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Analysis of Water Supply to Building Infrastructure in Tertiary Institutions Mubi Region

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Abstract

Water is globally acknowledged as one of the basic necessities of life. Communities, irrespective of their ideologies and economic functions, are expected to treat water as being necessity rather than luxury. Naturally, water is an essential ingredient for survival, it is used as domestic and public water in building infrastructure, water is characterised by low chemical activity, high freezing point, and covers sixty to seventy percent of the earth surface. Normal person consumes forty-five litres of water per day plus twenty-five percent for waste. Therefore, continual reviews towards improvement of water supply to school communities building infrastructure is paramount to support life and effectiveness of teaching/learning. But such is lacking in tertiary institutions in Mubi region. This has motivated the researchers to carry out a research work on analysis of water supply to building infrastructure in tertiary institutions in Mubi region of Adamawa state in Nigeria. Five specific objectives was used to aid the main objective of the research. The research work is hinged on the grey systems theory due to its closeness to the research work. Among other methods, geophysical method was adapted but the objectives the research work could not be achieved. The researchers therefore concluded and recommended that other methods such as: Areal method, sub-surface method, or surface method be used for further research work.

Keywords: *Analysis, Water supply, Building infrastructure, Tertiary institutions*

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Background of the Study

Naturally, water is an essential ingredient for survival, used as domestic and public water in building infrastructure, characterised by low chemical activity, high freezing point, and covers sixty to seventy percent of the earth surface. Normal person consumes forty-five litres of water per day plus twenty-five percent for waste. Water is a chief component of protoplasmic life, therefore, water supply to building infrastructure in communities is basic. Similarly, water supply to institutions building infrastructure is paramount to support the life of the institution's community and effectiveness of teaching /learning activities as opined by the World Water Council, (2015).

The main source of water supply is the rainfall which falls directly into: ponds, streams, rivers, lakes, or wash over the surface of the earth and some percolate into the ground and become groundwater. The tertiary institutions in Mubi region need groundwater supply to: Houses for members of staff, classrooms, offices, workshops, libraries, clinics, lecture theatres, canteens, public toilets, laboratories, students' hostels, and what not. Conducive learning environment in the institutions can hardly be achieved without comfortable building infrastructure. The comfort-ability and conduciveness of building infrastructure for effective teaching/learning in educational setting depends to some large extent on the provision of adequate and pure water supply as viewed by the National Rural Water Supply and Sanitation, (2024). To address the problem, Geophysical investigation was conducted for the purpose of ground water development at the tertiary institutions in Mubi region Adamawa State, using ABEM Terrameter and Schlumberger array.

Statement of Problem

Water is globally acknowledged as one of the basic necessities of life. Communities, irrespective of their ideologies and economic functions, are expected to treat water as being necessity rather than luxury, particularly in the education sector as advocated by the World Water Council 2015. Similarly, the National Rural Water Supply and Sanitation, (2024) acknowledged water in same capacity. But such is lacking in tertiary institutions in Mubi region. The institutions depend on insufficient water supply at different capacities by water trucks and water vendors resulting to academic activities being seriously affected day in the day out. To top all, the safety of the members of the institutions from contracting waterborne diseases is not guaranteed. For these reasons, groundwater needs to be supplied to the institutions to safe guard lives, teaching/learning activity, and to promote comfort-ability of living standard. It is against these facts that the researchers were prompted to conduct research on analysis of water supply to building infrastructure in tertiary institutions Mubi region.

Objective of the Study

The main objective of the research is the analysis of water supply to building infrastructure in tertiary institutions Mubi region in Adamawa state, Nigeria. Specifically, to find out:

i. The significance of water supply to building infrastructure in tertiary institutions Mubi region.
ii. The sources of water supply to building infrastructure in tertiary institutions Mubi region.

iii. The quality of water supply to building infrastructure in tertiary institutions Mubi region.
iv. The factors to be considered for water supply to building infrastructure in tertiary institution Mubi region.
v. Possible solution to the challenges of water supply to building infrastructure in tertiary institutions Mubi region.

Scope of the Study

The research was limited to groundwater development and supply in the following tertiary institutions in Mubi region:

i. Federal polytechnic Mubi.
ii. Federal university of Agriculture Mubi.
iii. Adamawa state university Mubi.
iv. School of Health Technology Mubi.

Literature Review

Water (H_2O) is a universal solvent and an essential ingredient in the survival of mankind, his properties, and activities. Water divides the earth into aquatic and terrestrial environments and covers sixty to seventy per cent (60-70%) of the earth surface and gives support to the existence of organisms as explained by (Ahmed, 2020). Quality water should be colourless, colour in water indicates impurities in the water (decaying or decayed leaves or algae, giving it a brownish yellow colour). Quality water should be odourless. Odour is a product of water contamination. Quality water must not have taste. Taste and odour may be caused by naturally occurring dissolved organic matter or gases in the water. Quality water should be useful for drinking, washing, cooking, and birthing (Ohwo, (2018).

The main sources of water supply is the: oceans, seas, lakes, reservoirs, rivers, springs, groundwater, icecaps, glaciers and rainfall. Water is source of health problem known as waterborne disease. e.g. dysentery, diarrhoea, infective hepatitis, typhoid, paratyphoid and cholera. The quality of water is judged by the amount of suspended and dissolved materials in it e.g. eroded soil particles, leaves, grasses, positively charged ions such as calcium, magnesium, sodium, and potassium. Bicarbonate, sulphate, and chloride are negatively charged ions commonly found in water. These suspended materials can be removed with filters and flushing method of treatment, World Health Organisation, (2019) wrote.

