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Effcet of Water Scarcity And Its Remedy At Federal Polytechnic Oko

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Abstract: The project focuses on the investigation and remedy on its environment and geographic dynamic of polytechnic water scarcity. The administration grandiose under taking aims to produce some litres of fresh water in the institution by building borehole field to make vision of the current administration, a reality in the form of large expensive water scheme.The rapid growth in population notwithstanding, the administration has in its policies and maneuverability on this issue of water scarcity in spite of recent climate change promised to distribute large quantity of potable water to every nook and crannies of the polytechnic
Keywords; water scarcity, portable water, climate change, water demand and supply

I. INTRODUCTION

Water is essential for all socio-economic development and for maintaining healthy ecosystems. Always, population increase and development call for increase in allocation of ground water and surface water for the domestic, agriculture and industrial section. Moreso, the pressure on water resources intensifies, leading to tension, conflicts among users and excessive pressure on the environment.

The increasing stress on fresh water resources brings about by ever-rising demand and profligate use as well as by growing population worldwide is of serious concern, UN-Water 2007. Water scarcity occurs where there are insufficient water resources to satisfy long term average requirement. Also it is long-term water availability with a level of water demand exceeding the supply capacity of the natural system(figure 7).

UNDP (2006) in her Human Development Report focuses on water scarcity risk and vulnerability related issues, stated that water scarcity often happens in areas with low rainfall, human activities add to the problem in a particular area with high population density, like Federal Polytechnic Oko. Water scarcity is also the point at which the aggregate impact of all user impinges on the supply or quantity of water under prevailing arrangement to the extent that the demand by all sectors, including the environmental cannot be satisfied fully. (UN-FAO 2007).

Otti, (2011) provided an overview of water scarcity currently affecting federal polytechnic community including her surrounding neighbourhood, without significant solution to the problem. The scarcity becomes more acute over time as the population of the community increases.

Water supply to the polytechnic has been epileptic resulting to outbreak of skin disease mostly the students due to contaminated water, (Otti and Akabike 2013).

The challenges are more acutely felt in the departmental classrooms where 95% of the student population is found every working day. Scarcity has been a major factor impeding the student living in the campus and even the business operation. The potential risks associated with water scarcity has become an emerging risk of strategic important for business to thrive and the absenteeism of student to lectures, UNDP(2006)

It also has become rapid ways of truancy for lecturer, while other higher institution in the federation rely on the internal water supply, Federal Polytechnic students resort in fetching water for their domestic use outside the school compound and the buses to defecate.

The growing scarcity of fresh water due to rising water demand and low supply, a challenging climate is increasingly seen as a major risk for the global economy. Consumer awareness, private sector initiative, government regulation and targeted investments are urgently needed to move towards sustainable water use, Oki and Shinjiro (2006) Recently the World Economic Forum listed water scarcity as one of the three global systematic risks of the highest concern, an assessment based on broad global survey on risk perception among representative from business, academia, civil society, government and international organization Dharane and Pati (2004).

Konikow and Eloise (2005) in their ground water depletion, A global problem Hydrogeology confirmed that fresh water scarcity manifest itself in the form of declining ground water table, reduce river flow, shrinking lakes and heavily polluted water, but also in the increasing cost of supply and treatment, intermittent supplies and conflict over water.

Water Scarcity grows as a result of various drivers, population and economic growth, increase in demand for animal products and bio fuel and climate changes, Verosmary et al (2000)

II. STATEMENT OF PROBLEM

Ezenwaj an Otti (2013) in their determination of dominant rainfall cycles in Adamawa, emphasized that global warming plays a major cause of water scarcity in the world and that of federal polytechnic is exceptional. Moreover, increases in the global temperature by rise in the temperature causes the change in the seasons which leads to a decrease in the rain that falls over the earth and causes water scarcity leading to students of the polytechnic trekking to long distance to fetch water before attending lectures.

As the population of the polytechnic increases the consumption of water increases resulting to decrease in the availability of water.

