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CLIMATE-INDUCED MIGRATION IN COASTAL AREAS OF NIGERIA AND ITS ECONOMIC EFFECTS ON COASTAL ECOSYSTEM LIVELIHOODS

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ABSTRACT
Migration is an aged long phenomenon, which has been increasingly drawing attention from several disciplines, including economics. The effects of climate change on migration have also been increasingly gaining attention among researchers as well as those in charge of policy design and implementation in the past two decades. This paper presents a review on the effects of climate change on Migration flows in coastal areas of Nigeria. More specifically, the paper identifies coastal vulnerabilities in the face of climate change and the impact of climate change on future coastal livelihood opportunities. It also identifies the differences in age, gender and other patterns in the migratory movements. The paper notes that further rising sea level in future could make urban-urban migration dominate the prevailing rural-urban mobility in Nigeria, if measures are not taken to boost coastal adaptation and this will put more pressure on urban infrastructure and assets. The paper therefore, recommends the need for investment in coastal adaptation, since the future benefits from adaptation (net benefits) outweighs the cost of non-adaptation.

Keywords: Migration, Coastal areas, Ecosystem and Livelihoods

1.0 INTRODUCTION

The effects of climate change on the coastal areas of Nigeria and on livelihood options of the population living these areas have become an issue of increasing concern in recent times. In other to gain broader insights into the subject matter, there is need to first have an understanding of the Landscape of the Nigerian coastal areas, coastal population and their livelihoods. Furthermore, there is also the need to examine the link between climate change and vulnerabilities in coastal areas of West Africa, giving specific attention to Nigeria. Next, is to look at the characteristic and topology of migrations within West Africa (with Nigeria in focus) and, the climate change and migration nexus in West Africa and Nigeria. Finally, the impact of climate-induced migration on the Nigerian Coastal Ecosystem needs to be spelt out, with possible implications that can be drawn from it. Hence, following the points rose above, this review paper is structured into five (5) sections. The first section identifies the coastal population and their livelihood sustenance. Section 2 of the review paper discusses the nature, trends and patterns of migration flows within the West African and Nigerian coastal areas as well as the indicators of migration flows in coastal areas of Nigeria. In section 3, the paper presents a review of the relationship between climate change and its effects on migration flows in Nigerian and

West African coastal areas. Section 4 of the paper discusses the effects of climate-induced migration on coastal ecosystems, providing indicators of Eco-diversity in coastal areas of Nigeria. The paper concludes in section 5.

1.1 Nigerian Coastal Population and Livelihoods

Coastal zones involve the interface between land and sea. West Africa can be described as a coastal continent considering that twelve out of the sixteen countries are located on the coastal areas, while within these countries, there are coastal river systems (Agboola & Odunuga, 2015). The development of African cities, including those in Nigeria is concentrated around the coastal areas. The coastline of Nigeria stretched 853 km and the major cities including Lagos and Calabar are all located on the coast. It also encompasses the Niger Delta region, an economically important region of Nigeria. Out of the thirty-six states of Nigeria, nine (Lagos, Ogun, Onda, Rivers, Delta, Cross River, Bayelsa, Akwa-Ibom and Edo) are located on the coast (Mmom & Chukwu-Okeah, 2011). About 25% of the country's population are located in the coastal region (Mmom & Chukwu-Okeah, 2011). Not only is a large population of the country located on the coastline of Nigeria, but also, industrial and economic activities are highly centered in these areas. For instance, Lagos host a large number of institutions, both multinational and domestic, a home for manufacturing industries and provides about 60 percent of Nigeria's non-oil income (Agboola & Odunuga, 2015), meanwhile, its geographical location makes it more vulnerable to climate change (Elias & Omojola, 2015).

The coastal area is an entrance to ocean resources and livelihood for coastal activities for local communities such as fishing. The major economic activities in these areas include oil and gas exploration, tourism, agriculture, fishing and shipping. It also serves as an important area for navigation and military activities. In addition to the ecosystem functioning of the coastal areas, they also provide livelihood opportunities to a large number of people across the African continent (Diop & Scheren, 2016). Therefore, managing the competing interest of the coastal areas demands due diligence and accurate predictions on coastal change (Maanen et al., 2015).

