

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

Marie-Thérèse Sarch

---

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 access to farmland and fishing rights has evolved on the Nigerian shore of the lake. The paper aims to assess the applicability of different institutional approaches to natural resource management on the lake shore. These include the 'equilibrium or tragedy' approach characterised by Hardin (1968), critiques discussing attempts to impose state regulation of renewable natural resources in the Sahel, models of institutional adaptation to resource scarcity and approaches which perceive institutions, such as those which govern access to natural resources and act as crucial determinants 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 also expanded it to cover new areas of the lake floor, as well as the increasingly lucrative fishing opportunities which the 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.

## 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 the poor has been increasingly recognised (e.g. Swift 1989; Moser 1998; Carney 1988; Scoones 1998). The aim of this paper is to examine the evolution of the 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 farmland and 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. A total of 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 contexts of Lake Chad, as well as research into the 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.

## 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.<sup>1</sup> The 'Tragedy of the Commons' model predicts dire environmental consequences as a result of the human inability to restrict personal gain for societal benefit: 'Ruin is the destination toward which all men rush, each pursuing his own best interest...' (Hardin 1968:1244). Rather than advocate population controls such as Malthus and subsequent supporters have done, Hardin advocated controlling access to the environment. He 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 shared resources.

Although many recent approaches to natural resource management have reflected this approach, a growing literature has developed, both in support of and critical of Hardin's thesis. Several distinct approaches can be identified. The first includes work critical of the confusion surrounding 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 & Bishop 1975; Bromley & Cernea 1989; Schlaeger & Ostrom 1994 etc.). The next 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 examined next, with particular reference to the Sahel.

Other authors have rejected the static notion of resource access arrangements implied by many economists, and 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

Despite many instances where common property regimes have been successful, there are several recent examples of 'tragedies' which have occurred 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 & 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 which occur naturally in RNRs and have suggested that equilibrium in them is not natural or normal, equilibrium frequently remains the objective of resource managers. Many theorists have concluded that state regulation and the privatisation of property rights are the only options to sustain these resources, and great effort has been concentrated on defining how the limits of resource use should be set (Mahon 1997).

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 have led to considerable dissatisfaction among fishing communities (Bailey & Jentoft 1990). Despite the mandate provided by UNCLoS in 1982, there have been comparatively few attempts at state regulation of African fisheries (Lawson 1984). In west Africa, these have been associated with the sale of offshore fishing rights to the European Union. The information available on the outcomes of state attempts to regulate African fisheries shows mixed results (Johnstone 1996).

The forest reserves created throughout the Francophone Sahel during the colonial era, are examples of state regulation of natural resources in sub-Saharan Africa. 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 of all 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 allowed many reserves to become open access (Freudenberger & Mathieu 1993). The decline of systems of access to the forests, seasonal pastures and fisheries of the Niger Delta in Mali, as well as their subsequent over-exploitation, have 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 (Freudenberger 1991; 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 two attempts: those described above, which aim to achieve sustainable production through state regulation; and those which aim 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). However, Haugerud (1989) argues that although agricultural productivity did improve in Kenya, this happened in spite of land registration, rather than because of it. Although Tiffen et al (1994) illustrates how population has grown and how individualised tenure has 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 had little success in Africa, and in some cases, the reverse outcome has resulted: environmental degradation and reduced productivity. Several authors depict a situation where the depletion of natural resources 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 in order to appropriate them or to create more productive arrangements. This process has been observed not only in the rangelands, forests and fisheries of the Sahel, but also in the access arrangements of many natural and 'common' resources in other parts of the world. (Bromley & Cernea 1989; Jodha 1986, 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 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

Despite the considerable effort expended in improving the resource access institutions of the developing world, there is a wide body of literature which documents and explains processes of endogenous institutional adaptation and evolution.

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 the population grows, land tenure will increasingly become individualised in the process of agricultural intensification. Netting (1993:158) 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), with the result that 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).

Wade's theory (1988) differs from other theories of property rights, in that neither environmental tragedy nor increasing exclusion is inevitable. Rather, common property can be the end result of institutional adaptation. He describes how systems of property rights develop in response to risk, where the costs of privatisation and exclusion are high and the benefits uncertain. A fundamental difference in this approach is that it allows for individual and community interests to coincide. Runge (1981; 1984), Ostrom (1990), Quiqin (1993) and others have also identified circumstances where communal forms of property are economically efficient and have been successful in avoiding environmental 'tragedies'.

There are many examples which show how resource users can and do adapt systems of access to natural resources when it is in their best interests to do so.<sup>2</sup> These have validated the adoption of community-based approaches

by both national and international development agencies, which have advocated and 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.<sup>3</sup> 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 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 being 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:4) argue that the assumptions of distinct and consensual communities, as well as 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 generated a blizzard of claims and counterclaims, and 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 cooperation between them cannot be assumed.

### 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 1985:146). 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 & 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, as well as 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). Migration during the latter part of the millennium has brought to the lake basin, Shuwa Arabs from the east and Fulani pastoralists from the west. 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 & Verinumbé 1990). Although certain ethnic groups have particular traditions (for example, 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 mainly include Kanuri and Hausa households, but also smaller numbers of Fulani, Shuwa and Yedina.

