CHAPTER 9

CHANGING TRADITIONAL RESOURCE MANAGEMENT SYSTEMS IN THE CHAD BASIN AREA: THE CASE OF RURAL BORNO STATE

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ABSTRACT

Adaptive processes in the Chad Basin area under traditional resource management systems have generally been ignored in development projects. In consequence, there has been intensification of regional inequality, peripheral dependency, and periodic food crises. A key step towards initiating feasible resource management systems is an understanding of the traditional methods of resources utilization and management, and, their changing role in the economy of the semi-arid region of Nigeria. This paper examines two indigenous practices among rural communities in Borno State, Nigeria: these are, the utilization and management of water resources and land for agriculture. The result reveals that the rural people still operate through traditional resource management systems that are fair and sustainable. However, some of the existing systems are changing due to a number of extrinsic forces, which push rural people to exploit their environment in certain ways. Policy changes and reforms in the rural areas must be practical and suited to the needs of the rural people in order to achieve the desired results.

1.0 INTRODUCTION

Natural resources degradation is a serious environmental problem in the world today. The situation is worst in Africa (Angelsen, 1997), with two-thirds of the continent being deserts or semi- arid land. The problem of resources degradation has often led to conflicts over the use of natural resources. Thus, recent years have witnessed a growing awareness of the need for better understanding of the effects of man's activities on all facets of the environment. This is reflected in an increased concern for the sustainable development of the earth's ecosystem and generally heightened sensitivity to issues of environmental quality. Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future (NEST, 1991). It is a process in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspiration. Resource management on the other hand, is a process of decision making whereby resources are allocated over space and time according to the needs, aspirations, and desire of man within the framework of his technological inventiveness, political and social institutions, legal and administrative framework (O'Riordan, 1971).

People's response and attitude toward resource use are conditioned by time, place and culture (Hodge, 1963). For instance, the urban-industrial cultures have a very different set of relationships with the environment from rural-agrarian cultures and each has produced distinctive landscapes, which divide the world up into a wide range of regional units. Rural households are often highly dependent on the natural resources or otherwise referred to as common property resources (CPRs), which include fallow fields, forests, rangelands, wetlands, fishing and hunting lands for their livelihoods (OECD, 2001). The common property resources (CPRs) represent a significant component of the land resource base and have special importance for the rural communities. The range of products drawn from CPRs includes food, firewood, manure, fodder, medicinal herbs, handcrafts, materials for construction, water, amongst others. Access to CPRs is generally governed by traditional rules that governed who can use different aspects of the resources, and when. In addition, traditional systems to manage CPRs are built on common beliefs within the community. As these beliefs change, traditional resource management systems become less effective. In many countries (including Nigeria), community beliefs are changing rapidly in response to a variety of pressures, such as changing land use practices, population growth, government policies, urbanization amongst others. Thus, long-standing and sophisticated traditional systems of community resource management are breaking down, without being replaced by equally effective modern institutions. The result is that common property resources often become de facto open access resources. Unlike CPRs, open access resources are not controlled by any user and are thus open to all. This has led to rapid exploitation and depletion, as users maximize their short-term gain from access to such resources. Events in the Chad Basin area in recent times (Boundary conflicts and resettlement schemes) have brought out the need for a strategy of sustainable development, which involves the articulation of environmental and other elements of human needs and rights with the economic growth and development policies

According to Ajaegbu (1997), the new thing today in environmental and resources management is working as partners with the local people/communities; understanding the environment not only in its technical sense, but also in its socio-ecological, socio-economic and cultural contexts; understanding the interaction of local people and the environment; and designing action-oriented management projects that will get people in local communities to participate or even to be largely responsible for the management of their environment and resources. This paper addresses some of the ways rural people manage two basic resources (water and land for agriculture) in the Chad Basin area of Nigeria and the gradual breakdown of traditional resource management systems within the region (with special reference to Borno State).

2.0 MATERIALS AND METHODS

2.1 Study area

Borno state lies between Latitudes 10°-13° N and Longitudes 12°-15° E. A greater part of the State lies on the Chad Formation, an area subjected to prolonged continental and Lake sedimentation as a result of the down warp of the Chad Basin in the Pleistocene period. The State could be divided into two broad relief regions, namely; the hilly/ mountainous areas of generally over 600m above sea level, which cover the south and southeastern parts of the State; and, the plains of generally less than 600m above sea level which dominate much of the central and northern parts of the State. The basement complex underlies the highlands, while the vast open plains are developed on the young sedimentary rocks of the Chad formation.

