delhi (GNCTD)", including the Economic Survey of Delhi, 2005-06, the Socio Economic Profile of Delhi 2007-08, the Delhi Tenth Five-Year Plan 2002-07 or the Delhi Annual Plan 2006-07, total population in 1100 JJ clusters that sums up to approximately 3 million dwellers. The last survey of slums was held in Delhi in 1994, which estimated population of around 2.4 million whereas the 2001 census mentions Delhi slum population as 1.9 million, which is a gross underestimation (Risbud 2009). Detailed information regarding estimated population and their access to water supply can be found in Appendix IV. Notification of these slums is an official recognition by municipalities, corporations and local bodies for the provision of improvement services under government programmes apart from the benefits from slum leaders and local politicians. Non notified slums on the other hand are dependent upon other sources such as private sector for the access of services such as water supply etc. The number of notified slums has decreased from 52.89 percent in 1993 to only 9.15 percent in 2002 (Edelman and Mitra 2006) and correspondingly responsibilities of local bodies to provide basic amenities.

Policy shortcomings and inadequate access to water

Based on literature review in response to present 'three-pronged strategy', in situ up-gradation was implemented only in a very few cases[9] (Dupont 2008). Basic amenities under Environmental Improvement of Urban Slum Scheme are provided only to those JJ Clusters which are not being relocated or upgraded. In Delhi, 15-35 percent of slum population was

9 Up to 2006, in situ up gradation was undertaken in three JJ clusters (covering 784 families); another larger project covering 4,800 families is also reported as completed

without tap water in 2002 (Llorente and Zerah 2003). Rest of the community supply through community taps and PSP (Public Stand Posts) is often not in working condition due to lack of maintenance. The number of persons per PSP often exceeds the norms of 150 per PSP. Inadequacy leads to the wastage of time on an average 3 hours a day for fetching water. As a result 80 percent of the households are dependent on atleast two sources of water (Llorente and Zerah 2003). The main emphasis is on the removal and relocation of settlements due to insecure land tenure, which makes them prone to eviction.

Table 4: DUEIIP Projection for Water Requirements in 2021

Type of Settlement	Projected Population in Million	Norm of Supply (lpcd)	Total requirement (MGD)
Upgraded JJ Clusters	3.27	150	108
Notified slums	4.20	150	139
Upgraded Regularised	1.17	150	39
Resettlement Colonies	2.79	200	123
Total	11.43		409

Source: Department of Planning, Economics & Statistics 2007-08

3.2.3 Demand and supply gap within the city

Based on a norm of 60 "gallon per capita per day (GPCD)" as per CPHEEO norms prescribed in MPD 2021, existing water requirement is around 990 MGD (Indian Express May 2009) as compared to the present availability of 804 MGD10. The projected total water demand by year 2021 is around 1380 MGD (Department of Planning, Economics & Statistics 2007-08).

Reasons for inadequate and inequitable supply

Apart from urban growth and increasing population, there are several reasons for wide demand and supply gap. Importantly, the raw water availability is scarce in comparison to the

[10] Figure excludes the amount of groundwater extracted by illegal water vendors to suffice the requirements of unauthorised colonies

treatment capacity of the water treatment plants. Also, the percentage of UFW (Unaccounted-for-water) calculated from difference between produced and pumped is high at 40-47%, reflecting problems in the management of available resources during transmission and distribution (Mishra 2003). Lack of maintenance of supply infrastructure has resulted in leaking supply pipes. The distribution of water is unmetered, which not only accounts for water theft but also widens the gap between cost of production of treated water and user charges. According to Delhi Statistical Handbook, out of 1.6 million water connections 0.3 million are unmetered and out of rest of the metered connections, around 0.5 million are non-functional and defective (Department of Planning, Economics & Statistics 2007-08). The households where water consumption meters are working have never paid according to usage. Poor cost recovery further leads to poor maintenance and poor service delivery especially for the poor. The water supply is uneven in different districts within the city, due to which people in these areas have to rely on private owners for groundwater supply. This has resulted in significant depletion of water table varying from 2-30 meters at different places all over the city (Mishra 2003).

3.3 Main Sources of Water in Delhi

The river Yamuna contributes to 86% of Delhi's total water supply system. As discussed in table 5, Delhi's share of this river's resources, as per inter-state agreements is 4.6%. Apart from the Yamuna, Delhi gets its water from the Ganga Canal and the Bhakra Beas canal. Other sources include Sub-surface water includes Ranney wells and tube wells across Delhi. This source is met through rainfall which is approx. 611.8 mm in 27 rainy days and unutilized rainwater runoff, is 193 "million cubic meters (MCM)" (CSE 2003).

3.3.1 Private Bore wells

Apart from DJB's registered tube wells, every colony in Delhi has a borehole to supplement the water supply. These private bore wells have to be registered with "Central Ground Water Authority (CGWA)" but the laws are rarely practiced. CGWA has prohibited further extraction of groundwater in some notified areas mainly in south and southwest district but people still drill boreholes illegally. As a result, CGWA has no information about the total boreholes in the city. According to recent notification on groundwater regulation by CGWA, individuals are not allowed to extract water for personal use but a borehole can be used by law if an entire colony or community is benefitting from it. The private tankers also supply water on behalf of DJB at places where it fails to supply the required amount such as unauthorised colonies, slum areas and to the places where water is difficult to reach either due

to repair work or low pressure (The Hindu 28 April 2009). While supplementing the demand unfulfilled by the Delhi Jal Board, quality is not a concern for private owners. These informal water vendors have recently been described as the "unregulated micro-entrepreneurial sector" (Maloney 2004).

