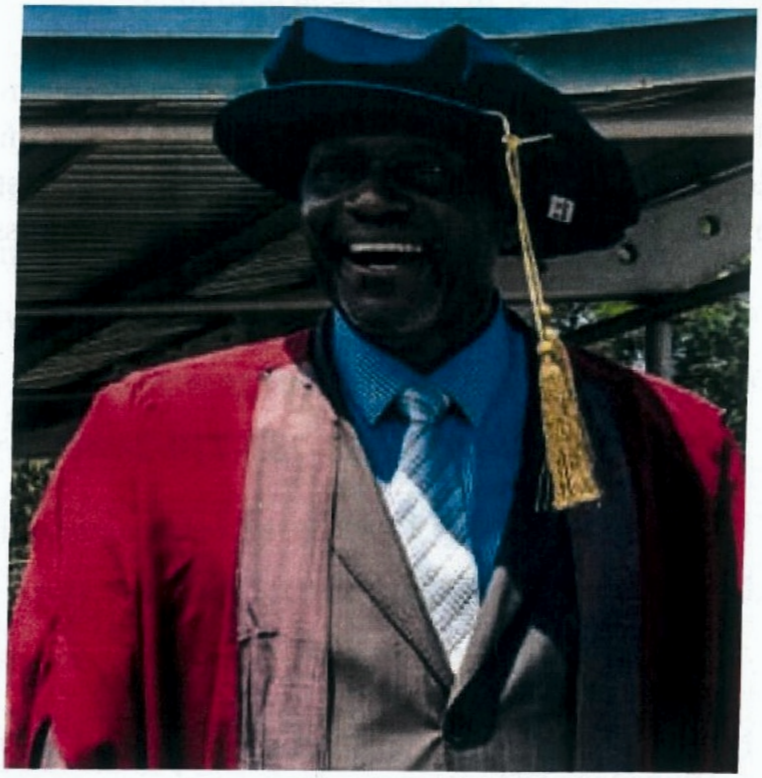
NIGERIA PERSPECTIVE TO POPULATION DYNAMICS AND SUSTAINABLE DEVELOPMENT

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CHAPTER SIX

Implications of Population Pressure on Water Resources in Nigeria

Lawal, F O, Geoffrey, E. O., Adebayo, M. O, Salau, W and. Sani W. J

Introduction

Humans all over the world depend on the earth's resources such as fresh water, energy, fertile land, vegetation, and biodiversity, for their survival. However, many of these resources are finite and limited in quantity. Thus, as the human population increases, these limited resources have to be shared among the rising population, thereby leading to intense resource consumption (UNFPA, 1991). Consequently, human population explosion threatens the capability of the earth's resources to sustain human livelihood. For instance, the rapid increase in human population has put pressure on water resources in most parts of the world, leading to massive stress on the natural environment (Abaje *et al.*, 2009). Empirically, the concern has been the difficulty in sharing the limited and essential resources as the demand for water increases more than twice the rate of population increase in the last century (Eja *et al.*, 2011; Morikawa, 2011; Cosgrove and Rijsberman, 2014).

This paper discusses issues around population and resources in Nigeria with emphasis on rapid population growth and water resources.

The Link between Population and Water Resources

Water is a vital natural resource that can never be substituted; therefore, its importance can never be overemphasized seeing it is the best of all things (Stewart, 2008). Since the evolution of man on earth, water has influenced population distribution and ancient settlements were located near water bodies for ease of water supply and trade (Dolatyar and Gray 2000). Water bodies (such as the Tigris, Euphrates, the Nile, and the Indus) contributed greatly to the birth and survival of some nations and civilizations in human history. It is therefore not an overstatement to say that the human population lives at the mercy of the water cycle. Although, with the aid of technology, humans have been able to make the best possible use of the water that passes through their geographical territory. Yet, the rate at which water is naturally renewed from the global water circulation system can hardly be influenced even with the advancement of technology.

Kummu *et al.* (2010) observed that areas with high population concentration are not often within geographical locations (do not coincide geographically) that are richly endowed with freshwater resources. It is against this background that the UN-Water (2006), projected that by the year 2025, about 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water-stressed conditions. In a later report, it was projected that water demand will exceed supply by 50% in most developing regions of the world by 2030 (Negoianu and Goldfaid, 2008). Population growth alongside urbanization trends is exerting pressure on water

resources service delivery (UN-Water 2007).

