

## URBAN WATER CONFLICT : CASES AND ISSUES IN GUWAHATI CITY

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### ABSTRACT

*Pure drinking water is a fundamental right of all living beings as it is provided by nature for all. It is a basic need for all and no human can live without pure water. The pattern of water availability differs from area to area and country to country. The variation is most acute between urban and rural area. In urban area due to a haphazard distribution of the population in the area of surface water has been reduced day by day and the groundwater is also depleted due to overuses. As a result water crisis poses a major issue towards the urban area. Water conflict in the urban area is now a major issue in the city area. Regarding this water conflict in an urban area many works have been done in different parts in the world. An interesting definition of water conflict is found in the Water Conflict Chronology by Peter H. Gleick. One of the categories he uses as "basis of conflicts" is "Development dispute". This is a wide category where probably most of the conflicts we are discussing would feature.*

*Due to the tremendous growth of population, the availability of drinking water began to hit the urban people in Assam. Guwahati the capital city of Assam is not exceptional on it. The main objectives of this paper are to study the surface water and groundwater scenario of the city. The paper also tries to identify the water crisis area of the study area. Finally, it is trying to find out a solution to mitigate the problems. The methodology adopted here is mainly the collection of primary and secondary data. The unit of observation and data collection has been confined within the limits of the city in order to arrive at a clear conclusion. The finding shows that some area in Guwahati is can consider as water crisis area. In that area supply water is not good and in some area it is nil. The amount of groundwater is not sufficient in some areas, it is not safe too.*

**KEYWORDS:** *Drinking Water, Household Water, Ground Water, Surface Water, Water Crisis*

### INTRODUCTION

Water is an integral constituent and a fundamental and vital requirement of all living creatures. Pure drinking water is a fundamental right to all living beings as it is provided by nature for all. It is a basic need for all and no human can live without pure water. The pattern of water availability differs from area to area and country to country. The variation is most acute between urban and rural area. In urban area due to the haphazard distribution of population, the area of surface water has been reduced day by day and the groundwater is also depleted due to over uses. As a result water crisis poses a major issue towards the urban area. Water conflict in an urban area is now a major issue in the city area. Regarding this water conflict in the urban area, many works have been done in different parts of the world. An interesting definition of water conflict is found in the *Water Conflict Chronology* by Peter H. Gleick. One of the

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Water conflict in an urban area is now a major issue in the city area. Regarding this water conflict in the urban area many works have been done of different parts in the world. An interesting definition of water conflict is found in the *Water Conflict Chronology* by Peter H. Gleick. One of the categories he uses as “basis of conflicts” is “Development dispute”. This is a wide category where probably most of the conflicts we are discussing would feature. The definition is not very sharp, but the list of cases makes for interesting reading. Even though it is difficult to establish causal links between water and conflict, or inversely the lack of such links at this stage of research, there seems to be a consensus on the fact that water interventions can create conflicting situations.

The role of water in conflict has predominately been studied in international contexts. More attention has recently been put on intrastate conflict in general, considering the fact that the majority of violent conflict is domestic. So far water as a component in local conflict has not been sufficiently studied or investigated. The various projects and databases dealing with conflict have up to now not taken conflicts with water components in consideration. Hopefully, this will change in the near future. One proposed definition of conflict is: “conflict [...] (is) a social situation in which a minimum of two actors (parties) strives to acquire at the same moment in time an available set of scarce resources. (Wolf,1998)). Any development project adds resources, and not only of a concrete material kind, such as technical solutions, jobs in infrastructure projects, the power of distributing money, etc. Power structures may be directly confronted in the project, a quest for equity can be distressing for many parties, gender main streaming may upset societal patterns and water demand management may force populations to change their way of living or make it necessary for them to seek other occupations.

As mentioned above the increased flow of resources to the sector may lead to spending demands. Recent Sida commissioned research (Osbron et al. 2011) has indicated how the additional inflow of resources may change programming and planning of developmental projects and lead to “accountability-in-terms-of-people-served” pressure. In a situation when increased resources are going to be distributed it is especially important to take the conflict perspective into account in the planning.

“Halve, by 2015, the proportion of the population without sustainable access to safe <http://www.un.org/millenniumgoals>).

## OBJECTIVES

The main objectives of this study are to –

- Understand the groundwater scenario of the city.
- Identify the water crisis area of the study area.
- Find out a solution to mitigate the problems.

