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INTRODUCTION

Abdel Ghaffar M. Ahmed and Hassan A. Abdel Ati

The present situation in the East African drylands is a very complex one. The dilemma facing the population of these countries is a result of a combination of factors that have their roots in the economy, social organization, policy and ecology. Though, strategically, the countries of the Horn of Africa, which represent a major part of the East African drylands, may be important on the international scene, their economic significance is debatable. One major feature of the production systems in these countries, under the present circumstances, is their dominance by certain trends, some of which are irreversible, such as land degradation, loss of livestock, continuous mobility and excessive marginalization of rural communities. Within such a frame recovery in the sense of simply restoring sustainable self-reliant systems - may no longer be an attainable option.

Among the population of the Greater Horn of Africa¹, pastoralists and agro-pastoralists represent a high proportion utilizing arid and semi-arid areas. To understand their systems of livelihood, the ways and means through which they are managing to cope with the difficult circumstances and the strategies they have developed over decades in their struggle for survival certain factors have to be taken into consideration. Such factors, as will be discussed below, are essential to the understanding of the pastoralists and agro-pastoralists activities and their integration or marginalization in relation to the wider surroundings in these countries.

Varying factors have direct bearings on the structure and culture of pastoral and agro-pastoral societies in the African Drylands. These include the patterns of movement, mode of habitation and the degree of reliance on supplementary economic activities. This had led to some definitional problems when attempts are made to distinguish, with precision, between the pastoralists and agro-pastoralists. It is perhaps more accurate to look at them as a continuum of modes of utilization of resources in time and space. Symbiotic relations are the major features of the relations between pastoralists and their neighbours communities. To try, for example, and give certain characteristic to pastoralists can be easily defeated by the sheer variety of pastoralists forms of adaptation to the demands of their environment. Perception of life, mode of production, social and political organization are essentially interconnected in the life of these people.

The ways of life of the population inhabiting the East African drylands have immensely changed over the past few decades. Development projects and government as well as other "external" interventions were the main driving force behind such changes. One of these changes is the gradual curtailment of spontaneous movement of the these people. Such curtailment has disrupted the natural process of adjustment that maintained a balance between people, land and livestock in the pastoral sector. In the case of the agro-pastoralists development and government interventions have also reduced the areas of land available for their activity and forced them to intensify the utilization of the limited space and, hence, natural resources left around their settlements. In certain cases such a practice has contributed to severe land degradation.

One very important element to note with reference to the state of development and government intervention is the considerable increase of animal population in many parts of the East African drylands as a result of the introduction of elementary veterinary services and provision of water in areas where traditionally it is lacking. However, such an increase was not, in many parts, matched by an equivalent off-take, whether for marketing or other purposes, in order to release the resulting congestion.

The livestock proliferation occurred at the time when the pastoralists habitat began to shrink (Markakis, 1993) due to encroachment of cultivation in the seemingly high potential areas and desertification in the marginal semi-desert areas. Large scale agricultural schemes whether irrigated or rainfed have also had their impact on the agro-pastoralists. However, with the emergence of cash crops as a major activity in the agro-pastoralists economy, competition between them and their fellow pastoralists has had its impact on the land situation as well as on social and political relations.

Constriction and degradation of the pastoralists habitat was accompanied by loss of complementary economic activities and supplementary sources of income. Viewed carefully, it can be noted perhaps more that the interplay of factors such as the population increase, neglect in the planning process, unfavourable terms of trade as well as climatic changes and desertification had led to the marginalization of the pastoralist, their impoverishment and, in some cases, imposed sedentarization either round their fellow agro-pastoralists' settlements or around urban centres. This had led to the emergence of a new category which can be referred to as pastoralists in town (M. Salih, 1985, Abu Sin, 1982).

This issue of sedentarization had to be looked into carefully since it normally affects the polar points of the pastoral sector i.e. the poorest and the richest (Abdel Ghaffar: 1976). At the same time the relations between the sedentary and pastoral people should not be taken, as so often mistakenly assumed, as one of polar opposition. In reality it can best be characterized as one of polar complementarity (Mohamed: 1980).