Table 5: Supply Capacity of Delhi Jal Board

Serial No.	Source of raw water	Name of the Plants	Installed capacity in MGD
1.	River Yamuna	Chandrawal I & II	90
2.	River Yamuna	Wazirabad 1 & 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
6.	Tehri Dam	Sonia Vihar	133
7.	Optimization of WTPs		19
8.	2588 Tube wells and 21 Ranney wells		100
9.	1100 DJB Water Tankers		2
Total			804

Source: Department of Planning, Economics & Statistics 2007-08; Gupta, G. 2009

3.4 Governance Institutions Responsible for Access of Water among the Urban Poor

Delhi has the presence of all three layers of governance, vis-à-vis, central, state and local leading to confrontation over development of the Capital. Altogether there are 118 departments governing and managing the city of Delhi. There are three planning boards for city and regional planning, namely, "National Capital Region Planning Board (NCRPB)", "Delhi Metropolitan Council (DMC)" and "Delhi Development Authority (DDA)". There are a number of service providers for Delhi, namely, "Municipal Corporation of Delhi (MCD)", "New Delhi Municipal Corporation (NDMC)", "Delhi Cantonment Board (DCB)", "Delhi Jal Board (DJB)" etc. Presence of such strong and parallel administrative statutory bodies such as DDA, MCD, GNCTD and NCPRB, created through the same act of Parliament, make the

horizontal linkages difficult, and the vertical linkages confusing and conflicting. Since 1988-89, after the transference of authority from DDA, MCD is responsible for the administration of the JJ Clusters, resettlement colonies and notified slum in Delhi (Department of Planning, Economics & Statistics 2007-08). Also, MCD has strengthened the administration at zonal level by constituting WDCs to carry out municipal work of delivery of basic services and implement local area plans.

Institutions involved in water distribution and its access

MCD defines polices which are executed by DJB (Shukla and Singh 2005). DJB is responsible for the production and distribution of drinking water supply in Delhi. The DJB, remains in the government sphere and cannot take major decisions such as tariff restructuring without the approval of the State assembly. There are different institutional actors involved in waters supply system in Delhi. The lack of coordination among the institutions has significant impacts on the water supply system mainly among the urban poor sector. DDA which is responsible for preparing and implementing Delhi Master Plan must ensure adequate water supply to the new housing projects. NCRPB should be well coordinated with DDA and DJB as it controls the influx of migrants to Delhi by providing adequate infrastructure facilities and incentives in the neighbouring towns. However, the record of in migration has shown continuous increase from year 1991 till 2006 Shukla and Singh 2005). Consequently, the pressure on DDA and DJB for providing housing and water supply facilities respectively to these migrants has amplified. Apart from these boards, CGWA working under the Ministry of Water Resources is responsible for the registration of private boreholes in the city. CGWA has banned the extraction of groundwater in some 'notified' areas but people still continue to drill bore wells and tube wells illegally. As a result ground water resources have depleted and contaminated especially in south Delhi.

3.4.1 Decentralisation of Governance

In order to efficiently manage the urban environment at the city level, the 74th Constitutional Amendment in 1992 has broadened the responsibilities of local Municipal Bodies. ULBs are responsible for the delivery of basic public services such as water supply, sanitation, waste management; mobilization of local resources for the provision of quality to city dwellers. As the city is divided into zones subdivided into 134 wards, several wards merge to form a "Ward Committee, (WDC)", consisting of councillors elected from each ward. Delhi has 12 WDCs, each zone having one WDC, with 1.25 million people per ward according to 2001

census as compared to 81 wards in State of Kerala with 7,000 people in each ward (Kundu. D 2009). Recently in 2007, the number of wards has increased to 272 with number of people restricted to 50,000 (Kundu. D 2009). The constitution of WDCs at zonal level has increased their financial powers and administrative support for maintenance and distribution of basic resources. Still the large size of the WDCs has made the governance process unmanageable due to lack of participation of all the common people. The ineffective working of WDCs has resulted in growth of RWAs working in parallel system with WDCs.

Participatory Governance excluding the urban poor

Representing a group of economically influential people RWAs are based mainly in middle and high income residential areas. Many of these welfare associations are registered with the Delhi government and MCD as *bhagidars* under *Bhagidari* Scheme (citizen-government partnership), others are working independently without any support from the Delhi government. The RWAs functioning as *bhagidars* has financial and institutional support extended by the local and the state government, thus play greater role in the local governance as compared to other RWAs. The RWAs are mainly involved in maintenance activities, provision of civic services, capital investment projects through participatory budgeting, planning the local area development, eviction of squatter in association with MCD and DDA etc (Kundu.D 2009). Mobilization of funds internally, availability of grants from the municipality and representation in local governance has led to the development in and around their localities. This has increased existing socio-economic disparity within the city.

CHAPTER 4 – RESEARCH METHODOLOGY

4.1 Objectives of the Study

The overall objective of the study is to explore the scope for the policy intervention to ensure adequate distribution of water among the urban poor population of Delhi. The study aims to analyse the nature and extent of gaps in water distribution among urban poor communities in Delhi. An in depth study regarding the water distribution in two informal settlements of south Delhi, Sangam Vihar, an unauthorised slum settlement, as Survey Area I and Jagdamba Camp, notified slum settlement, as Survey Area II was done.

