

Implications of Ecological changes on Sustainable Livestock Production in the Lake Chad Basin of Nigeria

*S.O. Aribido and P.I Bolorunduro

National Agricultural Extension and Research Liaison Services, Ahmadu Bello University P.M.B 1067, Zaria, Nigeria.

Target Audience - Policy Makers, Research Scientists, Research managers, Extensionists

Abstract

The Lake Chad Conventional Basin is an extensive semi-arid plain covering parts of Chad, Cameroon, Nigeria and Niger; where diverse human economic activities such as farming, livestock husbandry, fishing, trading and industrial mining explorations are carried out. About 70% of cultivated land in the basin is fallow and this largely explains the high concentration of livestock as well as the existence of large trans-Saharan livestock trading centers within and around the basin. The lake provides drinking water for livestock while its seepage to the surrounding soils provides moisture for growth of herbage. The fertile alluvial soil deposit on the shore of the lake by the receding flood encourages arable farming practices that produced crop residues for livestock. Trans-humant cattle, sheep and goats constantly move across national boundaries between the various ecological zones depending on which is currently most favourable. The decades of Sahelian drought of 1963-1983 caused a 60% reduction in water volume of the lake which had serious adverse effects on socio-economic activities including livestock production. Vast areas of swamps bordering the lake dried up leading to reduction in forage availability. On the other hand there has been a consistent increase in demand for meat by the ever increasing human population. Because of its importance as a reservoir of natural resources, the Lake Chad Basin is heavily populated and greatly exploited, particularly on the Nigerian portion. Human activities as well as natural changes have produced noticeable environmental effects with pressure on the fragile resources of the basin. Irrigation schemes on the in flow rivers abstract copious amounts of water. The use of agro-chemicals, particularly insecticides and large quantities of fertilizer, became widespread as the traditional and subsistence forms of agriculture metamorphosed into commercial agriculture. Prospecting for crude oil and mining of other solid minerals have left mining pits which are ecological wastelands. These changes raise concerns over pollution of the lake water which have health implications for the local livestock and human populations. These have caused major setbacks to the productivity of livestock in the basin. Improved agricultural practices and rational resource management policies are recommended in order to restore the ecology of the basin and hence increase productivity of the resident livestock population.

Key words: Lake Chad, Livestock, Ecology, Production.

Description of Problem

The Lake Chad Conventional Basin stretches between latitudes 10° and 16°N and longitudes 10° and 18°E. and covers an area of 427 300km², a total cultivated area of 3,140,000ha and the total lake surface area of 10,000km² (1,2).

The distribution of the basin's area, total cultivated area and surface area of the lake among the four riparian states are shown in Table 1.

The Lake Chad Basin is an extensive semi-arid plain where diverse human economic

activities such as farming, livestock husbandry, fishing, trading and industrial mining explorations are carried out. The location of the Lake Chad within the vast area of arid environment directly or indirectly influences these activities. The volume of the water and its extent are dictated mainly by climatic changes which determine the annual flood level of the drainage rivers. The water supply of Lake Chad comes from several sources, and the amount is

determined by the immediate rainfall on the lake itself (<2%), the local rain draining along the minor tributaries (5-10%) and the effluent of the large rivers Yobe, El-beid and Chari-Logone (about 75%). Important too is the high rate of evaporation and seepage into the surrounding sandy alluvial soil deposit. These characteristics perhaps cause the water to remain perceptually fresh and never salty like some other lakes.

