

Pastoralism and Conservation in the Sudan

Executive Summary

Introduction

On a global scale, Sudan perhaps ranks first in terms of pastoralists population size. About 66 per cent of Sudan is arid land, which is mainly pastoralists' habitat. Pastoralism in the Sudan involves about 20 per cent of the population and accounts for almost 40 per cent of livestock wealth [Markakis, 1998: 41]. The livestock sector plays an important role in the economy of the Sudan, accounting for about 20 percent of the GDP, meeting the domestic demand for meat and about 70 percent of national milk requirements and contributing about 20 percent of the Sudan's foreign exchange earnings. It is also a very significant source of employment for about 80 percent of the rural workforce.

In the Sudan it is estimated that the total number of cattle multiplied 21 times between 1917 and 1977, camels 16 times, sheep 12 times and goats 8 times [Fouad Ibrahim, 1984, p.125 in Markakis, 1998: 42]. Their numbers are estimated to have doubled between 1965 and 1986. The rapid rate of animal population increase has been attributed to the introduction of veterinary services and the stimulation of the market. Two periods of exceptional rainfall (1919-1934 and 1950-1965) added momentum to this trend. In the early 1980s there were nearly three million heads of camels, over 20 million cattle, nearly 19 million sheep, and 14 million goats. Livestock estimates for the year 2005 are 38 million heads of cattle, 47 million sheep, 40 million goats and three million camels [Ministry of Animal Resources, 2006].

The Ecological Context

Pastoral communities are almost entirely concentrated in ecologically marginal and semi-arid areas under communal land tenure systems. These areas also contain zones of large-scale irrigated and rainfed agriculture, small-scale farming, and protected wildlife areas and forest reserves. These tend to be supported by both the government and international donors and reflect land legislation and development interventions that favours non-pastoral activities.

In the Sudan, rainfall is the main factor influencing the distribution of human and livestock populations. The annual rainfall ranges between from 75mm in the extreme north to 1500mm in the extreme south. Accordingly, five ecological zones with variable grazing potentials can be identified:

- desert;
- semi-desert;
- low rainfall savannah on sand-dunes (*goz*) west of the Nile;
- low rainfall savannah on clay in the east;
- high rainfall savannah in the flood plain in the south.

Different livestock species and breeds tend to thrive in the different ecological zones that have distinct grazing qualities. The natural range is generally poor in nutrients and so no zone is qualified to accommodate livestock all year round. Seasonal mobility is therefore adopted to compensate for the shortages in pasture and water, to escape biting flies and

muddy conditions, and to avoid large-scale rain-fed and irrigated farming where livestock admission is prohibited.

Sudan is characterized by a high diversity of habitats resulting from interactions of soil types, climate, topography, vegetation cover, land use system, water resources and the prevalent human and animal population activities. The habitat diversity has created eight ecological zones: desert, semi-desert, low rainfall savannah, high rainfall savannah, *sudd* region, flood region, equatorial forests, montane region.

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The semiarid zone of the Sudan encompasses about 70 percent the surface area of the country. It extends roughly 800 km from latitude 10° to 16° N. Seventy percent of the Sudanese population lives in this zone with herding and farming as the main sources of livelihood. Despite the existence of large irrigation schemes (e.g. Gezira, New Halfa, Rahad) and large-scale mechanized rain-fed farming (Gedaref, Blue Nile, Sennar, White Nile and South Kordofan states), the majority of the rural population depends mainly on herding and small-scale rain-fed cultivation, which has been exposed repeatedly to hazards of drought during the last three decades of the 20th century. Compared with the preceding two decades, the precipitation deficit for this time period has amounted to 40-50 percent.

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Most pastoral lands in the Sudan are associated with a particular tribal homeland (*dar*), defined by customary rights. Within the *dar* grazing is communal. Conflicts associated with competition for pasture and water were suppressed since the colonial time with the maintenance of policies that restrict different tribal groups to their respective *dar*. This policy was severely undermined by the enactment of the 1970 Unregistered Land Act, the 1971 Local Government Act and the 1981 Regional Government Act [Shazali, 1988; Babiker and Abdel Gadir, 1999].

Table (1): Livestock Distribution over Ecological Zones

Ecological Zone	Location	% of total area of the country	Dominant Vegetation	Livestock Species
Desert	North latitude 16° N	29.0	Sparse in valleys and water courses	Camels, desert sheep
Semi-Desert	14°-16° N	19.6	Short grasses and thorny bushes	Camel, sheep and goats during wet season
Low-Rainfall Savannah	10°-14° N	51.1	Tall grasses and thorny trees	Cattle, sheep and goats
High-Rainfall	South latitude 10° N		Tropical forests	Cattle, sheep and

Savannah				goats during the dry season
Wetlands	Swamp and floodplain in southern Sudan		Aquatic plants and bamboos	Cattle in the dry season
Highlands	Western, East and South		Mountainous vegetation	Goats, sheep, cattle and camels

Climatic-Vegetation Zones in the Arid and Semiarid Sudan

Type	Precipitation in mm	Arid Months	Dominant Vegetation	Dominant Land Use
1. Hyper-arid to arid Saharan marginal zone	50-200	11	Sparse thorn-scrub grasslands in favourable areas. <i>Acacia tortilis</i> , <i>Acacia mellifera</i> .	Nomadic and semi-nomadic pastoralism with limited millet cultivation.
2. Arid northern Sahel	200-400	10	Thorn-scrub savannah with a dominance of <i>Acacia tortilis</i> , <i>Acacia mellifera</i> , <i>Acacia nubica</i> , <i>Balanites aegyptiaca</i> , <i>Commifora africana</i> , <i>Acacia Senegal</i> .	Herding combined with millet cultivation and gum arabic collection.
3. Semi-arid southern Sahel	400-600	9	Degraded low rainfall woodland savannah with a dominance of <i>Acacia Senegal</i> , <i>Adansonia digitata</i> , <i>Hayphaene thebaica</i> , <i>Balanites aegyptiaca</i> , <i>Acacia seyal</i> , <i>Guiera senegalensis</i> , <i>Combretum cordofanum</i> .	Cultivation of millet and sorghum combined with groundnuts and sesame as cash crops; pastoral and sedentary herding.
4. Semi-arid Sudan zone	600-900	8	Partly degraded low rainfall woodland savannah <i>Acacia seyal</i> , <i>Acacia albida</i> , <i>Combretum cordofanum</i> , <i>Cordia gharat</i> , <i>Dalbergia melanoxylon</i> , <i>Anogeissus schimperi</i> .	Intensive cultivation of millet, sorghum, maize and groundnuts; spread of large mechanized rain-fed farming, pastoral and sedentary herding.

Source: Ibrahim (1984: 22)

Pastoral Groups in the Sudan

1. *Abbala* Pastoralism

The term *Abbala* lacks any ethnic or territorial connotation; rather, it is generic subsuming all camel keepers. It is derived from the Arabic word *ibil*, meaning camels. The very name *Abbala* refers to camel keepers to distinguish them from the Baggara, another generic term referring to cattle keepers. The term *Bggara* is derived from the word *baggar*, which means cattle.

The northern arid and semi-arid zones favour camel pastoralism over other species of livestock. Their natural habitat is north of latitude 14° N. After the droughts of the last three decades of the 20th Century, the camels migrated south to latitude 10° N even though this area is not suitable for camel husbandry because of endemic diseases such as trypanosomiasis. However, the major camel-herding groups (*Abbala*) in these two zones are:

a. Eastern Sudan: Beja tribes, Rashaida, Ababda, Shukriya, Batahin and Lahawin in Gedaref, Kassala and the Red Sea states.

b. Western Sudan: Kababish, Kawahla, Hawawir, Shenabla, Beni Gerrar, Hamar and Maganin in North Kordofan state; and Meidob, Zeyadiya, Jellul, Mahmeed, Mahriya and Zaghawa in North Darfur state.

In western Sudan, camels have three migrations: rainy season, winter and summer. Summer grazing areas include El Khuwie, El-Rahad, En-Nahud, Nyala, El Diein, Wadi Hawar and Wadi El Melik. During the rainy season they congregate in Hamrat El Sheikh, Um Seyala, Um Enderaba, El Mezroub, Um Badir, El Malha, Kutum and Meleet. Camels in Eastern Sudan cover a much shorter migration between the rivers Atbara, Rahad and Dinder, and up and down the Red Sea hills.

During the last three decades of the 20th century frequent droughts had resulted in the decline of pasture in the traditional homelands of camel pastoralists. Nowadays the camel-herding groups of north Kordofan move south very much earlier and far deeper into the Nuba Mountains and beyond, in search of water and pasture. This often results in conflict with rival pastoral groups. This is also the case with the Zaghawa camel herders of north Darfur who moves south as far as Bahar El Arab.

The Beja of eastern Sudan move as little as possible (from the Red Sea hills to the coastal plain in summer). Movement is restricted to a short radius from their watering centres. Only when drought persists for several consecutive years do they move further, as they had during the 1980s drought. The Beja move outward after the rainy season, looking for pasture on the hills, and return to their homelands, where they have permanent wells, toward the end of the dry season. Sheep follow the same pattern as camels. They go to Toker and Gash deltas where areas of flood irrigation offer crop residues.

In the northern dry parts of the Red Sea hills live the Bisharyin with their camels, sheep and goats. In the centre live the Amrar who are semi-nomadic. In the southern parts of this arid zone live the Hadendawa down to the Gash and Toker deltas. They move to the hills during winter and into valleys during summer. The Beni Amer live close to the Eritrean and Ethiopian borders, which they frequently cross, especially during summer, and to the Red Sea hills and the coastal area in winter (the main rainy season in the Red Sea hills).

