Impact of Climate Change on Hadejia Nguru Wetlands Function

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ABSTRACT

Climate change is recognized not only as a threat to species survival but also a threat to the wetlands environment and its functions. Climate change has a pronounced impact on wetlands functions through alteration in hydrological regimes with great global variability. The impacts of wetlands is enormous to existence, despite all the wonderful values derived from wetlands, human induced impacts have made some of the wetlands functions extinct. These impacts have affected all the potential resources and all the benefits expected to be ecosystem service for human and the environment. The community around the wetlands have been benefiting immensely on the wetlands environment. The Hadejia/Nguru wetlands are prone to environmental degradation and ecosystem, food chain imbalance, biodiversity deformation, these are majorly caused by climate changes. It was recommended that government and all stakeholders involved in the global phenomenon need to increase public awareness toward utilization of wetland resources.

INTRODUCTION

Nigeria is endowed with abundant freshwater wetlands and the coastal saline wetlands as Lake Chad, Niger inner Delta, River Kaduna, River Ogon-Osun, Kainji Lake, Hadejia/Nguru, and Delta of the Cross River, Lagoon, Sokoto-Rima and Lake Chad. A stretched expanse of about 2,988,000 ha of the terrestrial lands in Nigeria are categorized as wetlands, while the freshwater swamp and Mangrove region of the wetlands environment are about 2,130,000 and 858,000 ha respectively (Zaccheaus, 2012 in Rer) the vast majority of the wetlands are located into the Chad Basin, Niger and Benue Basins, the Niger Delta wetlands are known as one of the largest wetlands in the world (Asibor 2009).

Climate changes are seen as a threat to species survival and the heath of Natural system and make future effect to restore and manage wetlands more complex. Climate change refers to an increase in average global temperature. The changes which are seen over recent years and those which predicted over the next century are caused by human behaviour and natural changes in the atmosphere. This change can be traced by from the activities of human action through the release of destructive gases which in turn bring about the warming of the earth surface by increase in the earth's temperature. The increase in temperature in return lead to the melting of ice which contributes to the rise in sea level, increasing flooding, the coastal increase in rainy and dry season, with each lasting approximately six month, on the average, that is, April to October and October to March respectively (Nwafor 2007). Nigeria's daily temperature differ base on the location and period of the year, in the coastal area average temperature is 25^0C and 40^0C in the North.

According to (IPCC 2001), a rise in temperature of between 1.4^0 C to 5.8^0C by 2100 will have serious negative effect on the socio-economic wellbeing of the country in the following ways:

- High temperature in the north will cause increased health issues such as meningitis, cataracts, malaria and yellow fever.
- Landslide especially in erosion prone areas.
- Desertification will increase and more droughts which encourage locust and white flies, which in turn will affect food and water supply.
- High cost of construction especially in the coastal areas.
- Deforestation as a result of relocating of people from the affected areas of the coast.

The impact of climate change on the function of wetlands are more pronounced in the developing countries especially Africa due to their low level of coping capabilities (Mshelia, 2005; Nwafor 2007; Jagtap, 2007 in Ana Godson, 2011). Nigeria is one of the countries in the continent of such developing countries that is already being faced with such menace having different ecological problems. These problems have been directly linked to the effect of climate change such as increasing temperature, increasing evapotranspiration, decreasing rainfall amount in the continental interior, increasing rainfall in the coastal areas, increasing disruption in climate patterns and increasing frequency and intensity of unusual or extreme weather related events such as, thunderstorms, lighting, landslides, floods, droughts, bush fires, unpredictable rainfall pattern, sea level rise. Desertification and land degradation, drying up of rivers and lakes and constant lost of forest cover and biodiversity (Ahmad and Ahmed 2000, IPCC 2001, NEST 2003 and Hengeveld et'al 2005, in Ana Godson, 2011).

GENERAL FUNCTIONS OF WETLANDS

Wetlands are the life-enhancing system of the environment, consisting of the direct and indirect components. The resourcefulness of the wetlands cannot be over emphasized. They include among others:

- Soil for agricultural purposes
- Fishing for food and economy
- Trees of various purposes
- Recharge of the hydrology of the ground water
- Provision of breeding and rearing ground for natural habitants
- They are also used for sport and recreational purpose.

Though the above functions are general, the Hadejia/Nguru wetlands have their own specific functions and they are:

THE HADEJIA/ NGURU WETLANDS FUNCTIONS

The Hadejia/Nguru wetland lies in the Yobe-Kamadugu basin. They are formed where the Hadejia and Jama're river meet. According to (Ramsar 1994), the Nguru lake and Marma channels complex, which is a section of the Hadejia Nguru wetlands, is located on the latitude $10^0$22'N and Longitude $12^0$46'E. The wetlands cover an area of about 3,500km^2. It lies between sudanian savanna to the south and drier sahel to the North. Some of the land is permanently flooded, while other parts are flooded only in the wet season (August and September), Annual rainfall range between 200-600mm, during the period, late May-September. The wetlands are well known for its value viz:

1. It serves as recharge and replenishment of underground water in the Kamadugu-Yobe basin.
2. It serves as a habitant for biodiversity of many fauna and flora.
3. And most importantly as a major tourism location for migrant water birds which attract students, researchers and pleasure seeking people from different part of the globe.
4. More so, over 1,000,000 people depend on these wetlands for water supply and other daily activities such as agricultural activities and trade (international and Regional).
5. The hydrological regime of the wetlands is closely related to the rainfall pattern in the upper catchment area and run off supplements form the wet season and later reduces through other hydrological output such as infiltration, soil moisture recharge, underground and evaporation. The connection between the southern moist and northerly dry tropical maritime and air volume converge at the basin from the south western location around the month of April and May and finally gets to the Northern side in August.
6. The Hadejia/Nguru wetlands community benefit from various activities that surrounded the wetlands, such as income generations and provision of food, from the different activities such as agriculture, land grazing, wood for domestic fueling, other wood products, tourism and mechanisms for protection against drought.