Moreso lack of adequate planning on the part of Directorate of physical planning creates inefficiency in water supply to the campus. Inadequate maintenance culture has been problem of the polytechnic which leads to the decay of most infrastructures. Non-feasibility studies prior to execution of any project constituted some irreparable damage resulting to abandon projects as rightly observed by Goudie (2006)

Schene (2014) noted in the Practical National Academic Science, that clean safe drinking water is scarce and nearly one billion people in the developing world are living without access to portable water .

Aim and Objectives

Otti (2011) in his economic advantages of rain water harvesting over water borehole as sustainable development at the extension site Federal polytechnic Oko considered the aim and objectives as follows"

- To meet condition for increasing water productivity in both permanent and temporal sites.
- To enable more efficient and equitable development and allocation of water.
- To create measure to protect water resources and increase water supply.
- To provide most appropriate way of ensuring adequate coordination of production

Significant of the Study

The important of the study lies on the solution to the gravest environment challenges that polytechnic faces today as the result of scarcity of water as was stated by UN-Water-FAO (2007) in her Produced on the occasion of world water Day 2007, which focused on the issue of water scarcity.

In deed water is the decisive factor in the population/supply equation whereas water supply in the polytechnic has fluctuated below stationary average, meanwhile the polytechnic community has continue to rise, which was caused by high rate of population growth and lack of planning has transformed a comfortable balance between population and water resources development and management.

The polytechnic has been exacerbated by borehole failure both in the temporal and permanent sites. The current little use already exceeds renewable supply because of shell formation around Aguata.

The deficit is covered by the unsustainable practice of over drawing existing high land aquifer resulting in covered water tables and declining water quality.

As the population of polytechnic expected to continue to rise the gap between water supply and demand threatens to widen significantly in 2016 as the current tread continue, per-capita water supply will fall from 175 liter per person to only 15 liters putting polytechnic community in the category of having an absolute water supply shortage (Darr 1975 et al)

III. SCOPE OF STUDY

The review on water scarcity risks and research cases from federal polytechnic demonstrates diversity of risk drivers and consequences to students/ business communities as a result of water scarcity issues (Darr 1975 et al)

These are the risk drivers

- Scarcity which is an expected or chronic declined in water supply, jeopardizes lecture/ studies and business operation, deteriorating water quality.
- As water quality deteriorates it affects the effectiveness of students and lecturers in their performance which is one of critical issues of water scarcity.
- Moreso, lack of effective water management and governance is a challenge that must be address for equitable water allocation and environmental sustainability, especially in higher institutions and propensity towards corruption.
- Given current water scarcity scenario and future water demand projection; as federal polytechnic takes step to strengthen regulatory mechanism for water use and pollution as part of its expansion processes. This affects the indiscriminately waste of water in the campus and negative impacts on the environment.
- The waste water generated from the school compound could be polluted to the down steam, Iyi Ocha and could be risk of conflict between the polytechnic and Oko communities over the past years, the polytechnic has undergone huge changes both structural and population. According to 2015 estimation, its population has risen from ten thousand to sixteen thousand and expected to reach twenty thousand in 2016. During the period

of increase, the environment has deteriorated, lack of toilet facilities in every department and faculties, UN-Water-FAO (2007). This could mar the trend of development pattern to be largely unsustainable. In most cases policies were overwhelming sets of provisional short term measures, meant to tackle momentary challenges rather than engaging in long term planning (MWR 2007) The current physical environmental stands threatens by numerous current and imminent problems of water scarcity. Water scarcity is an ever-increasing problem in the presence and future, for various reasons. Firstly the distribution of precipitation in space and time is very uneven, leading to tremendous temporal variability in water resources world wide (Oki et al 2006). Moreover the same countries from different continent receive imperceptible annual quantities of rainfall each year leading to water scarcity.

If by estimate all the fresh water on the planet are divided equally among the global population, there would be 5,000,000 to 6,000,000 liters available for everyone, every year (Vorosmarty 2000). Moreso the rate of evaporation varies a great deal, depending on the temperature and relative humidity which impacts the amount of water supplies.