The Kanuri hegemony of Borno 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 was based on a system of fiefs – either territorial or by association (by trade, for example) – which were allocated by the *Shehu* or suzerain to members of his family, favoured courtiers, or high ranking slaves. Under this system, the population was obliged to pay a variety of taxes to the fiefholder, who administered the fief through a tax collector or *Chima*, as well as a hierarchy of village heads, *Lawans* or *Bulamas* (Brenner 1973). Brenner (1973:112) 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 or *Ajia*, who were responsible for collecting tax from the various regions throughout Borno. The *Ajia* delegated this task to sub-district heads or *Lawans*, who usually delegated to local agents known as *Bulama*, all of whom were expected to channel revenues upwards to the *Shehu*. Initially, when this system was set up in 1905/6, 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, as well as 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 it 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 marketing of their produce, the households making their living on the Nigerian shores of Lake Chad are geographically and politically remote from Nigerian policy-makers. The villages in which this study was based, have hardly been acknowledged by Federal Government. They have received negligible public investment in their welfare: most wells are hand dug; education is restricted to Koranic schooling for boys; medical facilities are only available in the large towns; and the security services usually monitor only transport nodes. The villages are reached either on unmarked tracks on the lake bed, or via channels in the swamp vegetation.

### Research at Lake Chad

Fishing and farming livelihoods have been analysed using household survey data collected in 1993, as well as 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 & Sarch 1993). The subsequent analysis examined the 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 & Birkett 2000). In key respects, the farming techniques used are extensive: farmers rely on 'new' land to maintain fertility levels and labour is an important constraint to production; whereas in other respects, farming systems are intensive, with three or more crops often relayed within the season. Although farming is largely unmechanised, production is commercialised, with high levels of cash input and crop sales. In 1993, the value of farm sales represented more than three-quarters of the mean household output within the study region (Sarch 1999).

Similarly, the fishing systems on the lake shore have been developed to exploit seasonal flooding (Ibid.). Although estimates of fish production from the lake vary, and the exact impact of the lake's contraction and the exploitation of fish stocks is difficult to ascertain, at least part of the reduction in production during recent decades is accounted for by the contraction of the lake (Stauch 1977; Olivry et al 1996).<sup>4</sup> Following this contraction, the *dumba* method of fishing has become increasingly popular. A *dumba* is a row of fish traps which 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 fishing rights in the study area was based on the findings of participatory appraisals conducted in four case study villages within the study area during 1995 (Figure 2). The appraisals were designed to understand the institutional channels of resource access, and their context and evolution, as well as the contrasts and comparisons between them. The later stages of the investigation used predominantly secondary sources to examine access institutions at the district, regional, and national levels.

### Resource access institutions at Lake Chad

The results of this investigation are presented in this section. Systems of access to farmland are considered first, and exclusive access to fishing rights

is considered next. Analysis of secondary sources at national and regional levels have been used to explain the evolution of the de jure or theoretical systems of access, and this contrasts with what was learned at a village and district level regarding the subject of how access to farmland and fishing rights operates in practice.

### Access to farmland in theory

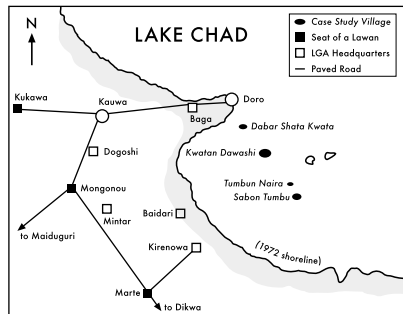


Figure 2. Map of case study villages at Lake Chad

Under the provisions of the 1978 Land Use Decree, all land in Nigeria was nationalised: '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 1979:69).

In theory this decree removed land from the trusteeship of families, communities and community leaders, and replaced them by the State

Governor; it also restricted individual interests in land to one of occupancy '... and [to] the sole right to and absolute possession of all the improvements on the land'. (Ibid:70). The decree vested the management and control of all non-urban land in the Local Government. Individuals utilising non-urban land were assigned rights of customary occupancy, which may be certified by the Local Government. The Local Government may also grant rights of occupancy of up to 500 hectares per individual or organisation for agricultural purposes. As there are few 'urban' centres at Lake Chad, most of the land in the Nigerian Sector comes under the jurisdiction of the Local Governments adjacent to the Lake.

### Access to farmland in practice

In practice, the Kanuri aristocracy has retained almost total autonomy with regard to the allocating of land on the shores of Lake Chad. Apart from land acquired in 1973 by the federally-sponsored South Chad Irrigation Project (SCIP), 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 fishermen. These tax bases parallel the territorial and associational fiefs granted by the *Shehu* in the pre-colonial era. Currently, *Lawans* are obliged to channel their tax revenues to the Local Government.<sup>5</sup> However, where *Lawans* do pass on a proportion of their revenue, they do so to the *Ajia* or the District Head.

Although this system has evolved since Nigerian independence, it is similar to the system which operated before colonisation. It differs, however, in one 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 was protected from the slave raids of hostile neighbours; however, when the British colonised Borno and undertook its defence, 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 officially funded by the Federal Government, and is also unofficially funded by the charges which its officers levy on movement around the lake basin.

Details of the land access arrangements in four case study villages are provided in Table 1. The table shows that the arrangements for allocating the land have changed little since the settlement of each village. Although the first settlers did not need to request land to farm with, local aristocrats were quick to claim their taxation rights, especially where disputes over land had arisen. In most cases, the local *Lawan* – nearly always a Kanuri – asked the community to nominate a *Bulama* whom they could channel their annual taxes through. In return, the *Bulama* was given the *Lawan*'s authority to allocate residential property and farmland, as well as authority to settle disputes within his community. Disputes over the right to allocate farmland, such as that between the *Bulamas* of Daba Shata Kwata and Dabar Shata Gari, are usually settled in the favour of the Kanuri community. In the case of Sabon Tumbu, similar disputes within the Hausa community have been settled in favour of the candidate with the ability to deliver the largest tax payment to the *Lawan*.

