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# Urban Exclusion through Water Distributional Inequity: The Case of Haora City, West Bengal

**PARAMA BANNERJI*[1] AND UTTAM MUKHOPADHYAY[2]**
[1]Assistant Professor and [2]Associate Professor & Head
[1]Department of Geography, Amity Institute of Social Science, Amity University, Kolkata (W.B.) India
[2]Department of Geography, Vidyasagar College, Kolkata (W.B.) India

## ABSTRACT

The paper reviews the water distributional equity in spatial and socioeconomic levels in urban areas. Literature reveals that there are a number of theories emplacing on the notion of citizenship and how the urban space should be shared between the privileged and the marginalized, but empirical studies reveal that often the urban poor are excluded from basic rights like right to water. While water is a renewable resource, a large number of households in the cities around the developing world, do not have access to the most basic of human need- a safe and reliable supply of water (Mackenzie and Ray, 2007). This paper uses the experience of an Indian city, Haora, a million city and an important industrial and transportation node of eastern India where the huge influx of industrial workers post 1930 led to the prolific growth and development of slums and other haphazard settlement. This city is used as a lens to view the access to water in the urban areas and various options available to them as reforms. The study uses both the qualitative and quantitative techniques to explore the nature of urban water supply in the study area

**Key Words :** Draft development plan, Howrah Municipal Corporation, Potable water, Urban water supply

## INTRODUCTION

While water is a renewable resource, it is at the same time a finite resource. The total quantity of water available on the globe is the same as it was two thousand years ago. Only 3 per cent of the world's water is fresh and roughly one-third of it is inaccessible. The rest is unevenly distributed. Over the years, increasing population, growing industrialization, expanding agriculture and rising standards of living have pushed up the demand for water. A large number of households in the cities around the developing world, do not have access to the most basic of human need- a safe and reliable supply of water (Mackenzie and Ray, 2009).

There are various dimensions of service delivery in water supply to urban poor which determine the effectiveness of the services and ensure access to sufficient water of safe quality for domestic purposes. Equitable distribution of water is yet another parameter to define the allocation of the water among the marginalized section of the society. Distributional inequity of this basic service to a marginalized socioeconomic group can be viewed as exclusion both at the spatial and socioeconomic level. This paper uses the experience of an Indian city, Haora, as a lens to view the access to water

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in the urban areas and various options available to them as reforms. The city of Haora is selected for the study because of its importance and the strategic and functional role as a commercial, industrial, administrative, social and cultural hub of West Bengal, India. The study uses both qualitative and quantitative obtained through secondary sources and primary survey, to understand the nature of urban water supply system- the volume and quality of available water, the pattern of water distribution, and its relation to socioeconomic characteristics of the population, in the study area. Additionally, the paper also examines the problems of urban water distribution and if there is a gap between the volume of water supplied and that which is finally reaching the end users due to leakage, pilferage and poor condition of pipelines.

**Research objectives :**

There are a few research objectives for the study, which are as follows.

– To explore the spatial dimensions of water distribution in an urban area

– To identify the socioeconomic or political factors, which cause the distributional inequality in water distribution, if any.

– To understand the nature of urban water supply system, both in terms of volume of available water and quality of water with special reference to the citizens of Howrah Municipal Corporation (HMC).

– To identify problems, if any, in the water supply system in HMC.

– To analyse if the existing system of water supply will be able to meet the demand of water for the population of the city.

## METHODOLOGY

On a broader scale, the objective of the study is to understand if urban dwellers face exclusion in terms of basic rights like water. Specifically, the study endeavours to understand the nature of urban water supply and explore if there exists any distributional inequality in water, if any. It also tries to analyse how far it is effective to meet the demand of the population of the area. It is necessary to contextualise the study and make it evidence based. Hence, the study uses the case study method so that the research problem can be understood within specified context.

In West Bengal, the city of Haora is known to be a node of transportation and industrial importance. Haora is one of the urban centres of West Bengal where the scope of planning is challenging due to its high level of social, environmental and economic concerns. Haora is also known for its squalor and urban misery (Dembowski, 2001). Hence the city is chosen for study.

The study uses both qualitative and quantitative and both secondary and primary survey. Reference to the Draft Development Plan (DDP) of Haora, Census of India and other government reports have been done to understand the situation of water supply in the study area while the Engineers of the Water Supply Department of HMC were interviewed to understand ground level reality. Perception study was conducted by HMC on its citizens of all 50 wards to 301 respondents to understand the satisfaction level in terms of water supply during the DDP (2007-12) preparation. The result of this survey was also used to understand the satisfaction level of the citizens in terms of water supply.

**Literature Review :**

It is estimated that by the year 2050, 70 per cent of the world population would be urban

(United Nations, 2013). However, in the event of inequality and exclusion, be it spatial (lack of affordable housing, water and sanitation), social (lack of equal rights and participation of the marginalized) or economic (job creation or lack of providing opportunities to the citizens for getting benefits of economic growth), the progress of urbanisation would be derailed.