In addition to this the recurrent droughts, over the past three decades, have had their impact on the human and animal population of the East African dryland as well as reshaping the ecological scene. This has led people to rely very much on their indigenous knowledge in order to cope with the imposed pressure. In some cases this might have worked and a number of life saving survival strategies have been developed. However, in many cases people had to abandon their traditional methods of land and pasture conservation and try to utilize their natural resources to satisfy their immediate needs without caring for the future. The felling of trees, damaging of forests and production of charcoal to satisfy the needs of the rapidly growing urban areas are typical cases in point.

In many African countries, various forms of "external interventions" of modernization, including forced sedentarization, have largely failed to increase the pastoral sector's contribution to national economies, to improve the lives of the pastoralists or even to sustain the sector as it was before.

The "*extra-dryness*" that occurred in African dryland, during the 1980's, has resulted in an immense body of literature on both causes and consequences of the drought and famine that followed. On the pastoralists and pastoralism, however, most of that literature was characterised by some extremism in either sentimentality and romanticism in sympathy with the pastoralists or the outright hostility that questions the viability of the pastoralism and its morality as "a humane way of life". This latter view, in fact, sometimes found some expression in policy terms, either in the form of forced settlement, or other anti-pastoralists' attitudes (Frank, Chapter 5).

The present collection of papers, or most of it, depends on research that was undertaken at times of recovery for most societies in the African Sahel. As such, it can be argued that they are somehow immune from the effects of the immediate shocks of the drought and the crisis it unravelled. As a result, the questions raised and, in most cases, the answers or explanations offered, have been related to wider contexts within which pastoralism operates and with which it interacted in its historical development. This concern, about time and space dimensions of the problems, has by and large dictated the assessment of and/or re-examination of the evident and relatively quick recovery of pastoral groups that occurred in several parts of the region, on new terms, methods and approaches. Hence, most of the contributions in this collection have departed or broken away from the analysis of the pastoral isolationism by focusing on their interaction with the external systems and not only with nature or the more limited internal processes.

In the deliberation of the workshop several basic questions were raised and attempts were made to answer some of them. Some of these include questions such as is pastoralism on the decline or just changing form?; Is it still the "only" viable option in marginal lands?; How do pastoral societies respond to internal and external pressures?; What are the elements and means of empowering pastoralists and how could they be involved in planning?; Is agro-pastoralism a solution to pastoralists or a temporary situation that becomes a step to a settled way of life? Other important issues that were raised as critical areas for East African drylands, but not dwelled on deep enough, included and privatization policies on pastoral groups; state-pastoralists relations; gender issues in pastoralism and the impact of conflicts and/or the peace, that hopefully follows, on the pastoralist sector of the East African states.

One of the basic questions was whether the common characteristics and trends among pastoralists, indicated by these papers, warrants common approaches and methods of research to allow for a comparative view and, consequently, generalizations about the whole region?. Leif Manger in his first article provides a combination of a cultural history approach (internal dynamics) and a human ecological approach (concerned with interaction with external systems), which covers the spectrum of concepts expressed in all papers. The point he stresses is that African pastoralist in the pursuit of adaptation to changing environmental conditions are also influenced by factors and actions far away from the immediate physical environment, e.g, the social, economic, political and ecological crisis of the continent. That means in our analysis even of internal dynamics and mechanisms of change in pastoralists societies, due considerations need to be given to, for example, the effect of civil wars and conflict. Factors affecting the national market and economic policies such as the structural adjustment programmes and liberalization (privatization) policies adopted by African governments, the level of pastoralists involvement in market relations, national policies towards other sectors of the economy, international policies, in addition to factors of climatic and ecological change are also major issues that need to be dealt with.

As he points out, "The predicament of the African pastoralists is therefore not dependent solely upon the state of the range on which they live and on the quality of their animals, but rather on a series of dynamics that reach far beyond the limits of the pastoral communities themselves". Some verification of that is provided by Omer Egami's paper in viewing the pastoralists crisis as a part of a process condemning all rural producers to exploitation and impoverishment. However, as indicated by Hassan Abdel Ati, not all pastorlists are losers. Hassan Abdel Ati's emphasis were totally on these external forces while Salah Shazali clearly shows that to preserve Rawashda and Wad Kabo forests of southern Butana, the solution is to solve the water supply problems far away in the northern Butana. Another evidence but on the positive side, is provided by Sharif Harir who illustrates some "exceptional" town subsidies to the pastoralists camps in northern Chad.