The Shukriya of the Butana plain (between the Blue Nile and the Atbara River) own camels and sheep, as do the Rashayda and Lahawin. These pastoral groups graze camels and sheep mainly on a grass with relatively high protein content, locally called *seha*. During the dry season the Butana plain experience severe water scarcity. This necessitates movement toward the Blue Nile, the Atbara River, and the irrigated schemes of Gezira, Rahad and New Halfa. Access is easier for those pastoralists who operate tenancies in these schemes. During the short rainy season several pastoral groups visit the Butana plains. These groups disperse widely over the Butana wherever temporary water supplies exist. The visiting groups leave the Butana toward the end of the rainy season since the local pastoral groups, the Shukriya, enjoy exclusive access to the well centres within the Butana during the long dry season.

Although many camel herders raise sheep in the arid and semi-arid zones, it is believed that that half of Sudan's sheep herd is located in the savannah zone. The Kababish have hardy sheep, which can withstand their long distance migrations as well the extreme aridity of their homeland [Asad, 1970, 1976]. The Hamar and Kababish sheep can graze as far as south Kordofan during the dry season and in central Kordofan (the *Goz*) during the rainy season [Ahmed *et al.* 1997]. In the dry season the watering interval is 5-7 days in winter, and 2-3

days in summer. The grazing distance between watering points is 30-40 km, resulting in an overlap in the radius of water sources and hence posing serious overgrazing problems. In north Darfur, sheep have started to migrate further south because of recent droughts. Traditionally they moved to the Gizu during winter and in summer to their homeland in north Darfur. Camel pastoralists keep few goats because they are unsuited for long distance migrations.

Before the droughts of the 1970s and the 1980s all camel herds moved northward during the rainy season. During the dry season they returned south to the permanent water sources in the same zone or even further south into the savannah zone. Camels and sheep normally grazed in the northern half of the country. Since migration is dictated by ecological and environmental factors, drought always results in longer migrations southward, especially for camels in the dry season. Sheep often follow the same pattern of migration as camel in the semi-arid zone (the Kababish and Hamar type).

2. Baggara Pastoralism

The term Baggara, like the term Abbala, lacks any ethnic or territorial connotation. Rather, it is generic term derived from the Arabic word *baggar* (i.e. cattle) to refer to cattle keepers and to distinguish them from Abbala (i.e. camel keepers). However, in some cases the boundaries between the Baggara and Abbala are so diffuse to the extent that pastoralists such as the Rufa'a al-Hoi of the Blue Nile state, for example, are sometimes classified as Baggara [Lebon, 1965: 200], other times as Abbala (Davies, 1966: 196). This confusion arises because the Rufa'a al-Hoi includes both Baggara (the southern Badiya) and Abbala (the northern Badiya) groups [Ahmed, 1974, 2001, 2002].

The Baggara constitute the second largest group of pastoralists in the Sudan after the Dinka. They are dispersed throughout the area from the southwestern parts of Darfur and south Kordofan to the banks of the White Nile in the east. There are four groups of *Baggara*:

- Those using the White Nile grazing areas during the dry season such as Kenana, Ahamda and Selim
- The Hawazma and Meseiriya Zurug living within the Nuba Mountains, often coming into contact with Nuba agropastoralists as well as large scale mechanized rainfed farming
- Meseiriya Humur, Rizeigat, Maalya and Habbaniya of southwest Kordofan and southeast Darfur
- The southwest Darfur groups, including Beni Helba, Beni Hessein, Ta'aysha and the Mberaro (pastoral Fulani)

The first group moves south toward the river during the dry season. During the rainy season they move east and west to open pasture. The last three groups, which constitute the main cattle pastoralists, live further south below a band of cultivated lands that stretch from Gedaref in the east to Wadi Azzoom. Living in *ferigs* (camps) on the plain between latitudes 10° to 12° N, they often move northward during the rains and southward during the dry season, covering long distances to reach scarce water and grazing.

In addition to cattle, the Baggara also keep few goats and sheep. They cultivate sorghum and millet, which are the main staple grains. Their main cash crops include cotton, sesame and groundnuts. The Baggara live within the savannah belt and with intensive interaction with

other pastoral and agro-pastoral groups in the north (Masaleet, Fur, Zaghawa, Hamar, Kababish, Kawahla, Shenabla, etc.) and with the Nilotic pastoralists (Dinka, Nuer, etc.) in the south. In the Baggara belt, the annual rainfall increases from 400 mm in the north to over 800 mm in the south and is confined to a relatively short season, which extends from June to October. The actual start of the rainy season is unpredictable and varies from one year to another.

The way in which the Baggara respond to such climatic uncertainties is best described by Gunnar Haaland. He writes: ‘...the Baggara cattle herders...typically move between Baher El Arab in the south, where they spend the dry season, and their homelands on the more sandy soils (*goz*) further north, where they do some cultivation, and still further north to the low rainfall savannah where they prefer to keep their cattle in the rainy season’ [*Haaland, 1982: 4*]. It follows that the Baggara adapt their livelihoods to fluctuations in pastoral resources so that they move from one ecological zone to another according to seasonal variations in climate and landed resources.

At present, Baggara pastoralism is threatened by all sorts of developments, namely, the unplanned expansion of mechanized rain-fed farming and the escalation of the civil war in southern Sudan. Historically the Baggara maintained peaceful relations with Dinka and other southern Sudanese pastoral groups through shared institutions of cooperation and mechanism of conflict resolution [*Kocjok, 1991*]. The ongoing war in the south between the SPLA and the government troops had undermined that harmony through the militarization of local conflicts and the continuous attempts to drag the pastoralists into the war as supporters of this or that party. In the process, the Baggara are becoming more and more squeezed between the semi-desert in the north and the mechanized farms in the south. The combined effect of both the civil war and the encroachment of mechanized farming is that the Baggara are increasingly denied the use of vast and rich dry season grazing and water resources.

3. Nilotic Pastoralism

The Nilotes (Shilluk, Nuer and Dinka) of the Upper Nile and Bahar El Ghazal are the most important pastoral groups in southern Sudan. Before the resumption of the civil war in southern Sudan in 1983, these groups used to own over 30% of Sudan’s cattle. During the war more than half of that wealth is believed to be lost. Though the Nuer and Dinka have their differences, they share some general characteristics, especially the importance of cattle in their social organization, though the Dinka are known to be richer in cattle than the Nuer. Again, Nuer and Dinka are engaged in the cultivation of sorghum, which complements the food obtained from cattle. Moreover, both groups live in dispersed settlements and involved in a complex pattern of seasonal migration. The Shilluk, on the other hand, have fewer cattle than the Nuer and Dinka and pursue an economy that combines livestock husbandry with cultivation and fishing. They live in compact hamlets on the terrace along the banks of the rivers, not dispersed in homesteads as the Nuer and Dinka.

According to the accepted climatic classification of the Sudan, the homeland of the Nilotic pastoralists falls within the zone of the high rainfall grassland savannah. Temperature variations are very small between dry and wet season as well as between day and night. Rainfall is the most important single climatic factor because of its direct effect on plant growth, as a source of moisture, besides its influence on other climatic factors such temperature and relative humidity. The rainy season might start as early as March, but normally reliable showers come at the beginning of May, with the maximum reached in July

and August. From then on the amounts of rain gradually decrease with the last showers at the beginning of November. The annual average of rainfall is 800 mm. The seasonality of climate with a distinct wet and dry season is a crucial factor governing all human activities (herding, farming, fishing, transport, etc.) in the area.

Nilotic pastoralism is depended on the utilization of three types of land distinguished as higher grounds, intermediate grounds and *toich*. The distinction, however, is not based on any striking differences in altitude, as the terminology implies; but rather it indicates variations in susceptibility to annual flooding, to which the three forms of land are subjected. The higher ground occupies a central position and is under permanent human habitation throughout all seasons. It is sandwiched between the intermediate ground, falling to its west and east, and separating it from the *toich* running parallel to the west of it. The use of the term higher ground is therefore arbitrary and to be taken in comparison to its surroundings. In most cases, the higher grounds are spots one or two feet higher than the inundated plains around them. They are not continuous and interrupted by intervening lower grounds. Because of their relatively higher elevation they remain un-flooded, or partially flooded, during the rainy season. For that reason, they are the most suitable natural sites for permanent settlements, where agriculture is also practiced.

The term intermediate ground implies that these are transitional between the higher ground and the *toich* in both elevation and geographical location. True, they are lower than the former and higher than the latter. As for geographical location, since they extend around the higher grounds from all directions, that part of them falling to the east of the latter assumes an intermediate position between the *toich* and the higher grounds. The intermediate ground is made up of extensive plains, constituting about 75 per cent of the land surface of the area. Topographically they are dead flat plains, inundated during the wet season by direct rainfall, sheet flooding and the rise of the river proper for about six months. This very fact renders the intermediate grounds suitable for grazing and human habitation for only part of the year, mainly during the early wet season and early dry season, depending on flooding conditions and the availability of drinking water.

Running parallel to the west of the highland and separated from it by intermediate land is the *toich*, or flood plain. During the flood season the river proper overflows its low banks, and the *toich* plains become inundated for over six months every year. When the flood recedes, rich grass cover vegetates the surface of the plain. Grass being adequate and drinking water from the river and pools abundant, the *toich* plains provide good pasture for livestock during the dry season, when the grazing in the higher and intermediate grounds is depleted or inaccessible due to scarcity in water supply.

South of latitude 10° N the limiting factors for livestock husbandry are the biting flies and muddy conditions. Here the pattern of pastoral migrations is complex with relatively short distances to cover. However, the short-distance, dry-season migration of these groups, from the un-flooded elevated plain to the *toichs* (floodplains that act as dry season refuge), is governed by drainage conditions, prevalence of biting flies and availability of pasture. At the first rains cattle herds move from river floodplains to the elevated plains. The reverse occurs during the dry season. The Dinka have relatively longer distances to cover to the areas of Bahar Al Arab and Bahar El Ghazal. This often brings them into conflict with the *Baggara* of south Kordofan and Darfur over dry-season grazing resources.