1.2 Climate Change and Vulnerability in West African and Nigerian Coastal Areas

Climate change has become a major threat to the entire global ecosystem. In addition to the clarity that man's unintended alterations of the environment are the major cause of climate change, there is a growing interest in understanding the impacts of climate change on the various sectors of every economy and sustainable development. The severity of its impacts depends on the location and other socioeconomic conditions of the inhabitants of the ecosystem. The African continent is most vulnerable to climate change due to high exposure, low resilience, poor governance (Busby, Smith, & Krishnan, 2014), weak infrastructural and institutional development and other economic challenges that weakens the adaptive capacities of the individual countries. For example, though flooding is a common climate shock globally, it is a

major threat in developing countries due to the poor planning or coordination of the urban areas (Israel, 2017). This also does not imply that climate vulnerability is equal across the entire continent. There are observed variations due to social class such as gender and geographical location such as the coast. For instance, the population in the coast of Nigeria are more vulnerable to climate change than non-coastal areas. Climate change does not only affect humans but also other living things. Akpodiogaga-a & Odjugo (2017) observed that, over a 105-year period (1901-2005), the temperature of Nigeria has increased by 1.1^0C while rainfall has decreased by 81mm. The authors also observed that despite the general decline in rainfall and the drying of surface water bodies such as Lake Chad, the coastal areas have experienced an increase in rainfall while sea-level rise has inundated 3100km^2 of the coastal areas of the country.

The coastal areas are one of the most vulnerable to climate change, manifested in sea level rises, coastal erosion and flooding. The global sea-level has risen by 20cm by the mid-19th century and expected to increase further by the end of 2100 (Cozannet, Garcin, Yates, Idier, & Meyssignac, 2014). During the past few decades of the 20th century, the sea level rise has risen by over half the global mean of 1mm/year. IPCC's estimates show that sea level has risen averagely by 3.2 mm/year within the periods of 1993-2010 (Wong et al., 2014). This rise has had impacts on the shoreline mobility across the world, causing transitional changes in the coastal areas. The increase in sea-level rise continuously result in submergence, coastal erosion and coastal flooding (Wong et al., 2014). Under business as usual, the current changes in the coastal areas including acidification, warming of coastal waters and, coastal population and assets would continue to come under increasing threat (Wong et al., 2014). While global sea-surface temperatures recorded the third warmest record in 2017, ocean heat recorded a highest value in 2017 (World Meteorological Organization, 2017).

There is an increase in the salinization of the aquifers thereby affecting coastal livelihoods and the development of coastal communities (Ojile, Koulibaly, & Ibe, 2017). The high concentration of population and other industrial activities along the coast of West Africa has placed a significant challenge on the coast to maintain its balance. In addition to the man-made causes, climate change have significant effect on the ecosystem management of the coast (Diop & Scheren, 2016). Coastal flooding due to heavy rainfall and runoff in Nigeria is worsened by the rise is sea level (Adeoti, Olayide, & Coster, 2017). In addition to the flood impacts of sea level rise, there is the potential for sea water inflow into the inland waters such as the rivers and mangroves, thereby, affecting the function of the inland waters' ecosystem and livelihoods (agriculture, fishing, domestic, industrial activities) that depend on these inland waters. Coastal erosions have also led to the evacuation of some coastal towns (Adeoti, Olayide & Coster, 2017) for resettlement and this means that there would be a probable change in occupation status. For instance, fish population and fisheries ecosystem of Nigeria are altered due to climate shocks such as floods and this have a negative effect on the livelihoods that depends on fishing (Adeoti, Olayide & Coster, 2017). However, although the global relative cost of adaptation to coastal changes vary from one economy to another, there is a general net benefits of adaptation (as the

benefit from adaptation is higher than cost of non-adaptation) (Wong et al., 2014), hence the need for coastal adaptation in Nigeria.