Such evidence supports Leif Manger's conclusion that "local groups are not only constrained by local factors ... (and hence), it is not enough to stick to the local population as (the only) units of study", or to short term change. This leads to raising an important point with regard to the use of concepts such as adaptive strategies, coping mechanisms and survival strategies which are interchangeably used as synonymous in various writings. Such use is misleading since the latter two are temporary situations and forced upon society while adaptation could be by choice and is a long term development.

Three papers in the collection concentrate on some internal dynamics, e.g, Frode Storås and Astrid Blystad, who discuss the internal mechanisms of reproduction of the pastoral society and its property (land and animals) and Idris Salim who tackles the issue of education among the Beja of Eastern Sudan. That, however, does not mean the departure of these contributions from the main stream arguments of the collection or a return to analytic isolationism. Blystad, for example, stresses the vulnerability of the Barbayiig pastoralists of Tanzania and the interdependence between the human population cattle and land as a cultural identity and a source of power to reproduce. Both of these are needed not only to survive droughts, but also to contain the invasions (cultural and physical) of neighbouring communities. Frode Storås, on the other hand, describes how the flexibility of the social system among the Turkana of Northern Kenya has helped them adapt to changes without losing their identity as pastoralists. It is through their claims to livestock, not necessarily substantiated to translate into property, that the Turkana maintain their social position and mobilize support, i.e, challenge or adapt to new changes both within their community and vis-a-vis other neighbouring communities. Idris Salim focuses on the pursuit of education as means of maintaining power (economic, social and political) among the Beja of Eastern Sudan both as a means of escaping the consequences of the recurrent drought (normality) and as a means of empowerment vis-a-vis other Sudanese groups. Thus, the three papers reflect an awareness of/or a conscious interaction with external systems with either the desire to resist and maintain cultural identity or, failing that, to join the newly emerging system on equal footing.

In their totality, these papers presented common views on four main areas:

a. that drought is a recurrent reality in the East African drylands with which pastoralists developed various forms and means of adaptation;

b. that indigenous techniques and coping mechanisms developed through long history of adaptation confirmed the above. This raised the need to reconsider the value of and possibly to develop techniques based on indigenous knowledge since most of the modern development projects achieved little success in improving pastoralist quality of life or enhancing the contribution of the livestock sector to the national economy on any tangible scale;

c. that the process of change among pastoral communities is not only a function of physical conditions, (e.g. drought), but also a result of their interaction with and/or encroachment of external systems; and

d. that there are common trends among East African dryland pastoralists of changing from large to small animals, from nomadic migration to transhumance pattern of mobility, and the engagement in other economic activities as secondary income sources. All these could be considered as short term survival strategies or means of temporary adaptation. Other long term mechanisms adopted include the combination of pastoralism with sedentary agriculture (agro-pastoralism) or the total departure from the pastoralism sector by means of education and joining the urban labor market.

Another two important arguments were advanced by these contributions. First, that of the complementarity of pastoralism and agriculture as opposed to the conventional view that conceived the latter as a more advanced stage of development to the former and is overtaking it (See Frank). The second, relates to the pastoralist access to the political power and how that led to the recovery of the pastoralist sector, reduced its risks and improved the pastoralist economic conditions. Taking the cases of Chad, Eritrea and Ethiopia respectively Sharif Harir, Mohamed Kheir Omer and Ali Said argued that the presence of political leaders with pastoralist background has relieved the pastoral sector from the state antagonism (expressed in policy and planning terms) and reduced the risks that threaten the sector. Both Sharif Harir and Mohamed Kheir, however, warn from the dangers of overstocking and overgrazing that could result from peace, settlement and low levels of stock off-takes.

This workshop and the research results presented to it are part of an ongoing project on the East African Drylands. The gaps identified in the above papers shall serve as research agenda for the next phase of the project on which the researchers have already embarked.

NOTES

1. In this case countries such as Uganda, Kenya and Tanzania are added to the countries normally referred to as the Horn.

