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Water Scarcity and Rain Harvesting Method- A Case Study of Diphu Town, Assam India

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Abstract: Water is the basic need for the all the living things in different ways including the ecosystem in which we are all part of. The importance of water is well known. Water is our most precious natural resources. Its uses are innumerable and its importance cannot be underestimated. Its role ranges from domestic uses, agricultural and industry to religious, recreation, landscape decoration, and even therapy. Water is basic to life. Due to the growing population over the decades, millions of people worldwide suffer from the lack of water especially in the urban areas where population concentration is very high. Because of this, the demand for water is very high with overuse of ground water resulted in a drop in water table levels and have made the cost of water is high. It is found that rain harvesting, the collection of rainwater from surfaces upon which it falls, is a long-standing practice of many countries still use as a means for dealing with water problems of today. Rain is harvested in many ways and it is vital supplementary source of water. Diphu is the hilly town, the district headquarters of Karbi Anglong district, Assam, in the northeastern state part of India. The largest administrative district with over population of 61000. Located at an altitude of 186 m (610 ft) has suffered acute water problems, the mismanagement of the town committee, lack of proper knowledge on groundwater potential areas has led the people suffered silently, pay a huge sum of money to buy a tank of water. This paper tries to attempt to understand the water scarcity problem's as well the reason and the rainwater harvesting method practiced by the local people.

Keywords: Water, Scarcity, Rain Harvesting, Population Increase.

I. INTRODUCTION

Water is essential for the environment, food security and sustainable development. In 2000, at least 1.1 billion of the world's people- about one in five- did not have access to safe water. Asia contained 65 percent of the population without safe water and Africa 28 percent. The increasing urbanization is the normal process of economic development and the challenge is to make this growth sustainable, efficient and equitable. Unfortunately, the positive role of urbanization is overshadowed by infrastructural deficiencies. Two million children die every year because of water or its poor quality. The availability of water in Diphu area is constantly declining and health risk continues to rise. The latest World Water Development Reports (UN-Water, 2009, 2012) observe how the various global crises reported recently – in climate change, energy, food security, economic recession and financial turbulence – are related to each other and have impacts on water. The Reports remind us that water plays a role in all sectors of the economy and is essential in achieving sustainable development and reaching the Millennium Development Goals (MDG).

As human demand for water increases and competition between water-using sectors intensifies, water scarcity becomes apparent in a variety of forms. However, the interrelationship between local hydrological environments, livelihoods and economic development are often difficult to understand. An objective appraisal of what we mean by 'scarcity' and how we expect water scarcity to affect the rapid social, economic and environmental transitions that we witness today is long overdue.

There is a widespread perception that water is becoming scarce as a result of trends that are, to some extent, unavoidable, especially population growth and the resulting increased demand for water for food production and domestic, industrial and municipal uses. This leads many to jump to the conclusion that a 'water crisis' is inevitable. Yet, the more predictable challenges (or potential crises) can be largely avoided by adjusting the way in which water is managed and governed (Moriarty, Butterworth and Batchelor, 2004). The scope for water management to contribute effectively to basic human needs and livelihoods is now well

documented (CA, 2007; UN-Water, 2009, 2012). However, the right balance of basic measures of water allocation, service provision and management by end users in relation to a variable hydrological cycle and increasingly scarce resource is still hard to define. In short, the behavior of water users needs to be better attuned to the growing reality of water scarcity.

II. STATEMENT OF THE PROBLEM

Water is the most precious resources for all the living things on earth. Due to the ever changing climatic condition as well as the increasing population, millions of people worldwide suffer from lack of drinking water. Diphu a hilly town is one such area where people are suffering from water both domestic and drinking water. The people change the land use land cover of the surrounding area, the mismanagement of the town committee, which also provides water for alternative days in some part of the town. The distribution of water is not equal by the concerned department as well as the awareness of the people regarding the location of a ring well which is very close from one ring well to another, are the major cause. -which might also be the reason for ground water depletion. The people of the town have to buy water from the private source which they pay a high amount like 1000 per month. In order to adjust in the prevailing situation, the people practice a rain harvesting method as an alternative means. This paper tries to attempt and understand water scarcity problem and rain harvesting method in the town.

III. OBJECTIVES

1. To understand the water scarcity as a problem;
2. To identify the rain harvesting method practice by the local communities;

Data source: The information has been collected from both primary and secondary data:

1. Primary data: personal interview, survey through questionnaire, personal observation, recording etc
2. Secondary data: books, census data, articles, journals, existing literature etc

IV. GEOGRAPHICAL BACKGROUND OF THE STUDY AREA

Location: Diphu town is located in between 25.50′ 20″ N to 93.26′45″ respectively, located in the southern part of the district. It is connected both by railways, and roads with parts of the state. The town does not have a linkage with other parts of the country through the airplane. The town is located on an undulating topography with small top hills and narrow valleys. The hills are generally low with a height ranging from 100 to 180 meters. It is along these narrow valleys and low senile top hills we see most settlement being located. It is surrounded by green vegetation.