Literature reveals that citizenship refers to boundary as those who are inside and those who are outside the concerned boundary, spatially (United Nations, 2013). Partha Chatterjee (2004) distinguishes between the 'political' and 'Civil' society *i.e.* the 'voting poor' and the 'tax paying rich' both of whom are included as citizens. The concept of Right to City used by Lefebvre (1968) discusses 'the projection of urban society over land' however empirical studies show (United Nations, 2013) that urban poor faces exclusion in terms of basic rights like water and sanitation.

In the international arena, building upon the progress of the Millennium Development Goals (MDGs), which were agreed by governments in 2001 and expired in 2015, Sustainable Development Goals were set in September 2015. Out of the many goals, Sustainable Development Goal 11 calls for "inclusive, safe, resilient and sustainable" cities.

Of the many definition of Inclusive city, Douglas (2013) explains Inclusive City as

'An inclusive city is one that values all people and their needs equally. It is one in which all residents—including the most marginalized of poor workers—have a representative voice in governance, planning, and budgeting processes, and have access to sustainable livelihoods, legal housing and affordable basic services such as water/sanitation and an electricity supply.'

As per census 2011, 31.16 per cent (377.10 millions) of the total population of India is living in urban areas with nonwage, informal employment becoming a dominant characteristic of the urban poor households namely slums. Most of the slum settlements lack water and sanitation systems and are often located in high-risk areas of cities (Bose *et al.*, 2017). Ever since the Universal declaration of Human rights , the right to water has been declared as essential component of right to life in particular and human rights in general in a number of international declaration (Pandey, 2014). As far as India is concerned there are certain figures which show that Water in India is in a very deplorable condition. According to the World Water Development Report, 2003 in terms of availability of water, India is at the 133$^{rd}$ position among 180 countries and as regards the quality of the water available, it is 120th among 122 countries with 17 per cent of India's population does not have access to portable water.

The presents study thus seeks to address this gap in literature where while urban citizenship refers to inclusivity, evidence based studies report exclusion of certain sections of the community in terms of basic rights like water.

## Profile of the Study Area :

### *History :*

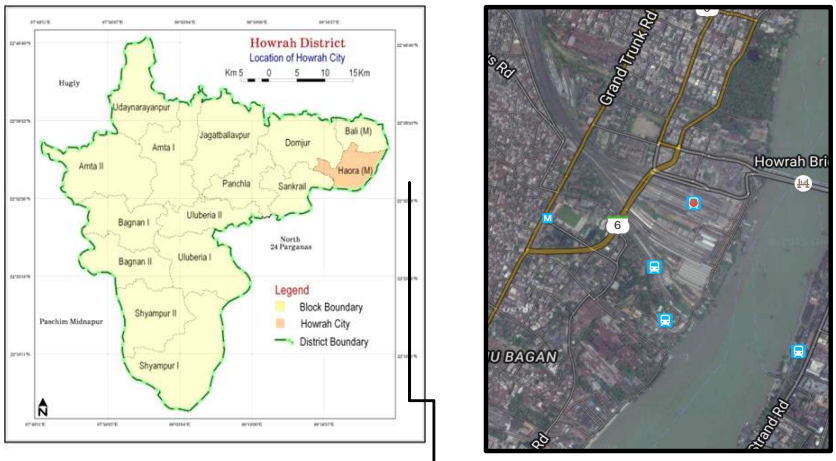
The city derives its name from the word Haor—Bengali word for a fluvial swampy lake, a depression where water, mud and organic debris accumulate. The history of Haora city dates back to over 500 years. But, the district has a rich heritage in the form of the great Bengali kingdom of Bhurshut. Venetian explorer Ceasare de Federici, who travelled India during 1565–79, mentioned a place called Buttor in his Journal Circa, 1578. This place is identifiable with the modern day neighbourhood Bator of Haora. Bator was also mentioned in the Bengali poetry Manasamangal written by Bipradas Pipilai in 1495 (O'Malley *et al.*, 1909). After 1568, it became a part of the empire of Akbar after the defeat of Daud Karanani. From 1862, the entire district came under the Zamindari of Burdwan (Change Management Unit, 2007)

In the mid-19th century, Howrah was the nucleus of industrialization in India (O'Malley *et al.*, 1909). Since 1845, the establishment of a dock, a few manufacturing activities and establishment of salt ware houses gave life and activity to the place. To meet the growing needs of the city there was an influx of labouring population from neighbouring states. This also was a reason for poor housing condition, shanties etc. in the city to accommodate the working class population.

