

CLIMATE CHANGE AND DAMS DRYING: A CASE STUDY OF THREE COMMUNITIES IN LANGTANG SOUTH OF PLATEAU STATE, NIGERIA

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(Received 16th June 2009; Accepted 18th August 2009)

ABSTRACT

The results of a three year study of the climate change and its effect on dams in three communities in Langtang South Local Government Area of Plateau State, Nigeria are presented. Low vegetation, high temp of between 39 – 44°C, dams sizes and location as well as the vertical land formation have been identified as major factors for drying up of the dams with the attendant hardship in the dry season and the flooding at the onset of the raining season. Competition between human and livestock for survival during the period of the drought has turned some of the dams into “dams of death” due to contamination by livestock and use of the untreated water by the community. Cases of water borne diseases are reported on a weekly basis. The problems associated with these natural conditions have been shown to have adverse effects on the education, economic, health and family social life of the people in these communities. The need for households to have personal rain tanks, pond or reservoir to store water and protect their sources of water from livestock during the dry season has been suggested. The communities are encouraged to plant trees and other vegetation around the dams to prevent flooding during rainy reason. It is also suggested that the Local, State and Federal authorities, including Non-Governmental Agencies, should come to the aid of the communities in solving the water crisis and the attendant health implications.

INTRODUCTION

The global strive for a sustainable water management and treatment by nations, the world over is gradually bringing to limelight the fact that water is really the defining crisis of the twenty-first century (Handidu, 1990; UNESCO, 2004). The notion that ‘water is life’ and nothing can replace it is an accepted fact with climate playing a major role. (Anitei, 2007). This is why the United Nations declared the period 2005 - 2015 ‘water for life decade with the global agenda on water and other related issue’. However, with half of the decade gone, most developing countries are busy tracking down other secondary issues instead of the water problem. The former UN Secretary General (Kofi Annan) also had cause to state that “we shall not finally defeat AIDS, tuberculosis, malaria or any of the other infectious diseases that plague the developing world until we have also won the battle for safe drinking water, sanitation and basic health care”. This is not disputable! For instance, in sub-Saharan Africa, drought has taken over most regions with 42% of the population still clamoring for improved water supply. Reliable sources of information indicate that for every 8 seconds, a child dies of water borne disease of which 80% occurs as a result of the consumption of infected water (Handidu, 1990) with diarrheal cases accounting for about 3900 children deaths per day as reported among underdeveloped countries (UNESCO, 2004; Anitei, 2007).

Water resources are linked with climate, so the prospect of global climate change has serious implications for water resources and regional development, with the impact being felt most by the poor who has the most limited access to water resources. Climate change is now a serious threat to life as water is being affected all season round. Flood impact is now greatly felt as it spreads across the globe with adverse effect as that of drought. Climate and regional hydrologic models suggest that some significant changes in the timing and magnitude of runoff are likely to result from quite possible changes in climatic variables (Alfred, 2009), and since society and natural ecosystems are dependent on river flows and the like, any changes would be a good reason for concern. There is indication that flooding is likely to become a serious problem in many temperate regions (Alfred, 2009). This would require some measures not only for droughts and chronic water shortage, but also for flood control and associated damages to dams and reservoirs.

Lack of portable water threatens the economy of a nation and the people’s health in different ways (Anitei, 2007), and this is true of Nigeria. “Is it oil spillage that kills all aquatic life forms and leaves the people without good drinking water in some villages of the Niger-Delta region of the country or the indiscriminate dumping of refuse and other wastes in ponds, rivers, lakes and other water bodies in the South-west?. Of course, one cannot

forget the deserted Northern part of the country and gully erosion in the South-east”.