The high prevalence of erosion of the river banks as well as the coastal areas have forced several communities to relocate to new non-coastal areas (Etuonovbe, 2007). Amadi & Ogonor (2015) showed that the 2012 flood that occurred in Nigeria have lead displacement and outmigration, hence, recommended for incentives that would motivate people to move from high risk areas to low risk areas. About 10 million Nigerians are at risk to sea level rise and would be displaced if the sea level increase by 2 meters (Awosika et al., 1992 in Amadi & Ogonor, 2015).

2.0 CHARACTERISTICS AND TOPOLOGY OF MIGRATIONS IN NIGERIA (TRENDS AND PATTERNS)

Migration is a long-standing phenomenon in West Africa. In 2015, 16 million Africans each were living outside the region and/or in other African Countries (International Organization for Migration, IOM, 2018). In 2017, there are 22,975,988 international migrants in Africa and this represents 2.2 percent of the total population (United Nations, 2018). Migration in West Africa is largely intraregional and driven by economic and strong network among member countries (IOM, 2018). The motivation for migration however differs in the periods of the pre-colonization era, the colonization and the post colonization era. Migration in the pre-colonization era was driven by the search for fertile farm lands and more secured places for residence. The economic and political development during the colonial and post-colonial periods have made some areas more attractive for migrants, especially, the males that seek seasonal and cross border migration (Adepoju, 2005). Migration in Africa is dominated by the young people. The median age for migrants in 2017 was 31 years and this is 7 years lower than the global median age (United Nations, 2018). Although child migration is a feature of migration in the continent, its incidence is not high. In terms of sex, not only do men migrate more than the women, but also, the men have longer migration duration than the women (United Nations, 2018). Generally, the duration of stay by migrants is 5-7 years.

The economic progress and prospects of Nigeria is not even, as there as there are areas with high development and others with high underdevelopment (Afolayan, 1985). This uneven development provide basis for migration; offering places for destination and other places as departure points. Therefore, migration is a long standing phenomenon in the country, with a common pattern of rural-urban migration (Afolayan, 1985). However, there are other rural areas that attracts high productive migrants, with rural-rural migrants seeking economic opportunities (Mberu, 2005). Historically, the rural-urban migration is often by the youths, the educated, the unmarried and students that sought better opportunities at the urban areas (Mberu, 2005). Among the migration flows (rural-rural, rural-urban, urban-rural and urban-urban) in the country, the rural-urban migration is the largest type (Fox, Bloch, & Monroy, 2017). The major factors that

influences rural migration in the country includes poverty, low agricultural yield, low access to quality education and healthcare (IOM, 2015).

The traditional destinations for international Nigerian emigrants are Ghana and Cote d'Ivore (Adepoju, 2005). The 2009 estimates showed that while Nigerian migrant males depart at the age of nearly 24 years, the female migrants depart at the age of 21 years (United Nations, 2018). However, there are concerns that the high migration of males in Africa is having negative effects on family-life and this also explains the poverty incidence among the females (Lucas, 2013). Although Nigeria is a destination of nationals from other countries in the region, the net migration of the country continues to decrease from -0.2 percent in 2000 and -0.4 percent in 2010 (IOM, 2016; IOM, 2009). There are about 1.7 million Nigerian emigrants in 2013, and this is over twice the migration in 1990 (IOM, 2016). Generally, emigration in Nigeria started to rise in the 1970s (IOM, 2015). Over half of Nigerians in OECD countries had tertiary education and work in the health sector as well as real estate development (IOM, 2016).

2.1 Rural-Urban and Urban-Urban Migration

As pointed out earlier, rural-urban migration is the most predominant type among the migration flows in Nigeria (Fox, Bloch & Monroy, 2017). The major factors that influences rural migration in the country includes poverty, low agricultural yield, low access to quality education and healthcare (IOM, 2015). Natural disasters, ostracism, and the lack of educational opportunities, social amenities and recreational activities in the rural areas force people to move to the urban areas. The poor quality and quantity of social amenities especially in rural Nigeria have influenced many people to migrate to the urban areas (Ogunmakinde & Oladokun, 2015). Uncontrolled rural-urban migration in the country is also due to the practice on non-regulatory system. However, in addition to sending remittances by migrants, migrants usually form associations in the urban areas and from time to time, engage in developmental activities needed in their rural communities (Ajaero & Onokala, 2013).