The major rivers in the State are: The Hawul, Yedzeram, Nggada and Nggadabul rivers, which are locally important to the rural communities along their courses. Three seasons can be identified in the State: the cool dry (harmattan) season (October-March); the hot dry season (April-June); and rainy season (July-September). Temperatures are high all year round, with hot season mean temperatures ranging between 39° and 40°C under the shade in the northern part of the State. The mean annual rainfall is over 800mm on the Biu Plateau but less than 500mm in the extreme north. Droughts are endemic. Two vegetation zones are identified: the Sudan and Sahel savanna. The vegetation consists mainly of combretaceous woodlands. In terms of soils, the vertisols dominate the flat plains close to Lake Chad, and in the depressions. The regosols are developed on dunes. These are shallow soils with weakly developed profiles. The volcanic and basement complex areas have rich clayey loamy soils in the valley bottoms, but skeletal soils (lithosols) and rock outcrops occur along the gentle and steep slopes respectively.

As far as population is concerned, Borno state is quite heterogenous. Kanuri is the dominant ethnic group. Other ethnic groups are Bura, Babur, Shuwa, Marghi, Chibok, Kwayam, Wula, Ngoshe amongst others. The 1991 population census put the total population at 2, 596,589. The projected population figures currently put the population of the State at 3, 178, 225. The State has a large land area (69,435 sq. km), but with sparse population. Majority of the people are farmers, herdsmen and fishermen. Agriculture is the mainstay of the economy. To a large extent, the successful development of the natural resources of the State depends on human adaptation to the hostile environment. The diverse ethnic groups spread over a wide range of physical environment (from the Lake Chad through the Wetlands and Sandy areas to the Hilly regions toward the Southern part) has affected the utilization, conservation and management of environmental resources in different ways. It has also affected crop pattern, building styles, land use, vegetation amongst others.

2.2 Method of Data Collection

The study is based on several years of research on the Borno environment by the Researchers (Shettima, 1987; Msheliza, 1997; Ayuba, 1992; and, Ayuba et al, 2002). It is also a collection of more than 10 years of field surveys and observations by the Researchers and their students in several rural communities within the State. For instance, the Researchers visited more than eight rural communities during the year 2003 alone. Field surveys included focus group discussions (Rapid Rural Appraissals), in-depth interviews and observations. In- depth interviews covered broad topics such as water, agriculture and other areas that are not covered in this paper (Ayuba et al., 2003). Special visits and interviews were made to village heads (Lawans and Bulamas) in order to get their perspectives on some of the issues raised. The secondary sources of information include research reports, conference proceedings on the Borno environment, and several issues of "Annals of Borno"—a multi-disciplinary annual periodical of research and documentation in the human and natural sciences covering Northeastern Nigeria, published by the University of Maiduguri.

3.0 RESULTS AND DISCUSSION

The results and discussion focus attention on two major areas of resources utilization and management among rural communities in Borno State, namely; water resources and agriculture. Other topics are treated elsewhere (Ayuba et al., 2003).

3.1 Water resources

Water is a daily necessity and a key factor in the well being of people and livestock in rural Borno. The water resource is perhaps the most fundamental feature that has shaped rural communities in the State. The way in which water is distributed serves to bind people together and to underwrite their differences. In other words, water is a source for social integration and social differentiation. The wells in particular (and more recently, the boreholes), are a focal point for social integration. People from within the community meet at the well: the women spend time there, washing clothes and chatting. Strangers are either excluded or may use the source only with permission.

Most water carriers are women and children: despite the heaviness of the task, it is not a man's work in most of the rural communities surveyed (except the Fulani men who are involved in lifting water for animal use). The fetching of water determines the structure of the day for the woman and children in the household. Usually, she has to go for water first thing in the morning and again during the day. Sometimes, three trips are required every day. Several containers are used. In the past, calabashes, clay pots and animal skins were used. Today, plastic buckets, jerrycans, and old tyre tubes holding up to 40 litres of water are used. The volume of water used by each household seems to be associated with a number of factors: the number of people in the household, the number of livestock owned, time spent waiting on queue, and other technological consideration such as the need for a bucket, jerrycan, or water tank