Table 1. Distribution of area of the basin and lake surface by the riparian states

		Surface area		Cultivated area		Lake surface area	
		Km ²	%	ha	%	Km ²	%
Chad	178,300	41.7	560,000	17.8	5000	50.0	
Niger	121,500	28.4	125,000	4.0	1700	17.0	
Nigeria	90,000	21.1	2,010,000	64.0	2500	25.0	
Cameroon	37,500	8.8	445,000	14.2	800	8.0	
Total	427 300	100	3 140 000	100	10 000	100	

Source: Lake Chad Basin Commission (1989)

The lake provides drinking water for livestock, while seepage to the surrounding soils provides moisture for luxuriant growth of herbage for livestock consumption. Similarly the fertile alluvial soil deposited on the shore by the receding flood encourages extensive arable farming practices that offer a great biomass of crop residues for livestock. It is estimated that fallow land representing 70% of the total cultivated land in the basin covers an area of 7 million ha (1). This explains the large concentration of livestock coming from near and far parts of the Central African region to the basin, and the existence of large trans-Saharan livestock trading centers within and around the region.

Three major climates prevail in the zone—the sub-Saharan climate in the extreme north, the Sudano-Saharan climate in the center and south, and the Sudano-guinea climate in the extreme south. These regions provide varying climatic conditions within which a large population of human livestock shuttles depending on which region is currently most favourable in

terms of available herbage resources.

Because of its importance as a reservoir of natural resources, the Lake Chad Basin is heavily populated and greatly exploited, particularly the Nigerian portion. Human activities as well as natural occurrences such as climatic changes, with their effects on the hydrology of the lake and the ecology of the basin in general, have produced noticeable environmental degradation. The constant threat of drought and desertification, the increasing damming of the inflowing rivers for irrigation, and the alarming destruction of the basin's biotypes in the past two decades, account for some observable ecological changes. The objective of this paper is to highlight these changes and their implications for livestock production in the basin.

Changes in the Ecology

Although the spectacle of Lake Chad's receding shoreline is not a new phenomenon, the recent fall in the volume of water in the lake following the intensified Sahelian drought of

1963-1973 was remarkable in two ways (3). First, the lake in 1973 has shrunk down to 3 small "pools" of water, and in 1975 had further reduced to a single isolated pool in the southern part of Baga town by the shore of the lake.

The decade 1973-1983 witnessed the lowest volume of water in the lake in the 20th century, with a water area of 6000km² compared with 25000km² in 1963 (1,4). Second, the available evidence indicates that the Sahel drought was associated with fundamental changes in the circulation pattern of the atmosphere which affected the precipitation characteristics of the low altitude belt. This desiccation is expected to last for a few more decades (3). The continued effect of these changes is reflected in the increased desertification of the basin due to low precipitation and reduced surface area of the lake.

Earlier development of irrigation schemes on the inflow rivers Yobe (north and El-beid (south), and the commissioning of the South Chad Irrigation Project (SCIP) in 1979 and Baga Polder Project (BPP) in 1983 on the lake itself, resulted in abstraction of copious amounts of water for irrigation. Since the irrigation projects have the capacity for a total area of about 103 800 ha, it confirmed that the water used for these schemes, together with continuous decrease in precipitation, resulted in serious reduction in the level and area of the lake. Studies (4,5) have shown that over 70% of the lake surface has been covered by water weeds. Some human economic activities such as fishing, arable farming and oil exploration are relevant to the ecological changes in the Chad Basin. Studies showed that 90% of the economically active population in the basin is employed in agriculture, livestock raising and fishing (6). The annual recession of the lake leaves behind vast areas of swamp with sufficient residual moisture to grow food crops such as cowpea, cereals and various horticultural crops within a short period of three (3) months i.e. February to April, The practices of employing

agro chemicals and large quantities of fertilizer became widespread as the traditional subsistence forms of agriculture metamorphosed into commercial agriculture with the advent of the irrigation projects. In addition, the use of fire for hunting is often devastating to the grassy terrain, shrubs and scattered trees, thus reducing available forage for livestock. Prospecting activities for crude oil by the Nigerian National Petroleum Corporation and mining of solid minerals, especially potash for domestic and industrial uses, have left behind mining pits which are ecological wastelands. Such activities further reduce the herbage density of the basin.

