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Research Paper

An Assessment of Water Distribution System in the North Western Part of the Federal Polytechnic Ado-Ekiti.

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Abstract: *This Paper is aimed at an assessment of water distribution system of water borehole, well and tank facilities in the North western part of Federal polytechnic Ado-Ekiti using Geographical Information Systems (GIS) Technologies. The spatial information of the water borehole, tank and well facilities were determined using hand-held GPS equipment in addition to their attribute data. The data generated was analyzed using Geographic Information System Application QGIS*
Key words: *Assessment, Water, Distribution*

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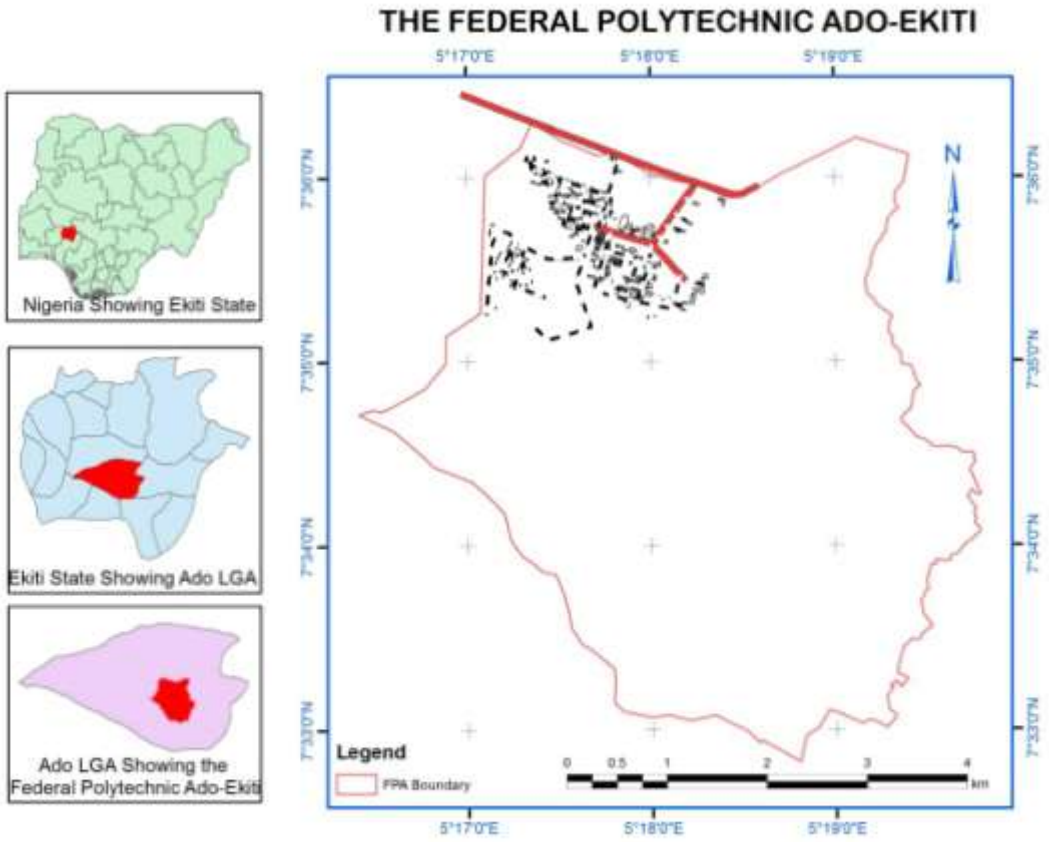
I. Introduction

The Federal polytechnic, Ado Ekiti have made frantic efforts to provide portable and adequate water supply to its Communities. These strides of water supply services, where they exist are unreliable, and not sustainable because of obvious difficulties in management. In the light of this, the World Bank (2002) stated that one of the key issues emerging in our time is access to clean water. Water supply is a basic requirement and necessity of life (Mars and Evans, 2011). It is essential to sustain life, and a satisfactory (adequate safe and accessible) supply must be available to all (WHO 2008). The requirement of clean water per person is about 2.7 liters per day. The availability of a reliable and clean supply of water is one of the most important determinants of our health (Parsons and Jefferson, 2006). Hence, water scarcity possesses risks and stress to any given human society (DWI, 2005). In spites of the significance of adequate water quality and quantity for human health and survival, public water supply coverage in the study area appears to be decreasing and deteriorating. This has therefore resulted in accessibility of water both in quality and quantity. Certainly, the use of distribution is very crucial to the public water supply since water is not only a commodity but a right to which human populace should enjoy. Therefore, water supply should be assumed a paramount necessity in order to position human health in the right perspective.