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Human Adaptation in East African Drylands:

The Dilemma of Concepts and Approaches

Leif Manger

1. INTRODUCTION

During the work shop in which the papers in this volume were presented, I was asked, as one of the organizers, about how such a collection of papers could be tied together, and also how this type of research work could contribute to an enhanced understanding of adaptive processes within the East African drylands. Based on what I have said during the workshop, the editors of this Proceedings has asked me to further reflect upon this issue. The question is relevant. If we take a look at the papers we find a lot of variation: there are cases from western and eastern Sudan, from Ethiopia and Eritrea, Uganda, Kenya, Tanzania and Chad. The people we hear about in the papers represent a variety of groups: Zaghawa groups speaking Saharan languages on the Chad/Sudan border, Arabs of Western Sudan, Cushitic Beja in Eastern Sudan, Cushitic Afar in Ethiopia, Nilotic groups, such as the Turkana in Kenya, Karamojong in Uganda and Barabaig in Tanzania. Furthermore, the authors represent a variety of disciplines, such as social anthropology, political science, geography, botany and veterinary science.

Rather than trying to link the contributions together, a responsibility I leave for the editors of this volume, I shall offer certain broad themes within which I think we should put the contributions. In my response my main aim is, thus, partly to reflect on the papers as they stand, but even more to show what a potential contributions such studies might have in a variety of fields.

2. A CULTURAL HISTORY APPROACH

My first point is to focus on a broad theme, i.e. **resource management in time and space**. By this I mean that our understanding of the concept "resource management" should not be a narrow "developmental" one in which the issue of crisis management dominates, but a broad one that allows for a **cultural history approach**. This allows us to see ecological systems as they persist through time and how they change. The time frame here is essential in order to keep short term changes from more long term ones. Such an approach would be based on a number of basic assumptions about the region with which we are dealing, and drawing on Anderson and Johnson (eds.) (1988) the following characteristics can be mentioned:

1. **The natural environment in East Africa is a varied one**, with variations in altitude, rainfall patterns in dry and wet seasons, river systems, soil types and vegetation cover. This varied pattern has in basic ways affected the distribution of settlements and population movements, and the distribution of productive activities such as cultivation and grazing.

2. **The human responses to this variation has been to develop adaptive patterns that have been flexible enough to cope with the variation and to minimize risk**. This coping has been characterized by movements across zones in different seasons and by combining many types of activities; cultivation and animal herding, hunting and gathering, wage labor etc. Such a mixed economy puts demands on the economic units' labor power, patterns of development and knowledge and organizational capacity.

3. **Cultural and political boundaries are very much affected by this type of adaptational game**. Population movements, historically as well as contemporarily, can be understood in this context. Such

movements and adaptations have also forged various forms of links between groups; violent ones such as cattle rustling and raids, peaceful ones such as marriages, reciprocal relationships build on sharing of animals and collaborative ones such as creating labor networks. Regional markets and trading centers, as well as towns, were important meeting places that further added to the development of relationships. The same goes for the development of various power centers. The emergence of East African states can historically be viewed as an interaction between people in different ecological zones, and hence different adaptations (e.g. the highland-lowland dimension in Ethiopia and Eritrea, the Nile Valley-Savannah dimension in the Sudan etc.). The state centers were in the highlands and the Nile Valley, but the exploitation of lowlands and savanna areas were basic mechanisms in maintaining the viability of the states.

A broad perspective to the issue of resource management as the one outlined above, allows us to interlink many developments in East Africa and opens for an understanding of the distribution of groups, and make visible the migration of the Nilotics, Bantus and Cushitic people around the region. We can see how adaptive processes change, as a consequence of coping with drought, shifts between agriculture and pastoralism etc. with concomitant shifts in identities (e.g. Nilotics becoming Bantus or Fur becoming Baggara). And we can see how such links affect the borders between groups, making them fluid rather than fixed and how the groups, seen as "moral communities" might not coincide with the borders of ethnic groups or eco-zones. Furthermore, it allows us to see the development of the contemporary states in a wider perspective, seeing how national boundaries have interfered with existing links between groups, how problems between groups on the borders become nation-state problems, and how commercialization and general modernization shape the adaptive responses of groups. We also see innovative processes, e.g. smuggling, becoming important strategies for people living on the borderland. Similarly the arming of the states, as well as local groups give many problems an escalating character. Applying the perspective will also show that the groups have not been static entities, captured within their own "traditions". There has always been differentiation, some people who succeed and others who fail. Poor people are vulnerable during droughts, rich people might benefit from the same drought. We are also able to question simple evolutionary perspectives about the relationships between agriculture and pastoralism and rather see them as processual adaptive consequences of different contexts of systemic inter-dependencies and management frames.