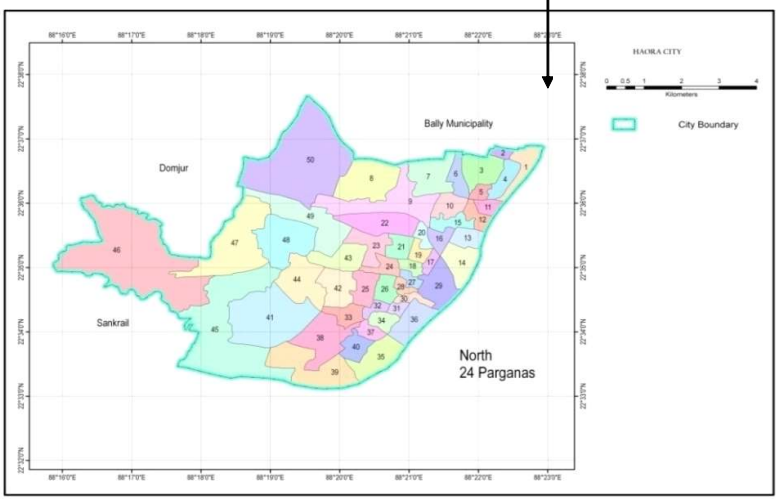
The city of Haora, thus represents a typical urban scenario of industrial growth and decline, immigration of labour, colonial heritage, urban poverty and prolific growth of slums.

## Geographical setting :

Haora is located at 22.59°N and 88.31°E. It has an average elevation of 12 metres and is on the right bank of Hugli opposite Kolkata, in the deltaic region of West Bengal (Map 1).




**Map 1.1 (a). Haora City, Haora District An Aerial view of Haora City**




Source: National Atlas and Thematic Mapping Organization and Google Image (2014)

**Map 1.1 (b). Haora city**

**Climate :**

Situated in the humid subtropical zone under the influence of Bay of Bengal monsoon branch, it enjoys the moderating effect of the sea.

**Administration :**

After Howrah became a railway terminus in 1854, an administrative jurisdiction was drawn. Howrah Municipality was established in 1862. In 1917, Padmapukur, Kasundia and Dumurjala areas were added. Vide the Howrah Municipal Corporation Act of 1980; it became a Municipal Corporation, in 1984. Presently, the corporation area is divided into fifty wards, each of which elects a councillor.

**Demographic profile :**

Presently, population wise, Haora is the second largest city of West Bengal. According to 2011 census, Haora city had a population of 1077075 with the total number of households being 244135. The area is 51.74 sq km with a population density of 20817 persons/sq.km. The city thus had one third of the population of Kolkata, the capital of West Bengal. The percentage of literates in Haora city was 81 per cent. The percentage of Scheduled Caste population was 3.25 per cent while that of Scheduled Tribe was 0.3 per cent.

While men comprised 52 per cent of the population, women comprised 48 per cent of total population of Haora and 46 per cent of the total literates. However, the share of female population amongst total Main workers, was as low as 12 per cent. Focussing on the slums, there are presently 565 slums having 10 per cent of the population of Haora city to accommodate the floating population as well as the labour force (DDP-2, 2012). Map 2 reveals the distribution of ward wise slum population in the city of Haora. The wards with high slum population are 39, 45, 46, and 41, 36, 29, 10, 3, 50.

The historical growth of Haora city with a population of 84000 from 1896 to its present level is largely due to the available job opportunities ( Fig. 1).

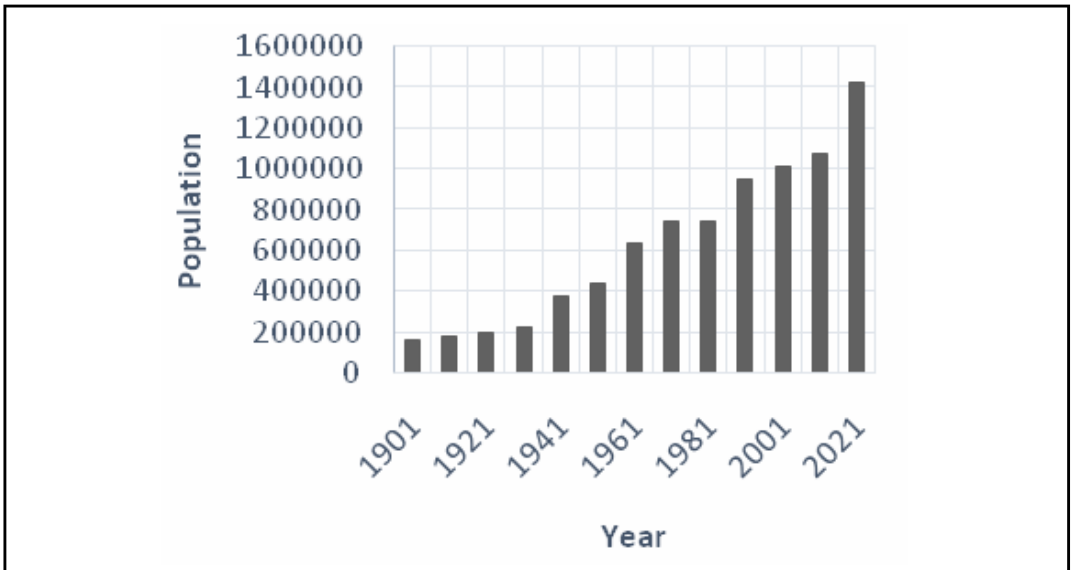



**Fig. 1 : Growth of Population, HMC**

In 1872, when the first Census of Howrah was taken, the city had two subdivisions namely Howrah and Mahishrekha which were parts of Hugli district constituting a population of 63,878 (Mukherjee, 1992). However the increased industrial activity, establishment of a railway terminus had attracted labourers from all over India and in 1901 the proportion of immigrant population to total population was 17 per cent. The city has a history of immigration with a greater share from the migratory labour force of Bihar and Uttar Pradesh (Mukherjee, 1992). Fig. 1 shows the growth of population of Haora city over the last forty years.