II. Study Area

Federal polytechnic Ado-Ekiti was first established in Akure in 1979. It was later in 1982 moved to Ado Ekiti between latitudes 7.594 and longitude 5.2955. It currently has over 15, 000 students and a total staff strength of about 2,000.

Fig.1 StudyAreaMap



Source: Surveying & Geo-informatics Department

Fig.2: AN IMAGERY OF PART OF FEDERAL POLYTECHNICS, ADO-EKITI.

III. Literature Review

2.1 Concept of Water Borehole (Water well)

A water well is a hole, shaft or excavation used for the purpose of extracting ground water from the subsurface. Water may flow to the surface naturally after excavation of the hole or shaft. Most wells are vertical shafts, but they may also be horizontal or at an inclined angle. Some wells are used for purposes other than obtaining ground water, investigation of subsurface conditions, shallow drainage, artificial recharge and waste

disposal. The location of any borehole (well) is mainly based on the underlying purpose which is an important consideration. The hydrogeological assessment should be done by qualified professional drillers. The determination of the suitability, availability of sufficient ground water and appropriate quality, are dependent on several factors. These factors include the knowledge of the system of the ground water, experience in similar areas and diverse array of information such as land surface topography, local vegetation, rock fracturing (location dependent), geophysical measurements among other factors.

Generally, the main thrust of the design and construction of water borehole is to create a structurally stable, long-lasting, efficient well that has enough space to have pumps or other extraction devices.
It will ensure that ground water move effortlessly and sediment-free from the aquifer into the well at the desired volume and quality, and prevents bacterial growth and material decay in the well.

2.2 Water Borehole Facilities and Environmental Effect

Water from rainfalls, are majorly absorbed into the ground and also as plant nutrients. The remaining that is not used by plants moves downward through pores and spaces in the rock until it reaches a dense layer of rock. The water trapped below the ground in the pores and spaces above the dense rock barrier is called ground water or aquifer, and this is the water we get when we drill wells. The removal of water in its natural state through geo-drilling activities creates disequilibrium of the earth crust which in turn can lead to land subsidence. This is one of the major environmental effects that are associated with multiplicity of borehole facilities. Over time, as more water is removed from the area, the ground drops and creates a cone. Land subsidence can lead to many problems, including changes in elevation, damage to structures such as storm drains, sanitary sewers, roads, railroads, canals, levees and bridges; structural damage to public and private building, and damages to wells. Most commonly, though, subsidence is known for causing an increase in the potential for flooding. Figure 1.1 shows the typical private water borehole location in a residential apartment with its corresponding concrete surface water tank for storage and distribution.

IV. Methodology

3.1 DATA ACQUISITION

(a) PRIMARY DATA

1. The field observations were carried out with handheld GPS (Garmin GPS 72H) to fix the geographical coordinates of the wells, boreholes and elevations tanks in longitude and latitude. These were converted to Universal Traverse Mercator (UTM) coordinates in Northings and Eastings.
2. Attributes of the wells, boreholes and elevation tanks (social survey) were obtained from the student's residing in the institution.

(b) SECONDARY DATA

The satellite imagery of the Federal Polytechnic, Ado – Ekiti which was downloaded from google earth pro was used as the base map.

3.1 MATERIALS USED

The following instruments were used during the exercise; Handheld GarminGPSmap 76CSx, Steel tape (50m), field book and writing materials & Social survey.