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 the community on whose support he relies. If taxes are too high or 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 (Hill 1972; Mortimore 1997).

### Access to fishing rights in theory

No national legislation regarding the licensing or regulation of 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 were introduced in the decree, and there is provision for the creation of further regulations at Federal level. Nonetheless, there remains no provision in the law for the ownership of water bodies. Rather, through assigning responsibilities to license and control inland fishing within each state to the Commissioner for Agriculture, it implies he is the trustee of the inland water bodies of each state (Inland Fisheries Decree 1992, Supplement to the Official Gazette Extraordinary No.75, Vol.79, 31 December 1992). Notwithstanding this, each LGA also has a remit for fishing, which is usually a concern for the Department of Natural Resources (Madakan & Ladu 1996).

Since the promulgation of the Federal Decree on Inland Fisheries in

Table 1. Access to farmland in four case study villages on the Nigerian Shore of Lake Chad

Village	Land allocated by	Taxes handled by	Taxes passed to	Year farming started	Major Changes	Conflicts
Dabar Shata Kwata	<i>Bulama</i> of neighbouring Dabar Shata Gari	<i>Bulama</i> of Dabar Shata Gari	The <i>Lawan</i> of Bega	1981	None	Initially, with <i>Bulama</i> of Dabar Shata Gari over right to allocate land
Kwata Dawashi	The <i>Bulama</i>	The <i>Bulama</i> 's assistants are overseen by the <i>Lawan</i> 's assistant	The <i>Lawan</i> of Dogoshi	1984	None	Periodically, between villagers and Fulani herders over access to lake water over farming land
Sabon Tumbu	One of three <i>Bulamas</i> representing the main ethnic groups	The <i>Bulama</i> 's assistants are overseen by the <i>Lawan</i> 's assistant	The <i>Lawan</i> of Beidari	1985	None	Recently, between transhumant farmers and Fulani pastoralists; and periodically within Hausa community over <i>Bulamaship</i>
Tumbun Naira	The 'acting' <i>Bulama</i>	The <i>Bulama</i> 's brothers and the <i>Bulama</i>	The <i>Lawan</i> of Mintar	1984	1994: Village flooded and abandoned; 1995: Few had returned to farm	None

Source: Key interviews and group discussions during the participatory rural appraisals of the four case-study villages in 1995



1992, the damming of inland water (and in effect – *dumbas*) has been prohibited:

The appropriate authority shall regulate and control the building of dams, weirs or other fixed barriers or obstruction to ensure the free movement of fish, and where permission is granted to a person to build a dam, weir or other fixed barrier or obstruction, fish ladders shall be built to ensure free movement of fish' (Inland Fisheries Decree 1992, Section 10 [1]).

The Lake Chad Basin Commission's Joint Regulations on Fauna and Flora also effectively prohibit *dumbas*.<sup>6</sup> The regulations specify that member states will take the necessary measures to prohibit '... dikes, dams or other obstacles which hinder or prevent the migration of fish' (see part B, aquatic fauna, article 6; cited in Moschetta 1991).

#### 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 endeavour to play an active role in regulating and taxing fishing in their areas. In 1995, for example, Mongono and Marte LGAs charged a 200 Naira license fee to fishermen within their jurisdiction. However, compliance with measures such as these is limited by a lack of LGA resources, and by an inability of their staff to reach the most productive fishing areas on the lake to enforce them. The Federal Fisheries Department has 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 (Tables 2 and 3). Fishing during the rising flood is more or less 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.<sup>7</sup> As the flood peaks and begins to subside, fishermen have the option to either fish the area of open water remaining at the centre of the lake basin, or to fish the pools and channels of residual flood water which remain around the villages of the study area (Table 3). Access to these fishing grounds is restricted to those who pay for it, usually in advance.

The allocation and taxation of *dumba* sites has become an important focus of fisheries regulation since they were introduced in the 1980s. Since

Table 2. Access to rising flood fishing from four case study villages on the Nigerian Shore of Lake Chad

Village	Restrictions enforced	Taxes/Fees	Taxes/ Fees passed	Year fishing started	Major Changes	Conflicts
Dabar Shata Kwata	None	The <i>Bulama</i> expects an acknowledgement from fishermen staying in the village	No further	1978	None	None
Kwatan Dowashi	None	None	N/A	1980	None	None
Sabon Tumbu	None	Fee paid to one of the three <i>Bulamas</i>	Used to meet tax demands of <i>Lawan</i> of Baidari	1985	None	None
Tumbun Naira	None	None	N/A	1984	None	None

Source: Key in interviews and group discussions during the participatory rural appraisals of the four case-study villages in 1995

Table 3. Access to *Dumba* fishing during the receding flood from four case study villages on the Nigerian Shore of Lake Chad

