

# Institutional Evolution at Lake Chad: Traditional Administration and Flexible Fisheries Management

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**Abstract.** Lake Chad is a vitally important wetland in the semi-arid Sahel corridor. It provides the basis of many thousands of livelihoods which depend on its seasonal fluctuations to renew fish stocks, farmland and rangeland. This paper describes how the institutions which govern access to fishing rights has evolved on the Nigerian shore of the lake. The paper aims to assess the applicability of different institutional approaches to fisheries management on the lake's floodplain. These include: the 'equilibrium or tragedy' approach characterized by Hardin (1968); critiques of state attempts at regulating natural resources exploitation in the Sahel; models of institutional adaptation to resource scarcity; and approaches which perceive institutions for resource access as a crucial determinant of social and economic development. The western shore of Lake Chad has been under the jurisdiction of Borno State in its various guises since the end of the fourteenth century and is currently one of 36 states in the Federal Republic of Nigeria. Although the administrative status of Borno has varied, it has been dominated by a Kanuri aristocracy for most of its existence. Traditionally, the Kanuri administration has played a crucial role in allocating access to farm land. In recent years, the 'Kanuri administration' has not only maintained its pre-colonial authority over farming on the lake shore, but has expanded it to cover new areas of the lake floor and the increasingly lucrative fishing opportunities which federal government has been unable to regulate. This success suggests that collaboration with the traditional administration is essential to the success of future natural resource management efforts.

**Keywords:** Lake Chad, natural resource management, land tenure, fisheries management, sustainable rural livelihoods

## 1. INTRODUCTION

Institutions are social constructs which guide human behaviour. They range from laws which are formal and with which compliance is obliged, to informal conventions to which conformance is expected. The importance of such institutions in shaping the livelihoods of those who depend on renewable natural resources (RNRs) has been increasingly recognised (e.g. Swift, 1989; Scoones, 1998). The aim of this paper is to examine the evolution institutions which govern access to farmland and fishing rights on the Nigerian shore of Lake Chad. These have been examined within a sustainable rural livelihoods (SRL) framework (Sarch, 1999).

In focusing on the systems of access to fishing rights at Lake Chad, the paper aims to assess the applicability of different institutional approaches to natural resource management on the lake shore. This is important because natural resource development initiatives in the Sahel have frequently been based on institutional approaches that may not have been appropriate to the situations in which they were used and, in any event, are rarely universal. Four institutional approaches to natural resource management are considered in the first section of this paper. These are followed by a review of the natural and social context of Lake Chad and research into fishing and farming livelihoods there. The third section presents an analysis of resource access institutions on the lake shore. The paper

concludes with a discussion of the relevance of different institutional approaches to systems of natural resource access on the Nigerian shore of Lake Chad.

### 1.1 Institutional Approaches to Natural Resource Management

Like Malthus (1803) almost two centuries earlier, Hardin (1968) expressed a pessimistic view of the capacity of the environment to support population growth. Although not the start of the debate, the "Tragedy of the Commons" which Hardin described in 1968 has focused much attention on the issue of access to natural resources. Rather than advocate population controls, Hardin recommended privatisation of natural resources and state enforcement of exclusion from them. The implications of this are that natural resources exhibit a fixed carrying capacity and that producers will not develop their own systems regulating access to these resources where they are shared.

A growing literature both in support and critical of Hardin's thesis has followed. Several distinct approaches can be identified. These include work critical of confusion in the nature of the property rights described by Hardin (1968). A spectrum of property rights have subsequently been defined and distinguished from the shared resources to which they apply (see Ciriacy-Wantrup and Bishop, 1975; Bromley and

Cernea, 1989; Schlaeger and Ostrom, 1994). A further group broadly concurs with the model of impending 'tragedy' and has attempted to devise the most appropriate ways to privatise and/or impose state regulation of RNRs. The experience of these approaches is considered and a critique of these, with particular reference to the Sahel, follows.

Other authors envisage more complex and dynamic relationships between resource tenure and developments in resource use. Two contrasting approaches are considered here: those which envisage institutional adaptation as a process which responds to developments such as population growth; and those which perceive the institutions which govern access to natural resources, as a crucial determinant of social and economic development and are themselves manipulated to serve the interests of the powerful members of the societies in which they operate.

