International Journal of Ecology and Environmental Sciences
www.ecologyjournal.in
Online ISSN: 2664-7133; Print ISSN: 2664-7125
Received: 01-05-2019; Accepted: 03-06-2019; Published: 10-06-2019
Volume 1; Issue 3; 2019; Page No. 06-10

Access to, availability and utilization of water resources in Magarya Province, Niger Republic

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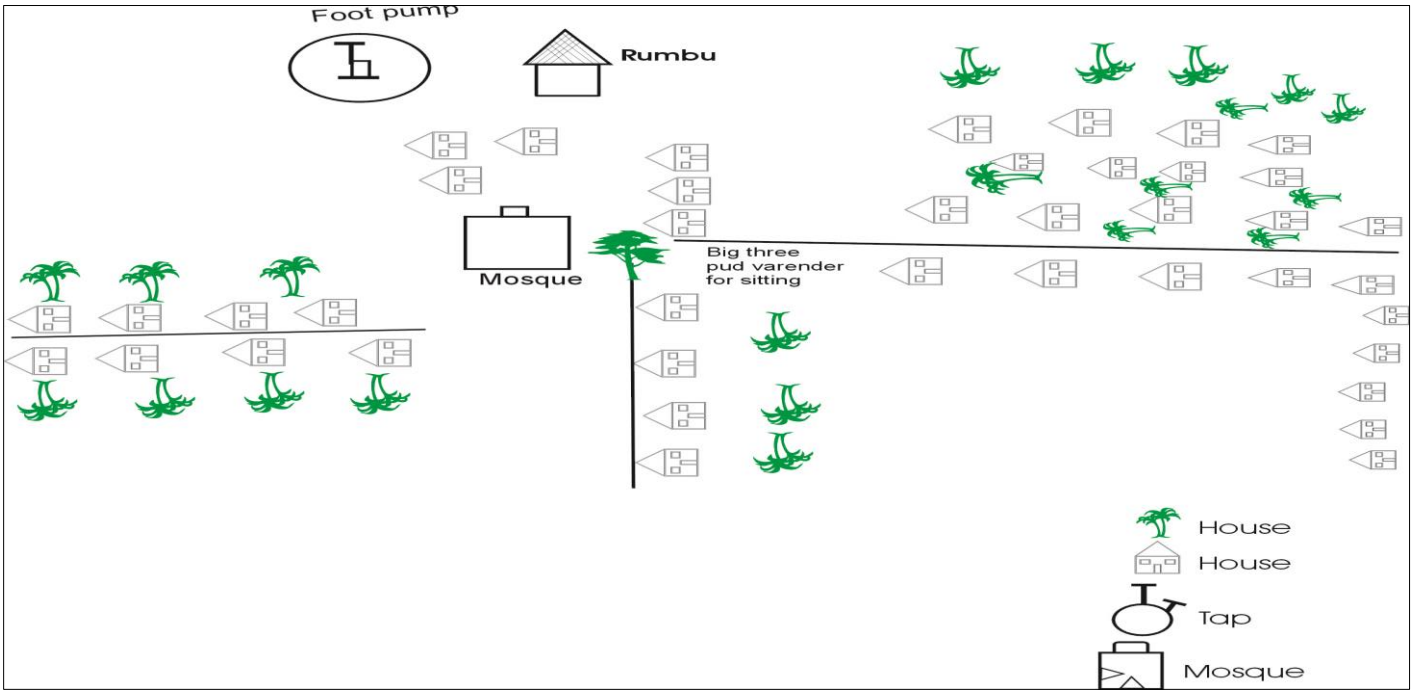
Abstract
Water is a precious natural resource vital for sustaining all life on the earth. Due to its multiple benefits and the problems created by its excesses, shortages and quality deterioration, water as a finite resource requires special attention. The study explores the accessibility, availability and utilization of water resources in the area. The study is purely qualitative using FGD, PRA and in-depth interview. The study findings revealed that accessing water is very difficult and costly and less available for domestic and other purposes, even though these depend with individual households and economic status of the households.