**Economic Profile :**

According to Census 2011, the number of Main workers in Haora city were 358922. The number of Cultivators amongst Main workers were 894 (0.2 %), Agricultural Labourers were 1008 (0.3 %) and Household industry were 12078 (4 %).

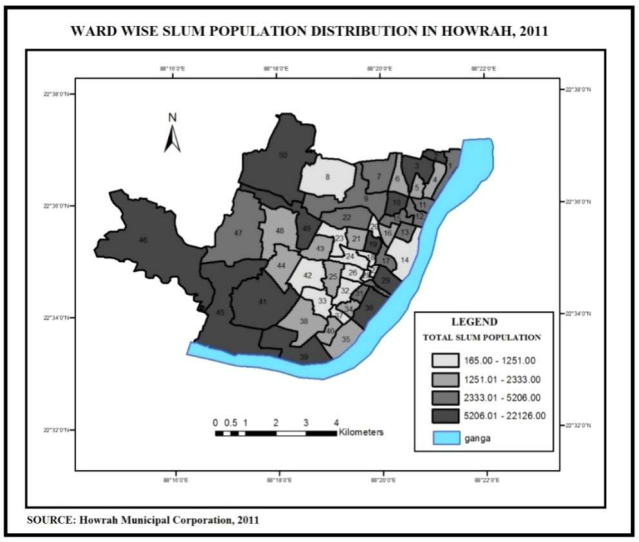
Haora has a rich industrial heritage. Modern manufacturing industries started in Haora city to meet the immediate needs of the Europeans who came to India for trade and commerce. The first large industries worked by European capital had started close to the 18$^{th}$ century to meet the requirements of the ships visiting Calcutta. Ironworks industries which are one of the most important industries in Haora, first started as early as 1810. It was the centre of steel melting and foundry activities serving the whole country. The city witnessed a large concentration of engineering industries. The first cotton mill in India called the Bauria Cotton Mill also started in Haora. After this, sugar factories were established in 1845, followed by establishment of East India Railway terminus and construction of bridge over river Hugli. All of these gave an impetus to industrial development here. In 1873 a number of jute mills also started here like the Howrah and Sibpur mills and the Ganges mills. The growth and development of the city was more rapid after the city was connected with Kolkata by a Pontoon bridge in 1874, which was replaced in 1943, by the Rabindra Setu.

However the industries are facing a decline since 1970s. But due to certain factors like strategic location, advantageous communication network by rail, river, road network, availability of power, high technical skill, raw material at nearby sources, steel complex, colliery coupled with rapid urbanisation and immigration, there is a scope for an expanded market. However some major activities like Zari and Embroidery, Handloom, flower, vegetable and trade runs the local economy. According to the Draft Development Plan -2, 2012, despite the gradual decline in industrial base in Haora, it still accounts for around 20 per cent of the registered working factories of the state (DDP-2, 2012).

**Problems of Haora city :**

Haora city's industrial heritage has been a major factor causing urban growth. The civic body of the city however, could not cope up in terms of infrastructure and service delivery for the inflowing population in search of economic opportunities. However in recent times the industries suffered a decline. Presently the city faces a vast mix of concern with its high slum population, immigrant population, social hazards, environmental issues and economic concerns. This has worsened the situation causing urban poverty and growth of slums. The city, due to the industrial and transportation activities is also threatened by severe air pollution, groundwater depletion.

Thus the city faces acute population pressure, unplanned urbanization, high level of air pollution due to industrialization with minimum open spaces and greenery, contaminated drinking water with high pressure on groundwater sources. Haora with its economic, social and environmental problems calls for immediate action and proper planning.




**Map 2. Illustrates the distribution of slum population in the city**

## FINDINGS OF THE STUDY

### Nature of Water Supply System :

Urban water supply refers to the facilities of meeting the water demand of the urban population. The distribution of water may take place either through the distribution system or through non piped sources. Urban water supply system comprises the source of water from where it is tapped, the service network, the pumping and treatment (iron removal, chlorination) plant, domestic service connection etc. For this study, to understand the nature of urban water supply in the study area, one focusses on the source of water, quantity of water supplied, the relationship between the user and the service provider and the perception of the users on the quality of service ( Fig. 2).