Population Trends in Nigeria

Nigeria is one of the fastest-growing populations in the world, with an estimated 140 million people and a growth rate of about 3.2% (NPC, 2006). The population size has been greatly influenced in the last 5 decades by significantly high birth rates. Asides high fertility rate and low mortality rate occasioned by improved health facilities, there was a high influx of foreigners into the country due to the oil boom of the mid-70's and 80's. Nigeria's population grew from 45.2 million in 1960 to 56.12 million in 1970. It then further grew to 73.68 million in 1980, and 159.7 million in 2010. By 2016, the population was 186 million. This shows that the number of people in the country increased exponentially in four folds in the period 1960-2016 (NBS, 2015). The revision of the World Population Prospects estimated the Nigeria's population to be 190,886,000 in 2017, and the forecast is that by 2035, it would be 297 million (United Nations, 2017).

The State of Water Resources in Nigeria

Nigeria is naturally blessed with water resources to the extent that some states and communities are named after rivers (e.g. Benue, Osun, Ogun, Niger, Imo, Kaduna etc.); *yet a*ccessing safe water has been difficult. For instance, of Nigeria's current estimated population of nearly 200 million, an estimated 55 million Nigerians do not have access to clean water (Water Aid, Nigeria, 2020).

The state of water resources leads to continuous reliance on low-quality water sources as the public water supply service performs below expectations (Akinde, Olaitan, and Fasunloye, 2019). Furthermore, the annual renewable per capita fresh water for Nigeria has been observed to be on the decrease. For instance, Ifabiyi (2012) observed that the annual renewable per capita freshwater in Nigeria was 2,203 cubic metres (Cu) in 1990, and the amount was discovered to be 1,292 cubic meters in 2003. This signifies that Nigeria is a water-stressed nation.

In addition, water infrastructure such as water works, storage reservoirs, pump stations, and distribution networks have been poorly maintained and are characterized by frequent breakdowns, dry taps, failed boreholes, poor coverage, old reticulation systems, abandoned projects among others, and therefore, perform below designed capacity. Past literature have shown that these crises are as a result of poor funding, lack of clear policy direction, and the overbearing influence of the government (UNDP/IFAD, 2015). Currently, the Federal Ministry of Water Resources manages all water resource development in the country.

Impacts of Population Pressure on Water Resources in Nigeria

Human activities intensified through rapid population increase have created disturbances in the water cycle which have posed serious threats to water resources. Some implications of human activities on water resources in Nigeria include:

Water Pollution

Increased population concentration alters the quality of freshwater resources and damages natural systems (Bisong, 2004). This is because the higher the population, the more the waste generated; this pollutes the quality of water. Also, fresh water is contaminated from various sources such as industrial wastes, sewage, and runoff from farmlands among others (Gusikit and Lar, 2014). In Nigeria, the quality of freshwater is contaminated majorly from agricultural practices. According to Asogwa and Dongo (2009), there is an increase in the use of pesticides and herbicides for plant treatment in Nigeria. Similarly, Haruna (2020) reported direct dumping of waste from livestock farms into waterways; this injects microbial pollutants into the waterways, and affects public health.

Furthermore, past studies (Ekaye *et al.*, 2010; Sangadoyin, 1995) have shown that industrial pollution is one of the main sources of water pollution in Nigeria, as many industries discharge their wastes directly into water bodies, without prior treatment. For instance, Sangadoyin (1995) conducted a study on selected industrial effluents in Ikeja, Lagos State. The results revealed a high concentration of effluents, far higher than the regulatory body's recommended standard.

In addition, domestic wastes affect the quality of freshwater resources owing to the fact that the shores of many water bodies in Nigeria serve as home to numerous informal settlers. More often than not, the wastes generated from these residences are dumped directly into the water bodies. Also, human exploration of resources such as petroleum activities and the use of chemicals for fishing activities contaminate the quality of freshwater resources in Nigeria (Bisong, 2004). This was confirmed in the study by Adeyemi (2004) which showed an isopleth map of oil concentrations in the water bodies in the Niger Delta region.

