INDIGENOUS WATER RECYCLING ADAPTATION PRACTICES: LESSONS FROM EKPOMA COMMUNITIES, EDO STATE, NIGERIA

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Abstract
This study assesses the indigenous water recycling adaptation practices as means of water supply in Ekpoma community in Edo State. The most important and available water source in the study area is a reservoir well with some private boreholes and water vendors. The study shows that 91.9% of the respondents have introduced water recycling through filtration, boiling and treatment of used water and water use regulations, why 8.1% of the respondents stipulated their water consumption only to meet the water demand of the study area. The study found that residents could meet their water needs through used water recycling and water regulations. However, since most residents of the area rely on the recycling of used water and water regulations, the authors of this study suggest that water recycling and regulations should be established. The data used for the research comes from primary and secondary sources. The analysis is just descriptive statistics using tables.
Keywords: Recycling, Reservoir well, Water Sources, Nigeria.

Introduction

Water is a precious natural resource, vital to life, development and the environment. It may be life or death, depending on how it happens and how it is handled. The lack of public water supply systems in rural areas and the inability to supply water to Nigeria's cities have prevented most of the population from having access to drinking water.

According to Orebiyi et al. (2010), 52% of Nigerians do not have access to an improved supply of drinking water. Sources such as rivers, wells, streams, wells, ponds and rain are still highly dependent on water demand. The health impacts of using these sources include alarming rates of water-related morbidity and mortality in the population. According to estimates by the World Health Organization (2000), 4 billion cases of diarrhoea are reported each year worldwide, in addition to millions of other illnesses related to lack of access to safe drinking water. According to WHO (2003), an estimated 200,000 people in Nigeria have been blinded by trachoma with an overall blindness rate of 1.3%. Studies on schistosomiasis infection in different regions of Nigeria by Nmorsi et al. (2005) and Pukuma et al. (2007) showed a high infection rate. They attribute this to the use of polluted rivers, streams and ponds (Ojeifo, 2011). Water is very important, without water life and civilization cannot exist or develop. Humans need about 4060 liters of water per day to drink to stay healthy (WHO, 1996). However, the average consumption in Nigeria is less than 12 liters per capita per day (Egunjobi, 1987).

Despite the abundant freshwater resources on earth, many regions are facing a drinking water crisis, especially the third world countries. Every day we use a large amount of water. It is important not only for cooking and of course drinking, but also for washing

clothes, dishes and ourselves, flushing the toilet, watering the garden and hundreds of other uses around the house. Everyone knows this but many people around the world do not have adequate drinking water supply services. The delivery of efficient and reliable environmental services, especially water, is crucial in the overall development of any country. Services are central to household economic production and activities.

Although there is enough clean water for basic needs for everyone, more than one billion people do not have access to an adequate water supply, while more than 2 billion people do not have access to sanitation. adequate (Center for Housing Rights and Deportation (COHRE, 2004) Lack of access to water with clear human rights dimensions. The poor and other low-income groups are consistently the most vulnerable. Urban and rural areas are overlooked or completely ignored in the development and maintenance of infrastructure as well as in initiatives to privatize water services. More of researches has focused on healthy water supply and provisions of adequate water it citizens. It is imperative to also research on how households are able to meet their water needs through water recycling strategies in Ekpoma communities.

In the face of the existing diverse challenges facing residents of Ekpoma in accessing water for drinking and ablution there is need to conduct empirical investigations to assess the impact of water recycling on the water supply in Ekpoma communities in Edo State. Achieving this is the main thrust of the study.

Literature Review

Most of the households do not receive water from the main works; even if they are prepared to pay for the services. In Nigeria, the public sector dominates the water supply sector. In most places, these services have been provided free or at low cost to consumers. Despite government accountability, most Local Government Areas (LGAs), especially urban areas, have failed miserably. Recall that Nigeria is a country with abundant groundwater and surface water, yet the water supply situation in Nigeria remains bleak. Social welfare, ecological conservation, human nutrition, production of goods and services, and communication would be virtually impossible given the inadequacy of water quantity and quality (Olokesusi et al. al, 2005). Improved access to clean water contributes to good health, livelihoods and extended economic development outcomes. A dwelling is a physical structure used as a shelter. It includes all the facilities, equipment, tools needed or desired for a healthy life in which water supply is very important.