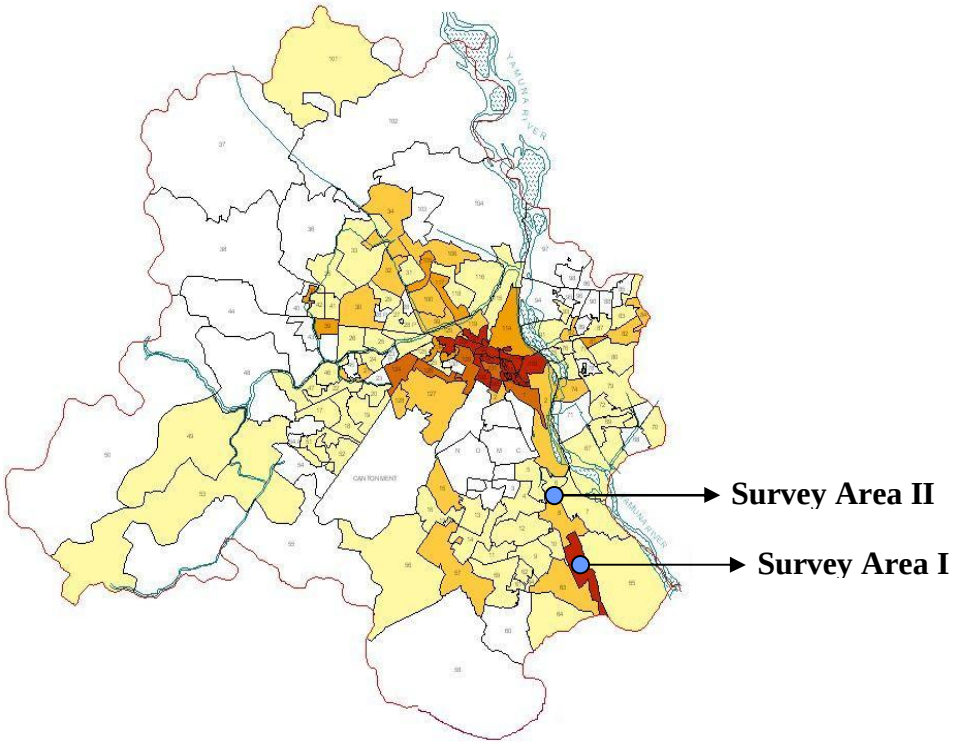

Figure 4: A Map of Delhi showing location of survey areas in south Delhi
Source: Census of India 2001

4.2 Reasons and Issues

Consequent to the 74th Amendment in the Constitution of India in 1993, the Municipal Corporation of Delhi was assigned 134 wards (Municipal Corporation of Delhi 1997). With the decentralised management system, concept of ULBs came into existence. WDCs are responsible for identifying, implementing and monitoring local development of their respective wards including the adequate provision of basic amenities such water and

sanitation. The study areas in this research constitute majority of the population of political wards, thus have significant contribution in bringing WDCs into power. Considered as huge vote banks, poor dwellers either staying in notified slum settlements or unauthorised communities possess right to vote but they certainly lack their fundamental right to access adequate water and participate in decision making. Both the study areas *Sangam Vihar* and *Jagdamba Camp* are situated amid affluent high income residential areas of south Delhi, but the distribution of water is highly inequitable and inadequate in poor settlements.

4.3 Research Process and Methodology

The issue of availability of adequate water is so vital for everyday life of urban poor population, it is necessary to involve them to understand the problems in a better way. The survey was conducted during the water supply timings to analyse the situation from a close perspective. An interactive and participatory approach was followed for communities to share their experiences related to inadequate supply of water. The research is based on active participation of women, men of all age groups, children and community service providers.

The research process included the following steps:

- Non-participant observation
- Familiarisation with the community
- Focus Group discussion based on community participation
- Contingent Value Survey based on the response from the community

4.3.1 Non-participant observation

A general visit of the survey area was undertaken to delve the how people sustain during the hours of no water supply. It was helpful to understand the real problems faced by the residents without the adequate access to water. The supply timings were noticed in case of *Jagdamba Camp* for conducting FGDs.

4.3.2 Familiarisation Process

The familiarisation process included getting acquainted with the settlement and the community. It includes introducing yourself to the community members, sharing the aims and objectives of the research and explaining them the research process in order to seek their help and cooperation during the research. The tools included direct observation and unstructured interviews. During the process of Direct Observation settlements were visited to observe the people, their activities. This process helped in becoming familiar with the community. Unstructured interview with the community representatives helped to cross

check the vital information regarding the exact area and population of the settlement obtained from the literature review.

4.3.3 FGD based on community participation

FGD is a participatory research tool which enables get the data at community level while they share and analyse their knowledge and experiences about their situations. Four focus group discussions were organised with the involvement of around 12-20 participants each time at two survey areas. In the discussion people from all the age groups, women and children willingly participated. The group discussions were conducted at different places within the same settlement. It was realised during the first FGD at both the places that situations are different in other part of the settlement. In case of *Sangam Vihar*, user charges were told be different in different streets and in case on *Jagdamba Camp*, part of the settlement away from the tube well was getting no supply at all in the community taps due to decrease in pressure. In case of *Jagdamba Camp*, where supply timings are fixed, FGDs were conducted during those timings so that situation can be visually analysed as well and people can express their feelings in a better way. Whereas in case of *Sangam Vihar* time for FGD was not fixed due to irregular and inconsistent water supply.

4.3.4.1 Questionnaire

As the residents of these settlements were not literate except few school going children, the questions were verbally asked to residents. As all the residents were equally affected response from each one of them was individually considered. The questionnaire consisted of three sections.