CLIMATE CHANGE AND HADEJIA/NGURU WETLANDS FUNCTION

Global climate change is seen as a threat to species survival and the balance of natural system. The outcome from the research on the ecological and hydrological impacts on climate change has grown considerably over long period of time.

Climate change affects the hydrology of Hadejia/Nguru wetlands ecosystem especially through change in rainfall received and high temperature in the area with great global variability. Looking at climate variability and the effect on the wetlands function, these ecosystems heed to be viewed in the broader context of their spatial location in a watershed within a specific region (Kevin 2009). This is in line with the effect of exerted by drought on the wetlands. Drought has been seen as a factor that affects the development of the basin water resources which reduce input in channel to the rivers. However, at one time the wetlands may have covered up to 3,000km^2. Between 1964 and 1971 over 2,000km^2 were flooded. By 1983 less than 9,000km^2 were flooded, and less than 3,000km^2 were flooded in the drought year of 1984. In 2011 over 4,000km^2 were flooded when the upstream dam (Challawa Dam) was over flooded. The catchment of the Hadejia and the Jama'are Rivers associated with the wetlands are raised in the western area and the upper basin affiliated to the Kano and Jos Plateau. These are rooted by basement complex, which consist of the Precambrian granite, and metamorphic layers which are characterized with sloppy hills and steeps (Thompson and Hollis 1995).

The decrease of water and high temperature in the area has been constrained, which affect existence and sustainability of wetlands functions. This, consequently affected the wetlands resources, hence, species became affected, through food chain imbalance, biodiversity reduction and ecosystem in general.

Climate change can be expected to play a great role in conjunction with other factors which attract greater attention on the use of the water resources of Hadejia/Nguru wetlands. It appears that climate change may have its most pronounced effect on wetlands resources and population growth in cities outside the wetlands area, causing an increase in the demand for

wetlands resource. As the number of people keeps on growing it's understandable that more resources from the wetlands will be required to meet the needs of everybody. By implication over-exploitation will take place which means that people would be taking more things at the environment than nature can produce through regrowth.

Climate change affect the amount of rainfall received especially in northern part of Nigeria. Declining rainfall, declining agricultural productivity, Arid and semi-arid areas in north are becoming dried and droughts are getting worse and climate uncertainty is growing. Consequently, result to construction of dams upstream of the Hadejia-Nguru wetlands to augment the particular situation of rainfall uncertainty. As water is stored upstream for the use of large scale irrigation project and Kano city water supply, the natural flooding of the wetlands has been reduced. Consequently resulting to less water for rice and recession farming, fewer places for grazing and watering of cattle, fish, birds, and other animals have less space to stay and find it more difficult to survive. Vegetation dies and disappears, sometimes completely. Areas where eater still can be found face more pressure as more and more people and animals have to make use of them.

The impact of climate is also affecting the resources and function of the Hadejia/Nguru wetlands negatively in terms of utilization of resource, consumption and socio-economic wellbeing. The increasing pressure on resources leads often to disputes between people about the use of the resource in the Hadejia-Nguru wetlands. Frequent clashes take place between nomadic herders and arable farmers. Both herdsmen and farmers have been using the area for generations. The herdsmen let their cattle graze and water in the wetlands while farmers grow their crops in the same area. Due to population increase, more farmlands had to be cultivated; as such the floods become less and less widespread. This resulted in less grazing land for the cattle as water became scarce, people had to farm as close as possible to the waterside. They even started farming in riverbeds in order to use the residual moisture for their crops. For the herdsmen this means that their traditional designated routes are blocked and used as farmlands thereby becoming hard for them to find place where they can water their cattle without entering land under cultivation. This situation leads to tension between the two groups and as a result, clashes occur regularly leading to loss of lives and properties.

Conclusion and recommendations

Climate change refers to an increase in average temperature. Natural events and human activities are believed to be contributing to an increase in average global temperature. This is caused primarily by increases in greenhouse gases such as carbon dioxide (CO_2). Nigeria is facing such menace of climate conditions which have negative impact on the wellbeing of many people and resourcefulness of the wetlands especially Hadejia-Nguru. In terms of drought and flooding, uncertain rainfall, consequently lead to lakes drying up and a reduction in rivers flow in the wetlands. The wetlands (Hadejia-Nguru) provide great importance in terms of socio-economic activities of many people. The resources include birds, fish, and tree for various purposes, recharging of the hydrology of the groundwater, provision of breeding and rearing ground for natural habitats and soil for agricultural purposes. As a result of climate changes some of the resources especially flora and fauna have been in extinction as a result of inadequate and unproductive rainfall, climate change, lack of awareness of the people in terms of utilization of resources.

RECOMMENDATIONS

The following are some of the recommendation made by this research to provide some insights in to the ways of minimizing the effect of climate change on wetlands especially Hadejia/Nguru wetlands.

- Government and all stakeholders involved in the global phenomenon need to increase public awareness toward utilization of wetland resources.
- Government should establish a commission that will handle issues related to global warming and climate change.
- Monitoring is an important element of ecosystem utilization and to provide insights to the potential ecological effect of the climate change on the wetlands function.
- International agencies especially advanced countries and other development partners are required to fund climate change projects in Nigeria for sustainable development of the wetlands function in Nigeria especially Hadejia-Nguru wetlands.
- The designated routes traditionally followed by nomadic herders should be trace and protect from illegal trespass by farmers.

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