The disruption of commerce and services, insecurity which lead to large-scale displacement, the contraction of subsistence activities and exchange networks, were all war-related factors which contributed to the decline of the pastoral economy. Most pastoralists had suffered livestock losses through raiding and disease, and very few families had been able to accumulate sufficient food reserves to see them through any period of natural calamity. The floods of 1988, which affected large parts of Upper Nile and Bahar El Ghazal regions thus had a devastating effect, and resulted in serious food shortages and local famines. The well-publicized famine of northern Bahar El Ghazal in 1988, however, was entirely a result of the war in that area, not natural catastrophes. In this tragic situation and before social peace has been secured, any prospects for the rehabilitation and development of the pastoral economy are very slim indeed.

Management of Pastoral Resources

The management of pastoral resources in Sudan involves movement of people, sometimes whole families, with their animals in response to variations in rainfall and the associated availability of water and pasture. Most pastoralists do not roam continuously but have permanent settlements and rights of residence and use of resources of specific areas. Some have regular seasonal movements from their permanent settlements. In addition to animal herding many pastorals groups are engaged in supplementary activities such as cultivation, trade, wage labour and fishing. The structure and culture of the pastoralists vary with the pattern of movement, mode of settlement and degree of reliance on supplementary activities.

Generally the extended family constitutes the productive unit and has certain relationships and commitment to the larger ethnic group. The economic, cultural and social lives and relationships of the pastoralists are articulated around their animals which are not viewed as sheer economic assets. Cooperation and solidarity are basic elements in their life. The movement of the pastoralists brings them in contact with many other ethnic groups with different mode of production and livelihood strategies but all sharing interests in certain resources.

Scholars who studied the pastorlist view their mode of living as ‘rational’ adaptation of human life to environment in Sudan. Many of them are against settlement of nomads and argue that their development should not aim to change radically their life. This is stated clearly by Cunnison, “the Humur could be kept as they are with improvement...provision of services which would enable them to lead a life of the same general kind as they do at present but with sounder health for themselves and their cattle and better quality for their beasts” (1976: 78)

Historically the pastoralists have managed an adaptive system that enabled them to exploit marginal regions in a sustainable manner. The population and animal increase has remained relevant to the carrying capacity of the land due to droughts, diseases and demographic factors. During their adaptation processes they have experienced changes and transformation in their lives. Since the beginning of the 20th century and particularly in the last three decades the pastoralists in Sudan have been facing many challenges associated with the increasing competition over resources and conflicts. Although they have been able to cope with many of the challenges and overcome the crisis in survival still many are struggling to endure the predicament created by historical local, national and external factors.

Until its dismantling in 1971, the system of Native Administration constituted the most effective mechanism to regulate and control the activities of the pastoral groups. It not only provided the instruments for the maintenance of law and order, but also defined and enforced the rights of each group over the resources, and regulated and the direction and timing of pastoral movements. As the abolition of the Native Administration was not accompanied by the introduction of an alternative system to undertake these functions, the result was a situation of virtual chaos. This was further exacerbated by the undermining of the principle of tribal homeland, which paved the way for the unfettered expansion of mechanised farming in pastoral areas. This in turn squeezed the rangelands and intensified both intermingling and competition among the various pastoral groups over the ever increasingly reduced resources.

Risk Management

The commercialisation of pastoral production via livestock development policies has been met with differential responses among Sudanese pastoralists. Large sections of the pastoral communities are integrated in the market economy with their standards of living increasingly becoming tied to the fluctuations of the exchange rate and the general inflationary conditions plaguing the Sudanese economy.

The increasing displacement of the majority of the pastoralists by the unabated expansion of large-scale mechanized farming forced them to devise, at greater social and economic costs, new mobility patterns to allow themselves longer periods of stay in the increasingly squeezed dry-season grazing grounds (Shazali and Ahmed, 1999). Others were forced to settle down and to undertake farming in order to avoid the purchase of their staple grains. Those who settled in the urban fringes have been transformed into milk vendors depending on their small herds of cows and goats (Mohamed-Salih, 1985). In this pursuit they had to endure the hardships associated with the competition imposed upon them by the proliferation of modern dairy farms and imported reconstituted milk. Herd management is practiced by women while most men are involved in selling firewood and charcoal or eking out a living in the urban informal sector (El Nagar, 2001).

Pastoralists displaced by the droughts of the 1980s and 1990s have responded in various ways to the crisis. The pastoralists who lost their herds in their entirety migrated to relief distribution centres only to live as destitute depending on international charity and food handouts. Those with small herds began to practice sedentary pastoralism in larger villages and the fringes of urban centres. The well-to-do pastoralists are much more able to diversify their sources of income and the variations in their responses were largely a function of the prevailing ecological conditions.

It is worthwhile to emphasize two processes without which the pastoralists might not have been able to cope with crisis. First, micro-level responses at times of crisis related to falling back into their rich local knowledge: collection of wild food, crossbreeding of livestock types to reduce susceptibility to disease and unfavourable environmental conditions, the use traditional veterinary medicine, and the mobilization of labour within and outside the pastoral sector. Second, macro-level responses to the processes behind their increasing impoverishment, which generated counter-processes such as flight and settlement in sub-humid zones due to drought, unfavourable terms of trade, loss of precious dry season grazing grounds to large-scale mechanized farming, and all the biased government policies.

At both levels, the pastoralists had to accommodate themselves to new conditions with greater unease and hardship. While the wealthy pastoralists are able to diversify their livelihood pursuits, the poor are increasingly marginalized with grave consequences such as being transformed into agricultural workers and herders or migrating to towns sinking into the urban informal economy. Scenes impoverished pastoralists caught into the trap of urban poverty in towns such as Khartoum, Omdurman, Kosti, Malakal, Wau, Kassala and Port Sudan, are staggering by all standards. Nevertheless, even in towns, the pastoralists have to adapt to alien socio-cultural settings in which their pastoral experiences are of little, if any, relevance. With no skills to facilitate entry into urban formal employment, the only option for the pastoralists is to sink deep into the informal economy with neither official recognition nor legal protection. In this way, they are an easy prey to harassment, blackmailing, and all other forms of corruption of the municipal authorities (the *kashsha* phenomenon).

Pastoralism and other forms of land use

The economic investments of the successive governments over the past century have contributed to the displacement of pastoralists and forced them into new unfavourable ecological zones. The pastoralists have to deal with the uncertainty of the new land and compete with other new forms of land use (mechanized farming, national parks, forest reserves, and mining enclaves). There is no doubt as to the adverse effects of such policies on the migratory patterns of the pastoralists.

The policy of agricultural expansion and establishment of large-scale schemes contributed to the reduction of migratory areas for the pastoralists. “The Gezira Scheme in central Sudan is a clear case of how the introduction of the cash crops displaced pastoralists and forced them into new, unfavourable ecological zones.” The Gash scheme in eastern Sudan deprived the Hadendowa of valuable dry season pasture. The Khasm al Girba Scheme and the rain-fed mechanized schemes have had similar effects on the pastoralists of eastern Sudan (Mohamed Salih, 1993; Morton, 1993; Manger, 1996; Salim-Murdock, 1993; Sorbo, 1985).

Competition over resources has particularly led to conflict and fighting among the pastoralists and sedentary agriculturalists. But the long continued wars and conflicts and the resulting movement of groups have aggravated competition over resources. The fighting groups in the South and West compete for controlling more land for animals. The war has restricted grazing areas for pastoralists.

Forced displacement connected to oil development had severely disrupted the local economy. The inhabitants of the area, whose mode of life is based on agro-pastoralism and fishing, depend on access to a range of natural resources in order to survive: dry season and wet season grazing grounds, dry season fishing areas, and wet season agricultural areas that are close to permanent villages. Freedom to move among these areas is essential to the agro-pastoral economy. Attacks on rural communities have a cumulative effect: repeated incidents of destruction of property, looting of livestock and loss of grain reserves make survival in the conflict-affected areas more and more difficult, eroding survival strategies to the point where displacement is the only option that remains. This process of displacement had interrupted the agricultural cycle and reduced livestock numbers, bringing the inhabitants of some areas close to destitution.

The gold mines and growth of Port Sudan provided new economic opportunities for Beja pastoralists in the form of important sources of income that contributed to rebuilding of the

stock depleted by droughts and famines. But that positive impact didn't last long, as labour in town became alternative for those who lost large proportion of their herds. The tendency of young Beja to work in urban centres created shortages of labour and caused the groups to introduce significant changes in their movement patterns. This in turn constrained the traditional survival and recovery mechanisms that are essential for the maintenance and strengthening of Beja pastoralism. These changes have made it difficult to keep large herds thus people shifted to more localized market-oriented systems of production focusing on small stock.

Pastoralism and Environmental Degradation

Pastoralists in the Sudan, as elsewhere, are usually accused of being responsible for the misuse of natural resources. Overgrazing is accordingly pointed out as among the primary causes of environmental deterioration. However, research findings have already shown that such interpretations have no empirical foundations. The issue here is not to deny the incidence of overgrazing. It is rather to draw attention to the fact that overgrazing more often than not is a symptom rather than a cause of resource mismanagement inherent in official land use policies and planning. In other words, overgrazing is a consequence of the squeeze of the rangelands as a result of the dramatic expansion in large-scale mechanised rainfed farming rather than of an increase in livestock population. Other factors such as water scarcity and widespread banditry in certain parts of Sudan, further limit the effective grazing areas accessible to pastoral herds.