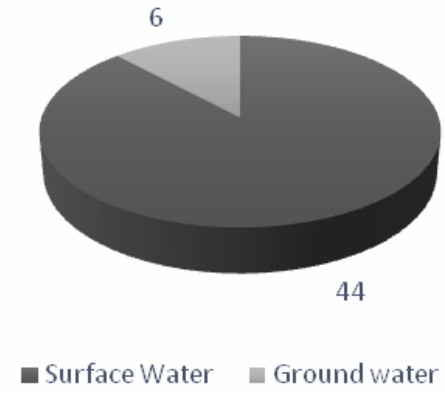



**Fig. 2 : Distribution of the Number of HMC Wards using Various Sources of Water**

### Quantity of Water Supplied :

An interview with the Engineers of Water Supply Department revealed that the total water

supply by HMC is 72 Million Gallons of Water/ day while the HMC consumes 56 Million Gallons of water/ day. Hence the supply exceeds the demand. However, they pointed to the problem of inequality in distribution of water.

**Source of water :**

Both surface and Groundwater system are used as a source of water supply system in Haora city. Surface water is drawn from River Hugli. At present, a water treatment plan at Padmapukur in Haora supplies 40 Million Gallons of water/day (MGD). The supply is expected to be augmented by another 30 MGD at Padmapukur by Kolkata Metropolitan Development Authority. Groundwater is tapped extensively at Ward Numbers 12, 31, 45, 46, 47, 50. Padmapukur water treatment plant supplies water to Wards 1 to 44. Wards 45 to 50 gets water from Kolkata Metropolitan Water and Sanitation Authority (KMWSA). In these areas water connection is obtained at the rate of Rs 30/ Domestic Connection. Looking at the scenario of Groundwater supply, the total number of shallow tube wells in HMC are 1893 in 2011 (DDP-2).

Fig. 3 and 4 illustrates the ward wise distribution of surface water supply and percentage of household having water connections while Fig. 5 illustrates the ward wise distribution of ground water source, namely shallow tubewells.

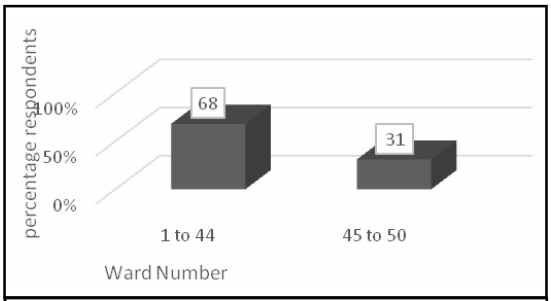



**Fig. 3 : Percentage of households having water connection**

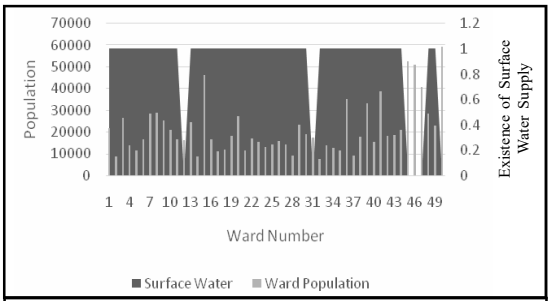



**Fig. 4 : Distribution of Surface Water Supply, HMC**

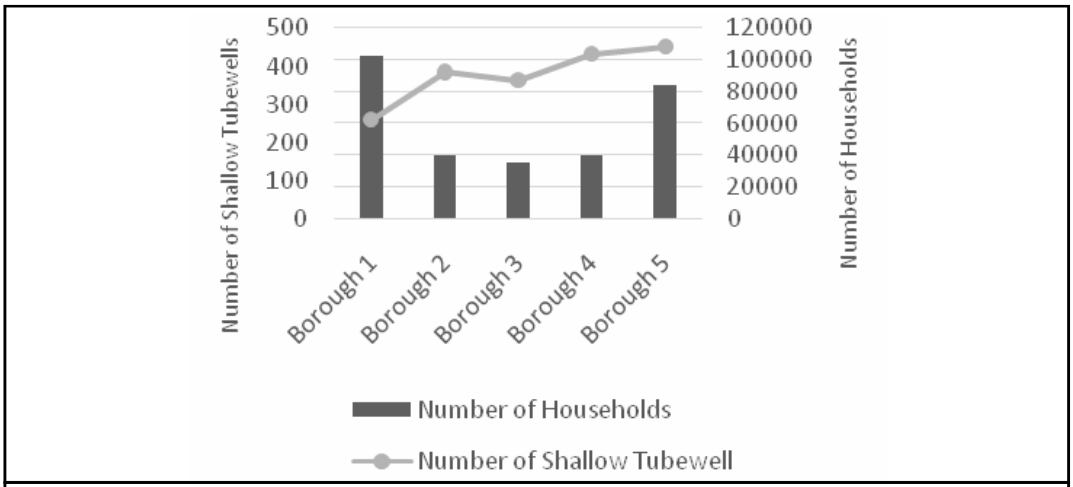



**Fig. 5 : Distribution of the Number of Shallow Tube wells and Borough wise Household Population, HMC, 2011**

**Perception on the Quality and Quantity of Water Supply :**

As per the wardwise workshop conducted by HMC during its preparation of Draft Development Plan (2007-12), the citizens of all wards were asked to provide their feedback on water supply system of Haora.

