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Climate change and the challenges of fisheries resources management in Nigeria

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Abstract

This paper takes a practical look at the challenges faced by fisheries resources in Nigeria due to climate change. It shows that Lake Chad which produce 60% of smoked fish in Nigeria worth ₦2.6 billion is at the brink of extinction and is expected to dry to a mere 2000 sq km by year 2010 from over 25,000 sq km in the 1960s. In simple clear terms, the paper gives practical adaptation and policy options to face the challenges of climate change.

Introduction

In recent times there has been a lot of reference to short-term weather anomalies and slowly developing changes of climate that has triggered severe economic, social and political dislocations. In the 1990s adverse weather in many regions affected food prices, balance of trade, and human settlements worldwide (Shackley and Deanwood, 2001). Developed and developing countries alike find themselves increasingly vulnerable to "abnormal weather". Furthermore, there is a growing realization that a carbon dioxide-induced climatic change could have much serious impacts than any of these short-term events.

Up until the early 1970s rivers, lakes, and coastal areas of the world were generally viewed as vast, almost limitless resources of food. As late as the 1960s and early 1970s scientists had reported that fish catches could be greatly increased, and would provide a large supplement to food production on land. However, after 1972, global fish catches declined from their peak of 26.5 million tons to 18.5 million tons in 1973 (FAO, 1981). Adeniji (1976) and Nwoko (1991) attributed the crash in the fisheries of Lake Kainji and Chad to the 1972-1973 drought. There has recently been a partial recovery with increasing rainfalls and floods due to global warming as contemporary scenarios indicate. It is now generally accepted that our earth is heating up and global climatic systems are changing. Those who before now argued against climate change have now come to terms with this new reality due to unprecedented shifts in climate patterns accompanied by natural disasters never before witnessed in modern times in such close successions and intensity around the world.

This paper takes a look at key area of the fisheries resources sector of Nigeria and the likely impact of a climate change on fish production. It also considers and presents adaptation and policy options drawing from field experience in various projects and research by the author.

Fish Production

Philander (1990) was of the view that 1972 and 1973 climatic fluctuations resulted in shifting ocean currents, sea surface temperatures, and wind patterns that may have been partly responsible for the general reduction in fish landings, (specifically in Peruvian coastal waters). The anchovy population there depends on an upwelling of nutrient-rich cold deep water to the surface. In 1972 and 1973 a phenomenon called the El Nino invasion of warm, nutrient poor surface water, depleted the nutrient supply and caused anchovies to die or disperse (Philander, 1990). There are other coastal zones that depend on upwelling to provide nutrients to the fish population; all are subject to similar year-to-year fluctuations of currents and water temperatures.

Figure 1 shows freshwater fish catch and aquaculture production in Nigeria between 1970 and 2000. The lowest record between 1970 and 1973 was due to the 1972/73 drought that led to crash in the fisheries of major inland water bodies of Nigeria like Lake Chad and Lake Kainji.



Source: EarthTrends 2003

Fig. 1: Freshwater fish catch and aquaculture production in Nigeria 1970-2000.

Both marine and inland fisheries are very sensitive to climatic fluctuations. Increased ocean temperatures may affect upwelling currents and destabilize thermoclines which can lead to collapse of the fisheries. The theoretic relationship between temperature, rainfall and inland fisheries have been well researched (Oloror, 1995).

The major adaptation option for fisheries in the area of climate change and water resources has been aquaculture. After the crash of 1972/73 people looked towards aquaculture to fill in the shortage caused by declining catches. This is why aquaculture production is on the increase as shown earlier. Studies carried out at NIFFR showed that over 40% of smoked fish consumed in Nigeria comes from the Lake Chad alone. The rest come from Kainji, Jebba, Taraba, etc. A study carried out at Doro market, Lake Chad (Sule, 2003) showed that over 80 fish species belonging to 17 families are traded. These fishes are sent in cartons by trucks (Mercedes-Benz 911) to Enugu, Ilorin, Lagos, Onitsha, Ibadan, etc. A carton of fish sells between N4,000-N5,000 weighing between 30kg – 40 kg. Between June 2000 and May 2001, the study showed that 244.25 metric tons of fish worth N45,740,000 (approx. N45.7 million) was sold weekly while 9903.07 mt, of fish worth N2,557,448,500 (approx. N2.0 billion) was sold during the one-year period.