Since mechanised farming is considered "modern" and conducive to growth of the production capacity of the Sudanese economy, its role in environmental degradation is more often than not ignored. In reality, the wholesale clearance of vast tracts of forestland for mechanised farming is taken for granted, while localised overgrazing around watering centres is emphasized out of all proportions to its actual magnitude. Likewise, herders tend, under certain conditions, to lop tree branches, and the forestry officials consider this as a cause for alarm. At the same time, the role of (often unauthorised) commercial woodcutting and charcoal making in destroying vast forests is overlooked. It is not an exaggeration to say that what a reforestation programme can rehabilitate in a decade could be destroyed by extensive woodcutting in less than a fortnight. Like mechanised farming, however, commercial woodcutting is underlain by, on the one hand, forcefully defended interests of "big merchants" and, on the other, the anxiety of politicians to secure stable and relatively cheap supplies (of both food grains and fuel wood) for the politically vocal urban population.

Pastoralists are much concerned about the long-term environmental conditions in their area. They are aware that a balanced environment is vital not only for the viability of pastoralism in the present, but also for the future careers of their children. Though both pastoralists and big farmers seem to share dependence on the natural resources of the region, a basic difference between the two should be pointed out and emphasised. Big 'farmers' consist largely of individuals drawn from, and reside, outside the region. For them, a short-term objective of "profit maximisation" rather than a long term strategy of "environmental conservation" is the primary drive for their involvement in mechanised rainfed farming. This is evident in their consistent non-compliance with the prescribed crop rotation. Thus, as soil fertility declines in a scheme, they would shift to another site or withdraw from farming altogether. Unlike the big 'farmers', pastoralists consider and view pastoral nomadism as a "way of life" for themselves and for their children. They have neither another equally

rewarding career to pursue, nor roots in another region to fallback on in the manner big 'farmers' do.

Though pastoral nomadism constitutes a form of production characterised by extensive utilisation of resources, it cannot be justifiably characterised as wasteful or destructive. In the context of the environmental constraints of the arid and semi-arid parts of the Sudan, the livestock sector cannot be sustained without mobility, or use of resources in a relatively extensive area covering diverse ecological zones. But use of an extensive area does not necessarily imply destruction of natural resources. Inherent to the operation of pastoral nomadism is indeed a mechanism for regeneration of natural resources. Pastoral mobility is both flexible and selective. Movement is usually organised on the basis of mobile camps, comprised of between 50 to 200 households. Each camp has a number of scouts who move ahead of herds to explore and collect information on the grazing potentials of the area toward which the herds are moving. Invariably, decisions concerning direction of movement are based on reports by scouts. In other words, herds do not graze at random, but in selected sites known to be the best available; ipso facto, poorer sites are avoided and left to regenerate.

The flexibility and selectivity of pastoral movements should not, however, be exaggerated and taken out of context. They do not imply that pastoralists would go out of their way for the sake of environmental conservation or resources regeneration. They rather simply mean that herds do not graze at random. Selectivity is intended, first and foremost, to ensure the best pasture, in terms of both quantity and quality, for animals. But it also has positive impact on resource regeneration. Under normal grazing conditions, therefore, one may conceive of a unity between pastoral and environmental interests. In years of bad rains and areas of poor pasture, when choice is limited or non-existent, pastoralists would not contemplate having a positive impact on the environment. Under such adverse conditions, herders cannot afford being more long-term than short-term maximisers. Were their herds not to survive the short-term, there would be no long-term for either herds or pastoralists. It is under such adverse conditions that pastoralists tend to pursue acts such as lopping of tree branches. In areas of poor pasture, or where cattle and sheep could not graze due to illness, pastoralists would lop branches of trees to feed their animals. They are conscious of the effects of lopping, and seek to avoid it, as far as possible, when trees are leafless. Pastoralists contend that they are interested in the tree cover not only because their camels and goats browse, but also because all animals need shade.

Policy Issues

In discussing some of the issues pertaining to the differential impacts of livestock and pastoral development policies, it became evident that the dominant planning culture is grounded on modern knowledge and its associated attitudes with a total disregard to the pastoralists' knowledge and culture. Such a state of affairs points to the urgent need to develop contact points between planners and pastoralists and to seriously reconsider the integration of pastoralism and agriculture, the use of browsing to supplement seasonal deficiencies in pasture, and the utilization of local veterinary knowledge to supplement modern medicine. There is ample evidence to suggest that the dominant planning culture constitutes an un-surmountable barrier and poses serious setbacks in the face of any attempt to venture into the richness of the pastoralists' knowledge and culture. The planners have come to realize the rationale behind the integration of animal and crop production only after the large-scale mechanized farming had imposed serious constraints on pastoralism and the

environment. However, it is not yet too late as the integration of livestock into large-scale mechanized farming is already, albeit spontaneously, taking place. What is required is a concerted effort to include the production of, for example, legumes in the rotation system and improving the already going on utilization of crop residues and by-products as fodder.

Integrated resource management projects and grazing reserves schemes have not succeeded in offering the pastoralists any of the modern inputs they promised. They failed to offer the pastoralists a viable alternative in terms of an efficient modern input delivery. Drug stores are empty, boreholes non-operational and favourable marketing outlets non-existent. However, grazing reserves were to some extent useful in offering the pastoralists some security as far as dry season pasture is concerned especially in areas where they would otherwise have been denied any opportunity to utilize. The problem is what does the future hold for the pastoralists? What are the chances for opening up new grazing reserves amidst the unfettered expansion of large-scale mechanized farming?

Sedentarisation

Sometimes nomads settle spontaneously and apparently voluntarily. The literature shows that in some the accumulation of pastoral capital might reach a level beyond the capacity of the herding unit to manage efficiently and hence induces the sedentarisation of nomads. However, in most cases, the apparently 'spontaneous' transition from specialised herding to farming need not be interpreted as an optimal evolution but may represent a constrained, and impoverishing response. In general, sedentarisation—spontaneous or as part of a resettlement scheme—has produced negative economic, social and ecological effects, as the many attempts at sedentarisation of pastoralist in the Sudan and elsewhere show.

Ranching

Other once-popular livestock sector projects included the establishment of ranches. The development of ranching assumes that the local ecosystem is capable of supporting herds year-round when these herds are confined to a specific territory. However, the limitations of the ecosystem to support livestock on a permanent basis caused many ranching projects to fail or to resort to additional feed inputs by importing grain or the by-products of certain agro-processing industries (for example, cotton mills, oilseed mills, sugar cane processing factories) from other regions at considerable costs.

Territorialisation of pastoralists

Some of the recent policies attempt to restore indigenous common property regimes by creating exclusive pastoral zones. Territorialisation of pastoralists has been advocated by a number of officials in Darfur. However, typical pastoral property regimes were not defined in terms of a specific territory. In fact traditional property regimes characteristic of semi-arid land pastoralism enabled continual mobility without restricting nomadic groups to a particular zone. The delimitation of pastoral zones, or the establishment of group ranches under territorially exclusive property regimes, does not constitute an appropriate policy for resource use in the semi-arid tropics. Empirically, such policies have often been associated with overuse of the resource base, amplification of negative effects of drought periods, and increased conflict between nomads and farmers, among nomadic groups, and within nomadic groups. Moreover, such policies sometimes end up merely allocating exclusive grazing rights to groups of sedentary farmers at the expense of pastoralists.

The transfer of property rights over pastoral resources to the state—ostensibly to reduce conflicts over such resources—often results in even more ambiguity and insecurity. For instance, the installation of deep boreholes opened up areas previously too arid for grazing, but local pastoralists did not obtain property rights to the new wells. Rather, the wells became state property, and quickly turned into open access resources. New immigrants were attracted by the wells, and refused to abide by the old rules of the traditional common property regimes. Before the introduction of boreholes, shortage of water precluded degradation of the rangelands, while access to water was subject to social control. After the introduction of boreholes, grazing could continue for longer periods, while access to water was deregulated and became effectively ‘open access’. At the same time, herd sizes increased through an increase in labour productivity: less labour was now necessary to water the animals. The combined effects resulted in serious overgrazing of the areas in the vicinity of these wells.

Livestock-crop integration

The integration of crop and livestock production has also been emphasised as a preferred agricultural policy. However, integration has nearly always been pursued at the farm level rather than from a wider regional perspective. For the semi-arid tropics, the importance of the integration of livestock and crop production at the farm level has been largely overstated. Such integration of farming and livestock production at the farm level is often constrained by unfavourable combinations of agro-climate, soil conditions, population density, and labour demands. The opportunity to keep livestock year-round on farm—the potential for sedentary mixed farming—is severely limited by natural fodder supply per unit of land in the north. Moreover, while potential feed supply per acre increases toward the south, opportunity cost of feed production also increases because of the increase in land scarcity.

Many development projects in western Sudan have promoted animal traction by distributing subsidised packages consisting of draft animals, ploughs, etc. The subsidised access to draft animals has of course been very popular among the farmers of the region. However, the actual use of equipment, as measured by acreage ploughed and weeded, is often very low, with exception of certain groundnut growing areas, such as West Kordofan and South Darfur. Consequently, the introduction of animal traction in western Sudan has not only suffered from very low adoption rates, it has also often failed to produce the expected intensification effects. Rather, being a labour-saving technique, animal traction has led to area expansion.

Given the agro-climatic conditions in western Sudan, increasing population pressure does not automatically induce the transition to agricultural intensification and an increase in output per unit of land as described in the literature. Here lies a fundamental difference between western Sudan and the high-altitude grasslands of Ethiopia, for example. In the latter case, population pressure often does induce a pattern of intensification based on an on-farm integration of agriculture and livestock production. In the Ethiopian highlands, such integration has far greater potential to be realised within the same farming system, mainly because of better soils and rainfall conditions. Consequently, the agro-climates of the Ethiopian highlands have produced a whole series of societies whose economic strategies were based on the integration of crop cultivation and herding.