Historically, the rural-urban migration is often by the youths, the educated, the unmarried and students that sought better opportunities at the urban areas (Mberu, 2005). The high rural-urban migration has led to an increase in unplanned urbanization, increase in urban crime, and unbalanced population. Although rural-urban migration is a common migration pattern in Nigeria, there are other rural areas that attracts high productive migrants, with rural-rural migrants seeking economic opportunities (Mberu, 2005) or urban-rural migration. For instance, urban-rural migration in the Oyo State of the country is also driven by high cost of living and the inability the secure employments (Adewale, 2017). Adewale (2017) thus, recommended that government provide amenities in the rural areas to serve as incentives for people to move into the rural areas.

2.2 Coastal-Inland and Inland-Coastal Migration

Coastal-inland or inland-coastal migrations a major concern from the impacts of climate change on migration. The coastline of Nigeria provides high economic opportunities, since most of the country's cities are located along the coasts. People migrate from the inlands where there are less economic opportunities for sustaining their living conditions. According to Neumann, Vafeidis, Zimmermann, & Nicholls (2015), coastal areas are important attraction areas due to their rich resources or simply due to the interface of the sea and land in these areas. The coastal areas are also noted for high population densities and high population growth rates (Neumann, Vafeidis, Zimmermann, & Nicholls, 2015). On the other hand, the high vulnerability of the coastline to climate change means that people would be forced to move from the coastal areas to the inlands. Thus, the habitable coastal lands would be converted into inhabitable wetlands due to increasing sea level rise and floods. The landlocked communities are affected if coastal communities are inundated. However, coastal-inland migration is less common in Nigeria than inland-coastal migration.

2.3 Gender Differences in Migration Patterns

The impacts of environmental challenges such as climate change are not universally distributed as there are some groups of persons or areas with higher impacts than other areas. Generally, the existing vulnerable groups are more predisposed to environmental threats. This means that the pattern and impacts of migration, either climate induced or not, differs among gender groups. The social construction of men and women in gender framework has implications on the cause, processes as well as the impacts of migration between the two. It is therefore, consistent that gender is increasingly recognised in migration analysis. The 2010 internal migration survey of Nigeria reveals that 51.5 percent of the migrants were females and this was predominant in states such as Abia, Adamawa, Bayelsa, Bauchi, Benue, Cross river, Ebonyi, Ekiti, Edo, Imo, Jigawa, Kano, Katsina, Kebbi, Kwara, Lagos, Nasarawa, Osun, Plateau, Sokoto and Yobe. However, there are more return male migrants (61.3 percent) than female returned migrants (38.7 percent). Except for Gombe, Katsina and Osun States, the percentage of male returned migrants were high in all states (IOM, 2016).

Recent migration estimates suggest that nearly half of international migrants are females. Migration can be a climate adaptation strategy for both men and women. In addition, it can be helpful in empowering women, improving the educational status of women, expand employment opportunities for women and generally help to address gender inequalities norms in a society. The deliberate or unintentional creation of labour markets along gender lines means that the demand for males and females in the job market differs, hence, an implication for gendered migration pattern. In addition, climate change affects livelihood activities differently, compounding the implication of gendered labour markets. Marriage and family reunification are important drivers of internal migration of women. Some women migrate to new locations in

order to avoid a marriage they did not sign for. In situations of restricted resources, men often engage in migration, leaving the women and children back home. These types of migration by men are more likely to be seasonal and temporal than permanent. Empirically, Popoola & Oladehinde (2017) observed that mean age for female migrants is lower than the mean age of male migrants, while more male migrants than female migrants earn income above the country's minimum wage.