## METHODOLOGY

The methodology adopted here is mainly the collection of primary and secondary data. The unit of observation and data collection has been confined within the limits of the city in order to arrive at a clear conclusion.

## Study Area

Guwahati is situated at from  $91^{\circ}38'E$  to  $91^{\circ}51'E$  longitude and from  $26^{\circ}5'N$  to  $26^{\circ}12'N$  latitude. Located on the banks of the Brahmaputra River, it is the largest commercial, industrial and educational center of the N-E region. The city is located towards the Southeastern side of Kamrup district, surrounded by Nalbari district in the North, Darrang and Marigaon districts in the East, Meghalaya State in the south and Goalpara and Barpeta districts in the West. The city is situated on an undulating plain with varying altitudes of 49.5 m to 55.5 m above Mean Sea Level (MSL). The Southern and Eastern sides of the city are surrounded by hillocks. Apart from the hilly tracts, swamps, marshes, water bodies like DeeporBeel, Silpukhuri, Dighali Pukhuri, Borsola Beel and Silsakoo Beel etc. also cover the city (City Development Plan, JNNURM). The total population of Guwahati UA/Metropolitan region is 968, 549. As per the data released by

Govt.of India for Census 2011, Guwahati is an Urban Agglomeration comes under the category of Class I UAs/Towns. The city is governed by Municipal Corporation and is situated in the Guwahati Urban Region (Gogoi,2017).

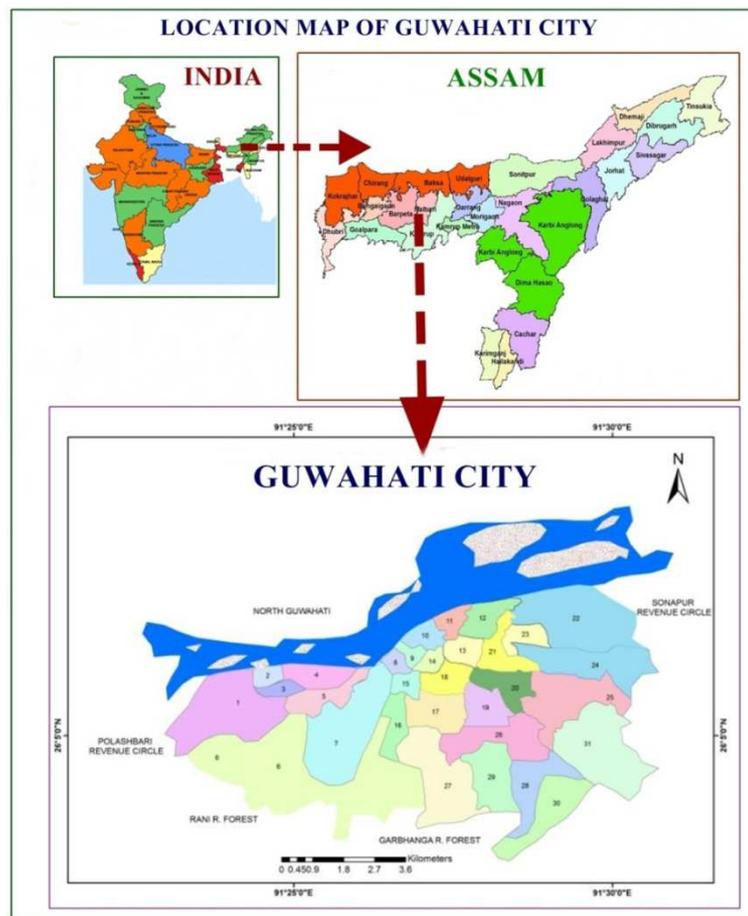


Figure 1: Location Map of Guwahati City

## RESULT AND DISCUSSION

In 1998 Devi mentioned that due to a rapid increase of population and unplanned development of urban areas, the availability of drinking water is going to hit the people in Assam.

Guwahati is the capital city of Assam and tremendous growth of population has been noticed last few decades. As a result, the management of water is not easy for the concerned authority. The city of Guwahati is presently served by piped water supply in limited quantities for specific areas. This facility neither covers the entire city, nor fulfills the standard of per capita demand. The water supply to the city is provided by five organizations viz. Guwahati Municipal Corporation (GMC), Public Health and Engineering Department, N.F.Railway, Urban water Supply and Sewage Board and Guwahati Refinery. The N.F. Railway and Guwahati Refinery have their independent water supply systems with which they serve their employees' colonies. But the other water supply agencies are unable to fulfill the requirement of the city dwellers.