The combination of shorter duration but more intense rainfall, that is more run off and less infiltration and combine with increase in evaportranspiration (Konikow and Kendy 2005).

In the developing world the lack of proper water and sanitation infrastructure constricts economic growth where growth is needed most. In part of United States of American and many countries, the under valuation of water has led to poor maintenance of aging infrastructure, water is therefore wasted and polluted and used inefficiently while underground and above ground infrastructure literally crumbles (Xia et al 2004)

The financial burden of upgrading these system is compounded when action is finally taken or as emergency repairs are implemented on a more and more frequent basis. Water resources are essential assets and effectively managing and leveraging them is a shared economic responsibility of business and industry, farms and factories, individuals and communities (Yang et al 2004).

Water resources management is an urgent and growing need therefore meaningful and impactful solution exist that will set the right course for growth and development in the polytechnic and nearby communities (Otti 2015).

IV. STUDY AREA

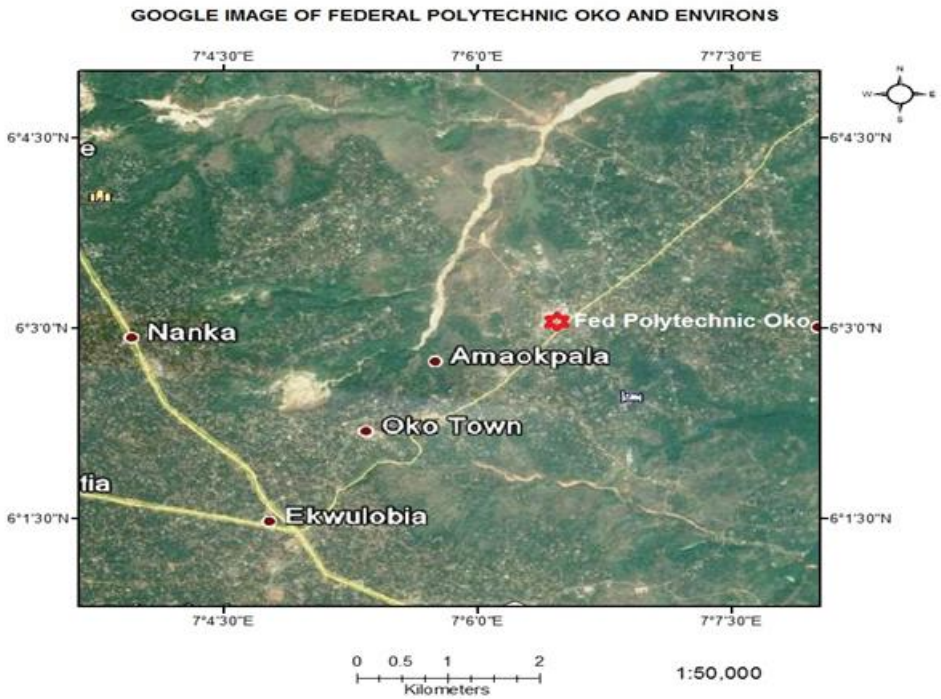

FIGURE 1: GOOGLE MAP OF FEDERAL POLY OKO AND ENVIRONS

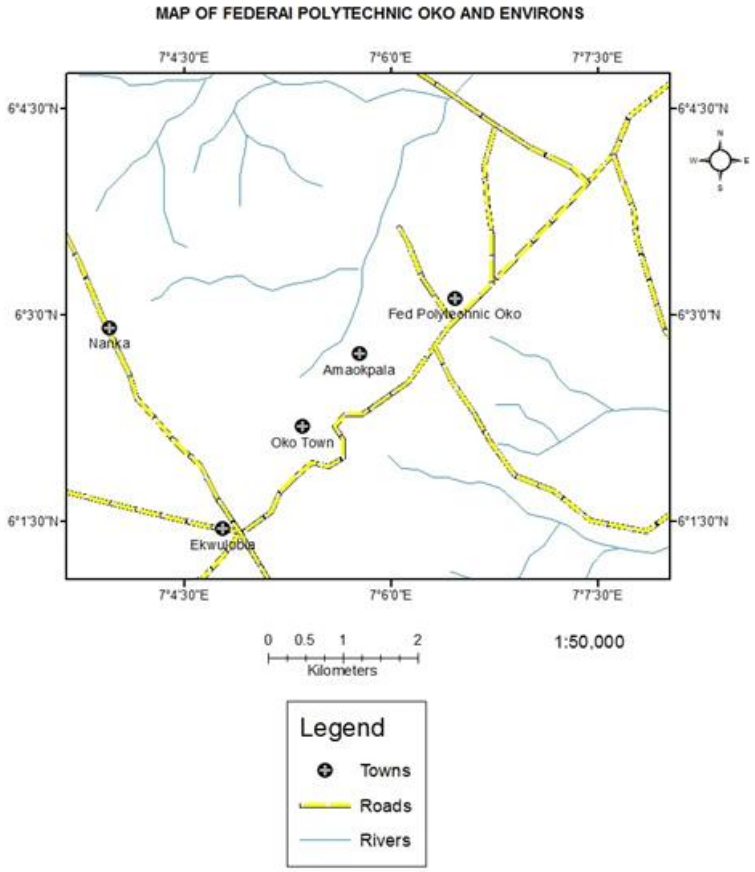

FIGURE 2: MAP OF FED. POLY OKO AND ENVIRONS

Federal polytechnic Oko is one of the communities in Orumaba North and its geographic coordinates are 6^0 3' 51N - $6^0$4'30N and $7^0$6' 47 E - $7^0$7'30 Orumba North being one of the twenty one local government areas in Anambra State has a common boundary with four local government areas namely Awka south; Aniocha, Aguata and Orumba South.

Federal polytechnic Oko is found in Ameki and Imo formation which is predominately of argillaceous rocks and shell. Underlies the Orumba north and Aguata local govt areas of the study area especially Oko town.