Kwaikong, Wubang and Mangwang, some communities in Mabudi, Langtang South Local Government Area (LGA) of Plateau State, North-central Nigeria are faced with two natural disasters all season round. It is flood, flood everywhere within the 1st and 2nd months of rainfall, bringing down trees, residential structures and washing away crops and livestock, leaving the people with unquantifiable losses. The three communities under study have no rivers or other water bodies to survive on during scarcity. For years, no government or any agency has ever thought of these communities in terms of water resource management and development. As such, the people resolved to dig and create dams through community manual effort. However, most of the dams are shallow (5 - 10ft), and so easily get filled within the first two months of rainfall. Figure 1 shows one of such dams filled with water within the first month of rain fall. Any additional water causes the dams to overflow on farmlands (Figure 2). Residential houses (built of mud) are always at the mercy of the early rains which are usually torrential and accompanied by the windstorms. However, it is always a different story when rains cease. 2–3 months of rain ceasure is enough for the surface dams and other water bodies in these communities to dry up, leaving human and livestock to compete for survival in the cloudy and muddy water. The researchers were reliably informed by the inhabitants that their outcry over the years had not attracted the attention of the State or Federal Government of Nigeria or any Non-Governmental Agency to the serious problem of portable water in this area.

In this study, the possible causes of flood and the fast rate at which the dams compete to dry are X-rayed and the implication on the education, economic, health and family social life of these people is highlighted and suggestion for a possible solution proffered.

METHODOLOGY

This study was accomplished by periodic visits to the area to observe and record parameters like the level of water of the dams, clarity of the water, temperature of the water and the environment, wind pattern and other environmental factors. The Primary Health facility available to the communities was also visited to obtain data on the reported cases of some water related ailments. Personal interviews were also conducted with some of the inhabitants.

RESULTS AND DISCUSSION

Based on the three year monitoring of the weather, a quarterly summary of the results obtained is presented in Table 1. Between March and April, almost all the dams run dry (Figure 3). During this period, evaporation and dehydration are very high because of the abrupt increase in temperature ($39 \pm 1^\circ\text{C}$). The environment becomes hot with lot of warm breeze. Absence of vegetation around the dams and the shallow nature of the dams, increase the amount of light reflected into the atmosphere which gets heated and disperse clouds, making it impossible for rain to fall (Anitei, 2007).

There is also the problem of intersecting unsaturated aquifers (US Geological survey, 2003 and McGuire, 2003), so that wells cannot be dug to any appreciable depth. Doing so will cause them to ‘cave in’ after sometime and finally collapse. This is also the reason for the shallow dams. Of course, the inhabitants particularly women and children, will have to trek or ride (on bicycles) long distances to neighboring communities where there are running streams to get clean water. In the alternative, they can make do with the dirty and cloudy water left at the bottom of the dams (Figure 4). Those who can afford the cost of alum can use it to precipitate the water or resort to some local herbs as precipitating and purifying agents.

The period between May and August is characterized by heavy wind storm prior to rainfall, clear visibility and flood with fluctuating temperature ($28^\circ\text{C} - 35^\circ\text{C}$). Between September and November, the rains cease with mist and fogs being experienced in the morning and late evening. Visibility during this period is a little bit poor with moderate temperature between 29°C and 32°C . The dry season continuous through to February, with further drop in temperature ($22^\circ\text{C} - 26^\circ\text{C}$), and high intensity of mist and fogs.

The above scenario can be attributed partly to the climate change and partly to the lithology and geology of the area. Climate change can affect water resources through its impact on the quantity, variability, timing, form, and intensity of precipitation (Richard et al, 2008). Additional effects of climate change that have important implications for water resources include increased evaporation rates, a higher proportion of precipitation received as rain, earlier and shorter runoff seasons, increased water temperatures, and decreased water quality in both inland and coastal areas(Adams and peck,2008; Gleick,2000; Solomon,2007 and Water climate,2009).



Figure 1: Photograph showing one of the dams filled with water within the first month of rain fall



Figure 2: Photograph showing a flooded farmland due to overflow of one of the dams

Table 1: Quarterly summary of the results and observation

June – August	Sept – November	Dec – February	March – May
Rainy (flooding) period	Ceaseure of rainfall	Dry season continuous	Disaster (drought) period
Temperature fluctuates between 28 ⁰ C and 35 ⁰ C (about to rain)	Moderate temperature (29 ⁰ C - 32 ⁰ C)	Drop in temperature (22 - 26 ⁰ C)	Abrupt rise in temperature (39 ⁰ C - 40 ⁰ C)
Clear visibility	Onset of mist and fogs making visibility poor	Thick/heavy mist and fogs between 6-11am and 3-7pm	Warm breeze
Heavy wind storm prior to rainfall	Less but dry wind	Chilly morning and evening	Windy but clear environment