Access to potable water and sanitation is one of the eight Millennium Development Goals (MDGs) to be achieved globally by 2015, with the achievement of the above statement, it is safe to say that water is a factor and essential elements of life (Topfer, 1998). Although rainwater is the main source of water supply for all rural communities in Nigeria, water storage and conservation technology is still very poor. It is necessary to design water storage devices suitable for use in rural areas to provide water for residents all year round. Given the fact that most of these rural communities are small centralized storage devices that can be used by the whole community, this ensures easy access by all members of the community. This study evaluated the coping mechanisms of residents to meet their water needs in Ekpoma, Edo State.

Human happiness and overall economic development depend on water use. In Nigeria, the management and use of water resources are central to the country's efforts to alleviate poverty, develop the economy, ensure food security, and maintain ecological systems.

However, domestic water resource management issues are mainly focused on water supply and receive little attention from the government. The speed of migration from rural areas to developing countries has led to the emergence of intense urbanization. Jinadu, (2004) observes that with the rapid increase of urban population, the increasing demand of the city people for basic amenities and high unemployment rate has made the situation of the city worse. The city got worse.

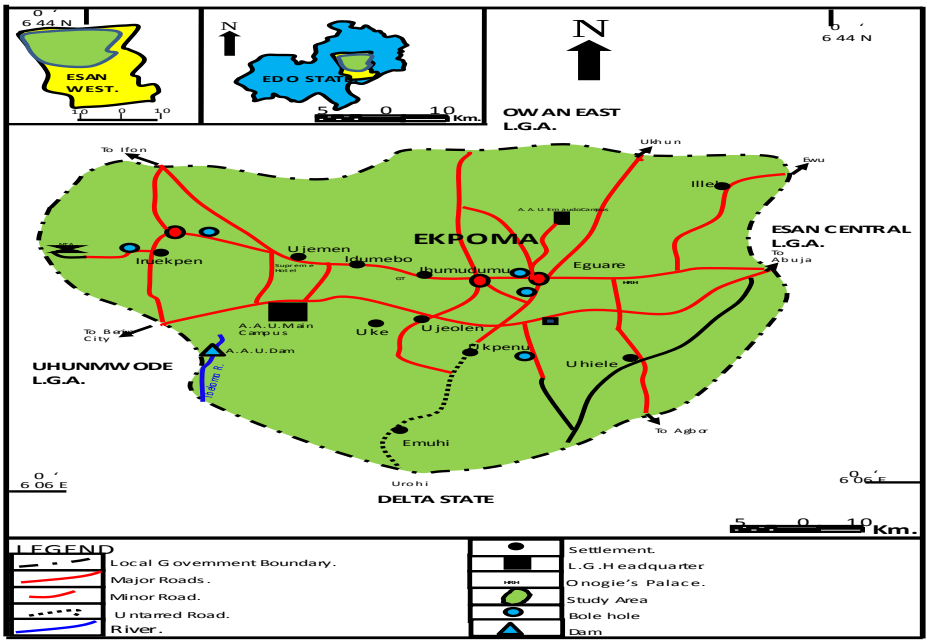
Several efforts have been made in providing and storing water to meet the needs of the people. Policies and programs have also been developed by the government to meet people's water needs. However, research has been done on water-related issues such as the impact of government on the provision of basic facilities, and the supply and distribution of water in urban centres. The water supply in Ekpoma was observed by the Toolkit (2005) to be unsatisfactory. Households are not supplied with water from the government, although they may be willing to pay for services. Most homes do not have a water source and in places where there is a water source, there are many problems with the water source. Future water demand based on urban population growth; often exceeds the benefit ratio, making the problem worse. Households are not connected to public water pipes but only receive water from wells and tanks. Usually water is not drinkable.