- Section 1 includes background information about the settlement, its existence, total population, migrants or non-migrants their primary Occupation, number of households, type of Households, number of Floors and average size of Dwelling Units
- Section 2 is based on their access to water, the main supply source and agency responsible for the supply. Information regarding the access points and their maintenance was gathered during the discussion. Respondents were asked about the problems they face while accessing the water mainly regarding waiting for water, collection time involved, frequency of water supply, quality of water supply
- Section 3 is related to the assessment of their willingness to pay for the improved services and their participation to bring the change and their land security rights, voting status

4.3.4 CV Survey

CV Survey was conducted in response to their willingness-to-pay for the improved services. It is used to estimate the economic value of non-market goods, especially environmental goods. CV is also useful in situations in which the direct and indirect uses of resources, for both consumptive and non consumptive purposes, are severely restricted (Mundy and McLean 1998). Some major concerns with CV surveys are hypothetical and strategic biases in the answers to CV questions and inaccurate bids by respondents (Mansfield 1998). To address them, a Community Managed Pro-poor Demand Responsive Initiatives successfully taken in State of Madhya Pradesh, India was taken as baseline for all CVs. The initiative taken in partnership with UN-HABITAT involving community and public serviced suppliers has proven prospects for managing sustainable water supply at affordable costs among the urban poor. The community initiative was explained, making sure that they understand the community responsibilities and tariff structure properly to get meaningful response. Details of the project undertaken in Madhya Pradesh and based on it corresponding questionnaire can be found in Annex 2. CV survey was conducted with the same focus group; the process was explained in two sections:

- Section 1 involved introducing the project and their benefits, along with the experience and response of urban poor after the installation of the project. It was followed by explaining the community responsibilities related to operation and maintenance.
- Section 2 explained the structure of user charges to the respondents. Out of two methods of payments, instalment process was chosen in comparison to one time lump-sum payment which can produce more conservative results than monthly payment method (Mundy and McLean, 1998).

CHAPTER 5 – ANALYSIS AND EVALUATION

5.1 Overview

This chapter presents the findings of the research conducted in two urban poor settlements including *Sangam Vihar*, an unauthorised slum settlement and *Jagdamba Camp*, a notified slum community. The research involved conducting three FGDs in each settlement. The participants were drawn from all segments of community, including males and females of all age groups, children and community service providers. Each FDG had approximately 12-20 participants. Based on the response of the community during FDG regarding the willingness to pay for the improved services, CV survey was conducted among the same set of people.

5.1.2 Survey Area I

Sangam Vihar

Sangam Vihar is one of the Capital's oldest and largest unauthorised colonies (Gupta, G. 2009). Located in the peripheral part of south Delhi, this area is considered to be the fastest growing political constituencies. It covers an area of around 2.5 square kilometres (Ramachandran, S.R. 2009) with around 0.25-0.3 million dwellers. *Sangam Vihar* is a low-income unauthorised colony situated in south Delhi. The *Sangam Vihar* settlements, according to the residents of the colony have been in existence since the 1979. It started with the migration of people from nearby states and villages in search of improved livelihood employment opportunities in Delhi. With the construction boom in 1982 a lot of labour from States of Uttar Pradesh, Haryana and Bihar migrated to Delhi (Census of India 2001) and set up temporary settlements in *Sangam Vihar*. These temporary shelters with time became permanent houses resulting in unauthorised colony. All the houses have *pucca* (Bricks) structures though they lack security of tenure. This shows their attempt to improve the living conditions even without ensured protection from eviction. Almost all the houses are double storied (Ground and One Floor) and renting out part of their house is found out to be common source of income for the residents. Each household has approximately 15-20 residents.

Despite being an urban living area for almost three decades, *Sangam Vihar* has no proper road system; no drainage, sewerage system or garbage collection, and people rely on private or

collective solutions for water supply, health and education. The electricity connections are among the recent developments in the area. Since then with the availability of electricity there has been a rise in number of private borehole owners. The unwillingness of municipal government to invest in the development of illegally occupied land and to share the city resources had ignored the slum dwellers rights to basic services.

In contrast to the general perception, which characterised the slum dwellers as illiterate, poor, unemployed, and polluting, it was found that most of them had completed primary education and more than 95 percent were employed – with an average income more than twice that of official poverty line; and a majority owned their own house, TV, radio, and bicycle. Most of them were able to accumulate some savings, and had capacity for own development.

5.1.2.1 *Sangam Vihar*: Level of Provision of Water Supply

With the increase in number of households the inadequacy of water has got evident as all the hand pumps in and around the settlement had dried out. This is mainly due to the excessive withdrawal of water to meet the ever increasing demand and depleting groundwater table, particularly in south Delhi. Apart from that no water supply system has been made available by DJB. Digging boreholes is no more legal in Delhi though but this settlement alone has 60 boreholes. The commoditisation of water through private ownership has left the dwellers with no option other then paying huge costs every month for limited amount of water supply.

5.1.2.1.1 Access to Water Supply

The main source of access to the available private water supply is through:

- Individual household taps
- Water cans

In comparison to formal and regularised settlements with individual and satisfactory level of water supply, these individual connections get water either once a day or sometimes no water for two consecutive days. This water supply through private borehole owners is highly inconsistent as revealed by the dwellers during FGD. During summers, conditions get even worse with increased water demand. Settlers have to rely on water cans apart from private borehole water supply. As told by one of the women resident “these tanks do not allow us to fill water for free in during summer months, they charge us even more”. Other women explained “my children help me carrying water in cans through long distance during summers from these tanks”.