Keywords: water resources, access, availability, utilization, Niger republic

1. Introduction
Water is one of the several current and future critical issues facing Africa. Water supplies from rivers, lakes and rainfall are characterized by their unequal natural geographical distribution and accessibility, and unsustainable water use (IPCC, 2008) [7]. About 25% of the contemporary African population experiences water stress, while 69% live under conditions of relative water abundance (Vörösmarty *et al*., 2005). However, the relative abundance does not take into account other factors such as the extent to which water is potable and accessible, and the availability of sanitation. Increased populations in Africa are expected to experience water stress before 2025, mainly due to increased water demand. The population at risk of increased water stress in Africa is projected to be 75- 250 million and 350-600 million people by the 2020s and 2050s, respectively (Arnell, 2004) [4]. Similarly, Annan (2000) [1] noted that about one third of the world's population already lives in countries considered to be water stressed, where consumption exceeds 10% of the total supply. He adds that if the present trends continue, two out of every three people on earth will live in this condition by 2025.

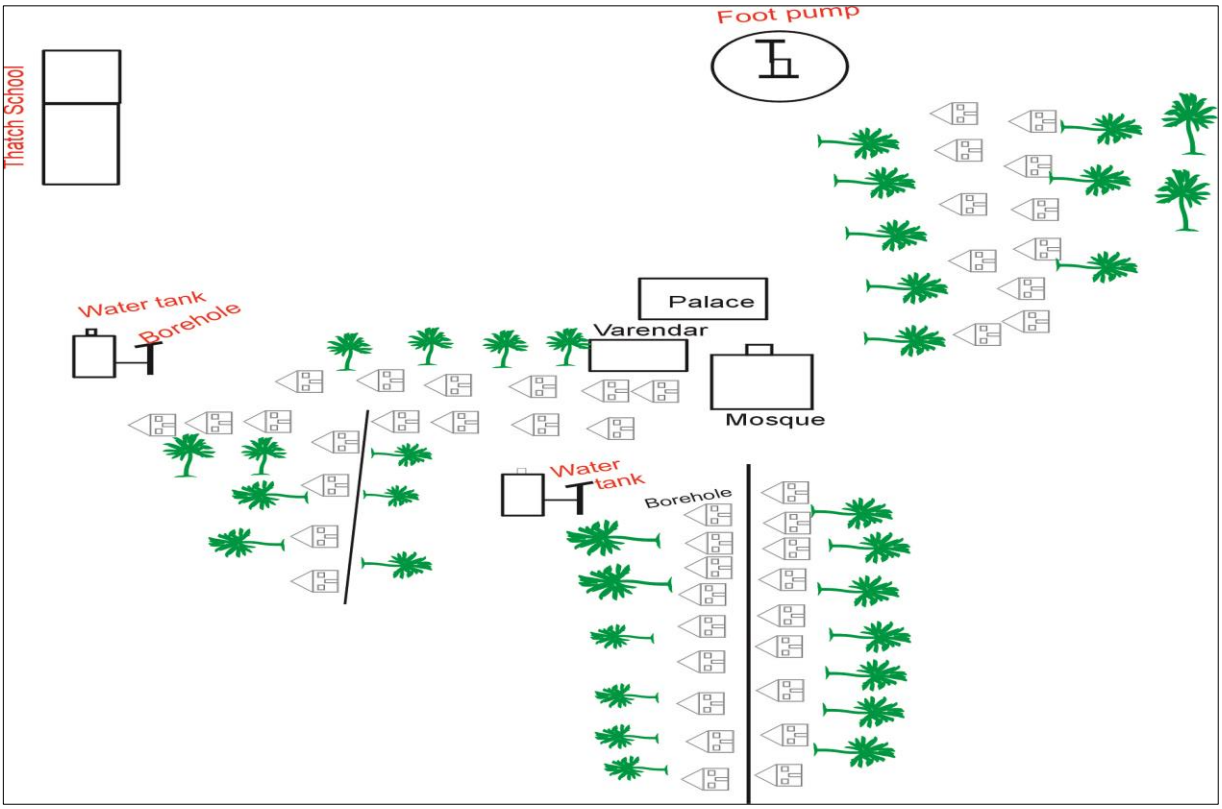
There is a growing global concern over the future of the world's water resources due to the increasing human pressure over the intricate and finite water resource which has led to water resources scarcity (Cosgrove and Rijsberman, 2000; Taha, 2007) [12]. The problem of water scarcity is expected to increase significantly in the coming years, unless a sustainable awareness of resources management emerges (Ayenew, 2007) [3]. Water resource is not only a basic need, but is also a centre-piece of sustainable development and a crucial part of poverty alleviation (Förch and Thiemann, 2004) [6]. The Dublin principles and the Earth Summit Agenda 21, also emphasize the need for integrated water management, recognizing water as one of a number of natural resource elements that needs to be managed in a sustainable manner (Figuaeres *et al*., 2003) [5]. Many parts of the world, markedly the Sub-Saharan Africa (SSA) are experiencing intense competition over water resources due to management failures. The study on sustainable utilization of regional water resources in China indicates that water resources are one of the most important factors hindering sustainable development of the world economy and society. This makes water resource one of the main factors restricting the local sustainable development (Liu *et al*., 2010). Livelihood security in sub-Saharan Africa is strongly dependent on water resources among smallholder farmers, the main challenge being to improve the management and productivity of the available water resources (Rockström, 2000) [10]. However, water scarcity is a growing concern worldwide (Rijsberman, 2006; Rockström and Barron, 2007) [9, 11], with SSA mainly struggling with economic water scarcity due to human, institutional and financial constraints.