3.0 CLIMATE CHANGE AND MIGRATION NEXUS IN WEST AFRICA AND NIGERIA

Migration is a vital component of understanding the link between population and climate change (Stephenson, Newman, & Mayhew, 2010). While some scholars described migration as an adaptation strategy to climate change (Davis, Bhattachan, Odorico, & Suweis, 2018; Mayer 2011), migration is also described as a failure to mitigation or adaptation (Mayer, 2011). The effect of climate change on migration has gained attention among researchers as well as those in charge of policy design and implementation. It is becoming a concern for analyzing the movement of people from one location to another. It is implicitly imbedded in other drivers of migration such as the lack of employment and the primary objective of migration which is to move from a place that is considered as bad to another place considered as good. For instance, migrants move to areas (destinations) that can give higher income (Cai, Feng, Oppenheimer, & Pytlikova, 2016). The cyclical mobility and rural-urban migration in the region can also be due to the complex interactions of environmental factors such as drought and floods, or climate change (IOM, 2018). Changes in rainfall, temperature and natural disasters explains the international migration witnessed in Africa (Lucas, 2013). Coupled with environmental degradation and disasters, is the loss of about 95 percent of Lake Chad have affected persons whose livelihoods rely on the lake, and this makes people migrate as an adaptation strategy (United Nations, 2018). Among the climate-induced factors, drought have the most significant impact on migration in Africa, particularly, the low income countries (United Nations, 2018). Generally, environmentally induced migration can be classified as regular (occurrence of predictable rhythms) or irregular (occurrence of periodic environmental hazards) (IOM, 2015).

The effect of climate change on health and livelihood can force people out of a particular location. The term environmental or climate refugees have become common due to the effect climate change has on imposing migration as an adaptation strategy on individuals or households. Generally, the climate change-migration nexus can be seen through a cause-effect-decision approach (Sabine, Michèle, & Imboden, 2008). The causes are the anthropogenic activities such as deforestation that leads to climate change. The effects are the direct and indirect consequences of climate change on the ecosystem, is such that man is unable to meet his expected life. The decision stage is the stage where the individual at the effect stage contemplates between modification of exposure or medication of sensitivity, thus, migration or non-migration (Sabine, Michèle, & Imboden, 2008).

In addition to the complex dynamics of migration, climate change has become a major force that defines the cause for migration. In Sub-Saharan Africa (SSA) for instance where there is high dependence on rainfed agriculture for sustenance, deviations in the production environment cause farmers and their households to migrate to other areas for agricultural activities or other wage works. This is explained by the positive significant effect of temperature anomalies on outmigration (Cai, Feng, Oppenheimer, & Pytlikova, 2016). The existing literature on SSA have shown temporal but not permanent migration as a result of climate variations (Cattaneo & Peri, 2016). The urban patterns and the general human settlements in SSA have been affected as a result of the positive impacts of climate change, particularly, the effects of fluctuations rainfall patterns on migration (Barrios, Bertinelli, & Strobl, 2006). The effect of climate change on migration can also be through income or conflict effects. Environmental degradation is a major factor that leads to outmigration of inhabitants of fishing communities (Njock & Westlund, 2010), since this have effect on both the fish stock and fishing activities. The loyalty of the citizens of SSA has diminished due to climate change and this fosters the desire for international migration. Between 1960 and 2000, over 5 million people have migrated in SSA due to changes in rainfall and temperature, and this is projected to an annual migration of 11.8 million each year by the end of the 21st century (Marchiori, Schumacher, & Schumacher, 2012). Although climate change may become the major force driving migration, the complexity of the factors influencing migration limits the prediction of future migrations due to climate change (Stephenson, Newman, & Mayhew, 2010). Thus, research on how people react to sea level rise and loss of coastal habitat is in its infancy stage (Hauer, Evans, & Mishra, 2016).