It is my contention that by this type of reasoning we can develop interesting discussions about local issues in a wider context. We open up to a wide range of topics and disciplines. Cultural history and linguistics as well as archaeology and vegetation history become fields that can provide information that is equally applicable and needed as the information provided by disciplines that focus on more contemporary issues. But because the above points are on a fairly broad level of generalization, we should, obviously, also approach problem fields that can be more specific.

3. A HUMAN ECOLOGY APPROACH

My second overarching theme comes from taking the studies that have been done as contributions that might enhance our understanding of East African environments and societies within a **human ecology** perspective. Recent decades have produced a growing awareness about the ecosystem dynamics of arid areas. This awareness has been brought about by the recurrent droughts in the areas. For instance in the Sudan it has been estimated that mean annual rainfall declined by 6.7% between 1960-69/1970-79, and by 17.7% between 1970-79/80-86. Year to year fluctuations in rainfall also seem to have increased during the same period (UNICEF/UNSO, 1992: 5). Hence a lot of attention has been focused on how arid ecosystems are able to deal with such shocks, i.e. drought; what happens to biomass production; what is the effect on nutritional quality of the range; how such developments affect the structure of pastoral herds; and ultimately how human populations deal with the reality of drought. There is, obviously, a time dimension to this; whether one is dealing with a drought of one year, or drought over several years, or yet, a longer term desiccation due to generally lower rainfall over long periods. Studies have also shown how earlier coping mechanism have deteriorated with new constraints on pastoral migration, herd

diversification and relationships with other groups. Dynamics in the arid lands ecosystems, particularly as dramatized by drought, thus trigger larger processes of wider socio-economic and political significance. There is a need therefore to start with some reflections on the basic dynamics of the types of ecosystem we are dealing with.

3.1 The Natural Environment

Seen from the perspective of tropical biologists (Desmukh, 1986; Ellis and Swift, 1988; Evenary et al., eds., 1985; Noy-Meir, 1979) arid or desert ecosystems are understood as terrestrial ecosystems in regions with less than 300 - 500 mm annual rainfall, which may further be subdivided into extreme arid, arid, and semi-arid regions. Noy-Meir (1973) points out that these systems are characterized by three features:

- a. the main limiting factor for most biological processes is the water input by rainfall;
- b. this input is infrequent and variable and occurs in discrete pulses (rain events); and
- c. the timing and magnitude of these pulses is to a large extent random (unpredictable).

The stability of such ecosystems seems to be poor. The fluctuations in population numbers, biomass productivity, species diversity and composition of plant and animals, both within each year and between successive years, are large and very irregular. This is most pronounced in the species-rich groups of desert organisms, the ephemeral, i.e. annual grasses and herbs, which are said to be the *drought-evaders*, and which appear in active forms only for short favorable periods after rain and disappear (eggs, seeds) for the long dry periods. The second group of desert organisms, the *drought-persistent*, trees, shrubs and perennial grasses, maintain at least some active biomass throughout the dry period. But many show considerable fluctuations in biomass, numbers and activity (Noy-Meir, 1985).

Are then arid ecosystems inherently unstable? Surely they do vary over time (months, years) and it might be impossible to define any equilibrium point. On the other hand they seem extremely stable, in that their capacity to "recover" is great, i.e. a similar event (of say rainfall on the same spot) produces regenerative results very quickly. There are, of course, variations in this; between fast respondents, medium respondents and slow respondents, being more or less directly dependent on actual rainfall versus ability to reach moisture through root systems etc. (Vetaas and Kolding, 1991). Thus, when viewed over a number of decades, what comes out, as a main impression, is a high degree of stability.