2. Materials and Method
The study area is located in the dryland of Niger Republic bordering Nigeria from the south (Niger Republic). Three villages located along the Nigeria-Niger border. The villages are Garin Mada, Garin Mati, Garin Me Shanu under Magarya province. The study area is located at 13.0035^0 N, and 8.9080^0 E. The study area is typically dryland with Sahel characteristics of sparse vegetation dominated by shrubs such as Guiera senegalensis, Piliostigma reticulatum and grasses such as Northern gamba grass, Borassus aethiopium, Cassia obtusifolia, Hibiscus cannabinus and tress such as Acacia albida, Acacia nilotica, Azadirachta indica, Adansonia digitata etc. The soil is typically sandy, poor in nutrients content and porous which aid water percolation and runoff. The rainfall pattern is erratic and inconsistent with high variability and accompanied by thunder and lightning. The major economic activity in the area is agriculture and raring of domesticated animals, while the youths goes on temporary migration in dry season to Nigeria in search of job opportunities and send remittances to families. There is only one thatch school in the area serving many villages and only operate during dry season.



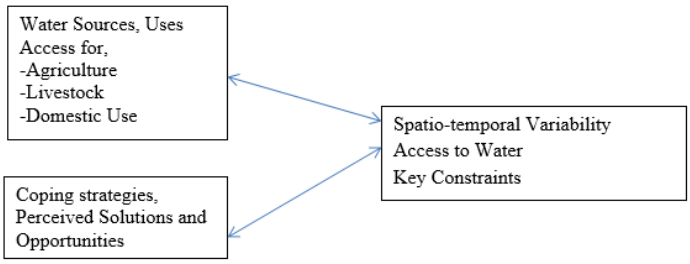
Source: Field Survey, 2019

Plate 1: A Sketch Map of Community Natural Resources of Garin Mada Village



Source: Field Survey, 2019

Plate 2: A Sketch Map of Community Natural Resources of Garin Mati Village



Sampling Techniques

The study employed systematic sampling techniques in selecting the study sites due to their various inherit physical characteristics. The first study site Garin Mada was in the North, while Garin Mati in the South and Garin Me Shanu in the East of the study area so at to have good geographical representation.

Tool and Techniques used in Data Collection

The study uses four methods of data collection, Focus Group Discussion, In-depth Interview, Participatory Rural Appraisal and Personal Observation. In each village one FGD conducted with village head in attendance in all the three villages. In-depth interview conducted with six community members in each village with additional of two interviewees (Commercial Water Vendors) in Garin Mati. PRA was also conducted as to seek information about the practical and perceived problems, needs as well as potentials of the villages while personal observation was to assess the terrain and available natural resources.

3. Results and Discussion

Diversity of water resources and uses at the village level

Prior to 1984 there was no technical source of water in the study area, rather dug well, pond and water collection during wet season. By 1984 the then government established foot pump to meet the water demand in three villages of Garin Mada, Garin Mati and Garin Me Shanu and neighbouring villages. These three established foot pump were the only source of water in the area, unless during the wet season. To meet the necessary water demand by the year 2013 a commercial borehole were established at Garin Mati, meanwhile another commercial borehole established in the same village in 2019. Despite these efforts still there is serious water challenges in the areas of access to, availability and utilization in the area.