#### *Institutional Intervention*

There are several recent examples of 'tragedies' occurring in natural resource management. Fish stock collapses in the Scottish herring fishery, the Canadian cod fishery, and the Peruvian anchovy fishery, each provide examples of 'tragedy' (Caddy and Gulland, 1983; Whitmarsh *et al.*, 1995; Charles, 1996; Roy, 1996; and see Cushing, 1982 and 1988 for the history of fish stocks). Although some have pointed to the large fluctuations that occur naturally in RNRs and have suggested that equilibrium in them is neither natural or normal, equilibrium frequently remains the objective of resource managers (Behnke and Scoones, 1993; Mahon, 1997; Sarch and Allison, 2000). Many theorists have concluded that state regulation and the privatisation of property rights are the only way to sustain these resources and much subsequent effort has concentrated on defining how the limits of resource use should be set. The United Nations Conference on the Law of the Sea (UNCLOS, 1982) assigned coastal states with the responsibility to identify and promote the optimal utilisation of the living resources with economic exclusion zones which extend 200 miles off shore and this has provided an institutional basis for an approach based on achieving maximum sustainable yields (Gordon, 1954; Scott, 1955).

There have been successful state attempts to regulate access to fisheries. The transferable quota system introduced in Iceland has been noted for its success in sustaining the demersal fishery (Arnason, 1994). However, there are many more which have either failed in their objectives, for example the British Columbia salmon fishery (Fraser, 1979), and/or led to considerable dissatisfaction amongst fishing communities (Matthews and Phyne, 1988; Bailey and Jentoft, 1990). In West Africa state attempts at fisheries management have been associated with the sale of offshore fishing rights to the European Union. The information

which is available on the outcomes of state attempts to regulate African fisheries shows mixed results (Johnstone, 1996).

A widespread example of state regulation of natural resources in sub-Saharan Africa is the forest reserves created throughout the Francophone Sahel during the colonial era. They were established in areas which were thought to be vacant and under used and were subsequently managed by the state forest service with the objective of obtaining sustainable timber yields. These have generally failed, not least because their use and management by local villagers were underestimated (Shepherd, 1991). Villagers were reluctant to leave land fallow in case it should be seen as vacant and were inclined to overwork it rather than let it return to woodland (Thomson, 1983). A lack of enforcement has allowed many reserves to subsequently become open access (Freudenberger and Mathieu, 1993). The decline of systems of access to the forests, seasonal pastures and fisheries of the Niger Delta in Mali and their subsequent over-exploitation has also been attributed to the intervention of the colonial authorities and their nationalisation of natural resources (Kone, 1985; Brinkerhoff, 1995; Williams, 1998). Licenses issued by post-colonial governments for cutting wood and fishing in the Delta have further undermined the customary management of these resources (Moorehead, 1989; Quiensière *et al.*, 1994). This process has also been observed in Senegal where the government has permitted the conversion of both rangeland and forests to peanut fields (Williams, 1998).

Exogenous adjustments to the institutions which govern access to natural resources have been initiated in anticipation of a range of potential benefits. Very generally, these can be divided into attempts, such as those described above, to achieve sustainable production through state regulation; and into attempts to improve the productivity of natural resources through the introduction of private property rights. In Africa, a well known example of an external attempt to improve agricultural productivity is Kenya's strategy of land registration for smallholders initiated after the Mau Mau rebellion in the 1950s (Swynnerton, 1954). Haugerud (1989), however, argues that although agricultural productivity did improve in Kenya this was in spite of land registration rather than because of it. Although Tiffen *et al.* (1994) illustrated how population has grown and individualised tenure spread in Machakos District, this has been criticised for masking differentiation within Machakos (Rocheleau, 1995; Murton, 1999).

#### *Institutional Erosion*

Overall, the alternatives of state regulation and private ownership of natural resources have frequently been shown to have had little success in Africa, and in some cases,

reverse outcomes, environmental degradation and reduced productivity have resulted. Several authors depict a situation where the depletion of natural resources previously held and used in common has been the direct result of intervention from outside agencies. External organisations such as powerful rulers, colonial agencies and emerging nation states have either eroded or dissolved community-based access arrangements either in order to appropriate them or in the name of creating more sustainable or productive arrangements. This process has been observed not only in the rangelands, forests and fisheries of the Sahel but also in the access arrangements to a range of natural and 'common' resources in other parts of the world. (Bromley and Cernea, 1989; Jodha, 1986; Jodha, 1992; Platteau, 1996).