5.1.2.1.2 Duration of Water Supply

The duration of water supply has a direct bearing on the environmental sanitation by influencing the amount of water available per household in these settlements. As majority of the household activities including the level of cleanliness and the operation of sanitation facilities like toilets and drainage are directly affected by the duration and quantity of water supply. Further, the amount of water available influences the level of personal hygiene. The duration of water supply in this unauthorised settlement ranges from one hour in day or two. It depends upon the priorities of private borehole owners to sell water through privately owned water tankers outside the settlement at higher prices depending upon the demand from nearby affluent colonies of south Delhi.

5.1.2.1.3 Time taken to Access Water

As the community has individual household taps for water supply, dwellers do not have to waste time collecting water. Rather the matter of concern is the odd and inconvenient timings of water supply. One woman expressed her frustration that "we stay awake almost whole night, as water usually comes after mid night". One reason is unavailability of electricity for 24 hours which limits the water extraction through boreholes and another is the supplier's interests of filling their privately owned water tankers. This results in water supply to these households mostly during midnight or early in the morning. The discussion revealed that the task of collecting water is the responsibility of women.

During summers, fetching extra water in water cans takes long time ranging from 30-45 minutes depending upon the accessibility and availability of private water tanks. They have to buy water not only at high prices but it costs them physical hardships and economically productive time in collecting water.

5.1.2.1.4 Payment for Water Supply

All the households are paying between 7-8 Euros per month. The charges are not fixed for different private borehole owners. The water cans cost around 50 euro cents for 40 litres water can. The current level and rate of payment for inconsistent water supply shows the readiness of community to pay for improved water services. Regarding the user charges one woman responded "If for one hour of water supply, we are ready to pay huge amount, we are willing to pay even more for adequate public water supply".

5.1.2.1.5 Level of Satisfaction of Slum Communities with Water Supply

Quantity of water as compared to quality was identified as a major problem during the course of Focus Group Discussions. Random supply timings were another matter of concern within the community. The odd hours of water supply keeps the residents awake almost the whole night. Respondents from one family told that "yesterday we didn't get supply at all and we are still waiting for today's water supply, we are still using the water we have stored in our containers day before yesterday". Despite paying huge amount for water supply the availability of water is highly insufficient. Participants also complained about the regular out sourcing of water through the water tankers owned by the private borehole owners in the community.

Figure 5 An attempt to fill the empty cans while waiting for the next supply in *Sangam Vihar*

5.1.3 Survey Area II

Jagdamba camp, Sheikh Sarai

Jagdamba Camp in *Sheikh Sarai* is one of the largest notified slum settlements in south Delhi. Established in mid 70's, this slum population of around 0.15 million is distributed over an area of 1 sq.km. The water supply and sanitation facilities here are grossly inadequate and have led to serious health hazards for the slum residents. There is severe shortage of drinking water, situation gets worse during summer months. Community taps, the only water access points remains overcrowded during the supply timings. Slum dwellers stand in queues for hours before the water actually starts running through the taps. Almost all the houses are double storied (Ground and one floor) inhabited by around 10 people. These *pucca* (Bricks)

houses have recently got electricity connection. Apart from renting upper floors of their houses; groceries, tailoring, basic utility shops, telephone booths etc are the other sources of income in these 1 meter wide streets.

5.1.3.1 *Jagdamba Camp*: Level of Provision of Water Supply

Being notified this settlement has been provided water supply through two tube wells installed by DJB. The depth of the water table in this part of south Delhi is over 35-40 m (CSE 2003). Presently, the depth of the borehole is around 80 meters which often supplies muddy water which is unfit for drinking purpose.

5.1.3.1.1 Access to Water Supply

The only source of access to DJB water supply is through community taps. One tap serves more than 10 houses i.e. around 100-150 people. The settlement has in total 50 community taps, out of which only 35 were functional during the survey period. This common phenomenon effects the equal distribution of water across the settlement and further increases the number of dependent population per tap.

5.1.3.1.2 Duration of Water Supply

Water in available for 10 hours a day. Five hours during the morning and the evening (5-10 a.m. / p.m.). These supply timings have direct implication on the women. They have to stay back at home and collect water despite contributing equally in earning the livelihood. Apart from some community entrepreneurs, majority of men are working as day labourers. Everyday they leave early in the morning leaving behind women to collect and store water. Whereas during the evening the task of collecting water is the responsibility of both women and children who spend a lot of their productive time in this chore, as few women responded "we waste lot of time daily while collecting water, we could work in the neighbourhood apartments and earn some money"

Figure 6 During the water supply timings in *Jagdamba Camp,* mainly women and children are involved in collecting water

5.1.3.1.3 Time taken to Access Water

As the number of people dependent on each tap is quite large, they have to spend a long time to accessing and collecting water. During the FGD it was revealed that it takes around 1-2 hours per person while standing in queue and collecting 20 litres of water everyday.

5.1.3.1.4 Payment for Water Supply

The survey revealed that dwellers are not charged for the water supply by DJB. While they are currently not paying for water but they are willing to pay for improved services as observed during the CV Survey. Almost six people agreed to the statement made my one respondent "if they are ready to supply us adequate water, we are ready to pay for water"

5.1.3.1.5 Level of Satisfaction of notified Slum Settlement with Water Supply

Quality and lack of access points for water were identified as major problems in whole of the settlement. Water supply is often muddy which requires further straining and boiling. The depth of the tube well and its poor maintenance largely affects the water quality. Due to less water pressure or broken taps, water is not able to reach the residents living far from the installed tube wells. Respondents mention that "people residing at the end of this settlement come here to collect water which affects our time to collect water. As the number of persons per tap increases, the disputes over water allocation amongst the residents becomes a common

sight. As one old woman mentioned her worries "I am scared of these everyday quarrels over water".