Satisfaction Score is obtained by adding the incidents of satisfaction level in terms of water quality and quantity. If a Ward is satisfied in terms of water quality, the score is 1, or else 0. Similarly, if a Ward is satisfied in terms of water quantity, the score is 1, or else 0. Using a binary method, the score of each ward is obtained in terms satisfaction level. While Fig. 6 illustrates the relationship between ward population and the statisfactory level obtained in terms of water quality and quantity for that particular ward, Fig. 7 sums up the score for water quantity and quality. It indicates that only 18 wards out of 50 wards have reached some sort of satisfaction level in terms of water supply. Remaining wards are dissatisfied with both the quality and quantity of water.

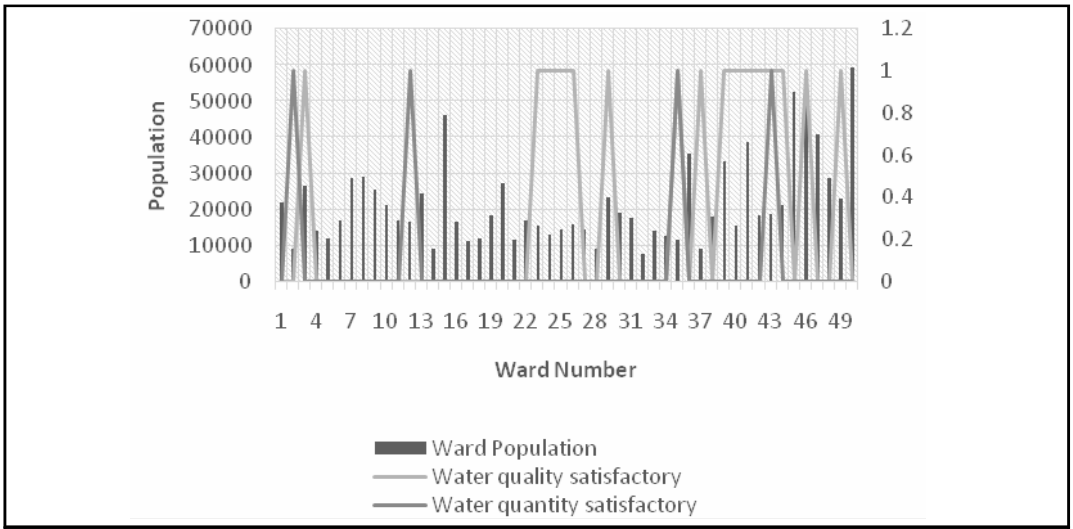



**Fig. 6 : Ward population and Satisfaction level of Water Quality and Quantity, HMC**

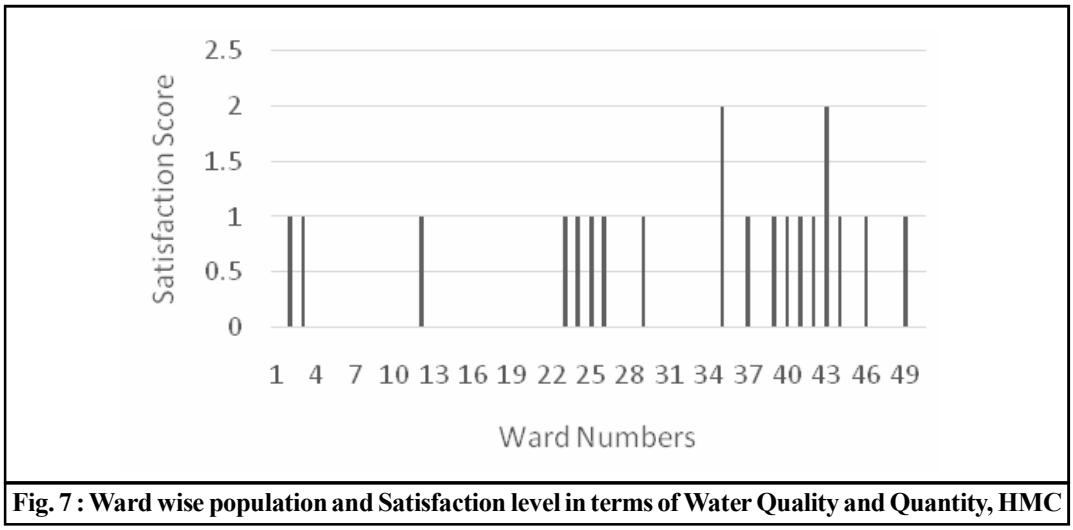



**Fig. 7 : Ward wise population and Satisfaction level in terms of Water Quality and Quantity, HMC**

**Water distribution in slums :**

Using the perception studies data, it is revealed that only the wards 1, 3, 5, 6, 11, 23, 25, 27, 29, 37, 40, 42, 44 have expressed medium to high satisfaction in terms of quality and quantity of water supplied. But in these wards the slum population is low indicating that slum pockets experience distributional as well as qualitative inequity in terms of water supply.