Implications of changes in the Ecology

Ecology change in the Lake Chad Basin have significant effects on livestock production. The 60% reduction in water volume in Lake Chad between 1970 and 1989 has had serious adverse effects on socio-economic activities including livestock production (1). The vast area of swamps previously bordering the lake have dried up and no longer support the luxuriant vegetation fed to livestock in dry periods. The reduction in forage availability has stimulated a major shift of grazing animals away from the Nigerian portion of the basin to the Cameroonian side that has a more stable ecology. As the Nigerian sector of the basin is reputed to be a major livestock producing zone, contributing as much as 39% of Nigeria's annual cattle supply (7) there is the fear of shortfalls in national supply of livestock products consequent upon the changes in the ecology of the lake's basin. Research works have shown that the major transitory livestock marketing centers in the surrounding villages and towns have been abandoned to trading in grains (2). The trend of cattle import into Nigeria from neighbouring countries between 1986 and 1990(8) attests to the dwindling livestock marketing activities in the region (Table 2).

Table 2. Cattle imported into Nigeria from Neighboring Central African Countries

Year	Chad	Cameroon	Niger	Total	Annual %
1986	15825	3458	9662	28945	13.31
1987	80701	2528	5652	88881	40.86
1988	24692	2194	7948	34834	16.02
1989	16092	2591	6044	24727	11.37
1990	23696	4628	11794	40118	18.88
Total	161006	15399	41100	217505	

Source: FLD and PCS (1991)

There has been a consistent decrease in the number of goats from across national boundaries to Nigeria through Dikwa Control Post and subsequent decreases in the number slaughtered in Maiduguri abattoir between 1990-1993, reflecting decreasing goat population in the basin (Table 3).

A serious ecological problem in the Lake

Chad basin threatening livestock production is the incidence of pest and water borne diseases. Since 1989, the incidence of a pernicious pest, *Cochliomyia hominivorax* commonly called "screw worm flies" has been eliminating substantial herds of cattle annually (9). Findings show that the receding lake

Table 3. Live goats imported into Nigeria through Dikwa Control Post and number of goats slaughtered in Maiduguri (1990-1993)

Year	Trade goats passing Dikwa Control Post	Goats slaughtered in Maiduguri
1990	2687	82596
1991	1250	69246
1992	630	66008
1993	622	46125

Source - FLD and PCS (1995)

gave rise to increased populations of molluscs and other fauna which are potent vectors of disease parasites such as *Schistosoma sp* (10).

It has already been noted that the diminishing water area of the lake basin has promoted increased use of irrigation technologies and intensive crop production involving high inputs of agro-chemicals and fertilizers. These inputs raise concern over pollution of the lake water. Leaching of phosphates and nitrates and the washing of

slowly-degrading chlorinated hydrocarbon insecticides into the lake have health implications for the local livestock and human populations.

Recent intensive human exploitation of the lake basin for domestic purposes and industry have produced environmental changes with potency for disruption of livestock if improved agricultural practices are not promptly adopted and efforts made to restore the basin's rich ecology.

Conclusion and Recommendations

The unique location of the Lake Chad Basin and its importance as a livestock producing zone have been discussed. The ecological changes consequent upon natural and human economic activities have also been examined. The ecological changes are having drastic effects on the availability of forage for livestock, as well as promoting the prevalence of pest and diseases that are rapidly decimating livestock populations. Although ecological changes in the Lake Chad Basin were occasioned by both natural and human interferences, substantial control of the latter may stem the severity of the natural phenomena and hence a maximization of livestock production in the basin. The following measures are therefore recommended:

1. The Lake Chad Basin Commission responsible for policy implementation for the entire basin, must work out modalities for effective policing of all human activities which promote environmental degradation.
2. Livestock grazing reserves should be identified and developed in the basin by the governments of the riparian nations. The rangelands may be developed through annual re-seeding techniques. In order to partly offset the cost of production, established pasture may be commercialized if adequately protected.
3. Farmers in the basin should be encouraged to plant forage trees as an integral part of their farming activities, and supported with planting materials and other necessary farm inputs.
4. International co-operation and collaboration on environmental monitoring and research should be put in place (especially among the riparian states) to records and undertake environmental studies in the basin.

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