3.1METHODS

The following are the methods used;

- **Base Map:** A High-resolution satellite image 2017 data covering the study area(s) was downloaded from Google earth pro and location of boreholes, well and tank were identified with the help of the coordinates collected from the site and save as KML file.
- **GNSS Data:** Field visitation was equally conducted with handheld GarminGPSmap 76CSx receiver which was used in picking UTM coordinates of existing boreholes and wells within the study area.
- Some attributes of the wells, boreholes and elevation tanks (social survey) were observed, while some were obtained from the residents of the area.
- Also, mobile phone Camera was used to take pictures of places in the study area.

3.2 DATA PROCESSING

The coordinates acquired from the field were overlay on google earth pro to identify those points. Thereafter digitization commence on google earth pro, coordinates as point, roads as lines and building as polygon, which was saved as .kml and lunch it on qgis 2.14.17

Data Presentation And Discussion Of Results

There are about five (5) boreholes, four (4) wells and twelve (12) tanks within the study area. Below are the attributes of the point observed

TABLE 1: THE ATTRIBUTES OF WELLS WITHIN THE STUDY AREA

POINT ID	LOCATION	NORTHINGS (m)	EASTING (m)	REMARK
1	Annex hostel block E well	752624	840616	Good
2	Lagos hostel block E well	752771	840461	Bad
3	Lagos hostel block c well	752907	840266	Good
4	Former health center well	753641	839935	Good

TABLE 2: THE ATTRIBUTES OF BOREHOLES IN THE STUDY AREA

Source: - Field work 2018

POINT ID	LOCATION	NORTHINGS (m)	EASTING (m)	REMARKS
1	Annex hostel block B borehole	752588	840878	Good
2	Annex hostel block D Borehole	752593	840729	Good
3	Lagos female hostel block B	752873	840348	Good
4	Lagos male hostel	752643	840805	Good
5	Lagos male hostel	752503	840850	Good

TABLE 3: THE ATTRIBUTES OF TANKS IN THE STUDY AREA

POINT ID	LOCATION	NORTHINGS (m)	EASTINGS (m)	REMARK
1	Annex male hostel	752506	841006	Good
2	Annex male hostel	752537	840837	Good
3	Annex male hostel	752587	840892	Good
4	DUDAP	752661	840864	Good
5	DUDAP	752678	840857	Good
6	Tank hostel	752603	840774	Good
7	Lagos female hostel block E	752742	840534	Good
8	Lagos female hostel block (H.C)	752932	840493	Good
9	Lagos female hostel block D	752811	840383	Good
10	Lagos female hostel block A	752967	840352	Good
11	Lagos female hostel block C&B	752924	840277	Good
12	Main source	753142	840621	Good