Village	Restrictions enforced	Taxes/Fees	Taxes/ Fees passed to	Dumba fishing started	Major Changes	Conflicts
Dabar Shata Kwara	Fishing at <i>Dumba</i> sites is restricted and licences are endorsed and enforced by the Army	Negotiated through his village-based assistant and paid in cash to <i>Lawan's</i> representative. A further fee is also paid to the Army	The <i>Lawan</i> of Baga	1989	In 1993, conflict led to regulation and licensing of <i>dumba</i> site allocation, which had previously been on a 'first come, first served' basis	<i>Bulama</i> involved in dispute over the <i>dumba</i> licence which he paid for in 1995 and was subsequently ignored and <i>dumba</i> rights denied
Kwaton Dawashi	Fishing at <i>dumba</i> sites is restricted and licences sold	Fees negotiated with and paid in cash to the <i>Bulama</i> who issues a LGA receipt	Kukawa LGA	1989/1990	In 1994, Kukawa LGA took over <i>dumba</i> licensing revenues from the <i>Lawan</i> of Dogoshi (and the Army). Recent enforcement of 1992 decree challenges the LGA taxation of <i>dumbas</i>	None mentioned
Sabon Tumbu	Fishing at <i>dumba</i> sites is restricted and licences sold	Negotiated through 1 of the 3 <i>Bulamas</i> . <i>Lawan's</i> rep. decides whether to issue licence & accepts payment in cash	A proportion is passed to the <i>Lawan</i> of Baidari (& on to District Head)	1989	In 1994, Marte LGA took over direct allocation and licensing of <i>dumbas</i> , and then had to stop after the enforcement of the 1992 decree. The system then reverted back to its current status.	None mentioned
Tumbun Naira	Fishing at <i>dumba</i> sites is restricted & sites are allocated by acting <i>Bulama</i> for an initial fee	Taxes assessed in relation to catches and paid to acting <i>Bulama</i>	A proportion is passed to <i>Lawan</i> of Mintar (& to District Head)	1989	The system of <i>dumba</i> regulation had evolved by 1993. Mongonou LGA considered taking over <i>dumba</i> licensing, but considered it too problematic	None mentioned

Sources: Key interviews and group discussions during the participatory rural appraisals of the four case-study villages in 1995

then, there has been considerable competition for suitable sites in which to locate *dumba*. Until 1993, *dumbas* had been a source of conflict between *dumba* fishermen and those downstream of them. In 1993, the conflict was resolved by a wealthy *Lawans*, who agreed to issue a written license which could be checked and (the exclusive rights of the licensee) enforced by the Joint Patrol or Army.

Then in 1994, Kukawa and Marte LGAs attempted to license and tax the *dumbas*, and confusion developed over who had the right to license them. This was resolved when, in early 1995, Federal fisheries officers visited the LGAs and explained the regulations of the 1992 decree. These prohibit *dumbas* and thus prevent LGAs from taxing them (Table 2). Nonetheless, the use of *dumbas* persists. The 'traditional' administration filled the void created by the withdrawal of Local Governments and expanded its authority over fishing, particularly with regard to the allocation of *dumbas*.

Although there was considerable variation in the systems of access to *dumbas* which operated from each case study village, the profits to be made from *dumba* fishing were reflected in the ubiquitously high license fees which were charged for them. In 1995, the exclusive rights to operate a *dumba* at a particular site were sold for as much as 10,000 Naira, or more than US\$100. 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*.

## Discussion and conclusion

Rather than evolving from communities in response to their production strategies, the system of access to farmland on the current Nigerian shore of Lake Chad has been imposed by an aristocracy, which is based in the towns and villages along the former lake shore. This system was familiar to most in the case study communities and, since much of the agricultural production at Lake Chad is for sale, the system does not seem totally unworkable. However,



it is, largely arbitrary, because farmers have no say in who receives their taxes, or how they are spent. Unlike during the pre-colonial era when peasants received protection from the Kanuri aristocracy, the farmers of the lake shore receive nothing (other than access to farm the recently revealed lake shore) in return for the taxes paid to the *Lawan*.

Unlike the case for farmland, the systems of regulating access to fishing have only been created recently. They developed in response to the introduction of the highly profitable method of fishing, which led to conflict and confusion. Conflict between fishermen developed over the impact of *dumbas* on downstream fisheries, as well as confusion between modern administrative agencies over *dumba* regulation and taxation. Large *dumba* profits were both a source of conflict and a motive for the traditional administration to resolve the conflict in order to benefit from the profits.

The institutions for access to resources 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 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, which 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 institutions which control access to the lakes 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

differ from those of the systems of customary tenure in the Francophone Sahel.

The first difference 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 legitimised what is essentially a system of feudal exploitation. The current system differs very little. However, in the past the 'Native Administration' passed on a proportion of the tax collected to the British, whereas today, very little of the revenue from farm taxes reaches the Local Government or Nigerian Army, which now defends the lake.

A second lies in the objectives of the two systems. Systems of customary tenure have been characterised as broadly benevolent, in that they sustained rural livelihoods. At Lake Chad, however, the overriding and overt objective of institutions for resource access is profit. *Lawans* 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. After all, the floor was only revealed after the lake began to contract in the 1970s. Essentially, their ability to instigate the institutions of 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 considered was that of the institutional development which Boserup (1965) and Netting (1993) linked to the process of agricultural intensification generated by population growth and an increased demand for land. The model predicts that the intensity of resource exploitation will determine the exclusivity of property rights, as resource users will develop institutions to exclude others from benefiting from their resource investment. Agriculture at Lake Chad has not 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 rights to farmland, and while farmers 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 maintains that 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 centres and other social and physical infrastructure that would enable households to build on their assets.

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 it to, they know 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 'Native Administration' 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 resulted in failure. Federal attempts to enforce a ban on *dumba* fishing at the beginning of 1995, prevented Local Government regulation of *dumba* fishing. Consequently, the traditional administration 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. In addition, the formulation of regulations cannot to keep up with the dynamics of the Lake.

Although farm taxes are neither accounted for, nor invested in the communities who pay them, the understanding which all involved have about the way they are collected is an advantage. Most of the other taxes imposed at Lake Chad are not only illegitimate, but inconsistent too. The allocation of exclusive fishing rights is one example of this. The inconsistent nature of these taxes severely constrains the ability of farmers and fishermen to plan for them.