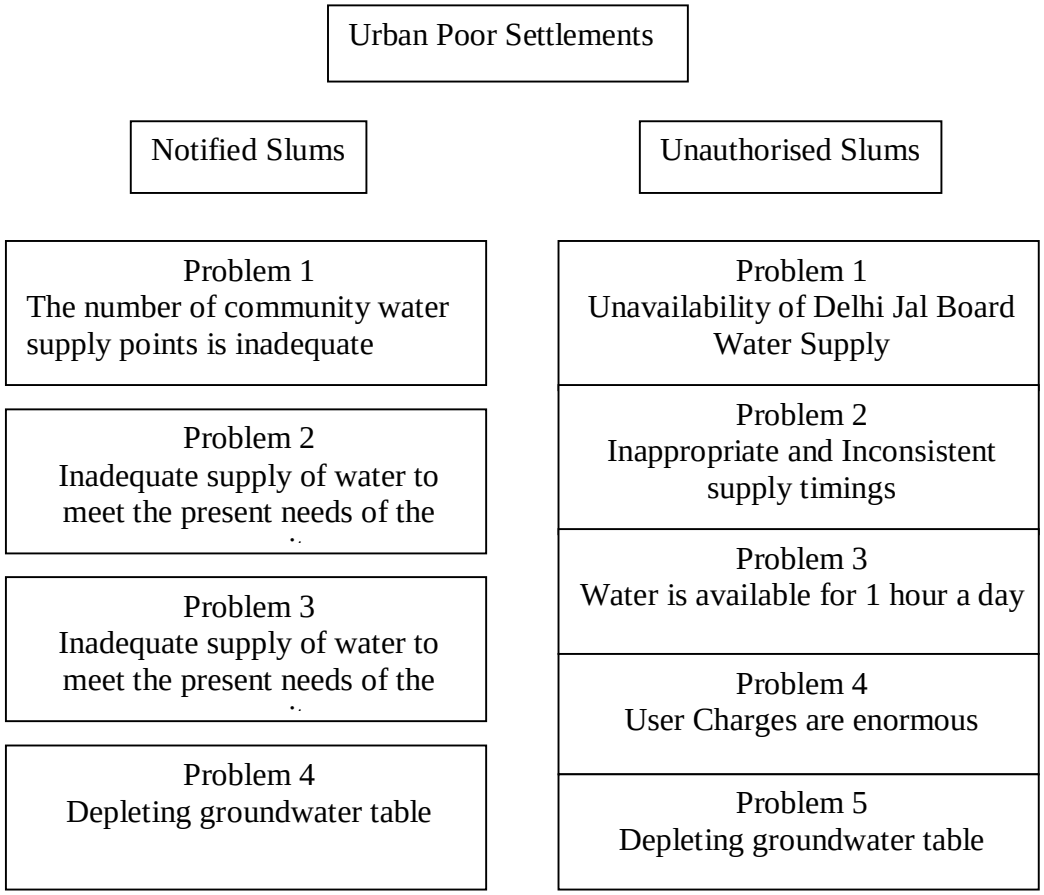

Figure 7: Comparative Nature of Water Problems in two different types of Urban Poor Settlements in Delhi

5.1.4 Willingness-to-Pay

In response to the Contingent Value survey, it was realised that respondents are willing to pay for the improved services. In case of Survey Area I, unauthorised slum colony, all the 20 participants were ready to pay for regular public water supply. One of the woman responded "we are already paying 7 Euros per month for irregular and inadequate supply to private owner, we would be happy to pay for regular and adequate public supply". The private borehole owners are the only water suppliers in this urban poor colony; they supply water at their own will during odd hours. After realising the possibility of public supply and community supply system, an old man responded that "we are considered as illegal settlers, we can not fight for our access to water, we are paying as per their (private borehole owners) demands but we are more willing to pay for regular public supply".

In case of Survey Area II, the notified slum area, 14 out of 20 respondents were willing to pay for the improved services. As slum dwellers are getting water free of charge, some of them were satisfied with the supply system but the rest were willing to pay for the improved services. Due to poor maintenance and low pressure, all the community taps were not functional. This increases the number of persons dependent on one tap. As one of the respondent described " number of installed taps are enough but all of them are not working, people who are residing away from the tube well come to our street to collect water which reduces our access to water". Respondents were willing to pay for maintenance of access points and water pressure.

5.1.5 Marginalisation of the Urban Poor

Due to large size of WDCs, the individual wards are not able to represent the problems of people in their wards at grass root level. As the urban poor are not involved in decision making, the elected representatives of WDCs remain unapproachable for them (Kundu.D 2009). Therefore, except for the interest of WDCs in urban poor as their vote banks, WDCs has not been able to fulfil its responsibility of poverty alleviation and local improvement. The RWAs has provided the pathway for the active involvement of citizens in decision making, development and maintenance of services. But the power has rested in hold of economically sound group of the society for their own benefits excluding the interests of urban poor completely. *Bhagidari* scheme involving RWAs has also excluded the urban poor to large extent making it a platform representing only the elite section of the society. Also, RWAs are more powerful in south Delhi which has majority of high income residential colonies. On the other hand, the socio-economic exclusion has serious consequences for urban poor dwelling in same part of the city in terms of access to water and sanitation and secure land tenures. The notified slum settlements not connected through individual pipe system, they have to spend long hours while queuing and collecting few litres of water through community supply. Unauthorised slum colonies have to rely on private illegal borehole owners, who supply water at enormous cost. These prices are thrice as much as paid by connected households with regular and adequate supply.

CHAPTER 6 – DISCUSSION AND CONCLUSION

6.1 Overview

As this study aims at examining the factors responsible for the inadequate access of water among the urban poor in two urban poor settlements in south Delhi, this chapter provides general conclusions and summarises the environmental injustice experienced by the urban poor.