Conversely, increases in population pressure in the conditions of western Sudan, if not reduced by high out-migration rates, may result in an expansion of cultivation onto marginal lands, thereby raising the opportunity costs of grazing land. By increasing cultivation at the extensive margin, farmers encountered increased competition with nomads. This induces a phenomenon known as 'preventive' clearing. When nomads are absent, farmers preventively clear land in order to secure property rights, given that both nomads and farmers will normally respect the security of usufruct-property rights. Such encroachment by farmers is often backed by formal legislation. The ruling that fields left fallow for more than three years were considered 'free' has created tenure insecurity and farmers to reduce fallow periods and embark upon strategies of preventive clearing. We may think of this as farmers 'gathering' fields for possible future use. Accelerated environmental degradation and an intensification of conflicts between nomads and farmers were the results.

Above the farm level, however, the wider regional environment offers several opportunities for crop-livestock integration—but integration based on economic exchange. Various traditional types attest to the benefits of such exchange opportunities. The widespread phenomenon of farmers entrusting their cattle to nomads under a variant of the crop-sharing contract is a good example of an economic exchange based on the comparative advantages of the two production systems. The nomads herd the farmers' cattle in exchange for a share of the outputs, usually specified in terms of calves and/or milk. Nomads profit from the increased access to capital, while farmers profit from a diversification of their assets across ecological zones. Such investment opportunities are also highly valued by urban investors. Another type of practice is known as *talaq*, under which farmers allow nomads to graze their livestock on the crop stubbles left after the harvest when the animals can no longer damage the crops, in exchange for the benefits of animal manure. Outside the growing season, both farmers and nomads benefit from the establishment of a set contractual arrangements and customary practices.

In conclusion, equity, efficiency, and environmental sustainability strongly suggest that much can be gained from the restoration of non-exclusive property rights to pastoralists, and from the reestablishment of property regimes that allow for the exploitation of the comparative advantage of different production techniques in a regional context. This can only be achieved by avoiding policies that call for the territorialisation of pastoralists together with the adoption of policies that foster the integration of pastoralism and farming. How to achieve this in practice requires in-depth social science as well as technical research.

Conclusion

When Sudan is considered as a whole, the general pastoral situation is not encouraging. Development in the rangelands give cause for concern not only because of the sequence of droughts, but also because of the deterioration of the conditions in the rangelands caused by changing patterns of land use and the unrestricted and almost universal access to land formerly retained by different groups of pastoralists for their own exclusive use. Environmental degradation caused by the removal of plant cover seems more rapid and more serious in the central clay plain than elsewhere in the pastoral habitats. There have been dramatic changes in land use patterns in Kassala, Gedaref, Blue Nile, Sennar, White Nile and South Kordofan states where large tracts of natural rangelands have been cleared, and the linkages between herding and farming clearly contribute to declining productive capacity as a result of over-utilization.

The typical approach to development in such degraded areas is still to treat symptoms, often over-emphasizing the easily visible, but superficial phenomena at the expense of their root causes. There has been a tendency to assume that the immediate human cause of any particular symptom of ecological degradation is the significant cause. This in turn tends to preclude any possibility to look deeper in order to reconstruct a chain of causation. The end result is a prescription of simple remedies in the form of management regimes with the expectation that they would be implemented easily and effectively. The various attempts to establish ranch models, sand-dune stabilization through tree planting, and water provision programmes (drilling boreholes and excavating *hafirs*), all are vivid examples. It is typical for such approaches that solutions are generally designed by focusing on the natural symptoms of the problem and by relegating the social factors to a trivial status by paying just lip service to them as additional 'aspects' of the problem.

This approach has often failed to bring about a satisfactory solution and has sometimes brought about unintended, if not disastrous, consequences. If farmers, for example, invest in stock because the incomes they derive from export crop production are insufficient, and if in so doing they contribute towards the degradation of the rangeland, it seems unrealistic, both politically and ecologically, to reverse trend towards land degradation only by looking at management solutions for the rangelands. Yet this has been a common approach adopted by both the government and by other organizations implementing development and conservation projects in the Sudan.

It is clear that there is an urgent need for change of vision, not only by considering improvements in pastoral resources within the framework of a comprehensive area plan that would allow for the different land-use systems (irrigated/rain-fed agriculture and pastoralism), but also by suggesting the political, economic, social, and ecological dimensions of any process that involves the interaction of human activities and natural processes. If the problem of low productivity and ecological instability in pastoral areas is to be approached realistically, all these dimensions must be taken into account.

It is almost impossible to develop pastoralism without due consideration to the pastoralists' culture and knowledge and the manner in which they respond to the agents of planned change. It is also naïve to think that the knowledge of the pastoralists alone provides a sufficient prescription for development. There is an indispensable role for modern scientific knowledge to penetrate areas of concern proved so immune to break in by local knowledge alone. Modern knowledge is so crucial to the advancement of the pastoralists' standards of living through measures designed ensure secured water supplies, modern educational opportunities, improved human and livestock health, and increased livestock productivity. The pastoralists are positively responsive to such interventions, as the proliferation of the successful experiments of informal medicine men (the paravets) clearly demonstrates. In this endeavour, the cooperation between the technical and social sciences is more than vital in paving the way for a better understanding the merits of the pastoralists' perception of ecology while exploring the value of adapted technological interventions.

Development planning is a social system carrying new cultural meanings whose acceptance by the would-be recipients is a prerequisite for the realization of its objectives. The interface between livestock development and pastoral production cultures is, to say the least, confrontational. While the former is geared towards modernization through the adoption of technological innovations and modern institutions, the latter aims at securing the basic needs

of the pastoral households. Whereas livestock development depends heavily on imported technology, knowledge and infrastructure, the pastoralists' culture is grounded on local knowledge with very little use of external inputs. The contradictions between these two opposing cultures of livestock production are compounded by an interest gap between the pastoralists and the planners. The planners are educated and trained to appreciate modern techniques of production with little or no interest at all in the pastoral culture of production. These contradictions also relate to the planners' perception of the methods capable of developing the livestock industry, which are at times incompatible with, if not detrimental to, the pastoralists social organization of production and aspirations.

Moreover, there is the observed tendency among planners and administrators to simplistically believe that an increase in livestock production and productivity is synonymous with pastoral development. Thus, for them, the prime objective of integrating the pastoralists in the market economy is to satisfy the increasing demands for meat and other livestock products. This view, certainly, does not correspond with that of the pastoralists, whose perception of animal husbandry is that it is geared towards meeting the basic needs of their households. It is in this respect that pastoral development policies failed to inform planning to engineer programmes in harmony with pastoralists social objectives and physical environment. Livestock development policies have so far been mainly concerned with water provision, disease control and productivity improvements with little interest in social development. In the hierarchy of investment priorities, pastoral development has often been considered secondary to commercial farming and ranching.

Abandoning the pastoralists or leaving them to struggle alone for survival assuming that they will live in harmony with nature, is no more than a romantic's pipe dream. Positive interventions are urgently needed in order to improve the pastoralists' standards of living. Any delay in this regard will at best prolong the misery of the pastoralists and renders them victims to the hegemonic state apparatus, the unfavourable terms of trade and the vagaries of nature. Thus, any call for the romanticisation of pastoralists' past or the conservation of their present situation is naïve and merciless, and would earn them nothing but more suffering and misery.

The issue at stake is not a simple increase of production for the market *per se*, but a process of structural transformation involving massive social development programmes engineered with the active participation of the pastoralists themselves and geared towards the satisfaction of their immediate needs. Development planning should not compel the pastoralists to accept the false assumption that the experts know what they need and how to access it. It is high time that pastoral knowledge be utilized and that the experts start to explore such if they to generate sound development interventions for the pastoralists.

REFERENCES

Abbas, Babiker, *et al.* 1992. Camel pastoralism in the Butana and north-eastern Sudan: An interdisciplinary study. *Nomadic Peoples* No.31, pp.64-84

Abdalla, A.J. and Akasha, Faroug. 1987. Camel pastoralists of Kordofan region: Problems of survival and adaptation 1983-1985. In M. A. Mohamed Salih and B. E. Musa eds. *Camel Production as a Food System*. Uppsala: Nordiska Afrikainstitutet

- Abdel Ati, Hassan A. 1993. A Socio-Economic Survey of Central Butana. Khartoum: UNDP.
- Abdel Ati, Hassan A. 1996a. External pressures on indigenous resource management systems: A case from the Red Sea area, eastern Sudan. In Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati eds. *Managing Scarcity: Human Adaptation in East African Drylands*. Addis Ababa: OSSREA, pp.50-75.
- Abdel Ati, Hassan A. 1996b. Beyond the locality: Urban centres, agricultural schemes, the state and NGOs. In Leif Manger with Hassan Abdel Ati, Sharif Harir, Knut Krzywinski and Ole R. Vetaas, *Survival on Meagre Resources: Hadendowa Pastoralism in the Red Sea Hills*. Uppsala: Nordiska Afrikainstitutet, pp.103-119.
- Abu Sin, Mohamed El Hadi. 1970. The Regional Geography of the Butana North of the Railway. *MA Thesis*, University of Khartoum.
- Abu Sin, Mohamed El Hadi. 1998. Sudan. In Charles R. Lane ed. *Custodians of the Commons: Pastoral Land Tenure in East and West Africa*. London: Earthscan: 120-149
- Abu sin, Mohamed El Hadi and Sadig A. Suleiman. 1995. The status of nomadic pastoralism in Central Butana. Paper presented to Area Development Schemes Workshop on Nomadism, El Obied, January 15-17
- Adams, Martin (1982). The Baggara problem: Attempts at modern change in southern Darfur and southern Kordofan (Sudan). *Development and Change*, Vol.13: 259-289
- Ahmed, Abdel Ghaffar M. 1974. *Shaykhs and Followers: Political Struggle in the Rufa'a al-Hoi Nazirate in the Sudan*. Khartoum: Khartoum University Press
- Ahmed, Abdel Ghaffar M. 1976a. Introduction: The question of pastoral nomadism in the Sudan. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.1-13
- Ahmed, Abdel Ghaffar M. 1976b [1973]. Nomadic competition in the Funj area. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.42-62
- Ahmed, Abdel Ghaffar M. 1976c. The Rufa'a Al-Hoi economy. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.81-94
- Ahmed, Abdel Ghaffar M. 1987. National ambivalence and external hegemony: The negligence of pastoral nomads in the Sudan. In M. A. Mohamed Salih ed. *Agrarian Change in Central Rainlands, Sudan: A Socio-Economic Analysis*. Uppsala: Nordiska Afrikainstitutet, pp.129-148