Excessive Withdrawal of Water Resources

Prodigious withdrawal of water poses serious threat to water resources and disrupts the natural systems due to overuse. In many parts of Nigeria, water resources are increasingly overexploited as many areas are unable to meet the water demand of their inhabitants, thus stressing the limited water resources. For example, about 15,572 ha of land responsible for water resource usage across the country to improve food security is not fully actualized (Jeje and Adesina, 1996). In Nigeria, excessive extraction of water resources is evident in the gradual dwindling of water bodies as many lakes, rivers, and their tributaries are drying up due to excessive water withdrawal and climate change. For instance, over the last few decades, Lake Chad has been decreasing in size at the rate of 100 meters per year (De Villiers, 2003), because of the huge extent of human activities going on around the lake. Groundwater resources are not also left out of overuse, as there are records of sharp drops in aquifer levels. Threats posed by overdrawn groundwater resources are minimal though, compared to surface water. Such threats include decreased yields, reduced river flow, poorer water quality, damage to natural habitats such as wetlands, and the gradual susceptibility of water resources to subsidence.

Sedimentation

Aquatic lives are threatened by sediments such as soil and particulate matter in water bodies. Sedimentation occurs either naturally or through man's activities such as deforestation, farming, construction, and mining. According to Abam (2001), in a study of sediment influx in River Kaduna, the study revealed that Shiroro dam receives an influx of sediments of about 96 t/km^2 (66.6 × 10^6) per year. In another study of sediment yield at the upstream watershed of Jebba lake by Adeogun *et al.* (2015), an estimated sediment yield of 255.8 tons/ha per year was discovered. Aside from the danger posed to the aquatic ecosystem, Adeogun *et al.* (2018) validated previous studies by collecting data on Nigeria's three hydropower reservoirs (Shiroro, Kanji and Jebba). The results revealed that the storage capacities of these dams have been greatly reduced by the deposition of sediments from upstream to the reservoir. Ezugwu (2013) corroborates this stating that sedimentation of water bodies in Nigeria reduces the storage capacity and life span of reservoirs. This phenomenon has led to persistent flood as well as significant reduction in reservoir life, power generation, irrigation, water supply, flood control, and wildlife among others. It also reduces flow in rivers, thereby affecting the quantity and quality of water, increasing costs of water purification and purchase of equipment used in water supply installations and hydroelectric plants, and disturbs easy navigation of ships.

Conflict over Water Resources

Nigeria has been battling series of inter and intra-communal conflicts and competition over water resources. Conflicts occur because water demand (by the number of people) surpasses the supply. Moreover, since many of the watersheds in Nigeria are transboundary, people resort to fighting to get access to the control of water (Birdstal, 2007 and Madu, 2016). For example, clashes between the Fulani herdsmen and farmers arose due to competition for water holes and grasslands for their cattle (Amobi and Onyishi, 2015; Elisha *et al.*, 2017). Hence, the pressure on water resources has resulted in national and regional tensions among users.

Nomads move along the direction of water supply, particularly where surface water such as dams, rivers, lakes, streams, ponds and even puddles are accessible and reliable. As such, Dingba and Adamu (2007) opined that herders in Nigeria have a good understanding of the nature of the environment, and their seasonal movement depends on the seasonal nature of rainfall, and availability of vegetation and surface water for their cattle.

Alteration of Natural Course of Waterways

With advancement in technology, man has been able to modify the natural course of waterways to cater to the needs of increasing populations by creating energy and constructing dams, among others. Around the year 2000, the Federal Government of Nigeria spent about ₦618million on the water resources sector, resulting in the construction of Adoka, Ughoju, and Igumade water works; provision of boreholes at Oju and Obi; water supply scheme in Gboko, Tarka, Makurdi, Naka, Aliade, Guma and Buruku, all in Benue State. It also included the Katsina-Ala River Project