The Lake Chad fisheries have a huge market in Nigeria. According to fish sellers during the study, 90% of the fish come from the open lake while 10% comes from swamps and lake shores. A total of 949 trucks were recorded during the study period. A total of 181 (19.1%) loaded fish to Onitsha, 122 (12.8%) to Ibadan and 190 (20%) to Enugu (Table 1).

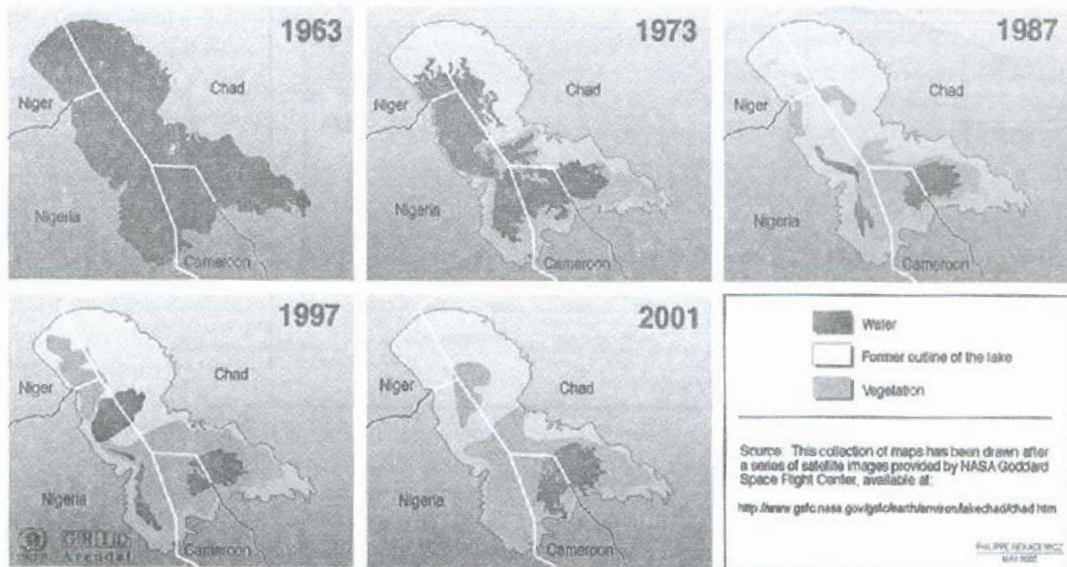
Table 1: Smoked fish sold at Doro Market, June 2000 thru May 2001.

Destination	No. of trucks	Percentage (%)	Destination	No. of trucks	Percentage (%)
Onitsha	181	19.1	Ilorin	82	8.6
Ibadan	122	12.8	Mubi	24	2.5
Enugu	190	20.0	Jos	29	3.1
Maiduguri	67	7.0	Potiskum	5	0.5
Benin	70	8.6	Minna	2	0.2
Kano	82	8.9	Bauchi	1	0.1
Lagos	85	8.9	Yola	3	0.3
			Total	949	100

Source: Sule (2003)

This study shows that Lake Chad is a big natural resource. But sadly we are beginning to see the gradual extinction of the resource due to higher temperatures, higher evaporation rates, low rainfall, drying up of feeder rivers and desert encroachment. The Executive Secretary of the Lake Chad Basin Commission, Muhammed Sani Adamu, in 2005 showed that there is a gradual disappearance of the lake and the end of a major source of livelihood for millions of Nigerians (Figure 2). Most of the fish from the lake now comes from pockets of almost dried up swamps. One of the numerous plans to save the lake is to transfer small amounts of Congo Basin waters that go waste into the sea from Oubangui river, the biggest tributary of the Congo river into Lake Chad through the Chari river system. Even though some workers tried to characterize the lake into Greater Chad (1962-1965), normal Chad (1966-1971) and Lesser Chad (1973), satellite photographs as shown in figure 2 show that despite this fluctuation the lake is presently almost dried up and the likelihood of the return of a greater Chad is a thing of the past.