According to Noy-Meir (1979/80; 1985) this has to do with a number of stabilizing features. First, tolerance of extreme conditions, i.e. ability to survive long periods of drought. Ephemerals solve it by being dormant and by keeping a reserve for better times. Drought persistent plants and animals reduce active biomass production (shedding, aestivation, deferred reproduction and hypernization) or show behavioral adaptations like migration. Second, ability for rapid recovery, i.e. ability to make up for the loss in bad years during good years through high growth rates, rapid succession of developmental stages and high fecundity. Third, transition between a dormant, resistant reserve and a highly active pulse is also typical. The "timing" of these processes is crucial, and research shows that plants and animals possess a cautiously opportunistic strategy, by not committing all reserves to seemingly improved conditions. A fourth stabilizing feature include flexible and opportunistic feeding habits and a fifth includes spatial mobility. All such features increase resilience of the ecosystem as a whole.

But there are also destabilizing features. High sensitivity to damage of reserves, which can quickly bring about extinction. Sensitivity to lagging components, i.e. new elements introduced that do not have this response might endanger the whole system. Low density biomass and productivity becomes a problem in contact with higher producing ecosystems (e.g. irrigated areas), and finally, sensitivity to top soil erosion due to low plant cover.

On the conceptual level "stability" is intuitively understood as the set of attributes of a system which minimizes the magnitude, duration and irreversibility of the changes in its own state resulting from external changes or "disturbances". But a lot of factors must be specified in order to deal with this. What time-scale of disturbances and responses is referred to? Stability against what type of disturbances (climatic, geomorphic, biological or man-induced)? Are the changes gradual or sudden? An interesting way to approach this is by defining stability not as the ability of a population to minimize fluctuations in numbers, but rather its ability to bounce back after large fluctuations. Holling's (1973) concepts of stability and resilience point in this direction. "Stability" refers to the duration and magnitude of quantitative fluctuations around equilibrium. "Resilience" refers to the probability of qualitative changes: transitions from one domain of attraction to another, species extinctions and changes in the relationships within the system. Hollings shows that systems may be stable, but not resilient or unstable but resilient.

3.2 The Human Impact

One important question to us in this respect is how human populations affect the stability of such ecosystems. Just like plants, the various animals kept by people in arid areas might be said to have adaptive characteristics. Animals such as camel, sheep, cattle and donkeys can live in one such area but do have a different tolerance for the extreme conditions. Thus in the most arid areas animals like goats and camels dominate. Goats, with high turnover rates, are dominant, whereas camels, with low productivity are much fewer in number. Towards the south, with wetter conditions, other types of animals increase. The ecological requirements (niches) of each type of animals are different. Camels are browsers, whereas sheep and cattle are grazers, and donkeys and, particularly goats can do both. Cattle, donkeys, goats and sheep all tend to have the most varied diets during wet and early dry periods. Camels, on the other hand, show the opposite trend, as their diet is most diverse during late dry seasons, since because of their height, they can reach resources which are inaccessible to other small stock (Vetaas and Kolding, 1991: 7).

This pattern can then be extended into looking at the plant-animal interaction. This is interesting because grasses have developed a unique growth form which enables them to continue growth during periods of heavy grazing. Under conditions of continuous grazing grasses possess an advantage, whereas in the absence of grazers they lose competitive ability and a shift towards wooded vegetation might occur. This process has often been interpreted as a result of overgrazing, but might, in fact, be the result of too little grazing. Similarly, bushes and trees might be browsed in ways that are advantageous to their growth, or they may be over-browsed. In this case we should look into greater detail on this specific plant-animal interaction. But in a pastoral society this must include Man, as the pastoralists certainly affect this process by their herding strategies, by their knowledge and notions about good vs. bad grazing areas etc., i.e. the whole repertoire of behavioral solutions.

With the high variability in dry areas the pastoralist strategies of migration, of keeping a variety of species of animals as well as splitting them according to type of animal, age, sex, productivity etc., also can be seen as direct adaptive responses. However, the success of such strategies also depends on other types of human factors, like the specific land tenure system which gives pastoralists access to different types of resources, the availability of labor to be deployed for various types of activities, and on the availability, within a society, of skills and information upon which decisions can be made.