Whether or not external attempts to regulate access to natural resources can improve their sustainability and/or their productivity, there is consensus that, in Africa, external intervention has had an important impact on the institutions which do govern access to natural resources. However, in many situations the systems of access introduced during the colonial and post-colonial eras have not replaced customary systems. Rather, both systems have persisted and the administrative dualism of overlapping state and community systems of resource tenure has increased the vulnerability of community-based systems to abuse (Platteau, 1996; Williams, 1998; IIED, 1999).

#### *Institutional Adaptation*

The concept of adaptation has been used in the development of natural resources policy, where in contrast to Hardin's (1968) picture of resource users 'rushing to ruin', systems of resource access are envisaged as evolving in response to the costs and benefits associated with resource exploitation. Boserup's (1965) theory predicts that as population grows, land tenure will become increasingly individualised in the process of agricultural intensification. Netting (1993: p. 158) describes a range of examples which he uses to show that "land use determines land tenure". Demsetz's (1967) 'Theory of Property Rights' suggests an alternative outcome to the inevitable 'tragedy', where demand on a resource increases, for example through population increase, its value increases and the relative cost of excluding others from its use decreases. It becomes worthwhile for producers to develop their own systems of regulating access to the resource (Demsetz, 1967).

There are many examples which show how resource users can and do adapt systems of access to natural resources where it is in their interests to do so (e.g. Acheson, 1975; Mc Goodwin, 1983). These have validated the adoption of community based approaches by both national and international development agencies both of which have sponsored a range of local-level resource management initiatives, or 'community based sustainable development'

around the world (Leach *et al.*, 1997a). There have been several such initiatives in the Sahel (e.g. Toulmin, 1991; Brinkerhoff, 1995). However, the outcomes of such processes vary as widely as the natural resources and resource users themselves (Toulmin, 1991; Painter *et al.*, 1994; Brinkerhoff, 1995; Leach *et al.*, 1997a). They have, however, often fallen short of expectations and their experiences do not point to widely or easily applicable policy measures (Western *et al.*, 1994; Leach *et al.*, 1997a).

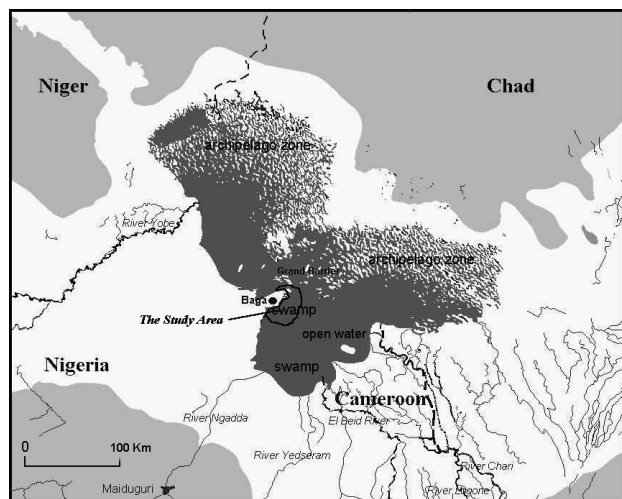
#### *Institutional manipulation*

In contrast to models of institutional adaptation, North (1990) considers the process of institutional evolution as a determinant, rather than a result of economic development. North (1990) argues that rather than to be socially efficient, institutions are created to "serve the interests of those with the bargaining power to devise new rules". More specifically, Leach *et al.* (1997b: p. 4) argue that the assumptions of distinct and consensual communities and of relatively stable local environments, which are fundamental to most community-based resource management initiatives, are incorrect. They suggest that the failure of such initiatives can be attributed to these assumptions and propose an "Environmental Entitlements Framework" in which co-users of natural resources use their varying rights and resources to negotiate for different levels of access (Leach *et al.*, 1997b). The processes of codifying 'native' arrangements for access to land which Berry (1993) examined in former British colonies fit this framework well. She describes how this process placed enormous power in the hands of those with contacts in the British Administration. Both North's (1990) and the environmental entitlements approach point to the crucial role of power relations in shaping the institutions that determine the use and management of natural resources. Although the community-level focus on resource users remains valid, consensus and co-operation between them cannot be assumed.