**Problems of Water Supply :**

As per the Draft Development Plan's (2007-12) public consultation process in HMC, the citizens identified the following problems in the HMC area. Water supply was identified by 34 per cent of the population as the major problem in HMC area. This was followed by drainage and sewerage (32%) and solid waste management (26%). The type of problem which were identified during the consultation process is also illustrated in Fig. 8.

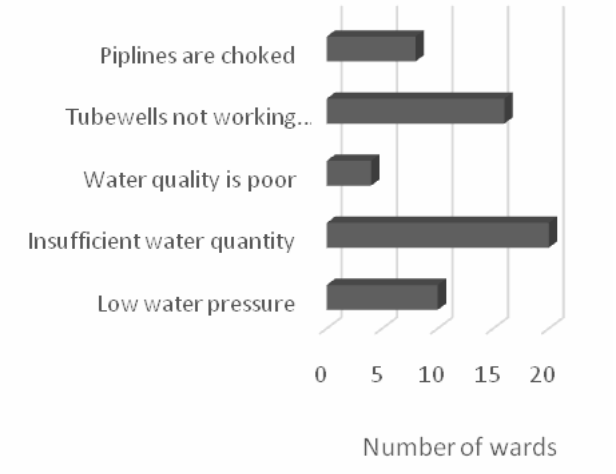



**Fig. 8 : Problems related to water supply as pointed by the Citizens, HMC**

**Table 1: Problems and suggestions related to water supply, HMC**

| Problems | Recommendations |
|---|---|
| Inadequate/ Low pressure of water at the head | Repair and Renovation of existing pipelines |
| Encrusting of pipelines | Create awareness among citizens to stop misuse of water |
| Ageing of pipelines | Tail end areas of the boosting stations with low water pressure head to be identified |
| Leakage of water | Identify leakage points first |
| Wastage of water in the distribution network | Identify leakage points, repair and replacement of the pipelines |
| Pilferage of water | Create awareness |
| Contamination of water | Identify leakage points |

Source : DDP Consultation and Field Survey, 2015

The findings are also tabulated below, in Table 1. The problems and recommendations were obtained on the basis of the outputs of public consultation process during DDP meetings and the interviews with Engineers of the Howrah Municipal Corporation conducted during field survey, for the study.

## RESULTS AND DISCUSSION

**Understanding spatial distributional equity (or inequity) of urban water distribution :**

Haora city depends on both surface and groundwater for its supplies. As revealed in Fig. 4, except 6 wards, most of the wards of HMC are primarily dependent on the water supplied from Padmapukur water treatment plant. However it is not necessary that wherever population is high, the wards have received surface water supply. The total length of water supply pipeline is 750 kms. As revealed in Fig. 4, wards 45, 46 and 47, with comparatively high population, does not receive water from HMC. Analysing the situation further, if one uses a Pearsons Product Moment Correlation Coefficient, the value between the existence of water supply and ward population comes to -0.55873. Hence a negative correlation exists between the population level and the facilities of surface water supply.

Looking at the scenario of Groundwater supply, the total number of shallow tube wells in HMC are 1893 in 2011 (DDP-2). If one refers to Fig. 5, Borough 1 (Ward 1 to 10) has the highest number of households and is facilitated by the least number of shallow tube wells while Borough 5 (Ward 40-50) has the largest number of the shallow tube wells. It may be pointed here that Wards 45-50 is included in the newly added area of HMC and does not receive water from the Water Treatment Plant at Padmapukur. Hence this result.

Again correlating the number of households in each Borough with the number of shallow tube wells, it indicates a negative correlation between the two. It means that as the number of households increase in any area, the number of shallow tubewells used, decreases. It can be explained from the fact that probably the households of the area are switching to surface water supply connections, as the swelling population level trigger the initiation of facilities of surface water.

Correlating the data of number of shallow tubewells and number of households in each Borough, the result of the Pearson's Product Moment Correlation Coefficient, is -0.45138. Hence again a negative correlation between the population and water supply.

Correlating the population level of each ward with the perceptions on the quality and quantity of water supplied by HMC in that ward, it was found that the incidents of satisfactory water quality and water quantity and wardwise population level did not coincide together. As revealed in Fig. 7, wherever the population level was high, it was not necessary that the quality and quantity of water supply was satisfactory. For example in case of Ward 15, 16 or 20, even if the population was high, the water quality and quantity was not satisfactory.

Further, analysing the Pearsons Product Moment Correlation Coefficient, between the population level and perception on water quality, there was found to be a weak positive correlation of 0.010268. Again, the Pearsons Product Moment Correlation Coefficient between the population and water quantity was negative and the value was -0.18322. It thus indicates that wherever population is large, the quantity of water faces shortage.

As per the findings, inequality in distribution of water exists both at the spatial level as well as the socioeconomic level. HMC supplies an average of 135 litres/capita/day of water (HMC, 2012). The net available water supply is same as the Bureau of Indian Standards (IS) norm of urban water supply (135 lpcd.). However, as interviews revealed, a significant quantity of water is lost through pilferage, encrustation of pipelines etc. The water quantity which finally reaches the user is after the wastage.