The climate is hot equatorial with average maximum temperature of 30^{0C} and minimum of 21^{0C}

V. MATERIALS AND METHODS

Otti and Nwafor in Multi-purpose Water Resources Optimization Programme emphasized on the increase in population in the polytechnic that posses particular challenges, considering the implication for students welfare, especially establishment of new departments over stretched infrastructure and creating over crowed unhealthy and insecure long condition in both temporal and permanent sites.

The major environment challenges in the polytechnic are those related to water scarcity and lack of liquid waste management, UNDP (2006). Currently the polytechnic has less than 10% of available water supply compare to demand of not less than 85% from students, staff and traders in the school environment. Meanwhile the rate of water consumption restraining the supply of attaining higher percentages Huntington(2005).

The total per-capita water use in the campus is much more greater than the daily supply considering results from the table below of population and school/ faculty(Table 1)

TABLE 1: SCHOOL AND POPULATION

SCHOOL OF ENGINEERING	
DEPARTMENT	*POPULATION*
Civil	419
Computer	405
E.E.E	630
Mechanical	191
Agriculture	227
Total	**1860**
SCHOOL OF FINANCIAL STUDIES	
DEPARTMENT	*POPULATION*
Accountancy	618
Banking/Fin	628
Insurance	121
Total	**1364**
SCHOOL OF GENERAL STUDIES	
DEPARTMENT	*POPULATION*
Languages	97
Natural Science	108
Social Science	59
Total	**261**

SCHOOL OF ARTS, DESIGN AND CLOTH TECHNOLOGY	
DEPARTMENT	*POPULATION*
Fashion & Design	229
Fine & App art	307
Printing Technology	215
Total	**751**
SCHOOL OF ENVIRONMENTAL TECHNOLOGY	
DEPARTMENT	*POPULATION*
Architecture	215
Building Technology	331
Estate Management	398
Quantity Survey	421
Surveying and Geo inform	312
Urban & Regi Planning	370
Total	**2047**
SCHOOL OF APPLIED SCIENCE TECHNOLOGY	
DEPARTMENT	*POPULATION*
Ford Technology	314
Home & Rural Economy	215
Science Laboratory	713
Total	**1242**