The Disappearance of Lake Chad in Africa



Source: Adamu (2005)

Fig. 2: Satellite images of Lake Chad between 1963 and 2001.

Drought

The extreme fringes of Northern Nigeria are characterized as areas under stress from drought. In the 1970s and 1980s, drought led to the death of millions of cows, sheep and goats. Crop failure was rampant leading to serious economic losses coupled with desert encroachment and intense heat which greatly affected the water resources of the region.

Experts believe that sand dunes are encroaching at a rate of 30 hectares a year covering entire villages. Worse affected are Borno, Gombe, Bauchi, Adamawa, Kano, Zamfara, Katsina, Jigawa, Kebbi and Sokoto States, putting at risk the livelihoods of over 55 million people, a number comparable to the population of Senegal, Burkina Faso, Mauritania and Mali put together. In a report posted on the internet on 28th March 2008, Reuters Alert Net quoted the Nigerian Meteorological Agency as saying that rainy season in the North has dropped from 150 days, 30 years ago to 120 days. As a result, crop yields have dropped by 20%. The report noted that increase need for wood fuel for domestic use has led to rapid depleting of trees leading to unprecedented deforestation in the north. The population burns over 40.5 million tones of fire wood each year which destroys 400,000 hectares of forest. The forests have almost vanished and that puts Nigeria in the first place with the world's highest deforestation rate.

The 1980s were said to be the warmest years in record coupled with dwindling rainfall have further complicated the situation in the north. The search for fuel wood in north is steadily moving downwards to States like Niger, Plateau, Kogi and Benue. One can see the heaps of firewood and charcoal stacked along the roads. These find their ways to bakeries, hotels, homes, industries in the north up to Niger. Fuel wood has become very valuable resource and high in demand. Except a law is passed to check this southward scourge, the problem of desertification and deforestation will steadily move down south. A policy on the use of planted trees for both domestic and industrial use instead of natural wood will help reduce this problem. Efforts should be made to restore already degraded forests, woodlands and grasslands.

The use of alternative energy sources such as wind and solar will be of great advantage. A study in 2002 shows that 396,250kg of wood per year worth ₦1,325,060 is used to smoke fish worth ₦19,273,600 annually around Kainji Lake alone (Olorok et al., 2004). This led to the introduction of simple solar tent fish dryers and improved smoking kilns using saw dust and minimal wood to reduce fuel wood for fish smoking CO₂ emission and deforestation. Also the planting of neem trees at the fringes of the arid zone is capable of reducing desert encroachment.

Conclusion

Man has always depended on water for survival, so its availability in both spatial and temporal aspects determines to a great extent, location of human concentrations. But temporal fluctuations of water supplies have throughout history been an outstanding problem to man and his activities, and in some cases, a severe threat to life. Knowledge of temporal and spatial variations in water supply is an invaluable input for water resources management.

As a result of global warming and changing rainfall patterns, many parts of the World where water resources management and planning has been able to make provisions for water supply are facing fluctuations which dislocate human activities that are already adjusted to such regions. Some areas are receiving lesser rainfalls while other areas get too much of it. Areas with lesser rainfalls experience droughts while those with higher rainfalls are faced with floods, increased erosion and silting of rivers and lakes.

In the tropical rain forest zone of Nigeria for instance, increased rainfall will render neutral soils acidic, making them less suitable for the cultivation of traditional crops like cocoa. But in the semi-arid and arid zones, it will lead to higher humid conditions thereby reducing harvest of crops such as millet and sorghum. Increased rainfalls will also lead to increased leaching and lower soil nutrients. Diseases, pests and weeds which were not prevalent in these zones before may begin to spring up.

Insects such as mosquitoes, tsetse flies, ticks, trypanosomiasis, malaria etc will also increase. In the northern parts of Nigeria, flood incidences may be on the increase, especially in the built up urban areas where it is not a common occurrence and where drainages were not put in place to handle flash floods.

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