The GMC serves the highest number of households covering 24 percent of the city's total, followed by PHED with 5percent, urban water supply and sewage board with 5percent N.F.Railway with 2percent and Guwahati Refinery with only 1 percent.

### **Groundwater Scenario**

The occurrence and movement of groundwater are influenced by lithology, structure, geomorphology and drainage pattern of a particular area while replenishment or recharge is further affected by land use, precipitation, and infiltration rate. The groundwater level in the study area varies according to local topographic conditions. In areas close to the undulating inselbergs / residual hills viz. Basistha, Borbari, Panjabari, Mathgharia, Birubari area the water level is deeper compared to the areas situated in relatively flat alluvial plains and valley-fill areas such as Rukminigaon, Wireless, Kacharibasti, Gotanagar, Jalukbari areas. In valley-fill areas depth to water level is variable depending on the thickness of the residuum. Overall depth to water level gradually reduces from elevated eastern and southeastern areas to the flat lying alluvial plains in the west. However, the depth to water level in areas like Rehabari, NepaliMandir, Paltanbazar area is found to be deep though these are situated in the valley-fill deposits. This may be due to the high amount of groundwater withdrawal in the area for both domestic and commercial purposes. Geological structures may act either as conduits or barriers to the flow of groundwater. Lineaments representing faults, fractures, shear zones, etc. are the structural features that control the occurrence and movement of groundwater in hard rock terrain (Subramanian and Seshadri,2010). In the eastern part of the study area there is a fault trending NNE-SSW which gives rise to the formation of Silsako and Hahchora beels. Another prominent fault is seen in the central part of the study area trending along a NNE-SSW direction. This lies in the corridor between the Fatasil hills and the Narakasur hills. These faults are overlain by weathered rocks or alluvial plain. This zone, which includes areas such as Garchuk, Betkuchi, Fatasil-Ambari, Birkuchi, the Silsako and Hahchora beels has a negligible thickness of clay layer in their soil profile, while the thickness of the sandy layer varies from 50-60 meters, thus resulting in easy and convenient infiltration of surface water through them. The hydrological study of the city reveals that the presence of groundwater is just below the water table for the shallow aquifer and in case of the deeper aquifer the presence of ground water is available within the semi-confined to confined conditions.

Hydrogeological studies revealed the presence of groundwater just under water table conditions in case of shallow aquifers; however, in case of deeper aquifers it is available within the semi-confined to confined conditions. In case of loose unconsolidated formations, the depth to water in the open dug wells ranges from 2 - 4 meters below the ground level during pre-monsoon period. Dug wells located in the foothills zone shows the deeper ground water level ranging between 5 - 10 meters below the ground level during pre-monsoon period. Similarly,shallow tube wells constructed in the loose

formation down to 30 meters by Public Health Engineering Department and its yield around 2000 to 3000 liters per hour. The maximum depth of normal dug wells constructed in the pediment formation of the city covering the valley parts is 15 meters and a good quantity of water irrespective of seasonal change and can be pumped at the rate of 10 cu.m/day. As per hydrogeological studies conducted by the Central Ground Water Board during 2004 –2006, the net annual dynamic groundwater availability in Guwahati has been estimated to be in the tune of 11045.31 Ha-m or 11 mcm with a static ground water resource of 625152 Ha-m or 625 mcm, up to the depth of 200 meters.

### **Water Crisis Pockets**

Some places within the main section of the city have already reported 2-3 days of irregular water supply. Due to the repair work doing by the PHC department some of the people in the city suffering water crisis severely. Some of such area in the city is Machkhuwa and Kumarpara and the area located along with Assam Trunk Road situated in the middle of Guwahati. The 80 percent people among the survey are mentioned that they complain about their scarcity and issues, but that their pleas are never heard. During the field survey, it has been found that due to leakage of pipe the supply water is not clean. That water is not suitable for the drink. To eliminate the problem people arrange their source of drinking water in other ways. They use deep tube well, well, nearby spring or sometimes purchase from a vendor. The people of Anil Nagar, Nabin Nagar reported that they are staring a new crisis—the shortage of pure drinking water and their struggle for potable water has become an everyday affair.