## **1.2 Lake Chad**

The Lake Chad basin covers a large part of central Africa. The lake itself lies at the south-east extreme of the Sahara Desert and traverses the Saharan, Sahel and Sudan-Savannah agro-climatic zones. Although rainfall is low and variable in these zones, it has little impact on the volume of the lake which is "an accumulator of positive departures from the mean Chari/Logone discharge, rising in response to runs of wet years, falling with successive years of drought" (Grove, 1985: p. 146). Water from the Chari/Logone rivers flows into the lake at its southern extreme and flows northwards and outwards encouraged by the lake's gradient and prevailing winds. This inflow peaks in October/November following the end of the rains in the southern catchment area and reaches a minimum in May/June at the start of the next year's rains. These flood waters take between one and two months to reach the

Nigerian shore where water levels peak in January and reach their minimum in July (Olivry *et al.*, 1996). In the past 25 years, annual rainfall in much of the catchment area has been reduced and the surface area of the Lake has varied considerably both on an intra and interannual basis (Sarch and Birkett, 2000). Although the limits of different ecological zones in the lake are determined by its level, the map in Figure 1 indicates the approximate location of these zones and the study area in the swamps of the Nigerian shore.



**Figure 1** Map of the Lake Chad Basin

The western shore of Lake Chad has been under the jurisdiction of Borno since the end of the fourteenth century. Borno State is currently one of 36 states in the Federal Republic of Nigeria. Although the administrative status of Borno itself has varied, it has been dominated by the Kanuri ethnic group for most of its existence. (McEvedy, 1995). Recent settlers on the lake shore include Hausa families from across northern Nigeria who were attracted by fishing opportunities at the lake during the 1970s (Meeren, 1980; Neiland and Verinumbe, 1990). Although certain ethnic groups have particular traditions, e.g. the fishing traditions of the Hausa, households from a variety of ethnic groups fish, farm and/or herd cattle (Harris, 1942). This paper focuses primarily on the communities who have settled on the south-west lake shore. They include mainly Kanuri and Hausa households.

The Kanuri aristocracy was named the 'Native Administration' by the British colonists (and is called the 'traditional administration' in this paper) who collaborated with them to develop their system of taxing the rural population (Temple, 1919). This had been based on a system of fiefs, either territorial or by association (by trade for example), allocated by the *Shehu*, the suzerain, to either members of his family, favored courtiers, or to high ranking slaves. Under this system, the population were obliged to pay a variety of taxes to the fiefholder who administrated the fief through a tax collector, a *Chima*, and a hierarchy of village heads, *Lawans* or *Bulamas* (Brenner,

1973). Brenner (1973: p. 112) describes how mutual interest was the primary justification for these administrative links:

"Barring drought or other causes of crop failure the peasantry could support itself without the aid of the state, which in any case did little to plan against possible famine. But the protection which the ruling classes provided was crucial, for without it a village might be the constant target of slave raids and looting forays."

Under the colonial system of taxation, the *Shehu* nominated District Heads, *Ajia*, who were responsible for collecting tax from the various regions throughout Borno. The *Ajia* delegated this task to sub-district heads, *Lawans*, who usually delegated to local agents known as *Bulama*, all of whom were expected to channel revenues upwards to the *Shehu*. Initially, in 1905/6 when this system was set up, the *Shehu* was required to pass half his receipts to the British (Palmer, 1929).

Since Nigerian independence in 1960, a modern government has operated in parallel with the traditional administration and consists of three tiers: Local, State and Federal. Although State and Local Governments can and do raise their own revenue, they mostly rely on Federal Government allocations. In contrast, the traditional administration raises most of its revenue at a local level predominantly by taxing the rural population.

There are five Local Government Areas (LGAs) which are adjacent to the Nigerian shore of Lake Chad. Although LGAs have a fishing and agriculture remit, the level of involvement in fishing and/or farming varies between each LGA. The study region includes the middle three, Kukawa, Mongonu and Marte.

The Borno State Government has a minimal involvement in the administration of the lake and its immediate vicinity. This is partly due to international tensions. Outbreaks of armed clashes and rebel activity on islands in the lake have persisted since the 1970s and are largely associated with the succession of civil wars in the Republic of Chad. A multi-national 'Joint Patrol' has been created in response to these outbreaks and has been monitoring the lake to prevent further violence. Along the western shore of the Lake, the Nigerian Army dominates the Joint Patrol.

