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The impacts of the drying Lake Chad on rural dwellers of Africa

E.D. Oruonye

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Resumen:

The unique location of Lake Chad in the Sudan-Sahel region of Africa made it more vulnerable to climate change and environmental externalities resulting from both natural and anthropogenic driving factors. The Lake Chad region is a fragile area with high climate variability and extremes of weather. As this inland water is used for domestic and agricultural purposes, salt mining, as well as transportation by Nigerians, Nigeriens, Chadians and Cameroonians, it is an area of trans-boundary water conflicts. This paper examines the impacts of the drying Lake Chad on fishery resources and livelihood activities in the region. Data from field studies, structured interview and secondary sources show that fish catches and livelihood activities have declined tremendously in recent times due to several factors including overexploitation and increasing demands on the aquatic resources. Findings from the study show that droughty periods have resulted in the reduction of open lake water surface from about 25,000 [km.sup.2] in 1973 to less than 2,000 [km.sup.2] in the 1990s. This has led to the diminishing aquatic and other resources in the area as well as potentially major challenge to social and economic development of the region. Although the importance of fisheries and irrigation in the region are well known, mechanism for mitigating and/or responding to the effects of the drying lake is not in place. A call is made in this paper to support the earlier advocate by scholars for inter-basin water transfer from the Congo Basin to the Chad Basin and the construction of canals on the Lake Chad to boost fishing activities and transportation.

Keywords: Conflict, drying, impact, livelihood, resource

Texto completo:

Short title: Impacts of drying Lake Chad

## 1. Introduction

Within the very arid and difficult environment of the Sahelian region of Africa, Lake Chad and its associated riverine system have always played an extremely important role in the livelihood of the millions of people living in the Basin. The Lake Chad basin, as an important natural resource of the Sahelian region of Africa, covers about 8% of the surface area of Africa and is shared by Algeria, Cameroon, Central Africa Republic (CAR), Chad, Libya, Niger, Nigeria and Sudan (Basssi, 2007). The Lake Chad Basin carries at present, human population of about 27.9 million people increasing at about 2.7% per annum (Adeniji, 2007). The people of the Lake Chad region of Africa are suffering from the effects of droughts and desertification which has persisted for nearly forty years and have devastated landscapes, production methods and interaction between activities and renewable natural resources. The region has over the years suffered from repeated incidence of droughts, which has led to significant decrease in the inflow from the major tributary rivers such as the Shari, Logone and Yobe. Thus in the 1963 and 1984 droughts alone, the head waters of river Shari and Logone experienced 20% decrease in precipitation as against more than 50% in the Basin (Oteze and Tomajong, 1987). During the 1983 and 1986 drought, the Lake Chad's water level had fallen below 239 meters above sea level, while river Yobe, one of the tributary contributing 3% to the annual inflow of the Lake Chad, dried up completely, leaving the irrigation scheme based on it unproductive (Ayuba, 2005). Mean rainfall isohyets have shifted by more than 185 km southwards (Jauro, 2007). The combined effects of climate fluctuations (drought) and unsustainable water projects (large dams) led to significant reductions in the inflow of rivers that feed Lake Chad. Thus, the open Lake water surface has reduced from about 25000 [km.sup.2] in 1973 to less than 2000 [km.sup.2] in the 1990s (Bababe, 2007).

The people "follow the natural resources dynamics" and settled on the territories of the south already made fragile by felling trees for firewood and trampling plant by livestock. They also settled on wet areas or spaces left behind by the receding lake waters. The poverty cycle leads to environmental refugee situation whereby fishermen follow the water for several miles to fish (Jauro, 2007). This in turn accelerates poverty and tension (amongst farmers, grazers, refugees and fishermen). The major problem is that these resources, which have become limited and fragile, are also trans-boundary in nature. This has exacerbated in the face of increasing population, persistent drought and the inability of the countries to provide adequate responses to the complexity and magnitude of the changing needs. Conflict over diminishing resources is a common occurrence between people within the same territory and people of different nationalities. The Nigerian-Chad war of 1983 and current dispute over territory in the Lake area between both and between Nigeria and Cameroon are all fallout from the drying up of the lake (Oruonye, 2008a). In the north western parts where clans are fighting in a spillover from Darfur, the bloody conflict in Sudan's far west is rooted in disputes over water and grazing rights between sedentary farmers and semi-nomadic herders.