SCHOOL OF BUSINESS STUDIES	
DEPARTMENT	*POPULATION*
Business Admin & Mgt	927
Catering & Hotel Mgt	199
Public Admin	892
Office Technology & Mgt	382
Total	**2968**
SCHOOL OF INFORMATION TECHNOLOGY	
DEPARTMENT	*POPULATION*
Library & Info. Science	405
Mass communication	897
Total	**1364**

Poor distribution and heavy demand especially from existing boreholes that characterizes water use in the polytechnic leads to lack of clean water for much of the population and the waste of significant amounts in water flowers and field, Addams et al (2009). A striking example of the conflict that exist between rapid demand and epileptic supply in the recent new construction of structure both in the temporal and permanent sites exposes the directorate of physical planning of effective planning for development (scheme 2014)
Total population is =11799 + 6650 = 18,449
Staff and traders 13.5% of students population
Grand total 18449 + (18449 x 13.5%)=18449 x1.135= 20, 940
Average per capita consumption = 75 liters/day
Total demand = 20,940 x 75= 1,570,500 litres
Total supply = 20,940 x 15 =314100 liters
Total demand –Total supply = scarcity =1570500 – 314100 =1256400 litres

VI. ANALYSIS AND DISCUSSION

In order to carefully plan for the future, polytechnic has adopted a national water strategy. The strategy is comprehensive set of guideline employing a dual approach of demand management and supply management (Huntinghton 2005) It places particular emphasis on the need for improved resources management stressing the sustainability of present and future uses.
Also special care will be given to protecting the water supply against pollution quality degradation and depletion of resources. Furthermore, resources management will be improved by increasing the efficiency of conveyance and distribution system while the application and uses of water will be more selectively determined (Okewo 2005). Multiple resources will be use interactively to maximum both the usable flow as well as the net benefit acquired from a unit of water, (Otti and Nwafor 2012)
While enjoying its rapid infrastructure development, the polytechnic has been facing increasing severed water scarcity with low per-capita water availability at permanent site, rising water consumption has let to over withdrawal of both surface water (Iyi ocha) and boreholes with serious environmental consequences of indiscriminately defecating in the nearby bushes causing ground water subsidence and salinity intrusion ,(Konikow and Kendy 2005).

VII. CONCLUSION

The challenges of addressing water scarcity in the polytechnic aggravated by population increase and water governance remain fragmented among various components development which generates problem of the nationalization of water use (Okewo 2005)
The problem is further aggravated by high rate of population increase, the geographical location of the area into Imo-Ameki shell and lack of developmental annual programme to rationalize water consumption.
Responding to the challenges, the management has adopted multi-faceted approach designed to both reduce demand as well as increase supply and lack of planning for development. Observation revealed that water supply presently satisfies 3% of demand by polytechnic water tanker while the remaining are met by water vendors from outside (Ojielo 2002)
The quantity of water supply daily against the daily demand shows evidence of acute scarcity of water in the polytechnic (see figures 3,4,5,6 and 7)

VIII. REMEDY

Presently the way water scarcity issue is addressed in the polytechnic could impact upon successful achievement of the current administration to alleviate suffering of the students, staff and traders. The vision corresponds to the declaration of the most of the millennium Development Goals to remedy the effect of water scarcity and the following aims are to be met:

1. Access to qualitative and quantitative water for domestic and productive uses and other economic activities.
2. Access to potable water particular in condition of scarcity resources considering gender related implication.
3. Equitable reliable water resources management programmes reduce polytechnic community vulnerability to hardship in caring for their domestic activities.
4. Access to water and improved water and transmission risks of mosquito borne illness such as malaria and typhoid fever.
5. To strengthen internal cooperation between management, staff and student in terms of development and enhances water supply for share benefits of scarce water management.

Figure 3: OVER-HEAD TANK AT THE TEMPOARY SITE

Figure 4: BOREHOLE HEAD

Figure 6: BOREHOLE HEAD AT PERM. SITE

Figure 7: UNDER-GROUND TANK(EMPTY)

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