Water for people and livestock traditionally has been procured from ephemeral ponds, surface rivers, shallow wells dug in riverbeds during the dry season (usually less than 20metres deep), and deep wells dug through communal efforts. Today, some villages have boreholes and cemented wells provided by government. Others have their exclusive wells in their compound. The rural people mostly use ponds in the rainy season and wells in the dry season to supply water for human and livestock. These sources have different costs and benefits. The ponds are easily accessible but are available for only a short period of time. The wells are usually a permanent source of water but require a large input of labour to lift water to the surface. Where the wells are deep (more than 40metres), donkeys and camels are used to lift water to the surface. The wells in the State have different water-bearing properties: the wells on the basement complex and volcanic substrates toward the southern part have more favourable water storage characteristics than wells on the sedimentary and Chad formation towards the northern part.

Water harvesting and management

In the semi-arid region of Nigeria, there is very little in the literature about traditional water harvesting techniques, even though rural dwellers have devised age-long traditions on how to manage water. The most widespread traditional water harvesting techniques observed for crop production and livestock in Borno state are variations of contour earth bunds with walls around which excess runoff is drained; and, shallow wells dug in river beds. These are common in cropping fields along the River Yedzeram. In the heavy and cracking clay soils (vertisols) where masakwa (dry season sorghum) is grown, peasant farmers build bunds/strips across the gradient to trap or hold water to ensure that the soil is well saturated for the production of the masakwa during the dry season. Since the infiltration rate in such soil is normally low, the masakwa can then make use of the residual moisture in the soil. Where earthen bunds/strips are used in water harvesting systems, breakages are commonplace, and erosion from the breaches are severe.
Many masakwa farmers in the Bama area also conserve water absorbed by the cracking clays during the rains by pulverizing the topsoil with hoes during weeding to seal up large cracks/openings created. The sealing of the topsoil by pulverization reduces loss of water via evaporation.

Another conservation measure adopted by peasant farmers in fadama land is mulching. Some farmers leave their crop stubble after harvest while others purposely cover their farms with grasses or rice husks. These crop residues not only improve soil structure and fertility, but also conserve soil and water by reducing runoff and allowing more water to infiltrate into the soil. Shaduf irrigation is still a common practice among fadama farmers around Ngurosoye. Although with increased incentive by government, many of the fadama farmers have their own water pumps and washbores. Water for domestic use is collected from roofs (zinc) and stored in clay pots, drums, jerrycans, and water tanks. The volume of water stored and used is chiefly a function of income and material wealth. The fulanis have adapted to the problem of water by queueing at the wells at various times to provide water for their livestock. Some move their animals to more distant water sources.

3.2 Agriculture

Agriculture is not only a vital source of food among rural communities in Borno state; it is also the prevailing way of life. An average of 90% of the rural population engage in crop production and livestock husbandry.

Tillage practices, crops grown and storage systems

The common traditional tillage practices found in the State are minimum tillage (hand-hoeing), harrowing once, harrowing twice, and, ridging across the predominantly wind erosion direction. Simple tools such as the short-handed hoe, long-handed hoe, axe, long-forked sticks, cutlass, and Ox-carts are used in land preparation and tillage. The use of simple tools such as the short- and long-handed hoes affect only the topsoil and appears to do limited damage to the soil during normal rainfall years. However, during below normal or drought years, tillage in whatever form accelerates wind erosion. Msheliza(1997a) observed that deflationary activities are more over farmed areas than areas left fallowed. Field observation reveals increasing pressure on land for agricultural purposes and fuelwood in Biu and Hawul Local Government Areas. This has forced rural people to farming and tree felling within traditional graveyard areas, a practice that could not be imagined in the past. The major crops grown in the uplands are millet, sorghum, beans, groundnuts, and maize. In the fadama fields, crops such as rice, wheat and vegetables are grown for household consumption and income generation. Recently, sesame is also cultivated by the rural farmers.