These conclusions indicate a radical route forward with regard to the

problem of addressing the inconsistent nature of much taxation at the lake. Whether the taxation is legitimate or not, is not the real issue. Rather, if the taxation is at least transparent, then households could plan for 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 organisations whose agents rely on fishing revenues. 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) could be established and disseminated for taxes which must be paid, this would reduce the transaction costs for all involved.

### Acknowledgments

The research at Lake Chad was undertaken as part of the Traditional Management of Artisanal Fisheries Project (TMAF). TMAF was funded by the UK Overseas Development Administration Project No.R5471, and was conducted by the University of Portsmouth (UK), in collaboration with the University of Maiduguri (Nigeria) and the Federal University of Technology in Yola (Nigeria). Further analysis of this research has been made possible by an ESRC research studentship awarded to Marie-Thérèse Sarch.

### Endnotes

- 1 In a similar vein to Hardin, Olson (1965) argued that if an individual can derive a benefit from a public good, there would be no reason for she or he to contribute to the good. Other authors have described this theory using the 'prisoners' dilemma', where individuals are offered a choice between cooperation with each other or defection. If both cooperate and stint in their use of the common resource, its over-exploitation is not inevitable. However, the theory predicts that joint users of a common resource have no incentive to stint in their use of it, as they cannot be sure that their co-users will do likewise. Instead, they will pursue the 'free-rider' strategy and will ultimately over-exploit, leading to 'tragedy'. (Runge 1984, Moorehead & Lane 1993, Wade 1988)
- 2 For example: Acheson (1975) describes how 'fief' holders have created exclusive rights to the lobsters on the Maine coast; McGoodwin (1983) describes a variety of indigenous mechanisms of self regulation in unmanaged fisheries; Wade (1988) shows how users have developed a system of managing access to irrigation; Child (1993) describes how rural



- communities in Zimbabwe now manage and market their wildlife successfully; and Kurien (1995) describes how communities are acting collectively to rejuvenate coastal fisheries.
- 3 For example, the *Programme National de Gestion des Terroirs Villageois* in Burkina Faso (see Toulmin 1991) and a similar strategy for forestry management in Mali (see Brinkerhoff 1995). The TMAF project, through which research for the thesis was conducted, is an example of such an initiative funded by the UK DFID to promote community-based solutions to perceived fisheries management problems. The recent UK DFID sponsored Capacity Building for Decentralised Development (CBDD) project, based in central Nigeria, is another example.
  - 4 Extrapolating from figures for the fish sold in the two key, lake-side markets, Sagua (1991) estimated an average annual production of 56,000 tons (fresh weight equivalent) between 1986 and 1989. This is a fraction of the figures calculated by Duran (1980) for the 1970-1977 period, which allow a comparable estimate for an average annual production of 243,000 tons.
  - 5 Since 1976, village heads (i.e. *Lawans* rather than *Bulamas*, who are officially described as ward or hamlet heads) have, in theory, been the paid employees of Local Government (see Thomas, Jimoh & Matthes 1993). This is not, however, always the case for the *Lawans*, whose areas of jurisdiction are adjacent to Lake Chad. The power and status of individual *Lawans* varies considerably: those with least are most likely to attend LGA sessions, and those with most will not. LGA officials may even seek audiences with the most powerful *Lawans*. For example, the *Lawan* of Baga.
  - 6 Although the Lake Chad Basin Commission's Joint Regulations on Fauna and Flora were ratified by the member states (Nigeria, Niger, Cameroon and Chad) in 1988, they have not been enforced in Nigeria.
  - 7 In theory, fishers were required to have licences issued by the LGA. In practice, the LGA does not enforce compliance with this however members of the Joint Patrol can ask to see these licences and can extort payment when they are not presented immediately.

## References

Acheson, J.M., 1975, The Lobster Fiefs: Economic and Ecological Effects of Territoriality in the Maine Lobster Fishery, *Human Ecology*, 3:183-207.

Arnason, R., 1994, Iceland's ITQ System, *Marine Resource Economics*, 8(3):201-218.

Azeza, N.I., 1977, *Fish Handling, Processing and Marketing in the Lake Chad Basin (North West Shores)* in proceedings of the Conference on the 'Handling, Processing and Marketing of Tropical Fish', 5-9 July 1976, Tropical Products Institute, London.

Bailey, C. and Jentoft, S., 1990, Hard Choices in Fisheries Development, *Marine Policy*, 14(4):333-344.

Behnke, Jnr. R. and Scoones, I., 1993, Rethinking Range Ecology: Implications for Rangeland Management in Africa, Chapter 1 in Behnke, Jnr. R., Scoones, I. and Kerven, C., (eds), *Range Ecology at Disequilibrium: New Models of Natural Variability and Pastoral Adaptation in African Savannas*, London: Overseas Development Institute.

Berry, S., 1989, Social Institutions and Access to Resources, *Africa*, 59(1):41-55, 1989.

Berry, S., 1993, *No Condition is Permanent: The Social Dynamics of Agrarian Change in Sub-Saharan Africa*, Madison: University of Wisconsin Press.

Borno State, 1982, *Borno State Local Revenue Committee Report August 1982*, Maiduguri, Nigeria: Government Printer.

Boserup, E., 1965, *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*, New York: Aldine Publishing Company.

Brenner, L., 1973, *The Shehus of Kukawa: A History of the Al-Kanemi Dynasty of Bornu*, Oxford: Clarendon Press.

Brinkerhoff, D.W., 1995, African State-society Linkages in Transition: The Case of Forestry Policy in Mali, *Canadian Journal of Development Studies*, XVI(2):201-228.

Bromley, D.W. and Cernea, M.M., 1989, The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies, *World Bank Discussion Papers No.57*, Washington DC: The World Bank.