Water scarcity is found to be a major problem in all the three wards. As mentioned above, the problem is more severe in the dry season when water supply becomes irregular and the water level of the wells goes down. The primary survey reveals that 57 percent of the population heavily dependent on private suppliers due to the scarcity of water. A highest scarcity of water is found inward no. 42 where 82 per cent of the respondents perceived a water scarcity situation. Against this, ward no. 50 suffers from lesser water scarcity, which has been perceived by the respondents as 31 per cent. Again, here too the most common reasons for the water scarcity are found to be irregular water supply and water level reduction, especially during the winter season. Under such circumstances, reliance on groundwater should be minimized by giving emphasis on the use of river Brahmaputra as the main source of water for the city. Rainwater harvesting may also be encouraged among city residents to face the challenge of water deficiency.

The area also faces several problems with respect to water supplied by the municipality and water shortage due to deteriorating groundwater conditions. Some of the problems related to the ground water are—water level reduction, water logging during the monsoon period, pollution from sewerage, unplanned extraction of ground water, high iron (Fe) content, etc. All these problems, except the high iron content of groundwater, can be related to the rapid and haphazard growth of the wards alongside unplanned urbanization process. In the case of the municipality water, as mentioned above, there is an inadequacy of water supply, more especially during the dry winter seasons. Moreover, the existing public water supply facilities are running well below their capacity and require urgent investments and expansion. The Panbazar water treatment plant has already been suffering in relation to its outdated design and is in a very poor state, which requires immediate renovation and augmentation, at least until the time the on-going modern drinking water supply projects are completed (Bhattacharya, and Borah,2014).

**Table 1: Groundwater Condition as Perceived by the Users**

Part of the City	Level Decreasing	Level Remain Same	No Comment
Central Part	78	21	2
Western Part	96	3	1
South Eastern Part	85	1	14
North Eastern Part	94	4	2

*Source: Field Survey, 2017.*

**Table 2: House Hold Water Availability as Perceived by the Users**

Part of the City	Facing Scarcity	No Scarcity
Central Part	96	4
Western Part	70	30
South Eastern Part	65	35
North Eastern Part	44	66

*Source: Field Survey, 2017*

The distribution of water is sufficient to some extent to meet the demand of the area. However, there is transmission loss at certain places caused by leakages in the pipelines, which are hardly replaced with the new ones. The problem becomes more acute during the summer season. Due to leakages in the pipelines, muddy and polluted water enters these leakages and the water that reaches the consumers are very poor in quality and unfit for use. This is the result of the hilly topography of the ward no. 50. People living in lower elevation is getting adequate water, while a flow of water is found to be almost nil at the higher elevation.

Thus, it can be said that the status of drinking water in the study area is below the average standards set for India urban environment, which requires immediate attention. Although the city is growing very rapidly in many aspects in the name of external face-lift and modernization of infrastructure, it can be said that in terms of the growth of necessities the picture remains gloomy. The very basic necessities of life of the city dwellers are deteriorating over the years in both its quality and quantum. People are made to compromise with the basic needs of their existence.

## CONCLUSIONS

In Guwahati, water crisis is a common phenomenon in some area. In that area no supply water is available and people use natural spring, well, tube well, deep tube well as a source of water. The availability of water is not same in the city in all season. In winter water crisis is occurring in the city. It is seen that ground water depletion is the major factor of water crisis for the people who has no supply water.

There are many techniques to increase the availability and better management of the water resources in the urban areas like rainwater harvesting for underground water recharge and for storage in tanks. Water reuse or water from wastewater after appropriate treatment can be used for nonpotable uses like flushing, cloth washing, plant irrigation, agriculture and also for potable uses after latest treatment technologies. Some of such option can be adopted in the city.

The study analysis of various aspects of water uses of the city environs boils down to the conflicts and issues among the community around water in the city. To mitigate these problems and for the better quality of life, it is important to make certain interventions pertaining to proper water management in broad level. The Pragmatic Solutions to Resolve the Problems are –

- Water withdrawal and consumption.
- Water Availability Limitations.
- Water Treatment Limitations.
- Rain Water Harvesting.
- Water Reuse or Water from Waste Water.
- Conservation of Supplied Water.
- Improving Water Distribution System and its use.
- Ground Water Recharge.
- Publicprivate partnership.

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