Factors that influence the availability of water supply to communities are topography, distance from the sea, and nature of the soil. Supply of quality water for communities involves water collection and analysis, treatment and distribution. The analysis of water after collection is for bacteriological and chemical content. The former is more important from the end user's health perspective. But the chemical content must be considered because it can attack metals used in building sanitary appliances (Muta'a, 2023).

Theoretical / Conceptual Framework

The research was focused on the analysis of water supply to building infrastructure in tertiary

institutions Mubi region and was hinged on Deng (1982), the grey systems theory. The theory focused on the quantity, quality, and safety of water supply to consumers from small and medium-sized water supply system with a limited database that often do not have water supply programme implemented. It enables making decisions in the absence of complete information. To assess the input parameters **P, I** and **U**, a trapezoidal and triangular membership functions were used, due to the small number of data needed to define the function and the ability to modify function parameters during the analysis, as shown in Fig. 1 below, these parameters are evaluated using variables: low, medium, and high.

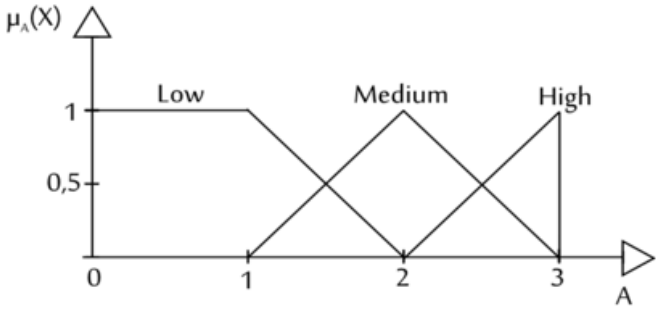


Fig. 1: Membership function of parameters P, I and U

Materials and Method

In practice, any of the following procedures for groundwater investigation and development for community water supply can be adapted: Areal method, sub-surface method, surface method, or geophysical method. The research used the geophysical method. The geophysical investigation adapted was the resistivity method, Vertical Electrical Sounding (VES) using Schlumberger Electrode Arrangement, where resistivity meter was used to delineate conductive zones. These zones were subjected to computer modelling techniques using interpex Software.

Data Collection

The geology and hydrogeology data obtained revealed that the area lies within the undifferentiated basement rock complex of Nigeria. Groundwater in basement rocks are found in thick weathered mantle or fractures and further enhanced by its lateral extension. Therefore, thick overburden and fractures were targeted.

Result and Interpretation

The data obtained were matched with the standard master curve. The attached **VES** data is the representation of the apparent resistivity against depth as shown in fig. 2 below:

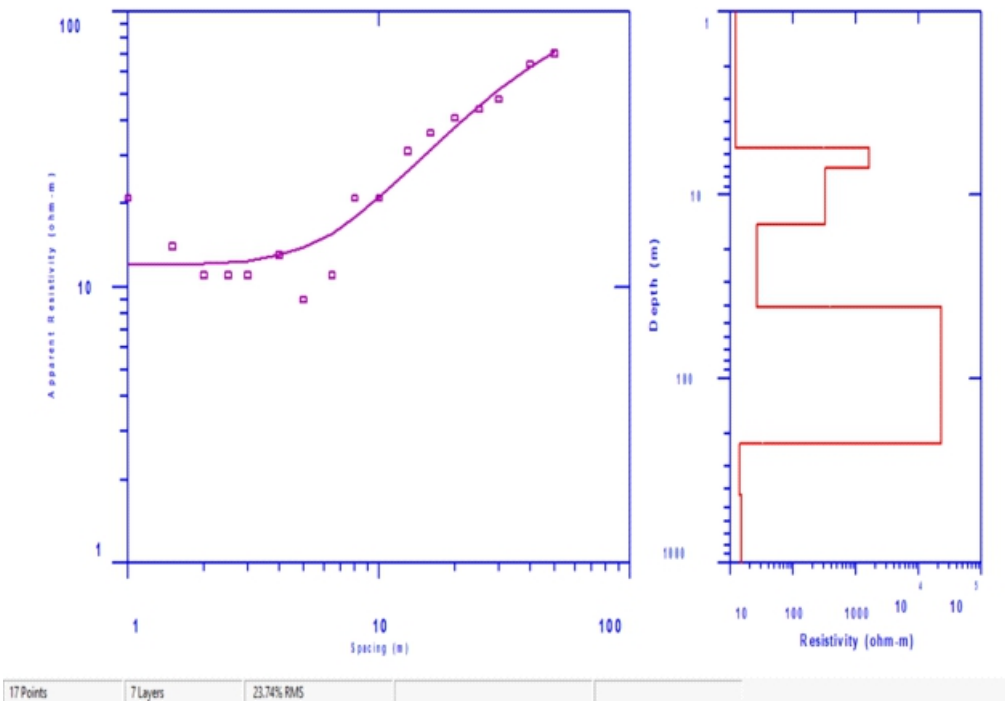


Fig. 2: Geophysical investigation to locate suitable drilling point for groundwater development and supply to building infrastructure in tertiary institutions Mubi region, Adamawa state Nigeria.

Findings

After interpretation and also from other deductions made electronically by the researchers, it was found that drilling can only be possible to the depth **40 ± 5m**, however the yield can only be determined after drilling as the area appears to be a low yielding zone which may perhaps accommodate low-capacity pump or hand pump.

Recommendation & Conclusion

Based on the method used for the research, findings obtained by the researchers showed that the objectives of the research could not be achieved. Therefore, to achieve the objectives of the research, the researchers recommended other method such as: Areal method, Sub-surface method, or Surface method for further research work.

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