amongst others. The expansion further applied to other states like Sokoto State, where boreholes were sunk in Bakolori, Dadin Mahe, Tidibale and Katani coupled with the rehabilitation of the Goronyo Dam aimed to facilitate water supply to Sokoto, Argungu, Birnin Kebbi and other places (Samson, 2013). Furthermore, Nwankwere (2012) reported that due to the need to improve water supply, there was rehabilitation of the 33 main dams and 28 earth dams which are spread nationwide. Also, the attempt to improve the supply of electricity in the country led to the integration of various dam projects with small hydropower schemes. However, these activities have the tendency to permanently change the natural landscape. For instance, the diversion of river water, which serves as aquatic life's natural habitat, has severe effects on the fishes and other aquatic life. These modifications also impact human communities that live near modified waterways by making them more susceptible to flooding. Additionally, the alteration of natural landscapes to urban water-impervious lands limits available freshwater resources (Sun *et al*., 2013). This creates increased pressure on freshwater resources and disrupts rivers' natural flow.

Increased Per Capita Water Consumption

Rapid increase in human population puts pressure on water resources in many communities in Nigeria. The continuous rise in population increases the per capita water consumption, and this further puts a strain on local water supply as water demand increases. As such, the rise in population reduces the amount of water available per person (Thomas and Durham, 2003; Eja *et al*., 2011). Annual renewable per capita fresh water for Nigeria has been observed by Ifabiyi (2012) to be on the decrease, from about 3,203 cubic metres (Cu) in 1990 to about 1,292 cubic metres in 2003.

Policy Recommendations

On the basis of the foregoing, this paper suggests the following policy recommendations, regarding population control and measures to manage and mitigate the effects of population explosion on water resources in Nigeria.

1. It is imperative that government makes policies not only to control the escalating population, but to also ensure that the existing population becomes more productive through the following:
   i. Urgent actions and policies aimed at reducing national birth rate to ensure both population size and available resources are at equilibrium. Already, the revised 2022 Population Policy, launched by the President Buhari-led administration, emphasised the need to urgently address Nigeria's incessantly high fertility rate through measures such as expanding access to modern contraceptive methods (modern family planning, counselling, and promoting birth spacing) across the country. The Policy also highlights investing in quality education of young people (particularly girls), human capital development, as well as advancing holistic efforts

to achieve significant demographic transition. If rightly implemented, Nigeria would be in the position to sufficiently provide for its citizens, not just today but for generations to come.

ii. Efforts that propagate adequate livelihood for citizens through improving their health and education, particularly that of women. Improving women's social status can have profound influence in reducing the national population growth rate. Past studies have shown that majority of highly educated and working class women are commonly preoccupied with studies, work and business, and might not want to procreate too often.

2. Pollution from industrial and domestic waste should be mitigated through strict implementation of industrial and domestic waste management laws and regulations. According to the Federal Environmental Protection Agency (FEPA) Act of 1988, backed up by the Environmental Impact Assessment Act of 1992, environmental protection in relation to effluents, pollution control, and management of hazardous wastes requires that an environmental impact assessment be carried out by all major industries requiring the approval of the Ministry of Environment. The government, through the Ministry of Environment, should also ensure that the Polluter Pays Principle (PPP) is being fully enforced. It is also important that government engages in regular public enlightenment and sensitization campaigns on the dangers of water pollution.
3. There is need for political commitment to the formulation of clearer and more comprehensive legal and institutional frameworks that will provide lasting solutions to water resource management problems in Nigeria.
4. A nationwide inventory of aquifers and surface water resources in Nigeria should be carried out. The inventory should cover the characteristics, classification, and conditions of these resources. This will improve the availability of data for water managers, planners, and operators.
5. Lastly, there is need for strict adherence to, and enforcement of, existing environmental and population laws so as to stem unsustainable use of the resources and excessive population growth.

Conclusion

This paper examines the relationship between population pressure and water resources in Nigeria. Nigeria is one of the fastest growing populations in the world. As the population increases, so is there intense resource consumption. This threatens the capability of the country's resources to sustain the population's needs. As examined pointedly in this paper, continuous increase in the country's population has led to increase in local water demand, which ultimately has been putting enormous strain on local

water supply. Definitive plans are required to ensure sustainable use of environmental resources amidst the growing population. This paper concludes by suggesting policy recommendations to facilitate an equilibrium between the country's population and its water resources.

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