Source: - Field work 2018

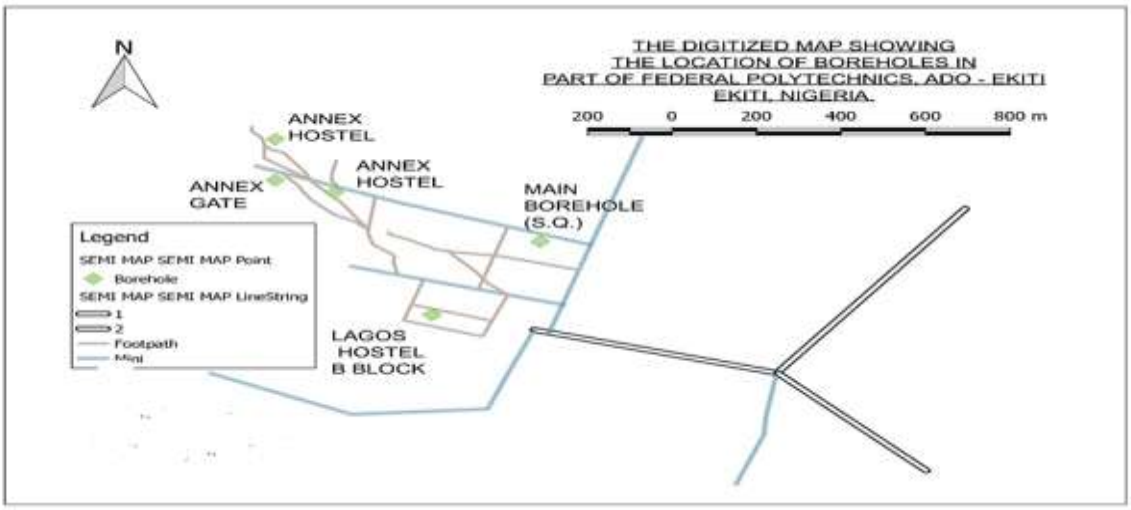


Fig.3: Map showing boreholes in the study area

Source: - Field work 2018

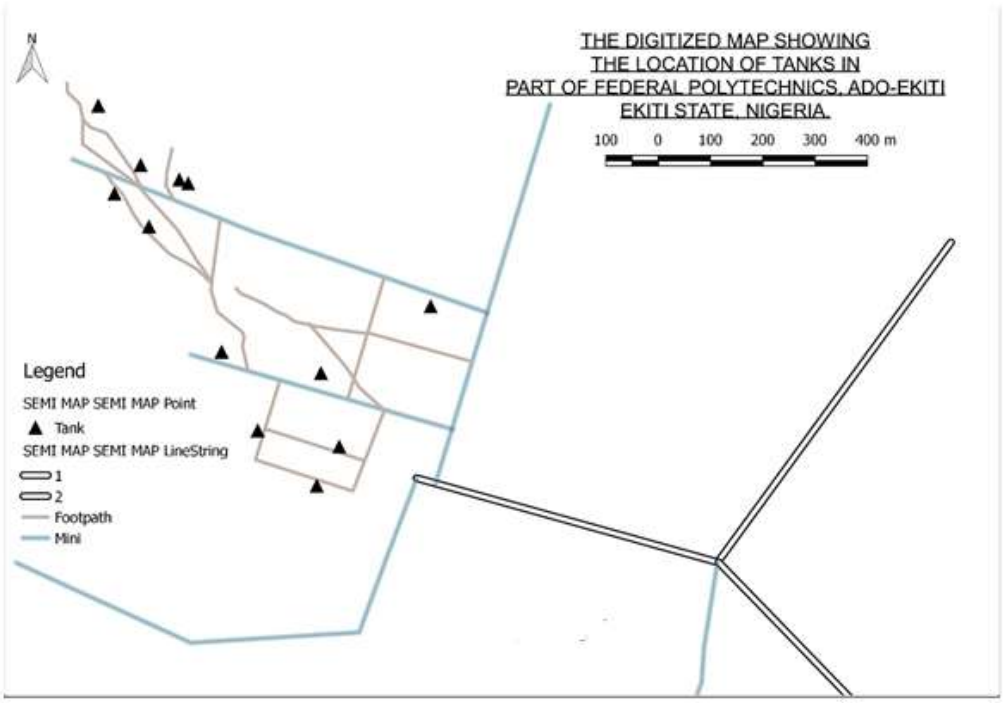


Fig.4: Map showing tanks in the study area.Source: - Field work 2018

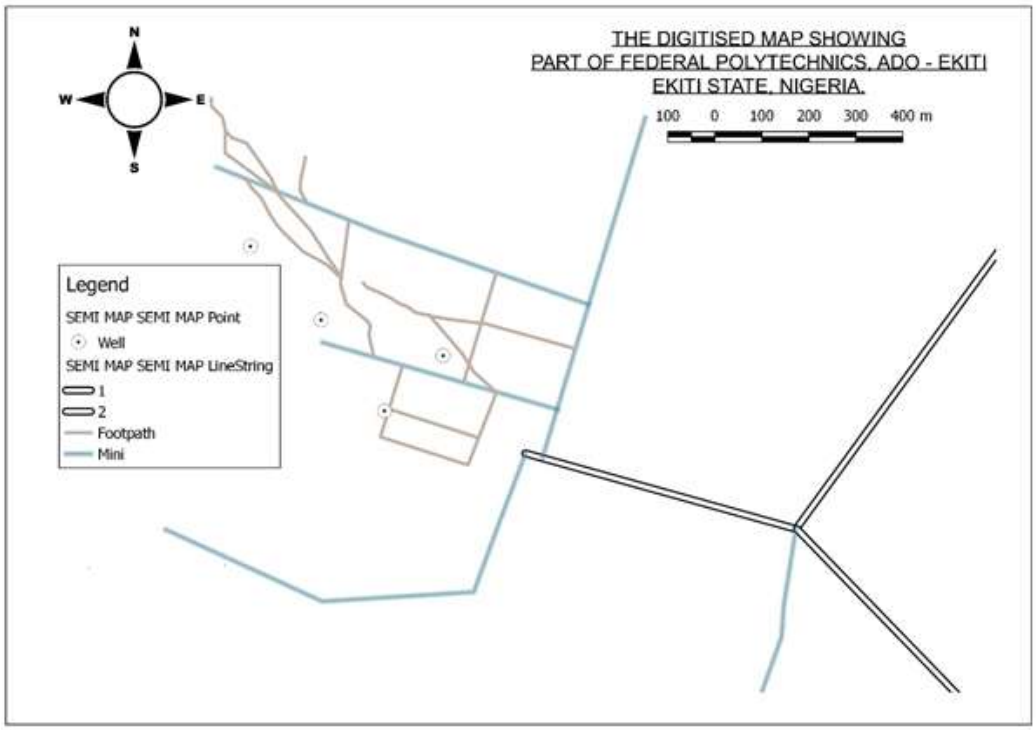


Fig. 5: Map showing well in the study area

Source: - Field work 2018

4.2 Evaluation Of Efficiency Of Water Distribution System Within The Study Area

The capacity of each tank = 2500
No of tanks = 15
No of building within study area = 37
No of flat in a block = 2
No of room in a flat = 5

No of people living in a block = 50
According to WHO 2008 requirement of clean water per person is 2.7litres per day.
Therefore 2.7* 50 = 135litres of clean water is required per block.
Then for the whole of the study area 135*37 = 4995litres per day.

V. Summary, Conclusion And Recommendation

5.1 SUMMARY

The rate of growth in population of the Federal Polytechnic Ado – Ekiti has resulted in overwhelming demand of clean water which requires management to provide more boreholes and tanks within the study area. Some of the tank tap are bad that need the attention of the management to repair it.

5.2 CONCLUSION

The need to adhere to safety and development control procedure when planning and constructing water boreholes to avoid contamination and pollution for either the sources and/or groundwater becomes necessary in the light of issues of citing of water borehole facilities. The spatial location of these facilities mainly provided by private households and the neighborhood analysis carried out in this research underlines the importance of reviewing the modalities of providing a safe and portable quality water supply to the students.