Caddy, J.F. and Gulland, J.A., 1983, Historical Patterns of Fish Stocks, *Marine Policy*, October, pp.267-278.

Carney, D., 1998, Implementing the Sustainable Rural Livelihoods Approach, Chapter 1 in Carney, D., (ed), *Sustainable Rural Livelihoods. What Contribution Can We Make?* London: Department for International Development.

Carswell, G., 1997, Agricultural Intensification and Rural Sustainable Livelihoods: A Think Piece, *IDS Working Paper No.63*, Brighton, UK: Institute for Development Studies.

Charles, A.T., 1996, *Creating a Collapse: Atlantic Canada's Groundfishery*, paper presented to the Eighth Conference of the International Institute for Fisheries Economics and Trade, Marrakech, 1-4 July 1996.

Child, B., 1993, Zimbabwe's CAMPFIRE Programme: Using the High Value of Wildlife Recreation to Revolutionise Natural Resource Management in Communal Areas, *Commonwealth Forestry Review*, 72(4):284-296.

Ciriacy-Wantrup, S.V. and Bishop, R.C., 1975, 'Common Property' as a Concept in Natural Resource Policy, *Natural Resources Journal*, 15:713-727.

Cushing, D.H., 1982, *Climate and Fisheries*, London: Academic Press.

Cushing, D.H., 1988, *The Provident Sea*, Cambridge, UK: Cambridge University Press.

Davies, S., 1998, *Adaptable Livelihoods: Coping with Food Insecurity in the Malian Sahel*, London: Macmillan.

- Demsetz, H., 1967, Toward a Theory of Property Rights, *American Economic Review*, 57:347-359.
- Duran, J.R., 1980, Evolution des captures totales (1962-1977) et devenir des pecheries de la region du lac tchad, *Cahiers ORSTOM series Hydrobiologie*, 13:93-111.
- Elias, T.O., 1950, *Nigerian Land Law and Custom*, London: Routledge and Kegan Paul Ltd.
- Ellis, F., 2000, *Rural Livelihood Diversity in Developing Countries: Analysis, Policy, Methods*, forthcoming in 2000.
- Emmerson, D.K., 1980, Rethinking Artisanal Fisheries Development: Western Concepts, Asian Experiences, *World Bank Staff Working Paper No.423*, Washington DC: The World Bank.
- Flam, S.D. and Storoy, A., 1982, Capacity Reduction in Norwegian Industrial Fisheries, *Canadian Journal of Fisheries and Aquatic Sciences*, 39:1314-1317.
- Fraser, G.A., 1979, Limited Entry: Experience of the British Columbia Salmon Fishery, *Journal of the Fisheries Research Board of Canada*, 36(7):754-763.
- Freudenberger, M.S. and Mathieu, P., 1993, *The Question of the Commons in the Sahel*, preliminary paper, Land Tenure Center, University of Wisconsin-Madison, December 1993.
- Gordon, H.S., 1954, The Economic Theory of a Common Property Resource: The Fishery, *Journal of Political Economy*, 62(2):124-142.
- Grove, A.T., 1985, Water Characteristics of the Chari System and Lake Chad, Chapter 3 in *The Niger and its Neighbours: Environmental History and Hydrobiology, Human Use and Health Hazards of the Major West African Rivers*, Rotterdam: Balkema.
- Grown, C.A. and Sebstad, J., 1989, Introduction: Toward a Wider Perspective on Women's Employment', *World Development*, 17(7):937-952.
- Hardin, G., 1968, The Tragedy of the Commons, *Science*, 162(3859):1243-1248.
- Harris, P.G., 1942, The Kebbi Fishermen (Sokoto Province, Nigeria), *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 72(1&2):23-31.
- Haugerud, A., 1989, Land Tenure and Agrarian Change in Kenya, *Africa*, 59(1):61-90.
- Hayami, Y. and Ruttan, V.W., 1985, *Agricultural Development: An International Perspective*, Baltimore: Johns Hopkins University Press.
- Hill, P., 1972, *Rural Hausa: A Village and a Setting*, Cambridge: Cambridge University Press.
- Hutchinson, C., Warshall, P., Arnould, E.J. and Kindler, J., 1992, Lessons from Lake Chad, *Environment*, 34(6):17-20; 40-43.
- IIED, 1999, *Land Tenure and Resource Access in West Africa: Issues and Opportunities for the next Twenty Five Years*, London: International Institute for Environment and Development.
- Ita, E.O., 1993, *Transactions of the Inland Fisheries Laws and Regulations Drafting Committee*, 25 April 1985, New Bussa, Nigeria: National Institute for Freshwater Fisheries Research.
- Jodha, N.S., 1986, Common Property Resources and Rural Poor in Dry Regions of India, *Economic and Political Weekly*, XXI(27):1169-1181.
- Jodha, N.S., 1992, Common Property Resources: A Missing Dimension of Development Strategies, *World Bank Discussion Papers 169*, 1992, Washington DC: The World Bank.
- Johnson, C.A., 1997, Rules Norms and the Pursuit of Sustainable Livelihoods, *IDS Working Paper No.52*, Brighton, UK: Institute for Development Studies.
- Johnstone, N., 1996, The Economics of Fisheries Access Agreements: Perspectives on the EU-Senegal Case, *IIED-Environmental Economics Programme Discussion Paper 96-02*, London: International Institute for Environment and Development.
- Kolawole, A., 1986, *Irrigation and Drought in Borno, Nigeria*, PhD Thesis submitted to the University of Cambridge.
- Kone, A., 1985, Traditional Fishing Rights in the Central Delta of the Niger and the Lake Region: Conflicts and Recommendations with a View to Equitable and Rational Management of Fishery Resources, in *FAO Fisheries Report No.360*, pp.95-103 Rome: FAO.
- Kurien, J., 1995, Collective Action for Common Property Resource Rejuvenation: The Case of People's Artificial Reefs in Kerala State, India, *Human Organisation*, 54(2):160-168.
- Lawson, R., 1984, *Economics of Fisheries Development*, London: Frances Pinter.
- Leach, M., Mearns R. and Scoones, I., 1997a, Editorial: Community-based Sustainable Development: Consensus or Conflict? *IDS Bulletin*, 28(4):1-3.
- Leach, M., Mearns R. and Scoones, I., 1997b, Challenges to Community-based Sustainable Development: Dynamics, Entitlements, Institutions, *IDS Bulletin*, 28(4):4-14.
- Lemoalle, J., 1991, Elements d'hydrologie du lac Tchad au cours d'une periode de secheresse (1973-1989), in *FAO Fisheries Report No.445*, pp.54-61, 1991, Rome: FAO.
- Lipton, M. and van der Gagg, J., 1993, *Including the Poor*, proceedings of a symposium organised by the World Bank and the International Food Policy Research Institute, Washington DC: The World Bank.
- Madakan, S.P. and Ladu, B.L., 1996, *Investigation of Fisheries Management Systems in North Eastern Nigeria: National, Regional and District Level Institutions for Fisheries Management*, draft report to TMAF Project, Centre for Economics and Management of Aquatic Resources, University of Portsmouth, UK.
- Mahon, R., 1997, Does Fisheries Science Serve the Needs of Managers of Small Stocks in Developing Countries?, *Canadian Journal of Fisheries and Aquatic Sciences*, 54:2207-2213.
- Malthus, T., 1803, *An Essay on the Principle of Population*, reprint of the sixth (1826) and second (1803) editions, 1986, London: William Pickering.
- Matthews, R. and Phyne, J., 1988, Regulating the Newfoundland Inshore Fishery: Traditional Values Versus State Control in the Regulation of a Common Property Resource, *Journal of Canadian Studies*, 23(1-2):158-176.
- McEvedy, C., 1995, *The Penguin Atlas of African History*, London: Penguin Books.