The effect of climate change on migration in Nigeria is diverse. For instance, households were found to send males to migrate as an ex-ante mitigation strategy (Dillon, Mueller, & Salau, 2011). In addition to socio-cultural and political structure of Nigeria, environmental factors such as floods, drought and landslides have implications for the rising change in environment by people (Adewale, 2017). The impacts of climate change on coastal areas are enormous and expected to increase as climate change continues into the future. The high population and infrastructural development of the coastal areas are under threat due to sea level rise and other climate change events. Stephenson, Newman, & Mayhew (2010) explained that the increase in migration due to climate change should be considered as a 'legitimate response' to minimizing the effects climate change. Millions of coastal dwellers may have to move from their residents if current predictions in sea level rise are observed (Stephenson, Newman, & Mayhew, 2010). According to these authors, although current environmental migrants comes from the rural areas, future trends may show higher urban migration due to the effects of sea level rise on coastal population and their livelihoods. Climate migration can span from individual decisions, leading to circular migration and individual assimilation abroad, to community based climate migration, leading to temporal displacement and permanent resettlement (Mayer, 2011).

The high prevalence of erosion of the river banks as well as the coastal areas have forced several communities to relocate to new non-coastal areas (Etuonovbe, 2007). Amadi & Ogonor (2015)

showed that the 2012 flood that occurred in Nigeria have lead displacement and outmigration, hence, recommended the need for incentives that would motivate people to move from high risk areas to low risk areas. About 10 million Nigerians are at risk to sea level rise and would be displaced if the sea level increase by 2 meters (Awosika et al., 1992 in Amadi & Ogonor, 2015). Recent estimates show that the coastal areas are being eroded. For instance, an area of 9.1km^2 deltaic land of the Delta coast was lost to coastal erosion between the periods of 2010 and 2012 (Dada et al., 2016) while approximately 43 percent of Niger Delta is highly vulnerable to the rise in sea level . Sea level rise is also high in subsiding coastal areas than in stable coastal areas (Musa, Popescu, & Mynett, 2014). Again, 1,110 communities and 7,120,028 people were estimated to face the risk of displacement in three Niger Delta States (Amangabara & Obenade, 2015).

4.0 IMPACTS OF CLIMATE-INDUCED MIGRATION ON THE NIGERIAN COASTAL ECOSYSTEM

IPCC's (Intergovernmental Panel on Climate Change) estimates show that sea level has risen averagely by 3.2 mm/year within the periods of 1993-2010 (Wong et al., 2014). This rise has an impact on the shoreline mobility, and it is causing transitional changes in the coastal areas. The increase in sea-level continues to result in submergence, coastal erosion and coastal flooding (Wong et al., 2014). Temperature (heat) recorded its highest value in 2017 (World Meteorological Organization, 2017).

There is an increase in the salinization of the aquifers thereby affecting coastal livelihoods and the development of coastal communities (Ojile, Koulibaly, & Ibe, 2017). The high concentration of population and other industrial activities along the coast of West Africa has placed a significant challenge on the coast in maintaining its balance. In addition to the man-made causes, climate change have significant effect on the ecosystem management of the coast (Diop & Scheren, 2016). Coastal flooding due to heavy rainfall and runoff in Nigeria is worsened by the rise is sea level (Adeoti, Olayide, & Coster, 2017). In addition to the flood impacts of sea level rise, there is the potential for sea water inflow into the inland waters such as the rivers and mangroves, thereby, affecting the function of the inland waters' ecosystem and livelihoods (agriculture, fishing, domestic, industrial activities) that depend on these inland waters. Coastal erosions have also led to the evacuation of some coastal towns (Adeoti, Olayide, & Coster, 2017) for resettlement and this means that there would be a probable change in occupation status. For instance, fish population and fisheries ecosystem of Nigeria are altered due to climate shocks such as floods and this have had a negative effect on the livelihoods of people that depends on fishing (Adeoti, Olayide, & Coster, 2017).