## 2. Factors responsible for the drying up of the Lake Chad

There have been so many argument and propositions put forward to explain the factors responsible for the drying up of the Lake Chad, Africa's largest inland lake. Some of these factors include human factors such increased population and high water abstraction for irrigation, as well as natural factor such as climate change. Although the Lake Chad area is a rich environment which attract

multiplicity of users, with over 20 million people depending on it for various means of livelihood such as fishing, pastoralist, crop cultivation, transportation and mining, the area is fragile with high climate variability and extremes of weather as well as unsustainable human activities. Lake Chad was once the sixth-largest lake in the world, but constant drought since the 1960s has shrunk it to 1/10 its original size. The Shari River, at the southeast, which provides 90% of Lake Chad's water, now averages only about half of its original 40 billion [m.sup.3] per year in the period 1930-60s. The recent low levels are a concern, and have been monitored through satellite and other means by the Lake Chad Basin Commission and others. In addition, the region has suffered from an increasingly dry climate, experiencing a significant decline in rainfall since the early 1960s. The most dramatic decrease in the size of the lake is shown in the fifteen years between 1973 and 1987. Beginning in 1983 the amount of water used for irrigation began to increase. Lake Chad has been the source of water for massive irrigation projects in the region. Ultimately, between 1983 and 1994, the amount of water diverted for purposes of irrigation quadrupled from the amount used in the previous 25 years (Figure 1). This is further exacerbated by increase in the number of dams constructed on the headwater of the tributary rivers. For example, river Yobe in Nigeria contributes about 3% to the up keep of the Lake Chad and several dams have been constructed on its tributary rivers. This includes the Challawa gorge dam, the Tiga dam and recently the Karfin Zaki dam which is still under construction. A profound example of the impact of human diversion of water from Lake Chad is illustrated in the UNEP report (UNEP, 2004) where it is pointed out that "since the 1960's human demands for water near Lake Chad have grown rapidly. Between 1960 and 1990, the number of people living in the lake's catchment area has doubled from 13 to 26 millions. " This growing need for water has resulted in huge irrigation projects and dams along the rivers that feed Lake Chad. Of the Komadugu-Yobe river system the report states "The upper basin used to contribute approximately 7 [km.sup.3]/yr to Lake Chad. Today, the bulk of this water is impounded in reservoirs within Kano province in northern Nigeria, and the system provides just 0.45 [km.sup.3]/yr". By this estimate that is enough impounded water each year to double the current volume of the lake.

The greatest inflow to Lake Chad comes from the south via the Chari-Logone River. However, since the 1970s the Chari-Logone stream flow has been drastically modified. The construction of 30 km wide Maga Dam for the creation of Maga Lake and 80 km of dykes along the Logone downstream from the dam have had a profound impact. This construction was part of the well intentioned SEMRY irrigation project to open up more agricultural land and fish farming. This diversion of water from the Chari River for agricultural purposes has contributed greatly to the decreasing stream flows and the discharges into, and extent of the Lake Chad (Figure 1).

### 3. Coping strategies to the effects of the drying Lake Chad

The people around lake are among Africa's most vulnerable to food insecurity. They have dealt with variability through mobility and through diversity of food sources. People who raise livestock typically moved closer to the lake for grasses in the dry season, then move up to 100 km away in the rainy, mosquito season. After the 1970s droughts, herders shifted from grazing animals (cattle and camels) to browsing animals (sheep and goats), which affected the area's vegetation by incessant consumption of the woody plants. Coping strategies have included farming the lake bottom and on "recessional lands", where the lake water recedes every year, in the "polder" depressions between dunes. In a traditional polder, one crop a year is grown as the lake water recedes. If dams and pumps are used, up to three crops a year can be grown. The potential impacts of increasing droughts in the region would lead to further land degradation from browsing animals and the shorter shoreline from receding lake implies fewer polders to grow crops. Furthermore, a low lake also means fewer fish, which may lead to an increase in other lake-related activities such as soda mining. Lake Chad has been the source of water for massive irrigation projects.