Despite huge investments in irrigation (and smaller investments in fisheries) during the 1970s, development initiatives have achieved little lasting change at Lake Chad (Azeza, 1976; Kolawole, 1986; Hutchinson *et al.*, 1992; Sarch, 1999). Although linked to the Nigerian economy through the market for their produce, the households making their living on the Nigerian shores of Lake Chad are remote, both geographically and politically, from Nigerian policy makers. The villages in which this study was based had hardly been acknowledged by Federal Government. They have received negligible public investment in their welfare: most wells were hand dug; education was restricted to Koranic schooling for boys; medical

facilities were only available in the large towns; and the security services usually monitored only transport nodes. The villages are reached either on unmarked tracks on the lake floor, or via channels in the swamp vegetation.

## 1.2 Research at Lake Chad

Fishing and farming livelihoods at Lake Chad have been analyzed using household survey data collected in 1993 and the findings of participatory research conducted with four communities on the lake shore during 1995. These exercises were undertaken as part of the British Government fisheries research project (Neiland and Sarch, 1993). The subsequent analysis examined these data in the wider context of the environmental fluctuations, socio-economic development and institutional changes described above (Sarch, 1999).

Unlike the systems described in many text books, the farming systems at Lake Chad are not readily assessed as 'shifting, 'semi-permanent' or 'permanent'; or extensive or intensive (Sarch, 1999). Farming systems in the study area have been developed to exploit the seasonal flooding of the lake shore (Sarch and Birkett, 2000). In key respects the farming techniques used are extensive, farmers rely on 'new' land to maintain fertility levels and labor is an important constraint to production. In other respects, farming systems are intensive, three or more crops are often relayed within the season and although largely unmechanized, production is commercialized, with high levels of cash inputs and crop sales. In 1993, the value of farm sales represented over three-quarters of mean household output in the study region (Sarch, 1999).

Similarly, the fishing systems on the lake shore have been developed to exploit seasonal flooding (Sarch and Birkett, 2000). Although estimates of fish production from the lake vary and the exact roles of the lake's contraction and the exploitation of fish stocks in this decline are difficult to ascertain, at least part of the reduction in production over recent decades is accounted for by the contraction of the lake (Stauch, 1977; Duran, 1980; Sagua, 1991; Olivry *et al.*, 1996). Following this contraction, the *dumba* method of fishing has become increasingly popular. A *dumba* is a row of fish traps that are placed across a channel of receding lake water. The traps are linked by small meshed netting which forces the fish in the retreating flood water into the traps. The *dumba* is especially effective as fish retreating with the receding flood cannot escape them, and they do not need to be baited.

The investigation of systems of access to farmland and to fishing rights in the study area was based on the findings of participatory appraisals conducted in four case-study villages in the study region during 1995. The appraisals were designed to understand the institutional channels of resource access, their context and evolution, and to enable

contrasts and comparisons between them. The further stages of the investigation used predominantly secondary sources to examine access institutions at the district, regional, and national levels.

## 2. RESOURCE ACCESS INSTITUTIONS

The results of this investigation are presented in this section. Systems of access to farmland are considered first and access to fishing rights next. Analysis of secondary sources at national and regional level have been used to explain the evolution of the *de jure* systems of access and this is contrasted with what was learned at a village and district level about how access to farmland and fishing rights operates in practice, i.e. the *de facto* systems of access.

### 2.1 Access to farmland in theory

Under the provisions of the 1978 Land Use Decree, all land in Nigeria was nationalized: "All land comprised in the territory of each State in the Federation are hereby vested in the Military Governor of that State and such land shall be held in trust and administered for the use of common benefit of all Nigerians." (cited in Uchendu, 1979: p. 69).

The decree vested the management and control of all non-urban land in Local Government. Individuals utilizing non-urban land are assigned rights of customary occupancy that may be certified by Local Government. Local Government may also grant rights of occupancy to up to 500 hectares to an individual or organization for agricultural purposes. As there are few 'urban' centers at Lake Chad, most of the land in the Nigerian Sector comes under the jurisdiction of the Local Governments adjacent to the Lake.