Figure 3: Photograph showing one of the dry up dams



Figure 4: Photograph showing children struggling obtain drinking water from the dirty and cloudy water left at the bottom of the dam

The physical and economic consequences of the effect of climate change on biodiversity, agriculture, water resources, etc., have been discussed by various authors and authorities (Ojima et al,1990; Colon and Miller,2001; Water cycle study,2001; US Geological survey,2003; Climate change,2009 and Miller,2009).

Implication

The education, health, economic and family social life of these communities suffer most. For example, the education of the children is affected because during scarcity, half of the day is spent searching for water. Women and children wake up at 4 a.m. and head to the dry muddy dams in order to get little water which might have settled overnight. At times they trek long distance only to return without a drop to use because of the competition from other villages. Attending school during this period is not compulsory as the teachers are not left out in the struggle. Water related topics are no longer interesting because they remind them of the situation and little is assimilated.

Even though there are no industries, too much traffic and waste dumping near these dams, there have been reported cases of diarrhea, typhoid, *schistosomiasis*, dysentery, intestinal helminthes and hepatitis among children (2 - 10 years) and

adults. For instance, 470, 360 and 460 cases of *schistosomiasis* were reported in 2007, 2008 and 2009 respectively. There were also 201, 465 and 419 cases of typhoid in 2007, 2008 and 2009 respectively in the area. Flooding increases the health threat from contamination through the washing of gutters, human and animal wastes, etc. into the dams (Aniter, 2007). Domestic cleanings (washing of clothes and kitchen utensils), washing of cars are also done at the bank of some of the dams. Besides, livestock are not restricted from drinking the water and this can as well introduce some pathogens into the water.

The economic loss is great, similar to that reported in some African countries and Bangladesh, where women and children spend the entire morning looking for water instead of going to the market to trade (Ahmed, 2008). Men no longer grow enough crops because they spend less time on the farm and more riding long distances in search of clean water in the distant villages and towns. Sometimes the farms are flooded with water and most of the crops are lost through washing away thereby creating hunger in the communities.

The women have little time to engage in other activities especially during scarcity because they sleep late and wake up early. A similar situation to

that of Bangladesh, where adolescent girls may be eager to get married outside the communities, but the parents may not wish that it happens because they help a lot during water scarcity (Ahmed, 2008). As a lady marries the groom families celebrate while her family does the opposite.

Suggestions

The following suggestions are hereby proffered as possible solutions towards addressing the water problem in the area;

- i. Comprehensive geological survey of the area should be carried out for better understanding of the lithology and geology of the land, in order to identify suitable locations for drilling and digging of boreholes and wells.
- ii. The government should come to the aid of the communities by expanding and maintaining the existing dams.
- iii. The communities should be encouraged to plant vegetation around the dams and there should be demarcation of the points of use for human from those for livestock.
- iv. The building of pond-sand filters for water purification and use of appropriate precipitation and purification agents should be encouraged.
- v. Climate-proof adaptation projects like construction of personal rain tanks, ponds reservoirs, etc. should be undertaken.
- vi. There is the need to develop and organize awareness programme on the safe use and the protection of water sources in the area.
- vii. Relevant International Humanitarian Agencies are hereby invited to come to the aid of these communities in addressing some of the above suggestions.

CONCLUSION

Perhaps, a visit to Kwaikong, Wubang and Mangwang communities of Langtang South Local Government Area of Plateau State, North-central Nigeria, in the summer and winter will convince one of the seriousness of the water problem in these communities and the attendant health implications. The suggestions proffered should be implemented by the government as a matter of urgency in order to save the lives and endowment of these communities.

ACKNOWLEDGMENT

The authors are grateful to the University of Jos and Pan African Chemistry Network (PACN) for financial support and opportunity to share our results at the 2009 PACN Sustainable Water Conference in Nairobi, Kenya.

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