More than three-quarter of the agricultural output of these peasant farmers are kept at the village level using simple storage systems (Appert, 1987). These methods provide different levels of protection of grains against biological agents of deterioration, especially insects, of which weevils and bruchids are the most important. A survey of 10 rural settlements in Borno state (Lale, 1997), which is corroborated by the findings in this study, revealed that the rumbu (local granary), underground pits and on-farm storage, are the most popular storage systems used by the rural households. Unthreshed millet and sorghum is stored temporarily on- farm by making a bed of stalks. The crop is then heaped on to the stalk bed in a form of a dome. This is completely covered with thorny shrub species cut from the fields. The threshed seeds are stored in rumbu and underground pits (an underground pit can accommodate up to 30 or more sacks of threshed grains). The mats used as lining for the interior walls of the pits to check possible dampness and contamination of stored grains are made from locally available materials. Rice husks are also used to fill up empty spaces between the pit wall and the mat. Other storage structures include the use of live tree branches on-farm, and make shift canopies using tree branches cut from the bush. Serious losses have been reported in the use of most of these traditional storage structures. Losses include physical and chemical deterioration of the grains, theft and attack by insects, moulds, rodents, and other domestic and wild animals. Methods of reducing losses are difficult to implement probably as a result of extant economic and sociological factors (O' Dowd, 1971). However, in recent years, the peasant farmers are substituting some of these traditional storage structures for modern ones such as metal bins, plastic containers and propylene sacks.

3.3 Soil management systems under traditional farming

Peasant farmers in Borno state have various ways of managing the soil to improve productivity. The use of animal dung, agro forestry, intercropping, crop residues, planting in rows, terracing, composting, mulching, bird droppings, burning of farm residues as a management strategy, and Binne are age-long practices. Binne is a traditional practice that involves burying of seeds especially millet, in the soil in anticipation of the rains. Since millet can thrive even under a short dry spell, yields are not grossly affected during such periods. The timing of sowing in this case is very important as it determines the difference in yield between farm plots. Timing however, is a matter of chance. The practice of shifting cultivation is gradually being phased out due to intensification of agriculture. Animal dung and crop residues are conveyed to the farms using Ox-cart and donkeys.

A survey of rural communities (particularly villages like Dusuman and Maimeleri) in the State revealed that farmers are fully aware of the effect of decomposing remains on their farms. Unpacked corn stalks and other crop residues are left on the farms to decompose. On the fadama fields, bird droppings were used in the past to improve soil fertility. However, with the decline of trees and consequently bird nests, the bird droppings are no longer substantial for use as organic manure on the farms. Chemical fertilizers are now used. According to the farmers, animal dung are not applied on the fadama fields because they promote the growth of excessive weeds. The harvesting of farm residues is also a common practice among peasant farmers in the region. Corn and millet stalks, rice husks, groundnuts and beans leaves are harvested and stored as harrawa (animal feeds) for livestock use during the long dry season. The corn and millet stalks also provide readily available materials for erecting huts and shades, roofing houses, and fencing of household compounds. Harrawa harvesting provides a good source of income for the rural farmers as the harvested plants are sold to nearby urban areas. In northern Borno, these are sold to urban areas of Gubio, Magumeri, Monguno, Kukawa, and Marte. A large proportion is brought to Maiduguri where there is an ever-growing market, especially since the 1985 SAP (Structural Adjustment Programme) and post SAP years. Income generated from the sale of harrawa is used to procure grains and to meet other domestic needs.

In spite of the benefits of the harrawa business, this practice easily leads to accelerated soil erosion by wind and water as the cultivated fields are often left bare. The removal of such crop residues, which could otherwise have contributed to increased organic matter on the farms, has led to soil nutrient depletion in many rural farmlands. This could also lead to desertification if not checked (Msheliza, 1996). The tide of these undesirable practices can be stemmed through increased agro forestry practices in the State. Conservation farming, (also known as conservation agriculture or conservation tillage) may also offer an opportunity to reverse this development. Conservation tillage practices, through minimum disturbance of the soil and the addition of organic matter from cover crops and mulch, will improve soil biology and structure, allowing plants to use water more efficiently. A soil that is porous, absorptive, and rich in organic matter and biological activity will be able to support maximum crop production for every drop of water it receives.

3.4 Pests, Diseases and Adaptations

The most common pests and diseases that destroy crops in both fadama and upland farms as revealed by the farmers are Quela birds, Rats, Locusts, Rodents, Stem borers, Army worms, Termites and Aphids. According to Anaso(1994), the high humidities and cooler temperatures of the fadama areas in particular, have encouraged mass immigration and faster development of anthropod fauna. Fadama lands supply the moist requirements for oviposition and egg development, while the accompanying crops support large nymphal and adult populations, which damage crops.