### 2.2 Access to farmland in practice

In practice, the Kanuri aristocracy has retained almost total autonomy in allocating the land on the shores of Lake Chad. Farmland is allocated in much the same way as before the 1978 Decree. Currently, *Bulamas* act as ward or hamlet heads, they allocate land and collect taxes under the jurisdiction of the local *Lawan*, also known as a sub-district head. In addition to the revenue received from *Bulamas*, *Lawans* may also receive dues of various kinds from representatives who receive taxes from non-village sources, such as pastoralists and fishers. These tax bases parallel the territorial and associational fiefs granted by the *Shehu* in the pre-colonial era

Although this system has evolved since Nigerian independence, it is similar in to the system that operated before colonization. It differs, however, in an important respect. Whereas in the past the system was balanced by the need to defend itself - the aristocracy depended on the

peasantry to replenish their armies and in return the peasantry were protected from the slave raids of hostile neighbors, when the British colonized Borno and undertook its defense, taxation and protection were divorced. The current state and local Governments receive little, if anything, from land taxation (see for example, the report of the Borno State Local Revenue Committee, 1982). The Joint Patrol receives nothing from these taxes either. It is funded, officially, by Federal Government and, unofficially, by the charges that its officers levy on movement around the lake basin.

Arrangements for allocating land had changed little since the settlement of each case-study village in the 1970s and 1980s. Although the first settlers did not need to request land to farm, local aristocrats were quick to claim their taxation rights and especially so where disputes over land had arisen. In most cases, the local *Lawan*, nearly always a Kanuri, asked the community to nominate a *Bulama* through whom they were to channel their annual taxes. In return the *Bulama* was given the *Lawan*'s authority to allocate residential and farmland and to settle disputes within his community. Disputes over the right to allocate farmland were settled in the favor of the Kanuri community where this was an option, and in the favor of those able to deliver the largest tax payment to the *Lawan* where there was no ethnic dimension to the dispute.

The size of the tax payments made to the *Lawan* is subject to annual negotiations: the *Bulama* must satisfy both the *Lawan*, on whose authority his position depends, and his community on whose support he relies. If taxes are too high or too low, he risks alienating one or the other. Although taxes are never welcome, they were not unexpected by settlers, since many of the lake floor farmers had come from home regions where similar systems had operated in the past (Mortimore, 1997).

### 2.3 Access to fishing rights in theory

No national legislation regarding the licensing or regulation of Nigeria's inland fisheries was enacted until the Inland Fisheries Decree of 1992. The decree charged the Commissioner for Agriculture in each state with the responsibility for licensing and regulating inland fishing. Certain regulations on gear are introduced in the decree and there is provision for the creation of further regulations at Federal level. The Lake Chad Basin Commission's Joint Regulations on Fauna and Flora also specify fisheries management measures. However, although these were ratified in 1988, they have not been enforced in Nigeria. Both the decree and the LCBC regulations prohibit the use of fishing gear which obstructs the free movement of fish and thus prohibit the use of the increasingly popular *dumbas* (Inland Fisheries Decree 1992, Section 10 [1]; see part B, aquatic fauna, article 6; cited in Moschetta, 1991).

### 2.4 Access to fishing rights in practice

Both Federal and Local Government have attempted to manage fishing at Lake Chad. The LGAs in the study region endeavor to play an active role in regulating and taxing fishing in their areas. For example, in 1995 Mongonou and Marte LGAs charged a 200 Naira license fee to fishers within their jurisdiction. However, compliance with measures such as these is limited by the lack of LGA resources and inability to their staff to reach the most productive fishing areas on the lake and enforce them. In 1995, the Federal Fisheries Department attempted to enforce the regulations of the 1992 Decree at Lake Chad through visits to the lakeside Local Government Areas to explain the stipulations of the 1992 Decree to LGA staff.

In practice access to fishing at Lake Chad varies with the season. Fishing during the rising flood is relatively open access. Anyone with the means to do so can fish the rising flood waters. Rising flood fishing does not require permission and is not charged for directly. There are, however, indirect costs, for example the discretionary charges imposed by the Joint Patrol. As the flood peaks and begins to subside, fishers have the option either to fish the area of open water remaining at the center of the lake basin or to fish the pools and channels of residual flood water which remain around the villages of the study area. Access to these fishing grounds is restricted to those who pay for it, usually in advance.