Smallholder agriculture is a major activity in Nigeria and the sub-region as a whole. However, there is a general conclusion on the negative impact of climate change on crop yield (Teklegiorgis, Abate, & Gandorfer, 2017;Hanjra & Qureshi, 2010). The impacts of climate

change on agriculture are largely due to the changes in the spatial and temporal distribution of rainfall, land resources, biodiversity and terrestrial resources. The impacts can be classified as direct effects and indirect effects (Lal, 2013). Over the past 50 years, cropland have dropped by as high as 13 percent (Hanjra & Qureshi, 2010), although there is competing need for agricultural land due to the increasing population. There is the high possibility that water resources for agricultural activities would reduce, and this poses more challenge for sustainable food production and food security. Lal (2013) argued that the agriculture sector is on a crossroad since more food must be produced under decreased per capita land and water resources under the changing climate. In addition to the impacts of climate change, the floor of surface water in Nigeria is changing due to changes in land use (Tijani, Obayelu, Sobowale, & Olatunji, 2015). These notwithstanding, measures that would increase productivity are appropriate for achieving a pro-poor growth. This is because, not only does the country rely on smallholder agriculturist as the main source of food for the Nigerian population, but also, smallholder farming households are located in rural areas where there are less economic opportunities. There is also the recognition of smallholder as poor farmers but efficient in crop production.

Economic transformation theories suggest that there would be a reduction of agricultural labour as more people would move to the urban areas for non-agricultural activities. The speed of labour transformation may be faster under climate change. Unfortunately, the assumption that there will be increase in productivity to compensate for the labour losses may be mitigated by climate change. As an adaptation strategy to climate change and climate shocks, smallholder farmers are faced with the decision to migrate or not to migrate. Whichever way the decision is taken, there are implications on the farming households and the rural economy. On one hand, migrants are able to send remittances to their households in the affected areas in order to cushion their expenditure and standards of living. Where production conditions return favourable, households are able to invest remittances in agriculture through inputs purchase as well as investment in improved technologies. On the flipside, migration leads to a reduction in agricultural labour. Considering that smallholder farmers are resource poor; the low availability of human labour can have an obstructing effect on agricultural activities. There is substantial evidence on the impact of migration on agriculture and food security of Nigeria. For instance, Mgbakor, Uzendu, & Usifo (2014) and Lawal & Okeowo (2014) found that rural-urban migration leads to a reduction in both agricultural labour and productivity. There is an increasing rural labour gap as a result of the continuous migration of the youths to the urban areas. Ofuoku & Chukwuji (2012) concluded that rural-urban migration is a major challenge to agriculture in the Niger Delta States, as it has significantly led to labour loss, incomplete harvest and revenue forgone.

5.0 CONCLUSION AND RECOMMENDATIONS

The coastal region of Nigeria is a very vital component of the Nigerian economy because of its resource endowments, ranging from crude oil, ocean resources, industries and businesses,

commercial activities, vegetation, ecosystem services, to mention a few. In fact, a very huge chunk of the government's income used to carry developmental projects comes from States located along the coast of Nigeria. The projected increase in future temperature and rainfall volume in the coastal areas of Nigeria based on the reports of the Intergovernmental Panel on Climate Change (IPCC) indicates that the high population, ecosystem and infrastructural development will come under increasing threat under this changing climate. More so, evidence on floods which occurred in 2012 and most recently, in 2018 has indicated more displacement and outward migration of millions of inhabitants of coastal communities, putting more people at higher risk of losing their livelihoods and economic activities (especially agricultural and fishing activities). In a global study by Moustakas & Karakassis (2009), the ecological footprint for Nigeria was 1.5 with a deficit of -0.9. This indicates that the lifestyle in coastal areas of Nigeria is ecologically harmful; putting the biodiversity in these areas under serious threat of extinction, if nothing is done to reverse this trend. With climate change, this trend is expected to worsen. In addition, the groundwater quality for the Niger Delta region of the coastal areas of Nigeria shows poor groundwater quality, with a water quality index of 285.20 for the region. This also indicates the effect of sea level rise (triggered by climate change) on the quality of groundwater and its implications on future scarcity of quality drinking water in such areas.

The study therefore, recommends the need for the government to provide the necessary incentives for people living in coastal communities to encourage them relocate from high risk areas to low risk areas. In addition, there is a need to increase investment in climate resilient coastal infrastructures to boost coastal adaptation and management of coastal resources. This is very important because the future benefits (net benefits) of coastal adaptation will greatly outweigh the cost of non-adaptation.

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