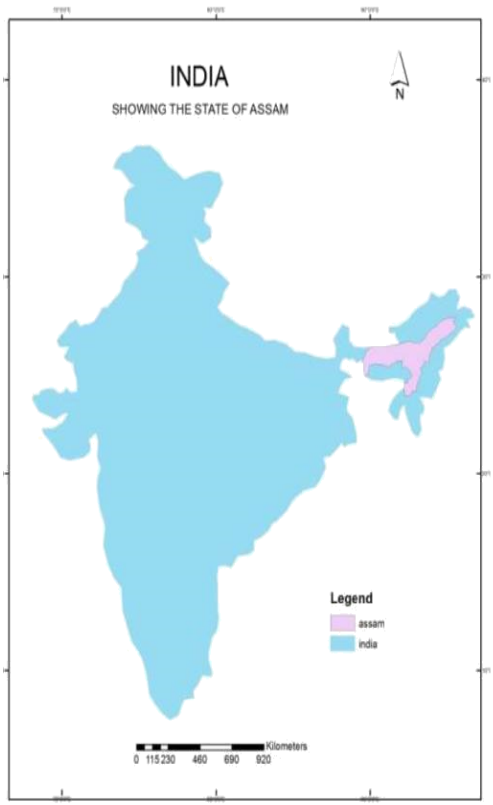
Flora and fauna: Karbi Anglong district is known for forest resources. The climatic condition here is very congenial for the growth of luxuriant vegetation. It contains tropical deciduous and semi-evergreen type of vegetations. Diphu is also covered by green vegetations. The adjoin Forest contains timber species as also abundant in around shrubby vegetation, climbers are also abundant in around Diphu. Wild beast like elephant, tiger, dears, bears, wild pigs and large species of birds are in the forest

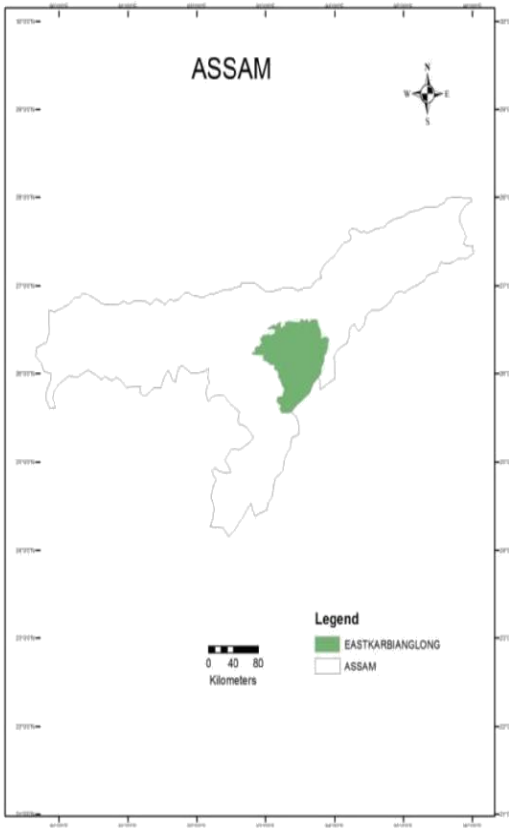
Soil: The core of the district is composed of gnessic rocks belonging to the pre-cambrian age. On a foundation of pre-cambrian gneissic rocks, the soil formation is generally slow. Over the hillslope soil is shallow with a thin surface layer of useful soil and prone to erosion. Usually, these soil are red loamy, over the lower slopes with tertiary formations, the cover is comparatively thicker and rich in organic matters. The soil primarily supports the vegetation cover over the hills.

Climate: The climatic condition of Diphu is controlled by three dominant factors

1. Its position of the side of the Meghalaya plateau
2. Variable altitudes
3. Vegetation cover

Though the effect of forest cover factor is commonly felt throughout the district, the remaining factors because of local differences in climatic conditions. Except for the differences caused in lower altitude. The Diphu town enjoys almost the same with another part of the district. The total annual rainfall ranges between 1155 and 1424 mm. the rainiest months is June, July, and August. The general atmosphere is sultry which means high humidity.





Population: Diphu is the administrative town and also the district headquarters of Karbi Anglong district. The population is quite low at the beginning but it soon started to migrate from the neighboring areas, now the town has a population of 70,000 plus, which might increase in the due course of time.

Year	population
1971	13795
1981	28028
1991	46233
2001	65650
2011	70000

Fig.1 Source: census of India

V. WATER CRISIS IN DIPHU

Diphu is a hilly town and district headquarter of Karbi Anglong a population of 70,000 plus With a density of 3749.8 per SQ. km. Falling water tables are widespread and cause serious problems, both because they lead to water shortages. Both contamination of drinking water and nitrate and heavy metal pollution of rivers, lakes, and reservoirs are common problems throughout the world. The world supply of fresh water cannot be increased. Growth in population, increased economic activity and improved standard of living has led to increased demand for fresh water resources in Diphu town area. Consequently, local and regional water scarcity occurs in the dry season. It is reduced mainly by low rainfall, low river flows, high demand of water, domestic consumption etc.