In addition to fishermen and farmers, pastoral communities have also been affected by the recession of Lake Chad since pasture has become very scarce around it. Cattle herders have been burning the sparse, coarse vegetation that is left in the hope that new plant life will sprout and provide a more palatable diet for their livestock, but there is no evidence that this work. Instead, the process seems to loosen the dry soil and make it more susceptible to erosion. As areas dry up, farmers and cattle herders have had to move southward towards greener areas, where they end up competing for land resources with host communities. This has led to some of the conflicts between herders and farming communities reported in recent years in north-eastern Nigeria. Government policy on land which does not make provision for grazing land for the nomadic cattle further compound this problem.

### 4. The impact of the drying Lake Chad on livelihood activities in the region

The Lake Chad, which provided a means of livelihood directly and indirectly to over 20 million people (including fishery, animal grazing, irrigation farming, flood retreat cultivation, natron mining, trading, etc.) has shrunk to a wetland one twentieth its original size and presently has an average depth of 1.5 meters only (Mayell, 2001). This has placed the livelihood of the people of the region at stake because of the high vulnerability of water resources like Lake Chad to the effect of climate change. Because of the limited amount and uneven distribution of rainfall in time and geographic space in the study area, rainfall represents the most limiting factor for the resources of the lake (Ziervogel et al., 2006). With drought episode, water quantity became a limiting factor for the people to practice any alternative livelihood activities such as growing crops, fishing, pastoralist, harvesting forest products and so on. The lack of water, in association with high temperatures (up to 45[degrees]C at certain periods of the year), is the most limiting factor for livelihood activities in the Lake Chad area.

The rearing of livestock is a very important aspect of life in the region, as it represents livelihood, income and employment. Recurrent droughts have forced some pastoralists to dispose of their cattle, lose their livelihood systems, and ultimately increase their vulnerability. Already pastoralists have been forced out of the Lake Chad area to move their herds to the wetter South. The southward movement of the isohyets has also resulted in the southward migration of pastoralists into lands formerly occupied by sedentary farmers. This has been one of the major sources of conflicts in the region leading to widespread destruction of farmlands and cattle, with adverse implications for food security (Oruonye, 2008b).

The shrinking of the Lake Chad has led to the decline in fishing activities, which is the major means of livelihood. For example, Begu (2007) reports of catch decline from about 100000 to 60000 tons annually. Some fishermen claimed that their daily incomes have also decline from about N10,000 (N=Naira is the local currency = \$100 USD) to less than N1,000 (\$10 USD). Some fishermen said that when they started fishing about three decades back, they use to catch 20 30 basins of fish daily, each as large as a man but today, the fish are smaller in size and very hard to get five basins (fewer in quantity). Also, Ahmed (2007), Ajepe (1983) and Hopson (1967) have reported the decline and loss of some fish types in the Lake Chad.

Rained agriculture is very difficult to practice in the Lake Chad region because of the unpredictable and low amount of rainfall in the Sahelian region. Hence, most farmers engaged in irrigation farming and flood retreat cultivation on the receded lakebed. Many

irrigation schemes have been adversely affected and some abandoned because of the shrinking of the Lake Chad (Figure 2) especially the South Chad Irrigation Project (SCIP) in Nigeria, SEMRY in Cameroon and SODELAC in Chad (Oruonye, 2008b). Many flood retreat cultivators (lakebed) have followed the receding lake for several kilometres. As the lake recedes and water resources become scarce, permanent and floating islands emerged, with the latter clogging up the waterways. The influx of fishermen, herders and farmers puts pressure on the resources (water, fish stocks, vegetation and land). Most struggling fishermen resort to the selling of firewood as alternative sources of livelihood, thereby further degrading the environment. The fact that the seasonal ponds and receding channels are, in aggregate, the most common type of water-bodies fished across the basin indicates that a large part of the fishing activity has developed as a temporary activity to adapt to the seasonal dynamics of the environment and, in particular, to make the most of the seasonal flooding. However, the seasonality that characterizes the hydrological environment of the lake area does not affect only fishing activity but the households' activity portfolio as a whole. The analysis by Neiland et al. (2005) reveals indeed that the households' livelihood relies on a strongly seasonal matrix of diversified activities the pattern of which is largely influenced by the local waterflood regime. These multiple activities are closely integrated and all households in the Basin irrespective of their wealth level are still heavily involved in a subsistence-based economy, where fishing, farming and cattle holding represent the pillars of the system.