Garin Mada with over 500 inhabitants, the only source of water was single foot pump established in 1984 up to date, the same foot pump in Garin Mati with over 1,500 inhabitants and Garin Me Shanu with almost 600 inhabitants. Several people stay for days without taking bath and washing of clothes and poor hygiene in few houses with toilets others practice open defecation in the surrounding farms with no water or tissue to clean themselves. The most terrible part of it is when the foot pump got faulty the only alternative is to get to the Garin Mati where they have two commercial boreholes to get water at commercial prices where six Jeri Can (6) cost 15 CFA and used beast of burden to convey water from the source to their various houses. Those that cannot afford to buy water at commercial prices have to borrow money to get access to water or beg some cups of water from those that afford to buy the water at commercial prices. This situation slightly differs in Garin Mati due to the presence of two commercial boreholes where you can buy six (6) Jeri Can at 15 CFA for domestic uses. There was no congestion at the source of water the only constraints was money to access the water. Due to the paucity of fund at household level, people prepared to be hauling water at night from public sources to their various homes. Other constraints limiting the access to water in the area was the commercial borehole owners tends to operate at their own disposal, even if you have money to pay for the water atimes you won't be able access the water. In other words no specific time for opening and closing operations which frustrate people even if you are capable to patronize their business, atimes during rainy season they went to farm you can only buy water at late evening or at night when they are back from farms.

Crop production exists during wet season, only one individual attempt to established orchard garden at Garin Mada. Crops such as cashew and Guava few survived up to this period, but the process was tedious in hauling water from the foot pump to the garden of about 500 meter distance. The second one was two standing Guava tree at base of commercial borehole in Garin Mati. Crop production d exist at rainy season producing crops such millet, guinea corn, sesame, cowpea, groundnut these are crops produced in the area.

Watering of livestock is also of paramount importance, always the public foot pump is busy with animals for watering especially in the morning with heavy congestion. Those that can afford watering at commercial boreholes were at ease where your money can serve you the same purpose at ease. In rainy season, herdsmen and domesticated animals owners got subsidy of available ponds where they can water their animals at all times and free of charge, using less energy.

Spatio-temporal variability of access to and utilization of water resources

Rain starts in in the Month of May and ends in September, the days and timing varies accordingly. The influence of climate change has affected the number of days receiving rainfall with temporal variation and intensity, where few days received high intensity of rain with drought at the onset of the rainy season.

Access to water resource in the area is of great challenge due to the limited number of water source compared to the total number of human population and animal population in the area. Water is only available for domestic uses, agricultural purposes, and animal watering during rainy season between the months of May-September. There is no spatio-temporal variability in the study area in terms of access to and utilization of water resources, the study villages are under the same climatic classification of AW, as well as having the same soil characteristics.

Therefore, each village has one public foot pump with addition of two commercial boreholes in Garin Mati Village. Commercial boreholes are patronized when the household have surplus money due to the abject poverty in the area where many households cannot afford three square meals per day talkless of balance diet. Should in case of technical problems in the public pumps they have to patronize the commercial ones, before they gather money through households' contribution to repair the public pumps. However, since the establishment these public pumps neither government nor non-governmental organizations come to their rescue when needs arise, however atimes when election is approaching some political parties do assist with money to repair the public pumps.

Foot pump borehole

Storage Facilities Storage Facilities

Fig 1

4. Conclusion

Water scarcity is a serious problem that limits economic growth and development in any society, owing to the findings of these study, the study conclude that the study area has been faced with serious water issues be it accessibility, availability and utilization. People are under water stress with no sign rescue from responsible agencies. People super before accessing water for daily recommended activities for well-living and development as well as economic growth.

5. Recommendations

Based on the findings the study recommends the following

- Establishment of boreholes and tap connection to each and every houses to get easy access of and availability of water
- Establishments of thunder to serve as reservoir for water storage should in case of technical problems
- Provisions of earth dams and water harvesting techniques so as to store water for irrigation purposes
- Special establishment of watering points design only for animal watering, technology such as wind mill that can pump water at all times
- Special intervention for capacity building in area to diversify the source income to boost the households' income level.
- Provision of individual toilets at household level to prevent open defecation
- Government should establish better school well equipped material and man power to provide education for sustainable development.

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