Methodology

Study Area

Ekpoma is located in the central districts of Edo State. It has 10 counties with an area of approximately 502 km², located between latitudes 6010' to 6045' north of the equator and between longitudes 6010' to 6030' east of the Greenwich meridian. The latitude location implies that the study area lies within the tropics. The tropical climate is dominated by high temperatures, high humidity and heavy rainfall. The region has two distinct seasons, the rainy season lasts from March to November and the dry season lasts from November to February every year. The area is located on a relatively flat plateau called the Esan Plateau and is about 466 m above sea level (Akinbode 1983). Apart from a very few areas with notable valleys with open surface drainage, the study area has almost no surface water. The aquifer in the study area is very low and lies about 150 m. This depth also makes groundwater in the area almost inaccessible. Secondary and tertiary activities such as commerce, hotel services, education, banking and health services are abundant in the area, but the main occupation of the people is agriculture. This has been favoured over time because of its rich, well-drained sandy loam soils, which retain the advantage of good food and cultivation (Akinbode 1983). Vegetation is a mixed type of forest and savanna, commonly referred to as native vegetation. There are several social amenities in the area; these include electricity, hospitals, schools, markets and roads. The main lack of facilities in the area is water.

The inability to supply water is attributed to the absence of notable surface water sources such as lakes and rivers, and groundwater levels in the plateau are difficult to access due to lack of technology. As a result, the majority of the region's inhabitants depend on other sources of water supply, one of which is the use of underground storage tanks commonly known as "wells" in the region. Rainwater is collected in these wells during the rainy season while water can be purchased there in the dry season to become a supply.



SOURCE: Edo State Ministry Of Lands And Surveys,Benin City,2012.

The Research Design

A survey study design was used for this study and a cross-sectional survey method was applied. Research data were collected from primary and secondary sources. Secondary data were collected from libraries, reports, Edo State Water Corporation, government ministries, published and unpublished research, journals, and local government agency files.

Instrument of Data Collection

Primary data were collected using a set of pre-tested questionnaires distributed to selected localities in the study area. Observations and in-depth interviews are also used in areas where this applies as needed. The questionnaire is divided into four parts viz.

Part A, on the demographic characteristics of respondents (household); Part B, for the various means of water supply and installation accepted by the residents; Part C, on the household water needs of residents; and Part D, about residents' water recycling facilities used to meet their water needs in the study area.

Sample and Sample Frame

The researcher's preliminary investigation revealed that a total of 59,618 residential buildings exist in the communities of Ekpoma. According to the field survey, Ekpoma is divided into 10 localities which are Eguare, Ihumudumu, Idumebo, Illeh, Emuhi, Uke, Ujeolen, Ujemen, Iruekpen and Uhiele. Samples were taken on households in residential buildings; the totality of residential buildings in the study area constitutes the sample frame for the study, the breakdown of which is presented in table 1.1.

Table 1.1: The Number of Buildings According to locality

Locality	Number of buildings
Eguare	9170
Ihumudumu	6628
Idumebo	4061
Illeh	5861
Emuhi	5652
Ujeolen	5302
Iruekpen	4930
Uhiele	6992
Ujemen	6098
Uke	5824
Total	**5968**

Source: Author's Field Survey, 2012.

Sample Size and Sampling Procedures

Five of the ten localities that make up the study area were randomly selected. These localities were; Eguare, Ihumudumu, Ujeolen, Emuhi and Idumebo. This has a total of 30,813 residential buildings. 1.0% of all residential buildings in each locality were randomly selected and a copy of the pre- tested questionnaire was sent to one household in each selected building. The household to which the first adult resident of the selected buildings belonged was sampled regardless of its residency status. A total of 306 questionnaires were administered. The distribution of this is shown in Table 1.2.

Table 1.2: Distribution of Sampled Buildings.

Locality	Number of Buildings (Sample Frame)	Number Sampled (Sample sizes)
Eguare	9170	91
Ihumudumu	6628	66
Ujeolen	5302	53
Emuhi	4061	40
Idumebo	5652	56
Total	**30813**	**306**

Source: *Author's Field Survey, 2012.*

Method of Data Analysis

Descriptive statistics, including frequency numbers, simple percentage, mean, mode, and standard deviation, were used to analyze data obtained from respondents (households). T-test analysis was used to test the research hypothesis with a significance level of 0.05%. This is used to analyze whether there is a relationship between the variables.