6.2 General conclusions

The socio-economic inequality has left urban poor with no organisational capacity. Informal and unplanned growth of slums and insecure land tenure, inconsistent with the master plan of city has failed to assure adequate water supply among the urban poor. There are no municipal supply connections in unauthorised slum settlements as the settlements are occupying public land reserved for other purposes. The urban poor without community supplies have to rely on private owners for few litres of water in exchange of enormous user charges, almost thrice of the amount paid by connected city residents. Otherwise taken as constitutional right to access water, urban poor are willing to pay for the supply services. The inadequate and inequitable distribution of water all around the city has led to the emergence of illegal profitable business of 'vending water'. The private borehole owners supply water to the places where DJB is left incapable and inefficient. The existing water tariff structure in Delhi is too low to cover even operational and maintenance costs by DJB. Poor cost recovery leads to lack of funds, poor service delivery especially among the poor.

WDCs, responsible for planning and managing infrastructure facilities at zonal level are incapable of serving the interest of common people due to urban growth and limited financial resources. Increase in urban population has increased number of people in each ward, making it difficult for ward representatives to monitor their respective wards. This has resulted in a parallel working group of RWAs which has offered community involvement for efficient service provision at local level but it functions in the interest of middle and high income group residents, excluding the urban poor.

Inadequate access to water has different impacts on different slum settlements. The urban poor of unauthorised settlement have to pay enormous user charges due to the absence of public water supply. The supply is irregular and for short duration mainly after midnight. Whereas in notified slum settlement, dwellers are getting water free of charge for fixed hours

during the day. Due the limited community access points that have to spend lot of time for collecting water, as person per community taps exceeds the basic norms of 150 persons per tap. But unlike connected households who gets treated water supply from DJB, both the settlements are dependent upon untreated groundwater.

6.3 Factors responsible for Inadequate Access to Water

6.3.1 Socio-economic Inequality

Considered as migrants, the urban poor are designated as group of people illegally occupying the city land and living under unhygienic conditions. This study has revealed that unlike the idea of slums being 'the poor' and 'unemployed', the people residing in these settlements are either day labourers working at ongoing construction sites; serving in the middle and high income group households or employed in cleaning and maintenance work throughout the city. This suggests that they are integral part of the middle and high income resident's daily life. They are poor to afford the well constructed houses in the city but they possess enough money and willingness to pay the affordable prices for the adequate public water supply services. They do not possess security of land tenures which makes them vulnerable to eviction at any hour. Formal and informal legal status of different settlements has been a great challenge in case on 'unauthorised urban poor settlements'. The vulnerability of these settlements to get displaced provides enough reason to the MCD and DJB to loose their interest in investing in infrastructure facilities in these settlements. Apart from the segmentation by local governmental and institutional structure, the RWAs functioning in influential high and middle income societies consider the urban poor as source of pollution near their residential areas. They have been successful in displacing the urban poor to the peripheral areas for clearing the expensive city land for their own needs. All this has slowly led to the out casting of the urban poor as a separate socio-economic section of the city. The urban poor community lacks active participation in the local governance. This has left the local government incapable of accessing their local needs, monitoring of service delivery and improving the environmental conditions in urban poor settlements. As told by the respondent from the notified slum settlement, that the community water supply facility is inadequate for the growing population. Also, the poor operation and maintenance of the installed facilities has further reduced their access to adequate water. They are willing-to-pay for the improved services but lack of involvement in decision making and planning the distribution according to the requirement has left the urban poor with inadequate water supply. This shows that environmental justice is not only about inequalities in how environmental harms and benefits are distributed based

on race or class, but also about non involvement in decision making for equal distribution of those harms and benefits. Broadening participation would bring a recognition and validity to the diverse ways of understanding and valuing the urban poor.

6.3.2 Inefficient Water Supply System

The survey shows that *Sangam Vihar* being an unauthorised settlement has no access to public waters supply. DJB remains in the government sphere and cannot supply water to the settlements which are not regularised by MCD. Incapability of DJB to meet the demand of water in the city has led the supply agency to rely on private borehole owners to supplement the water supply through water tankers mainly in south Delhi. The area is dominated by residential colonies of affluent and influential RWAs, who are dependent on private water vendors to meet their excessive water demands. In the absence of public water supply, *Sangam Vihar* residents rely on these private owners for water supply which is highly inadequate and irregular. The user charges paid by the residents of *Sangam Vihar* are thrice to the amount charged by DJB from connected households. These households usually pay 1 Euro per month for unaccounted usage of water in comparison to 8-10 Euros paid by poor settlers for few litres. The lack of coordination between MCD and CGWA and interests to serve RWAs, has resulted in unregulated extraction of thousands of litres of groundwater everyday and exploitation of the urban poor for user charges by private owners.

6.4 The way ahead

The recognition of water as a basic human right is necessary to include the urban poor within a common water supply structure irrespective of their ability to pay, group membership or place of habitation. Their adequate access to water requires:

Regularisation of land tenures

This is to provide them legal status in the city and equal right to access the city water supply services. As in the case of *Sangam Vihar*, an unauthorised slum problem can be tackled by providing community water while involving the settlers in planning, maintaining and implementation. They can be charged the minimum affordable price.

Resource management and cost recovery

The available water resources can be efficiently managed through regular maintenance to reduce wastage of water due to theft and leakage. Installation and repair of water meters is necessary to implement the effective tariff structure. The price incentives can assign more

weight to conservation while maintaining equity among users. Private service providers are important viable alternatives to improve water supply services among the urban poor but they should be legalised and regulated under decentralised system. This can be implemented while auditing groundwater recharge and extraction rate to prevent overuse.