- Ahmed, Abdel Ghaffar M. 2001. Livelihood and resource competition, Sudan. In M. A. Mohamed Salih, Ton Dietz and Abdel Ghaffar M. Ahmed eds. *African Pastoralism: Conflict, Institutions and Government*. London: Pluto Press, pp.172-193
- Ahmed, Abdel Ghaffar M. 2002. Survival under stress: The Rufa'a Al-Hoi of the southern Funj in the Sudan. In Mustafa Babiker ed. *Resource Alienation, Militarization and Development: Case Studies from East African Drylands*. Addis Ababa: OSSREA, pp.77-95
- Asad, Talal. 1970. *The Kababish Arabs: Power, Authority and Consent in a Nomadic Tribe*. London: C. Hurst & Company
- Asad, Talal. 1976. Seasonal movements of the Kababish Arabs of northern Sudan. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.26-41
- Asad, Talal, Cunnison, Ian and Hill, Lewis. 1996. Settlement of nomads in the Sudan: A critique of present plans. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.174-192
- Ausenda, G. 1987. Leisurely Nomads: The Hadendowa Beja of the Gash Delta and Their Transition to Sedentary Village Life. *Ph.D. Dissertation*, Columbia University.
- Babiker, Mustafa. 2001. Resource competition and conflict: Herder/farmer or pastoralism-agriculture? In M. A. Mohamed Salih, Ton Dietz and Abdel Ghaffar M. Ahmed eds. *African Pastoralism: Conflict, Institutions and Government*. London: Pluto Press, pp.134-144
- Babiker, Mustafa and Mohamed-Al-Amin Abdel Gadir. 1999. Environmental Capacity Building Research for Area Development Scheme, Central Butana. Khartoum: UNDP
- Behnke, Roy H. 1985a. Open-Range Management and Property Rights in Africa: A Case of Spontaneous Range Enclosure in South Darfur, Sudan. *Pastoral Development Network, Paper 20f*. London: Overseas Development Institute
- Bonsaksen, S. 1991. Living Today on Tomorrow's Resources: Coping With Drought Among the Hadendowa of Eastern Sudan. *Dr. Polit Thesis*, University of Bergen
- Cunnison, Ian. 1954. The Humr and their land. *Sudan Notes & Records* Vol. XXXV, pp.50-68
- Cunnison, Ian. 1966. *Baggara Arabs: Power and the Lineage in a Sudanese Nomad Tribe*. Oxford: The Clarendon Press
- Cunnison, Ian. 1976a. Subsidiary nomadic movements of the Humr. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.17-25

Cunnison, Ian. 1976b. Some social aspects of nomadism in the Baggara Tribe. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.65-80

Davies, H. R. J. 1966. Nomadism in the Sudan. *Tijdschrift v. Econ. En Soc. Geografie* (September-October), pp.193-202

Egemi, Omer A. 1995. The Political Ecology of Subsistence Crisis in the Red Sea Hills, Sudan. *Dr. Polit Thesis*, University of Bergen

Egemi, Omer A. 1996. From adaptation to marginalization: The political ecology of subsistence crisis among the Hadendowa pastoralists of eastern Sudan. In Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati eds. *Managing Scarcity: Human Adaptation in East African Drylands*. Addis Ababa: OSSREA, pp.30-49.

Egemi, Omer A. 2000. Dryland pastoralism among the northern Bisharien of the Red Sea Hills, Sudan. In Leif Manger and Abdel Ghaffar M. Ahmed eds. *Pastoralists and the Environment: Experiences From the Greater Horn of Africa*. Addis Ababa: OSSREA, pp.113-125

Egemi, Omer A. 2002. Traditional pastoralism along the Nile belt in northern Sudan and prospects for the future. In Mustafa Babiker ed. *Resource Alienation, Militarization and Development: Case Studies from East African Drylands*. Addis Ababa: OSSREA, pp.97-104

El Hassan, Ahmed Mohamed. 1981. The Environmental Consequences of Open Grazing in the Central Butana, Sudan. *Monograph No. 1*. Institute of Environmental Studies, University of Khartoum

Elmahi, Ali Tigani. 1994. Traditional wildlife conservation: A vanishing tribal lore in the Sudan. In Medani Mohammed M. Ahmed ed. *Indigenous Knowledge for Sustainable Development in Sudan*. Khartoum: Khartoum University Press, pp. 81-114

El Nagar, Samia El Hadi. 2001. Changing gender roles and pastoral adaptation to market opportunity in Omdurman, Sudan. In M. A. Mohamed Salih, Ton Dietz and Abdel Ghaffar M. Ahmed eds. *African Pastoralism: Conflict, Institutions and Government*. London: Pluto Press, pp.247-277

El Sammani, Mohamed Osman .1984. *Jonglie Canal: Dynamics of Planned Change in the Twic Area*. Khartoum: Graduate College Publications

Evans-Pritchard, E. E. 1940. *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford: The Clarendon Press

Fahim, Hussein M. 1980. Nubian resettlement and nomadic sedentarization in Khashm el-Girba Scheme, Eastern Sudan. In P. C. Salzman ed. *When Nomads Settle: Processes of Sedentarization as adaptation and Response*. New York: Praeger Publishers, pp.140-156

- Frankenberger, Timothy R. 1986. Integrating livestock into farming systems research: An example from north Kordofan. *Human organization* Vol.45, No.3, pp.228-238
- Haaland, Gunnar. 1972. Nomadisation as an economic career among the sedentaries in the Sudan Savannah Belt. In Ian Cunnison and Wendy James eds. *Essays in Sudan Ethnography*. London: C. Hurst & Company, pp.149-172
- Harir, Sharif. 1996. Adaptive forms and processes among the Hadendowa: Coping with unpredictability. In Leif Manger with Hassan Abdel Ati, Sharif Harir, Knut Krzywinski and Ole R. Vetaas, *Survival on Meagre Resources: Hadendowa Pastoralism in the Red Sea Hills*. Uppsala: Nordiska Afrikainstitutet, pp.81-102.
- Hjort af Ornas, Anders and Dahl, Gudrun. 1991. *Responsible Man: The Atmaan Beja of Northeastern Sudan*. Uppsala: Nordiska Afrikainstitutet
- Holy, Ladislav. 1987. Property differentiation and pastoralism in an agricultural society: The Berti. In P. T. W. Baxter and R. Hogg eds. *Property, Poverty and People: Changing Rights in Property and Problems of Pastoral Development*. Department of Social Anthropology and International Development Centre, University of Manchester, pp.206-216.
- Hoyle, Steve. 1977. The Khashm El Girba Agricultural Scheme: An example of an attempt to settle nomads. In P. O'Keefe and B Wisner eds. *Landuse and Development*. London: International African Institute, pp.116-131
- Hutchinson, Sharon. 1996. *Nuer Dilemmas: Coping with Money, War and the State*. Berkeley, CA: University of California Press
- ILO. 1965. Sudan: Sedentarization of Nomadic Tribal Population in the Butana Region of Northern Sudan. Geneva: International Labour Office
- Johnson, Douglas H. 1991. Political ecology in the Upper Nile: The twentieth century expansion of the pastoral "common economy". In John G. Galaty and Pierre Bonte eds. *Herders, Worriers and Traders: Pastoralism in Africa*. Boulder, CO: Westview: 89-117
- Johnson, Douglas H. 1994. Destruction and reconstruction in the economy of southern Sudan. In Sharif Harir and Terje Tvedt eds. *Short-Cut to Decay: The Case of the Sudan*. Uppsala: The Scandinavian Institute of African Studies, pp.126-143
- Kelly, Raymond. 1985. *The Nuer Conquest: The Structure and Development of an Expansionist State*. Ann Arbor: University of Michigan Press
- Khogali, Mustafa Mohamed. 1980. Sedentarization of Nomadic Tribes in the North and Central Sudan. *Ph.D. Dissertation*, University of Khartoum
- Khogali, Mustafa Mohamed. 1982. Sedentarization of the nomads in the Sudan. In J. Galaty and P. C. Salzman eds. *The Future of Pastoral Peoples*. Ottawa: IDRC