There's lots of reason why water is short in supply or why it is depleting. It is combination of all factors which are responsible for the water scarcity

1. Increasing population;
2. Overuse of groundwater;
3. Changing land use/land cover leading to;
4. decreasing recharge zone and more in surface runoff;
5. Mismanagement by the town committee, municipal
6. Unplanned city and town;

The survey found that almost every household in the study area has a ring well, the depth varies from 70 to 100 ft, and most of the ring well dries off after excessive use. The members of each household range from a minimum of 5 to a maximum of 10 which is another cause of rapid depletion of water in the study area. The town committee which supplies water is concentrated only on some part of the town and also it supplies water on alternate days. The water supplies come from the outskirt of the town from a distance of 20 to 30 km. They had to pay a huge sum of money to buy a tank of water both for drinking and domestic purpose.

Average people can't afford to buy water daily, they have to take water from the unhygienic water pond for cooking and washing- which is contaminated and is infected by a various harmful disease like malaria, cholera etc. many people of the town is having a history of malaria disease. Many people die from this disease every year, there is no age bar for getting these diseases but mostly the children are prone to it and die after suffering for a long time. Due to the shortage of water, people have to be very careful in using water, many people go to wash clothes and bathing outside the town in the spring water which is at a distance of 10km.

VI. RAIN HARVESTING METHOD

The problems that plague current water resources are numerous but so are the possible solutions. Rainwater harvesting, in its broadest sense, is a technology used for collecting and storing rainwater for human use from rooftops, land surfaces or rock catchments using simple techniques such as jars and pots as well as engineered techniques. Rainwater harvesting has been practiced for more than 4,000 years, owing to the temporal and spatial variability of rainfall. It is an important water source in many areas with significant rainfall but lacking any kind of conventional, centralized supply system. It is also a good option in areas where good quality fresh surface water or ground water is lacking. The application of appropriate rainwater harvesting technology is important for the utilization of rainwater as a water resource. Rainwater harvesting provides the long-term answers to the problem of water scarcity. In Diphu the rain harvesting method is an old and purely traditional method, and most of the time the tools and techniques use to store and conserve rainwater is not sufficient enough even if the rain water is more, there are no storage facilities available. In most household a plastic tank is placed below the roof to store the water when the rain comes, secondly, the average people built a septic tank just below the roof. In most school around the town, a pipe is fixed from the roof and joined to a tank which is raised above the ground.

These rainwater stored in the tank is used as drinking, cleaning, washing, cooking etc. People are excited when the rains come after a long period of the dry season, during the rainfall members of the house gets busy storing and transferring the pot from the kitchen and to the washroom. And during these time that most of the people take bath properly with sufficient water.
Rainwater harvesting offers an ideal solution for the people of the town during the dry season by storing in the jar, pot, tank etc an also recharge sufficient rainwater on the ground. In hilly areas, like Diphu, rainwater is used by humans, vegetation and animals.

Rainwater harvesting system is particularly useful in remote and difficult terrain as it has the ability to operate independently. The whole process is environmentally friendly. There are a number of ways in which water harvesting is beneficial to the local community. The water harvesting methods enable efficient collection and storage of rainwater, making it accessible and substitutes for poor quality water. In doing so, water harvesting assures continuous and reliable access to water harvesting system collects and stores water within an accessible distance of its place of use.

VII. FINDING

- Since the existing of the town, it has been managing by the town committee and the water supply charged has been taken by the town PHE department. They have not been able to provide the potable water sufficiently to the local residents. The one who suffers the most are the students who stay as rent in Diphu town,

- Since Diphu is the administrative town as well as an educational hub in the district and the neighboring district, thousands of students come from a different place and different background to make a career in the town.

- The students have to suffer a lot due to water scarcity, drying up of well is common in every household. They have to stand in a long queen to get the supply water, which they get after three days every week, wait for the rain so that they can store for a few days, or buy it from other sources.

- For the permanent residents, to meet their daily demand of water, they had to buy from other sources for which they have to pay a huge ransom every month. Some rich people go to the river by vehicles to wash clothes during the weekends which are 20 to 30 km away from the town.
- For common people, they just have to wait for the rain or work as daily wage earner to buy a tank of water. Almost every household has a ring well, the depth of the ring well to which the water is found to be at 70 to 100 in feet, depending on the location of the house either low lying or high areas.
- But the ring well is found to be dried off in evening during winter. Even during the rainy season, the water in the well is limited. Extraction of groundwater is being done unplanned and uncontrolled thus this has resulted in hydrological imbalance, deterioration in water quality.

VIII. RECOMMENDATION AND CONCLUSION

The methods they have adopted for storage of rain water like Plastic tank kept just below the roof, Cemented tank is built adjacent to their building just below the roof, Open dry ring well for storing the water, Keep open jar and pots in the rain outside the house.

It is found that the storing water could only last for a few weeks to a month, it means that the tank which they are currently adopting is not sufficient or do not meet their demands. The methods and technique they are adopting are old technique. In conclusion, it can be said that rainwater harvesting methods to a large extent are great benefit for the areas where water is scared. Therefore the methods of rain harvesting should be encouraging more with proper technique and with technology it can store more rainwater, the concerned authority or government should give more importance to this suffering.

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