Better Urban Governance

In order to improve the provision of adequate water to meet other MDGs, efficient participatory governance is required. Strategies must be designed to provide stronger community participation and commitment towards social and environmental justice. The capacity building at WDCs level should bring attitudinal change to consider the poor as their partners by involving them in decision making. Local NGOs can assist in brining the urban poor and the ward representatives at same level by organising events to discuss their common problems and their solutions. The state government besides extending its financial and participatory support to RWAs should make it mandatory for them to include the interests of the urban poor in development plans under *Bhagidari* scheme. The willingness and involvement of government departments and civic agencies is important to deliver efficient services to the urban poor. Inclusive governance is required at local level where the poor can become the part of urban development process.

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Appendix I

Questionnaire for Focus Group Discussion

Section 1: Slum Profile

1. Slum Settlement:

2. Type of Slum Settlement:

3. Location of Slum Settlement:

4. Number of Respondents participating in FGD:
   Adults (>18): F: M:
   Children (<18):
   Total:

5. Migrant: Non-migrant:

6. Primary Occupation
   Day Labourer: Student: Community Servant:
   Home Servant: Unemployed:

7. How old is the settlement?

8. Total Population of the settlement:

9. Total number of households:

10. Nature and Type of Households
    Kutcha (plastic, tin roofs):

Pucca (Bricks):

11. Number of Floors

12. Average size of Dwelling Units (sq.m)

Section 2: Access to Water in the Settlement

1. Type of water supply in the Slums
   Individual:
   Shared by 10 households:
   Public Stand Post:
   Tube well:
   Private Borehole owner:

2. Agency responsible for the supply
   Delhi Jal Board/ Private Borehole owner

3. Number of boreholes in the settlement

4. Depth of boreholes

5. Frequency of water supply
   24 hours:
   Few hours during the day: Timings:

6. Time spent in collecting water

7. Average amount collected by each household

8. User Charges
   Yes/No

9. Level of community satisfaction in terms of Quantity and Quality

   Adequate: Inadequate:

   Drinkable: Non-drinkable:

Section 3: People's Participation

1. Security of land tenures

   Yes/No

2. Right to vote

   Yes/No

3. Willingness-to-Pay and Participate

   Yes/No

Appendix II

Questionnaire for Contingent value survey

Section 1: Introduction to Initiative

Community managed Pro Poor Demand Responsive Initiatives in Gwalior, Jabalpur and Indore of Madhya Pradesh in partnership with UN-HABITAT, MC and community represented by Community water and sanitation Committee.

- Demand Responsive Initiative
- Distribution lines laid by the Municipal Corporation
- Full ownership of the assets by the community
- Responsibility of operation and maintenance can be shared by the Municipal Corporation and community
- Installation Loan recovery from the community
- Situation before the initiative began
- Situation after the initiative

Section 2: User Charges

- Way of payment of connection charges
  Lump-sum/ Monthly Instalments

- In case of Instalments, connection charges approximately 1.5 Euros for 9 months + user charges 0.5 Euros per month
  Agree: Disagree:

- In case of lump sum payment approximately 1.5 Euros for 36 months, then after only user charges 0.5 Euros per month
  Agree: Disagree:

Appendix III

Revised Tariff Scheme by Delhi Jal Board, 2007

Consumption, Kl/month	Price, Euros	Total Usage Charges, Fixed access charges+1.5 Euros/month
Upto 6	Nil	Nil
Above 6 and up to 20	0.03	0.42
Above 20 and up to 30	0.07	0.7
Total		1.12

Source: Department of Statistics and Economic Planning 2007-08

The water will be calculated as for household consuming water more than 20 Kl, Fixed Access Charges[11] + 1.5[12] X Usage Charges

1.1 + 1.5 X 1.12

2.78 Euros for 30 Kl of water

[11] Fixed access charges are payable by all registered consumers towards the cost of accessing the net work and for its operation and maintenance

[12] The factor 1.5 to the usage charge is towards maintenance of sewerage system

Appendix IV

Water supply in different urban poor settlements in Delhi

SN	Item	At the end of A.P. 2002-03	At the end of Annual Plan 2003-04 (Cumulative)	At the end of Annual Plan 2004-05 (Cumulative)	At the end of Annual Plan 2005-06 (cumulative)	At the end of 2006-07 (cumulative)	At the end of 2007-08 (cumulative)
14.	Total No. of Urban Villages of which covered with	135			135	135	135
	(i) Piped water supply	135	Aug.	Aug.	Aug.	Aug.	Aug.
	(ii) Sewer facilities (Cum.)	93	98	99	105	107	108
15.	Total No. of Regularised-Unauthorised colonies of which covered with	567			567	567	567
	(i) Piped water supply (Cum.)	557	557	557	557	557	557
	(ii) Sewer facilities	458	482	491	506	517	526
16.	Total No. of Resettlement colonies of which covered with	44			44	44	44
	(i) Piped water supply (Cum.)	44	Aug.	Aug.	Aug.	Aug	Aug.
	(ii) Sewer facilities	44	44	44	44	44	44
17.	Total No. of JJ Clusters (Taken over by DJB)	820			820	820	820
18.	Total No. of Unauthorised colonies of which covered with	1071			1071	1071	1017
	(i) Piped water supply	229	398	398	407	408	408
	(ii) Skelton water supply	-	374	374		-	-

Source: Department of Planning 2007-08. Socio-economic Profile 2007-08. NCT Delhi