A basic parameter in the working of a pastoral system is the relation between carrying capacity for the area and demographic processes, i.e. the growth rate of man and animals. Important concepts in this discussion are **carrying capacity** and **reproduction rates**. Ecological carrying capacity is found by quantifying the natural processes that determine the reproduction of natural vegetation (seasonal variations, rainfall, run-off, ground water etc.), and the pressure can be found by quantifying animal numbers (types of animals, reproductive rates for different types of animals, age of first calving, length of gestation period). In addition to such "internal" factors the reproductive rate is also affected by seasonal and annual variation in access to pasture and water, drought periods, diseases as well as human

management. One basic applied issue is whether the stocking rate exceeds carrying capacity, whether there is some sort of balance, or whether the stocking rate is below carrying capacity.

However, this problem must be discussed on the basis of an understanding of the major factors affecting life forms and adaptations in the arid areas (*Ibid: 14*). One view on pastoralism is that it is maladaptive and destructive system of adaptation which tends to surpass the carrying capacity of the environment. Low productivity of the range, combined with overgrazing, leads to desertification. Rehabilitation is believed to be possible only with reduced exploitation, yet to remove grazing pressure does not necessarily restore vegetation back to "normal". One problem here is that drought, overgrazing, desertification and carrying capacity are relative concepts, and they are based on an equilibrium theory regulated by feed-back controls (the functional assumption). Under such assumptions one is led to the conclusion that internal adjustment in the system (e.g. grazing pressure) can correct the imbalance. However, recent research (Noy-Meir, 1973; Ellis and Swift, 1988) highlights the role of *external* "drivers" like rain as control mechanism of the system. Cybernetic feed-back controls will in this context be of less importance. In the latter case persistence is dependent on adaptation to alterations in the environment and survival explained by "opportunistic" strategies. This type of situation makes irrelevant the notion of maximum sustainable yield. The management choice is thus between "stability-based" (persistence) strategies aiming at constant yield, and "resilience-based" management which accepts fluctuations in yield but aims at long term containment of fluctuations within certain boundaries, by using the systems natural resilience.

3.3 The Wider Context: The East African Pastoral Crisis

The perspectives presented above have revolved around the man-land relationship. The focus has been on the direct inter-relationships between the natural environment and human adaptation that directly depend on that specific environment. We know however, that contemporary East African pastoralism is affected also by factors outside the ones discussed above. African pastoralist groups are deeply affected by the general social, economic, political and ecological crisis of the continent, and are subject to forces which have an increasing influence on their ecosystems and cause growing vulnerability for local production systems. Understanding this crisis needs a perspective based on broad socio-economic causes as they are interlinked with factors like demographic growth, agricultural impasse, incorporation of pastoral economies into the market economy, general insecurity arising from civil wars and conflicts, faulty national and international policies as well as factors arising from climate and ecology. These processes have led to rapid sedentarization and urbanization, breakdown of traditional cultures, transformation of gender relations, degradation of natural resources and growing vulnerability of groups to ecological and economic stress.

Instead of a general acceptance of such complexities the past history of planning and contact between public authorities and East African pastoralism have been one of misunderstandings as well as more or less conscious policies of marginalization based on simplistic assumptions. The most common of these are the widespread generalizations that accuse pastoralists of creating desertification, of managing their stock according to irrational economic principles and of being technically stagnant and backwards; of wandering about destroying nature, and of adhering to conservative social structures and cultural notions, i.e. being anti-developmental, unprogressive etc..

Similarly, states have tried to control pastoralists, condemning their lifestyle, forcing them into rigid administrative structures and imposing upon them national identities. Such notions have led to harmful interventions by governments and donors alike. Development programmes characterized by technical weaknesses, lack of understanding of social systems and inadequate politico-administrative framework have not been uncommon. Lack of cooperation on the part of pastoralists, has been explained by resistance to change and inherent conservatism. The pastoralists themselves have often responded to such developments with distrust, resistance and violence. This was because their cooperation was never solicited, but was always *commanded*.

At the same time pastoral societies have undergone great changes and transformations during their contact with such state structures. Animal health, water policies, sedentarization schemes, land tenure reforms are all key words that indicate areas of public policies that have brought about profound changes in pastoral adaptations. It should be noted that not all of them have been detrimental to African pastoralism, nor have pastoralists shied away from involving themselves in all of them.