- McGoodwin, J.R., 1983, Some Examples of Self-regulatory Mechanisms in Unmanaged Fisheries, pp.41-61 in *An Expert Consultation on the Regulation of Fishing Effort*, FAO Fisheries Report No.289, Supplement 2.
- Meeren van der, A.G.L., 1980, *A Socio-Anthropological Analysis of the Fisheries of Lake Chad*, Mimeo Report No.FI:DP/NIR/74/001, prepared for FAO, Rome.
- Moorehead, R., 1989, Changes Taking Place in Common Property Resource Management in the Inland Niger Delta in Mali, Chapter 15 in Berkes, F., (ed), *Common Property Resources: Ecology and Community-Based Sustainable Development*, London: Bellhaven.
- Mortimore, M., 1997, History and Evolution of Land Tenure and Administration in West Africa, *IIED Drylands Programme Issue Paper No.71*, London: International Institute for Environment and Development.
- Moschetta, G., 1991, Considérations sur les aspects juridiques de l'aménagement des pêches dans le bassin du lac Tchad, in *FAO Fisheries Report No.445*, pp.94-101, Rome: FAO.
- Moser, C.O.N., 1998, The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies, *World Development*, 26(1):1-19, 1998.
- Murton, J., 1999, Population Growth and Poverty in Machakos District, Kenya, *The Geographical Journal*, 165(1):37-46.
- Neiland, A.E. and Verinumbé, I., 1990, Fisheries Development and Resource-usage Conflict: A Case-study of Deforestation Associated with the Lake Chad Fishery in Nigeria, *Environmental Conservation*, 18(2):111-117.
- Neiland, A.E. and Sarch, M-T., 1993, *The Development of a Survey Methodology for the Investigation of Traditional Management of Artisanal Fisheries, North East Nigeria*, Report No.24, Centre for Economics and Management of Aquatic Resources, Portsmouth
- Netting, R.McC., 1993, *Smallholders, Householders: Farm Families and the Ecology of Intensive Sustainable Agriculture*, Stanford, California: Stanford University Press.
- North, D., 1990, *Institutions, Institutional Change and Economic Performance*, Cambridge, UK: Cambridge University Press.
- Olivry, J.-C., Chouret, A., Vuillaume, G., Lemoalle, J. and Bricquet, J-P., 1996, *Hydrologie du lac Tchad*, Paris: Editions ORSTOM.
- Olson, M., 1965, *The Logic of Collective Action, Public Goods and the Theory of Groups*, Cambridge, Massachusetts: Harvard University Press.
- Ostrom, E., 1990, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge, UK: Cambridge University Press.
- Palmer, H.R., 1929, Gazetteer of Bornu Province, in *Gazetteers of the Northern Provinces of Nigeria Volume II*, London: Frank Cass.
- Painter, T.M., Sumberg, J. and Price, T., 1994, Your Terroir and my 'Action-space': Implications of Differentiation, Mobility and Diversification for the *Approche Terroir* in Sahelian West Africa, *Africa*, 64(4):447-464.
- Platteau, J-P., 1996, The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment, *Development and Change*, 27:29-86.
- Quensière, J., (ed), 1994, *La Pêche dans le Delta Central du Niger: Approche pluridisciplinaire d'un système de production halieutique*, Paris: Editions ORSTOM.
- Quiggin, J., 1993, Common Property, Equality, and Development, *World Development*, 21(7):1123-1138.
- Rocheleau, D., 1995, More on Machakos, *Environment*, 37(3):3-5.
- Roy, N., 1996, *The Impact of Social Insurance on the Length of the Fishing Season*, paper presented to the Eighth Conference of the International Institute for Fisheries Economics and Trade, Marrakech, 1-4 July 1996.
- Runge, C.F., 1981, Common Property Externalities: Isolation, Assurance, and Resource Depletion in a Traditional Grazing Context, *American Journal of Agricultural Economics*, 63:595-606.
- Runge, C.F., 1984, Institutions and the Free Rider: The Assurance Problem in Collective Action, *Journal of Politics*, 46:154-181.
- Sagua, V.O., 1991, The Current Status of the Fishery Resources of the Lake Chad Basin and a Programme for its Management and Conservation, in *FAO Fisheries Report No.445*, Rome: FAO.
- Sarch, M-T., 1996, Fishing and Farming at Lake Chad: Overcapitalisation, Opportunities and Fisheries Management, *Journal of Environmental Management*, 48:305-320.
- Sarch, M-T., 1997, Fishing and Farming at Lake Chad: Implications for Fisheries Development, *Development Policy Review*, 15:1-17.
- Sarch, M-T. and Birkett, C.M., 2000, Fishing and Farming at Lake Chad: Responses to Lake Level Fluctuations, *The Geographical Journal*, in press.
- Schlager, E. and Ostrom, E., 1992, Property Rights Regimes and Natural Resources: A Conceptual Analysis, *Land Economics*, 68(3):249-62.
- Schoonmaker-Freudenberger, K., 1991, Mbegue: The Disingenuous Destruction of a Sahelian Forest, *IIED Dryland Networks Programme Issues Paper 29*, London: International Institute for Environment and Development.
- Scouones, I., 1998, Sustainable Rural Livelihoods: A Framework for Analysis, *IDS Working Paper No.72*, Brighton, UK: Institute for Development Studies.
- Shepherd, G., 1991, The Communal Management of Forests in the Semi-arid and Sub-humid Regions of Africa: Past Practice and Prospects for the Future, *Development Policy Review*, 9:151-176.
- Stauch, A., 1977, Fish Statistics in the Lake Chad Basin During the Drought (1969-1976), *Ch. ORSTOM sér Hydrobiologie*, X1(3):201-215.
- Swift, J., 1989, Why are Rural People Vulnerable to Famine?, *IDS Bulletin*, 20(2):8-15.