There is a difference in the water distribution. While the core area (wards 1-45), on an average get 100 litres/capita/day in the non-slum areas and 70 litres/capita/day in the slum areas, the added

area (wards 45-50) gets 90 litres/capita/day in the non-slum areas and as low 40 litres/capita/day in the slum areas.

**Table 2 : Distribution of water quantity actually reaching the Beneficiaries, HMC**

| Slum | Core Area of HMC | Added Area of HMC | Average |
|---|---|---|---|
| Slum | 70 lpcd | 40 lpcd | 55 lpcd |
| Non Slum | 100 lpcd | 90 lpcd | 95 lpcd |

Source: DDP Consultation and Field Survey, 2011

Deriving from Table 2, the actual and estimated quantity of water reaching the users have been calculated. The quantity of water, both estimated and actual, reaching the users have been multiplied with the population or the projected population data and the product obtained is illustrated in Table 3.

**Table 3 : Actual and estimated quantity of water reaching users, HMC**

| Year | Actual Quantity (mgd) | Estimated Quantity(mgd) |
|---|---|---|
| 2001 | 33.25 | 49.51 |
| 2011 | 40 | 52.87 |
| 2021 | 46.89 | 69.75 |

Source: Field Survey, 2015 and DDP-2

Fig. 9 indicates that since 2001, the estimated and actual quantity of water reaching users have progressively developed an yawning gap and after projecting the population of 2021, the gap is likely to increase further. Several factors as lack of maintenance, leakage, theft of water and encrusting of pipelines have contributed to it.

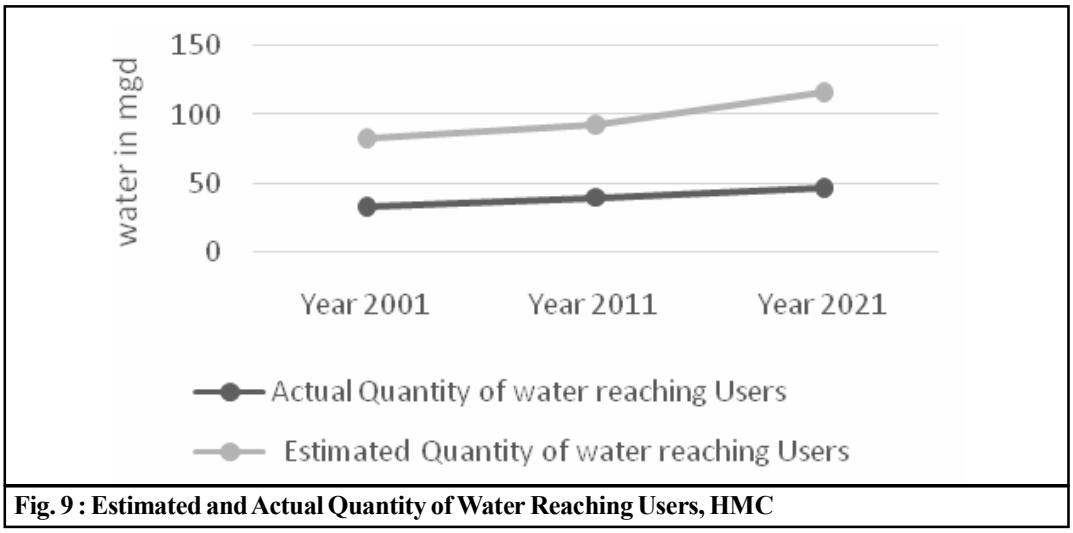



**Fig. 9 : Estimated and Actual Quantity of Water Reaching Users, HMC**

**Understanding socioeconomic distributional equity (or inequity) of urban water distribution:**

Finally, a correlation coefficient has been drawn between wardwise slum population and satisfaction score obtained from primary survey. Correlating the data, it is obtained that there exists

a negative correlation between wardwise slum population and ward wise satisfaction score reached in terms of quality and quantity of water. The correlation coefficient was found to be -0.4035 indicating the slum population is not satisfied with the municipal water distribution.

**Conclusion :**

The spatial dimension of exclusion includes resource, water being one of them. Haora city experiences spatial exclusion of water, an indispensible resource of any settlement. It may be concluded that Haora city experience water supply system as a problem, primarily because of the management of the water resource of the civic authority. Water supply system has developed to meet the needs of the teeming population and augmenting the supply has also been endeavoured. But inequality exists both at the distribution pattern as well at the socioeconomic level. Further there exists an yawning gap between the estimated quantity of water supplied and the actual quantity reaching the users. Inadequate management of water resource as well as unprecedented population growth due to development of industries and haphazard growth of slums have all contributed to the present crisis. Unless all possible attempts are made both at the administrative as well as the beneficiaries' level, to reduce the gap, the water crisis may never be solved.

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Mr. P.K. Bhanja,Executive Engineer, Howrah Municipal Corporation.

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