The designed digital map would help in the development of sustainable water supply to the institution which in turn would help in achieving part of millennium development goals of making water available to all as well as guaranteeing environmental sustainability. It is therefore expected for modern societies to be fortified with necessary information regarding location of the necessary utilities within their immediate environment.

5.3 RECOMMENDATION

The following recommendations are advanced for efficient electricity distribution networks;

- More efforts must be made to bring in refined and scientific approaches such as Geographic Information Systems into the management of water supply.
- Proper monitoring of the system by the management involve should be put in place
- Maintenance of the taps in other to avoid wastage of water.
- More tank should be made

References

[1]. **Emoabino and Alayande (2014)** – Research on "Water Demand Management,problems and Prospects of Implementation in Nigeria"
[2]. **DWI (2005):** A Brief Guide to Drinking Water Safety Plan(online) available at http://www.dwi.gov.uk/stakeholders/guidance-and-codes-of practice/water%20safety%20plans.pdf (accessed \in July 2017)
[3]. **Kufoniyi, O (1988):** Basic concept in GIS in C. U. Ezeigbo (ed), Principles and Applications of Geoinformatics System, Paraf Press, Lagos pp 30
[4]. **Mara D. D. and Evans B. (2011):** Sanitation and Water Supply in Low-income
[5]. Countries. Duncan Mara, Barbara Evans andVenture Publishing Aps
[6]. **Parsons S. A. and Jefferson B. (2006):** Introduction to Portable Water Treatment Processes.Blackwell Publisher, Oxford
[7]. **World Health Organization (WHO 2008):** Guidelines for Drinking Water Quality, FirstAddendum to the third Edition, Volume 1,Recommendations. World Health Organization,Geneva.

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