- Khogali, Mustafa Mohamed. 1984. Nomadism and settlement of nomads in the Sudan in socio-economic development perspective. Paper presented to the National Economic Conference. Khartoum: Ministry of Economic Planning
- Khogali, Mustafa Mohamed. 1987. An assessment of Gereih Al-Sarha Pilot Scheme for the settlement of the nomads and improvement of the livestock sector in the Sudan. *Geojournal* Vol.14, No.1
- Kocjok, Damazo Dut Majak .1991. The Mulwal Dinka-Baqqara border conflict and the impact on national integration in the Sudan. *Northeast African Studies* Vol.13, No.1, pp.73-83
- Lampen, G.D. 1933. The Baggara tribes of Darfur. *Sudan Notes & Records* Vol. XVI, pp.79-118
- Manger, Leif. 1988. Traders, farmers and pastoralists: Economic adaptations and environmental problems in the southern Nuba Mountains of the Sudan. . In Douglas H. Johnson and David M. Anderson eds. *The Ecology of Survival: Case Studies from Northeast African History*. Boulder, CO: Westview Press, pp.155-172
- Manger, Leif. 1994. Managing pastoral adaptations in the Red Sea Hills of the Sudan: Challenges and dilemmas. *Drylands Programme Issue Paper No. 52*. London: International Institute for Environment and Development
- Manger, Leif .1996a. Making ends meet: Some viability problems among Hadendowa households. In Leif Manger with Hassan Abd el Ati, Sharif Harir, Knut Krzywinski and Ole R. Vetaas, *Survival on Meagre Resources: Hadendowa Pastoralism in the Red Sea Hills*. Uppsala: Nordiska Afrikainstitutet, pp.120-140
- Manger, Leif .1996b. The Hadendowa way of life: Survival of a cultural tradition. In Leif Manger with Hassan Abd el Ati, Sharif Harir, Knut Krzywinski and Ole R. Vetaas, *Survival on Meagre Resources: Hadendowa Pastoralism in the Red Sea Hills*. Uppsala: Nordiska Afrikainstitutet, pp.141-164
- Manger, Leif .1996c. The future of Red Sea pastoralism: Links and planning implications. In Leif Manger with Hassan Abd el Ati, Sharif Harir, Knut Krzywinski and Ole R. Vetaas, *Survival on Meagre Resources: Hadendowa Pastoralism in the Red Sea Hills*. Uppsala: Nordiska Afrikainstitutet, pp.165-192
- Manger, Leif .1996d. Human adaptation in East African drylands: The dilemma of concepts and approaches. In Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati eds. *Managing Scarcity: Human Adaptation in East African Drylands*. Addis Ababa: OSSREA, pp.9-29
- Manger, Leif .1996e. Land tenure and pastoral planning in the Red Sea Hills. In Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati eds. *Managing Scarcity: Human Adaptation in East African Drylands*. Addis Ababa: OSSREA, pp.237-257

- Manger, Leif. 2000. East African pastoralism and underdevelopment: An introduction. In Leif Manger and Abdel Ghaffar M. Ahmed eds. *Pastoralists and Environment: Experiences From the Greater Horn of Africa*. Addis Ababa: OSSREA, pp.1-18
- Markakis, J. 1998. *Resource Conflict in the Horn of Africa*. London: Sage
- Michael, Barbara J. 1987. Milk production and sales by the Hawazma (Baggara) of Sudan: Implications for gender roles. *Research in Economic Anthropology* Vol.9, pp.105-141
- Michael, Barbara J. 1991. The impact of international wage labour migration on Hawazma (Baggara) pastoral nomadism. *Nomadic Peoples* No.28, pp.56-70
- Milne, J.C.M. 1974. The impact of labour migration on the Amara in Port Sudan. *Sudan Notes & Records* Vol.55, pp.70-87
- Milne, J. C. M. 1976. Changes in Pattern of Mobility and Migration of the Amara Tribe of Eastern Sudan. *M. Phil. Thesis*, University of London
- Mohammed, Abbas Ahmed. 1973. The nomadic and the sedentary: Polar complementaries not polar opposites. In Cynthia Nelson ed. *The Desert and the Sown*. Berkeley, CA: University of California Press, pp.97-112
- Mohammed, Abbas Ahmed. 1980. *White Nile Arabs: Political Leadership and Economic Change*. Atlantic Highlands, NJ: Humanities Press, Inc.
- Mohamed Salih, M. A. 1979. Inter-Tribal Conflicts in Southern Kordofan. *M. Sc. Thesis*, University of Khartoum
- Mohamed Salih, M.A. 1985. Pastoralists in Town: Some Recent Trends of Pastoralism in northwest Omdurman District. *Pastoral Development Network Paper 21b*. London: Overseas Development Institute.
- Mohamed Salih, M.A. 1990a. Government policy and options in pastoral development in the Sudan. *Nomadic Peoples* No.25-27, pp.65-78
- Mohamed Salih, M.A. 1990b. Agro-pastoralists response to agricultural policies: The predicament of the Baggara, western Sudan. In Mette Bovin and Leif Manger eds. *Adaptive Strategies in African arid Lands*. Uppsala: The Scandinavian Institute of African Studies, pp.59-75
- Mohamed Salih, M.A. 1991a. Livestock development or pastoral development. In P. T. W. Baxter ed. *When the grass is Gone: Development Interventions in African Arid Lands*. Uppsala: Nordiska Afrikainstitutet, pp.37-57
- Mohamed Salih, M.A. 1991b. Pastoralists, socialism and democracy: The Sudanese experience. In R. Cohen and H. Goulbourne eds. *Democracy and Socialism in Africa*. Boulder, CO: Westview Press, pp.165-179

- Mohamed Salih, M.A. 1993. Pastoralists and the war in southern Sudan: The Ngok Dinka/Humr conflict in southern Kordofan. In John Markakis ed., *Conflict and the Decline of Pastoralism in the Horn of Africa*. London: Macmillan, pp.17-29
- Mohamed Salih, M.A. and Harir, Sharif. 1994. Tribal militias: The genesis of national disintegration. In Sharif Harir and Terje Tvedt eds. *Short-Cut to Decay: The Case of the Sudan*. Uppsala: The Scandinavian Institute of African Studies, pp.186-203
- Morton, John. 1988. The decline of Lahwin pastoralism, Kassala Province, eastern Sudan. *Pastoral Development Network Paper 25c*. London: Overseas Development Institute
- Morton, John. 1993. Pastoral decline and famine: the Beja case. In John Markakis ed. *Conflict and the Decline of Pastoralism in the Horn of Africa*. London: Macmillan, pp.30-44
- Pearson, M. 1980. Settlement of pastoral nomads: A case study of New Halfa Irrigation Scheme. *Development Studies Occasional Paper No. 5*. School of Development Studies, University of East Anglia
- Reid, J.A. 1935. The nomad Arab camel breeding tribes of the Sudan. In J. A. de C. Hamilton ed. *The Anglo-Egyptian Sudan From Within*. London: Faber & Faber, pp.118-120
- Ring, Moses Mangor. 1980. Dinka Cattle Trade: A Study of Socio-Economic Transformation in a Semi-Pastoral Society. *MA Thesis*, University of Nairobi
- Ring, Moses Mangor. 1987. Dinka Stock trading and shifts in rights in cattle. In P. T. W. Baxter and R. Hogg eds. *Property, Poverty and People: Changing Rights in Property and Problems of Pastoral Development*. Department of Social Anthropology, University of Manchester, pp.192-205
- Salem-Murdock, Muneera. 1979. The impact of agricultural development on a pastoral society: The Shukriya of the eastern Sudan. *Working Paper No. 17*. Binghamton, NY: Institute for Development Anthropology
- Salem-Murdock, Muneera. 1984. Nubian Farmers and Arab Herders in Irrigated agriculture in the Sudan: From domestic to Commodity Production. *Ph.D. Thesis*, State University of New York at Binghamton
- Salem-Murdock, Muneera. 1987. Rehabilitation efforts and household production strategies: The New Halfa Agricultural Scheme in eastern Sudan. In Peter D. Little and Michael M. Horowitz eds. *Lands at Risk in the Third World: Local-Level Perspectives*. Boulder, CO: Westview Press: 337-351
- Salem-Murdock, Muneera. 1989. *Arabs and Nubians in New Halfa: A Study of Settlement and Irrigation*. Salt Lake City, UT: University of Utah Press
- Salih, Hassan Mohamed. 1976. The Hadendowa: Pastoralism and Problems of Sedentarization. *Ph.D. Thesis*, University of Hull

- Salih, Hassan Mohamed. 1979. Agricultural development in the Gash Delta: Problems of pastoralism and participation. Paper presented to the DSRC Workshop on "Planning, Agricultural Development and Popular Participation", Khartoum, December 5-9
- Salih, Hassan Mohamed. 1980. Hadendowa traditional territorial rights and inter-population relations within the context of Native Administration. *Sudan Notes & Records*, Vol. LXI, pp.118-133
- Shazali, Salah. 1988. South Kassala Nomadic Survey. Khartoum: CARE International
- Shazali, Salah. 1996. State policy and pastoral production systems: The Integrated Land Use Plan of Rawashda Forest, eastern Sudan. In Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati eds. *Managing Scarcity: Human Adaptation in East African Drylands*. Addis Ababa: OSSREA, pp.210-223
- Shazali, Salah. 2000. Effecting development: Reflections on the transformations of agro-pastoral production systems in eastern Sudan. In Leif Manger and Abdel Ghaffar M. Ahmed eds. *Pastoralists and Environment: Experiences from the Greater Horn of Africa*. Addis Ababa: OSSREA, pp.103-112
- Shazali, Salah and Abdel Ghaffar M. Ahmed. 1999. Pastoral land tenure and agricultural expansion: Sudan and the Horn of Africa. *Drylands Programme Issue Paper No. 85*. London: International Institute for Environment and Development
- Shepherd, A. 1984. Nomads, farmers and merchants: Old strategies in a changing Sudan. In E.P. Scott ed. *Life before the Drought*. London: Allen & Unwin, pp.77-100
- Shepherd, W. O. and Baasher, Mustafa M. 1966. Plant Production and Potential: Savanna Development, Sudan. Rome: FAO.
- Sörbö, Gunnar. 1976. Economic adaptations in Khashm El Girba: A study of settlement problems in the Sudan. In Abdel Ghaffar M. Ahmed ed. *Some Aspects of Pastoral Nomadism in the Sudan*. Khartoum: The Sudan National Population Committee and the Economic and Social Research Council, pp.113-124
- Sörbö, Gunnar. 1977a. Nomads on the scheme: A study of irrigation agriculture and pastoralism in eastern Sudan. In P. O'Keefe and B. Wisner eds. *Land Use and Development*. London: International African Institute, pp. 132-150
- Sörbö, Gunnar. 1977b. How to survive development: The story of New Halfa. *DSRC Monograph Series No. 6*. Khartoum: Development Studies and Research Centre
- Sörbö, Gunnar. 1985. *Tenants and Nomads in Eastern Sudan: A Study of Economic Adaptations in the New Halfa Scheme*. Uppsala: Nordiska Afrikainstitutet
- Sörbö, Gunnar. 1991. Systems of pastoral and agricultural production in eastern Sudan. In G. M. Craig ed. *The Agriculture of the Sudan*. Oxford: Oxford University Press, pp.214-229
- Spaulding, J. 1979. Farmers, herdsman and the state in rainlands Sinnar. *Journal of African History* Vol.20, pp.329-347

Tubiana, Marie-Jose and J. Tubiana. 1977. *The Zaghawa from an Ecological Perspective*. Rotterdam: A.A. Balkema

Pastoralism and Conservation

In the Sudan, many pastoral societies have paid great attention to the conservation of natural resources in their environment. They adopted several means and measures to maintain natural resources intact and to guard them against depletion. Among these natural resources, wild animals constitute a prominent example. Wild animals have always played a crucial role in the lives of pastoral societies. Hence, a variety of measures for wildlife conservation can be detected in the socio-economic and religious institutions of these societies: taboos, totems, beliefs and other practices.