Since their introduction in the 1980's, the allocation and taxation of *dumba* sites has become an important focus of fisheries regulation and there has been considerable competition for suitable sites in which to locate *dumba*. Up until 1993, *dumbas* had been a source of conflict between *dumba* fishers and those down stream of them. In 1993, the conflict was resolved by a wealthy *Lawan*, who agreed to issue a written license that could be checked and (the exclusive rights of the licensee) enforced by the Joint Patrol, i.e. the Army. Then in 1994, Kukawa and Marte Local Government Areas (LGAs) attempted to license and tax *dumba* and confusion developed over who had the right to license them. This was resolved when, in early 1995, Federal fisheries officers visited the LGAs to explain the regulations of the 1992 decree. These prohibit *dumba* and thus prevent LGAs from taxing them. Nonetheless, the use of *dumba* persists and in the case study villages, the traditional administration filled the void created by the withdrawal of Local Governments and expanded its authority over fishing, in particular over the allocation of *dumba*.

Although there was considerable variation in the systems of access to *dumba* that operated from each case study village, the profits to be made from *dumba* fishing were reflected in the ubiquitously high license fees which are charged for them. The exclusive rights to operate a *dumba* at a particular site were sold for as much as 10 000 Naira, or over US\$100 in 1995. Not surprisingly, the focus of access institutions has shifted away from other methods of recession fishing. In general, the exclusive rights to the fishing from a *dumba* site were sold for cash, in advance, on a seasonal basis. Purchasers of these could then sub-let these rights for various time periods during that season. *Dumba* sites are allocated by various agents of the local *Lawan*, although rarely the *Bulama*, with the objectives of revenue collection and conflict prevention. The second of these objectives is shared with the Joint Patrol whose officers also profit from their endorsement of the *dumba* licenses issued by certain *Lawans*.

### 3. DISCUSSION AND CONCLUSIONS

The system of access to farmland on the current Nigerian shore of Lake Chad has been imposed by an aristocracy based in the towns and villages along the former lake shore. This system was familiar to most in the case-study communities and not unworkable as much of the agricultural production at Lake Chad is for sale.

Unlike the case for farmland, systems of regulating access to fishing have been created recently. They have developed in response to the introduction of the highly profitable method of fishing that had led to conflict and confusion. Conflict between fishers developed over the impact of *dumba* on down stream fisheries and confusion existed between modern administrative agencies over *dumba* regulation and taxation. Large *dumba* profits were both a source of conflict and the motive for the traditional administration to resolve the conflict and benefit from the profits.

The institutions for access to fishing grounds at Lake Chad do not readily conform to existing models of resource tenure. The following discussion considers the extent to which those discussed at the start of this paper offer an explanation of resource access at Lake Chad. The first model to be considered was that outlined by Gordon (1954) and described as the 'Tragedy of the Commons' by Hardin (1968). This was based on the notions that environmental carrying capacity is finite, 'tragedy' ensues once this capacity has been exceeded and as the users of a resource will not voluntarily restrict their exploitation of it, the state must impose and enforce exclusive rights to the resource. This theory cannot be applied to Lake Chad where a major determinant of environmental carrying capacity is the extent of the flood and this fluctuates from year to year. The impact of resource exploitation on the capacity of the lake to support its population is unclear and in any event, is

restricted by a variety of local institutions that control access to the lake's resources.

The second model to be considered was the historical process of institutional erosion observed in the Francophone Sahel. The degradation of forests and rangelands throughout the region has been attributed to the partial imposition of 'modern' statutory measures to ensure their sustainability. These not only failed in their objectives but undermined the customary tenure arrangements that did exist. The result has been a dual system in which the many areas where tenure is either unclear or not enforced have been over-exploited. A similar institutional dualism exists at Lake Chad and this also has had gaps in its coverage, for example in the allocation of fishing rights. However, the fortunes of the traditional administration at Lake Chad have differed in two important respects from systems of customary tenure in the Francophone Sahel.

The first difference between the dual systems of resource tenure in the Francophone Sahel and those at Lake Chad is in the relationship between the traditional administration and the State. Rather than being undermined by 'modern' tenure arrangements, the British colonial policy of collecting tax through the traditional administration served to strengthen it. This legitimized what is essentially a system of feudal exploitation. The current system differs little except for, where in the past the 'Native Administration' passed on a proportion of the tax collected to the British, very little of the revenue from farm taxes reaches Local Government and the Nigerian Army which now defends the lake shore receives nothing from these taxes.