Peasant farmers in Borno have several ways of adapting to the problem of pests and diseases, coupled with the vagaries of the climate such as drought and desertification. To drive away Quela birds, farmers have to go to their farms as early

as 5 a.m. and stay till 5p.m. either shouting or by throwing sticks at the birds. Various forms of scarecrows are also used. Some farmers resort to prayers if the situation gets out of hand. The most common method of adaptation however, is the practice of intercropping as opposed to monocropping. Here, a range of crops is cultivated either on a single farm or on many farm parcels simultaneously. For example, beans or groundnut may be intercropped with millet or maize. This is helpful since these crops have different water requirements. In the event of a less than usual rainfall or where, a farm is ravaged by pests, not all the crops will be affected.

Another form of adaptation is the postponement of chemical fertilizer usage when the raining season is late in coming in any preceding year. The farmers respond by delaying the application of chemical fertilizer to the farms early in the following year because that could lead to the wilting of crops if fertilizer pellets do not dissolve. This is more like a game of chance. Losing sometimes could mean a complete change in lifestyle and even of environment. For instance, during the 1983 drought, families in villages such as Auno, Dalwa west and Dungushe responded by migrating to Lake Chad area to fish and irrigate market gardens (Shettima, 1987). Other forms of adaptations include uprooting of millet and corn stalks to deal with the problem of stem borers, and, adoption of innovations such as the introduction of fast yielding varieties of crops (e.g. groundnuts, beans and sorghum). These practices are common in the Magumeri, Gubio, and GammaGoni-Bukarti environs.

4.0 CONCLUSION AND RECOMMENDATIONS

It is often assumed that a lack of technical knowledge is a key constraint to rural people's management of natural resources. However, evidence is increasingly showing that rural people have an enormous store of indigenous technical knowledge. For example, environmentally sound cultivation practices, efficient water harvesting techniques and a range of systems for the management of pastures, fish, and wildlife abound in a variety of cultural forms. This study has revealed that most rural communities in Borno state still operate through traditional institutions and resource management systems, which may be considered fair and sustainable, thereby succeeding in reconciling social needs with the ecological conditions required for maintaining renewable resources. The commitment of rural communities to resource conservation and management over the centuries has played a significant role in allowing soil to regenerate, rangeland species to be conserved, and certain economic trees to be preserved through traditional beliefs and customs. The fact that traditional practices exist and are to a large extent maintained is because they are the expression of individuals satisfying, or attempting to satisfy, the multiple constraints under which they find themselves.

In many cases however, traditional mechanisms for resource utilization, conservation and management are collapsing. The collapse of some of the existing systems is due to a number of extrinsic forces, which push rural people to exploit their environment in certain ways. As a result, rural people are not always able to cope with the growing imbalance between the use of resources to generate income and preserve the potential for regeneration of the resources themselves. This imbalance can be explained by a number of factors:

i. A rapid increase in the pressure on land owing to increasing human population, without sufficient incentives for intensification;
ii. Increased enrolment in western-type schools;
iii. Urbanisation- through the gradual fragmentation of rural societies, for example, the creation of Local government areas;
iv. Contradictions between modern regulations put in place by government and traditional land tenure system; and,
v. Increased demand on fuel wood and fodder resources.

There is thus an urgent need to consider how best to satisfy the requirements of the growing rural population while maintaining the quality and quantity of the natural resources of the State. Improving resource management will therefore depend on strengthening existing traditional organizational capacities. Policy changes and reforms in the rural communities of Borno must be practical and suited to the needs of the rural people in order to achieve the desired results. They must focus on the establishment of community resource management institutions with secure and exclusive group rights over all natural resources on their land, and the opportunity to carry out integrated land use planning and management.

The top-down approach towards solving problems of resources depletion must also give way to local participation. Development programmes regarding natural resources management must involve greater involvement of local people in defining local problems, identifying solutions, and implementing them. Local participation should then be seen as an active process in which the initiative is taken by local people, guided by their own ideas, and using means and processes over which they have effective control. In consequence, development programmes should be implemented in response to specific needs and requirements identified by the local people themselves in collaboration with government agencies.

Local participation would imply that the rural people should:

i. Take part in making decisions about what needs to be done;
ii. Take part in implementing programmes and decisions by contributing resources or managing certain activities or specific organization;
iii. Share in the benefits of the programme; and,

iv. Take part in efforts to evaluate such programmes.

It must be a process whereby local people are given the capacity and power to make their own analysis, direct the process, grow in confidence and take their own decisions. In a nutshell, we believe that existing indigenous practices and previous co-adaptations among rural communities in the State can be advantageously incorporated into modern management interventions.

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