- Swynnerton, R.J.M., 1954, *Plan to Intensify the Development of African Agriculture in Kenya*, Nairobi: Colony and Protectorate of Kenya.
- Temple, O., 1919, *Notes on the Tribes, Provinces, Emirates and States of the Northern Provinces of Nigeria*, Cape Town: Argus.
- Thomas, D.H.L., Jimoh, M.A. and Matthes, H., 1993, Fishing in the floodplain, Chapter 7 in Hollis, G.E., Adams, W.M. and Aminu-Kano, M., (eds), *The Hadejia Nguru Wetlands: Environment, Economy and Sustainable Development of a Sahelian Floodplain Wetland*, Norwich, UK: Page Brothers.
- Tiffen, M., Mortimore, M. and Gichuki, F., 1994, *More People, Less Erosion: Environmental Recovery in Kenya*, Chichester, UK: Wiley.
- Toulmin, C., 1991, Natural Resource Management at the Local Level: Will this Bring Food Security to the Sahel?, *IDS Bulletin*, 22(3):22-30.
- Uchendu, V.C., 1979, State, Land and Society in Nigeria: A Critical Assessment of the Land Use Decree (1978), *Journal of African Studies*, 6(2):62-74.
- Wade, R., 1988, *Village Republics: Economic Conditions for Collective Action in South India*, Cambridge, UK: Cambridge University Press.
- Walker, T.S. and Jodha, N.S., 1986, How Small Farm Households Adapt to Risk, in Hazell, P., Pomerada, C. and Valdes, A., (eds), *Crop Insurance for Agricultural Development*, Baltimore, USA: Johns Hopkins University Press.
- Western, D., Wright, M. and Strum, S., (eds), 1994, *Natural Connections: Perspectives in Community-Based Conservation*, Washington DC: Island Press.
- Whitmarsh, D., Reid, C., Gulvin, C. and Dunn, M., 1995, Natural Resource Exploitation and the Role of New Technology: The UK Herring Industry 1960-1980, *Environmental Conservation*, 22(2):103-110.
- Williams, T.O., 1998, Multiple Uses of Common Pool Resources in Semi-arid West Africa: A Survey of Existing Practices and Options for Sustainable Resource Management, *Natural Resource Perspectives No.38*, London: Overseas Development Institute.
- Yerokun, O., 1983, The Legal Regime of Lake Chad, *Annals of Borno*, 1:159-167.
- Yerokun, O., 1991, Legal Aspects of Water Management at Local and International Levels, Chapter 32 in Gadzama, N.M., Adeniji, F.A., Richards, W.S. and Thambyahpillay, G.G.R., (eds), *Arid Zone Hydrology and Water Resources*, Maiduguri, Nigeria: University of Maiduguri Press.
- 1978 Federal Government of Nigeria Land Use Decree.
- 1982 United Nations Convention of the Law of the Sea – Articles 61 and 62.
- 1992 Federal Government of Nigeria Inland Fisheries Decree.

## Legislation

- 1977 Joint Regulations on Fauna and Flora of the Lake Chad Basin Commission, ratified by the Federal Government of Nigeria in 1988.