The second respect in which the 'Native Administration' at Lake Chad differs from customary systems of tenure in the Francophone Sahel is in its objectives. Whereas systems of customary tenure have been characterized as broadly benevolent in that they sustained rural livelihoods, at Lake Chad, the overriding and overt objective of institutions for resource access is profit. *Lawan's* collect taxes as rent on 'their' fiefs. The ability of such fiefholders to acquire and extend their fiefs has not been the result of any investment in or historical association with the lake floor which, after all, was only revealed after the lake began to contract in the 1970s. Rather their ability to instigate the institutions for access to the resources of the lake floor is a function of the power of the 'traditional' administrators to pursue their own interests.

The third model to be considered was that of the institutional development which Boserup (1965) and Netting (1993) have linked to the process of agricultural intensification generated by population growth and increased demand for land. This predicts that the intensity of resource exploitation will determine the exclusivity of the property rights as resource users will develop institutions to

exclude others from benefiting from their investment in the resource. Neither agriculture nor fishing at Lake Chad has experienced intensification or institutional development in the way that Boserup, Netting and others have described. The contraction of the lake has prevented the establishment of long-term use rights to farmland or fishing grounds and while farmers and fishers use a high level of working capital and sell a large proportion of their output, they have made minimal investments in fixed capital.

The process of institutional development at Lake Chad conforms most closely to the model propounded by North (1990) in which institutional evolution determines the outcome of economic development, rather than vice versa. North describes how where the evolution of institutions is driven by the interests of those with the power to devise them, nepotism, monopolies and underdevelopment results. For households making their living at Lake Chad, the result of this process is arbitrary taxation. The taxes imposed by the traditional administration are illegitimate because the obligation to pay them is not matched by a duty to provide. Such taxes are inimical to livelihoods because revenues are not used to provide the schools, health centers and other social and physical infrastructure that would improve living standards.

Despite the exploitation inherent in it, the system of land tenure at Lake Chad has important advantages over the system of fisheries management. The most important of these is that it works. The institutions for access to land are widely understood, they have almost complete compliance and they are stable. The households of the lake shore know when they will be expected to pay their farm tax, they know who they will pay, roughly what proportion of their harvest will be required and roughly what other households in the village will be paying. In contrast, the allocation of fishing rights varies from village to village, has required the army to prevent conflict, and has swung between the control of Local Government, the local aristocracy and the Army.

Although broadly benevolent and similar in their aims to sustain fish stocks and fishing livelihoods, the efforts of the Federal Fisheries Department and Local Government have conflicted and have resulted in failure. Federal attempts to enforce a ban on *dumba* fishing at the beginning of 1995 prevented Local Government regulation of *dumba* fishing. The traditional administration subsequently resumed their allocation and taxation of *dumba* licenses and where disputes arose, the Nigerian Army were paid to endorse these 'traditional' licenses. *Dumba* fishing persists and Local Government has little control over it. Fisheries management, like the other modern administrative institutions at Lake Chad, cannot operate effectively because there is confusion over which agencies have jurisdiction over which areas and the formulation of regulations cannot keep up with the dynamics of the lake.

Although farm taxes are neither accounted for or invested in the communities who pay them, the understanding which all involved have about the way they are collected is an advantage. The taxation and allocation of fishing rights is not only illegitimate but inconsistent as well. This inconsistency severely constrains the ability of fishing families to plan their livelihood strategies.

A radical route forward is to address the inconsistent nature of fisheries taxation at the lake. Whether or not the taxation is legitimate, if it is at least transparent, then households could adjust their livelihoods to cope with it. Lowering the transaction costs involved in both acquiring and allocating access to fishing grounds would be in the interest of both the households making their living on the lake shore and the individuals making a living on their backs. This would not require rigid regulations. The comparative success of the traditional administration in allocating farmland can be partly attributed to their flexibility in adapting to the changing environment at Lake Chad. If formulae, rather than fixed amounts or dates, for the payments which households must make could be established and disseminated, this would reduce the transaction costs for all involved.

How such formulae could be established is a crucial issue and here again the customary system of land tenure offers some guidance. No one at Lake Chad can ignore the dominance of its traditional administrators. Although no initiative would work without their co-operation, the negotiations necessary to establish formulae for tax payments, would benefit from the active participation of the traditional administration at all its levels. While development agencies would be well placed to provide logistical and technical support, the influence which the Kanuri aristocracy has in many spheres could provide the leverage to encourage participation from village communities, their overlords, local government and the army in such negotiations. The influence of the aristocracy would also lend weight to the outcomes of such negotiations. Given time, a process of arbitration between village communities and their tax collectors could not only reduce transaction costs but also improve the accountability of tax collectors.

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