Results and Discussion

Water basins and storage wells are very frequent in the study area. They are found in most homes in the area. Wells are usually built around houses.

The results of this study are presented in the table below which presents the means and methods of water recycling; and the percentage of households participating in water recycling schemes in Ekpoma communities.

Table 1: Water Recycling Means Adopted by Households

Means of Water Recycling	F	%
Filtering	273	89.2
Boiling	25	8.1
Treatment	8	2.6
Total	**306**	**100.0**

Source: Author's Field Survey, 2012.

The results in Table 2 show that most 273 (89.2%) residents recycle their water through filtration, 8.1% of residents reported boiling their wastewater, while 2.6% of residents said to recycle their wastewater through treatment. An indication is that most people have adopted wastewater filtration to clean floors, flush toilets and water flowers, which has reduce both the demand for water and the cost of water supply in the study area.

Research also shows that the majority regulate their water consumption by measurement, some claiming that they set the time period they use to regulate their daily water intake, while others claim that they use an hourly method to regulate water use. It is an indication that most people regulate their water use and they have adopted this measure as a means of regulation, which implies that people have used water wisely in the area.

Table 4: An assessment of water recycling impacts in Ekpoma communities

Question	Option	Freq.	%	T-test	Df	p-Value	Decision
Recycling of Water after usage	Filtering	273	89.2	49.928	305	0.000	S
	Boiling	25	8.1				
	Treatment	8	2.6				
Total		**306**	**100.0**				

Source: Author's Field work, 2012

From the SPSS output, it is observed that T-test with a calculated value of 49.928 has a p-value of 0.000, which is lower than the test significance value of the relationship at the 5% (0.05%) level. It needs to take into account how residents use their water. Therefore, we rejected Ho and accepted Hi, which pointed out "there is a significant relationship between the water cycle in the study area and the domestic water supply". When considering water adjustment methods to meet residents' water demand, a p-value of 0.000 was also determined. This shows that the test is meaningful. Therefore, we reject Ho and accept Hi, which mean, "There is a significant connection between water regulation and household water supply in the study area".

Conclusion

The analysis conducted shows that residents are able to meet their water needs through water recycling and water regulations. Public-private partnerships in the provision of water cycles and regulatory facilities will improve adequate water supply; public education and water supply awareness strategies. It will provide a unified solution for sustainable actions to maintain a balance between water supply and response strategies to meet their water needs.

Recommendations

In view of the existing high water demand and traditional rainwater collection technology, due to climate change, population growth and irregular rainfall patterns, outdated storage facilities for storing rainwater, are not conducive to rainwater collection and reduce the amount of rainwater collection. If rainwater collection in the study area is reduced, it is recommended to pay special attention to Esan land's overall water supply management, especially in the study area. To this end, it is recommended;

- Supplying water to residents is not a task that residents can manage alone; the idea of the concept of public-private partnership is intended to be used to effectively and efficiently supply improved water.
- The implementation and construction of the micro-water project in the study area will reduce the water shortage problem of Ekpoma, because it will help supply part of the population.
- Community mobilization, consultation and publicity visits, focus group discussions, installation of plastic storage tanks for collecting rainwater, training workshops on rainwater utilization and protection, and publication of case studies.
- People should understand how to apply water recycling methods and pass water use regulations to reduce water shortages.
- The installation of a reclaimed water recovery system for self-employed households should be approved and implemented by the government.
- Disinfecting chemicals such as hypochlorite, chlorine dioxide and bromine should be provided by the

government so that used water may be recycled.

- ❖ The state should provide assistance to residents in the form of grants, grants or loans for the construction of rainwater collection systems or boreholes to improve water supply.
- ❖ The government should provide residents with water treatment to curb water diseases, and should hire and assign health officials to inspect and monitor water sources.

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