Petroleum has been discovered in the Lake Chad region by Republics of Chad and Niger. Already, exploration activities have started in the Lake Chad region. Petroleum exploration activities involves deforestation, seismic and radioactive activities, sounding of rocks with gamma rays, all affects biodiversity and humans in the region and contribute to the global climate change. Seismic activities cause cancer and emit radiations which are hazardous to plant, animals and humans.

## 5. Conclusions

The persistent drought and desertification led to the reduction of inflows into the Lake Chad. This led to the shrinkage of the lake from 25000 [km.sup.2] surface area in 1960s to merely 2000 [km.sup.2] in recent years. This situation created a very serious ecological imbalance and destabilized the entire ecosystem of the basin thereby creating problems of environmental refugees in the sub-basin. But as livelihoods are destroyed and the deserts heads over southwards, time is of essence for planners in the riparian nations and Lake Chad Basin Commission.

Improved predictability and understanding of climate variability could help in deriving optimal operating policies for water and infrastructure management in the Lake Chad area. Policies can be put in place to help the farmers with less water-intensive crops, or even alternative livelihood strategies to reduce pressure on the fishery. There is need to provide climate change effect mitigation measures such as storing surplus foodstuff in good years (safety net). Stakeholders on global climate change at the global level should partner with the local communities through organizing seminars, workshops, conferences and the train the trainer forums. The local people should be involved in policy decisions so as to get their own view of how to solve the problem of this menace because they have been in the environment for long and have more knowledge and ideas about their physical environment. The United Nations should also help in facilitating and funding the Inter-Basin Water Transfer project in the Lake Chad region. The transfer of water from River Congo to the Shari River is believed to be the only practicable means of reviving the Lake Chad. By far, cooperation rather than competition among the riparian nations is very important in ensuring a lasting peace in the region. Thus, efforts need to be geared towards containing the ecological disaster through increasing agricultural production and necessary food security preparedness.

[FIGURE 1 OMITTED]

[FIGURE 2 OMITTED]

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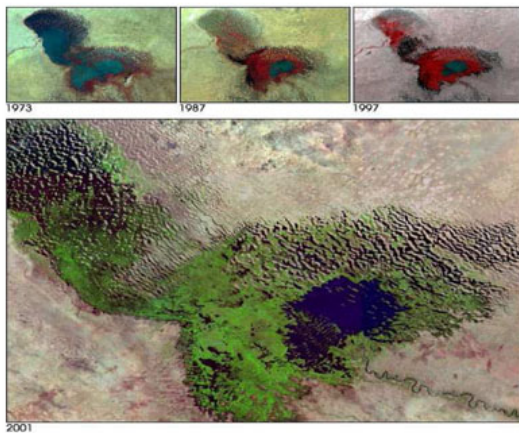


Figure 1. The Lake Chad floor showing the receding Lake water

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Oruonye, E.D.

Department of Geography, Taraba State University, P.M.B. 1167, Jalingo, Taraba State

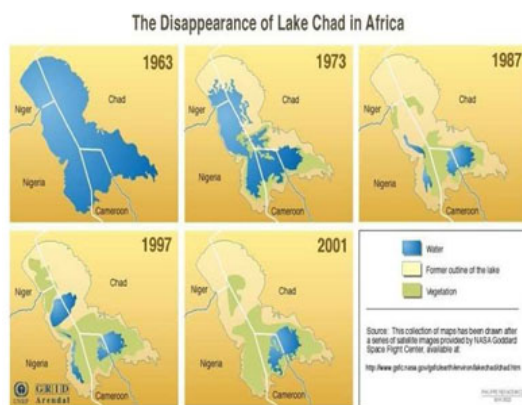


Figure 2. The shrinking Lake Chad

\* Corresponding author: eoruonye@gmail.com

Oruonye, E.D.

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