Box1: Shilluk Hunting Restrictions

The Shilluk...put firm restrictions on hunting wild animals. In fact, the restrictions made by the Shilluk tribe are meant to organise the hunting activities among its subjects and, hence, minimise its effect on wild animal populations...The large and wide variety of animal populations, but hunting does come as their main occupation. In addition, members of the tribe respect and observe the restrictions and the total ban imposed on hunting activities.

The Shilluk have a special relation to animals. For example, they believe that Nyakang, the founder of the Shilluk royal house, was married to a crocodile woman. Thus, the crocodile is a respected animal to which offers are made by throwing a goat in the river. Moreover, the Shilluk regard the crocodile as a patron of birth and a protector of babies... [T]he Shilluk believe that all wild animals belong to the founder of the royal house, Nyakang. Therefore, the "Bramash" (an equivalent of a treasurer) is the custodian of wild animals roaming in the Shilluk territory. The authority of the Bramash is spread over the Shilluk country by the "Lago". The Lago is an appointed man in each clan of the Shilluk...He is a representative of the Bramash and responsible for the wild animals within the territory of his clan. The restrictions on hunting are simple. No Shilluk man is allowed to hunt the property of the royal house. In particular, the hunting of leopards, lions, elephants, the lechwe, crocodiles, and ostriches is completely prohibited. So, if a man kills one of these animals, the information will reach the Lago who will confiscate the skin or ivory from the hunter. The skin and/or the ivory will be sent to the Bramash in Fashoda. In addition...any man killing a leopard must send its skin to the royal house and that the king keeps himself part of the fines...

This kind of arrangement indicates that wild animals in the Shillukland are the property of the highest political and social authority. Wild animals are, therefore, not regarded as communal property...Furthermore, to understand and appreciate the wisdom of this arrangement; we need to stress four points.

First, a Shilluk man will report any violation of the tribal rule of the hunting restrictions. It is a communal commitment undertaken by all members of the Shilluk tribe. Second, there are clear administrative arrangements that involve and commit every Shilluk individual in the conservation of wild animals. [I]n cases a lion or a leopard endangers the inhabitants or livestock...permission for killing this animal must be granted by the Bramash...The skin must also be sent to the Bramash immediately after the animal is killed. Equally, in periods of food shortage, permission must also be granted by the Bramash before the inhabitants...embark on hunting activities. Third, [in unauthorised hunting] the Bramash does not confiscate the flesh of the animal, but only take the ivory and the skin. The reason for this arrangement is simple. The hunter is not allowed to keep skin, ivory, etc. so that he cannot trade in wildlife products.

The accumulation of wildlife by-products can possibly attract foreigners and traders. If trade in

wildlife by-products and its profits find a place into the Shilluk society, then a lot of the Shilluk tribesmen will be engaged in hunting for trade...Consequently, trade in wildlife by-products... will lead to the degradation of conservation values in society. Therefore, the Shilluk's measures of conservation can be seen not only as a measure of wildlife protection, but also as a measure of combating...poaching and trade in wildlife by-products.

Source: Elmahi, 1994

Box 2: Baggara Selective Hunting

The Baggara tribes in western Sudan have a long tradition of hunting. Their hunting methods evolved in response to the environmental conditions of their region. It is a hunting technique suitable for long distances in an open savannah terrain. Again, the horse and the long spear have very much facilitated a hunting method...With such tools of hunting; the Baggara exploited the savannah big herbivores to secure their needs for the rainy season. The Baggara horsemen are known to take advantage of the Oryx migrating from the desert...in the north to the plains of Kordofan in the south during the dry season. They chase the Oryx groups using the horse and the long spear. The most interesting thing in this venture is that the Baggara horsemen carefully select the old males in the group of the Oryx. [T]he old males fell easily to the hunters...after a run for some distance. They are usually heavier and slower and, hence, their hunters...spot them easily and concentrate their...efforts on them. The old male Oryx in comparison with young one in the herd is easier to run down and gives larger meat yield. It has been reported that an adult Oryx can weight between 131 and 205 kg...Therefore, in term of input/output, the Baggara horsemen make the best choice by selecting the old males among the herds of the Oryx they encounter every year.

[Moreover], this type of hunting selects the prey for certain characteristics of quality based on age and sex to secure the efficiency of the hunting effort, to economise the input in the pursuit and to achieve a maximum output. In addition it offers the prey population the opportunity to maintain its young male and female members, which constitute the productive component in the herd. This productive component determines the future size and structure of the Oryx population. In this way, the Baggara exploit this resource carefully with a sense of future needs.

[Furthermore], this hunting strategy exerts a minimum pressure on the Oryx population since the absence of old males from the herd will neither affect the future herd size nor its productivity. In short, it is a hunting strategy that caters very much for the continuity...of a food resource, but at the same time it conserves certain animal species...

Source: Elmahi, 1994

Box 3: Dinder National Park and the Pastoralists

When Dinder NP was created its boundaries were demarcated for reasons of administrative convenience rather than any clear understanding of the ecological realities of the area and the tenure rights of the local communities. The wild animals in the park depend for their survival, during part of the year, on the adjoining extensive grazing areas; especially during the wet season large numbers of animals migrate outside the park's boundaries and return during the dry season months from December to May. Since the 1970s, however, the environs of the park have been cleared and replaced by large-scale mechanized rain-fed and irrigated farms. In places not cleared for agriculture, large stretches of bush land have been cleared for charcoal production. Owners of mechanised farms are said to supplement the meat supplies of their workers through poaching, a practice almost out of control of the park authorities. Traditionally great herds of livestock have moved to the Butana grasslands to the north of the park in the wet season and return to the banks of the Rahad and Dinder rivers during the dry season. Pastoralists grazed their animals as they moved over the extensive areas that are now occupied by mechanised farming, but are increasingly bringing their animals into the park itself. Here livestock not only competes with wildlife for scarce dry season forage and water, but

are also responsible for outbreaks of anthrax and rinderpest that decimated antelopes and buffalo. Thus, it will not come as a surprise that wildlife populations have dropped steadily during recent decades. In addition, relations between the national park authorities and local communities and pastoralists have degraded considerably, often out of pure frustration, from both sides, with the uncontrollable changes in land use.

It is against the background of this continuing deterioration of the conditions in and around the Dinder national park, that an UNDP-GEF project “Conservation and Management of Habitats and Species, and Sustainable Community Use of Biodiversity in Dinder National Park” was conceived. The overall objective of the Dinder National Park Project (DNPP) was to rehabilitate the park ecosystems to enhance the conservation of its wildlife by integrating the local community living in DNP and its borders, in the sustainable use of natural resources to improve their standard of living and to enable them to participate in the management of the Park’s resources. The long-term sustainable management of the buffer zone through the integration of the local communities in the utilisation and management of the natural resources of the park would be ensured by their participation in community oriented projects specifically designed with a view to enhancing their livelihoods through the provision of alternative sources of income and renewable resources on a long-term basis. This is a clear departure from past approaches to protection largely based on repression, leading to violent clashes between the local communities and park authorities.

The dramatic increase in mechanised farming in the areas surrounding Dinder National Park forces pastoralists to move earlier south than in the past to avoid conflicts due to trespassing of their animals into the army guarded farms. This in turn results in earlier arrival in the area around the Park before mechanised and traditional farms were harvested. In this situation they have two options: either conflict with farmers or avoiding that by invading the Park. Pastoral herds are reported to exert enormous pressure on the Dinder National Park’s water and grazing resources that are barely sufficient to meet the needs of the wildlife population. To reduce this pressure, the project has worked relentlessly to find a lasting solution to this problem. Efforts in this direction commenced by working directly with pastoralists (downstream) as well as (upstream) on the larger issue of land rights and land use planning. Nomads are willing to cooperate in these efforts on condition that exclusive areas, supported with secured water supplies, are allocated for their dry season grazing purposes.

The Project has already started to find means to address this problem at both local and state level. At local level, the DNP project started a dialogue with representatives of pastoralists, especially in Rahad river area. For instance the project participated at the Durban IUCN World Park Congress, with both the local Pastoralists’ Union representative and the project community development officer attended. At state level, the project has worked unremittingly with the authorities of the three States on the importance of land use planning and the necessity for a clear land use policy. Subsequently, several meetings with the concerned officials in the three states have resulted in their commitment towards conducting in-depth studies with a view to arriving at an appropriate land use plans emphasising the allocation of specific grazing reserves for the pastoralists. However, such activities are so far confined to consultation with the technical personnel with the result that recommendation are slowly, if at all, implemented. What is lacking is the political support at both the Federal and State levels for the technical solutions to be effectively implemented.

Source: Babiker, 2005