But the history of East African pastoral development can not be limited to one of intended and unintended effects of public policies. Hence, we will be ill advised to look at East African pastoralists as isolated societies, only victims of public policies, representing a "past" and withdrawing from the public arenas. Rather, we see a dynamic picture in which pastoralists pursue their interests, participating when they see benefits, withdrawing when they feel threatened.

Certainly, the general tendency is clear and indicates that pastoralists are at the losing end of such developments. However, this is not a game in which all pastoralists are similarly affected. Nor were all pastoralists equal in the past. On the contrary, pastoral societies have at all times been characterized by *inequality* despite the ideology of equalitarianism. Historically such inequality grew out of internal dynamics within the pastoral society itself. Today, it is also combined with unequal access to external resources. Thus, by participating in the public spheres certain elite groups among pastoralists have advanced and improved their positions, also within their own pastoral societies. For the poorer strata of pastoralists such links to the external world, through politics and through the market, have a different type of effect. Rather than benefiting from them they find themselves in a double-bind situation in which they are more and more dependent on the market etc., for their own survival, but at the same time occupying a peripheral position in that system.

The effect of this type of structural position is dramatized in times of crisis, particularly the periods of *drought and famine*. During such periods pastoralists are badly hit by the price developments in the markets, by falling animal prices and rising grain prices. In many cases it is this type of unfavorable terms of trade relationships that lead to the loss of animals through unfavorable exchange, rather than the drought itself. Ironically, the richer groups of pastoralists may stand to gain from this situation, as they make up part of the buyers of such animals, alongside traders and civil servants. "Losers" and "winners" become two distinct categories.

The predicament of the African pastoralists is therefore not dependent solely upon the state of the range on which they live, and on the quality of their animals, but rather on a series of dynamics that reach far beyond the limits of the pastoral communities themselves. But at the same time, local factors, range and animals alike, make up important premises for the continuation of pastoralism as a particular mode of adaptation. The challenge we are faced with is, therefore, to see the various interrelationships between the local factors and various types of external factors, that together shape the contemporary reality of African pastoralists.

4. THE CONCEPTUAL CHALLENGES

A third, and final task that I think is important is to offer some comments on conceptual issues of relevance to the themes discussed in the papers. The task is to conceptualize processes that relate to ***the state of the natural environment of the area, the agro-pastoral adaptation and the viability problems faced by the people engaged in that adaptation. Furthermore, issues pertaining to the socio-cultural situation, and finally, the agro-pastoral adaptation within a wider context of regional, national and international factors that operate and have an effect on the system under discussion.*** An important analytical task is to define the levels on which we want to put our focus: defining hypotheses about relationships that imply a direct link between the natural environment and human adaptation, and other types of relationship not directly related to this level. The basic problem is to look at ecological and social change in time and space.

The fact that different disciplines work on different types of data and have different perspectives on development is an important starting point for interdisciplinary discussions within any research project. On a general level such debates relate to the classic debates about the relationship between nature and culture. A second challenge is to deal with information from different levels of scale. Processes of change are locality-specific in the sense that they manifest themselves in specific areas and must be studied empirically there. But non-local processes and dynamics also have to be studied. Markets as well as political and administrative systems all provide dynamics that, in important ways, make up constraints for local people. They pay taxes, they trade, go on labor migration etc., thereby becoming participants in larger processes of change that are termed "commercialization" and "modernization" that bring about new patterns of differentiation. For any inter-disciplinary programme a major challenge is to find ways that may cut across disciplines and that may facilitate an understanding of a particular region as an ongoing concern, thus improving on fragmented and sectoral understandings.

These are conceptual issues which relates to micro-macro issues, to integrating analyses on different levels of scale, and also how to do this within a context of human ecological perspective as the ultimate aim is to address the issue of adaptation. We shall pursue some of these issues.

4.1 Adaptation and Systems Analysis

This is a huge field, both within the natural and social sciences, dealing with biological systems, ecology, human adaptation, cultural ecology etc. Many attempts have been made to understand such Man-Nature interaction, and a lot of concepts have been proposed to further this understanding, particularly the basic ones of "adaptation" and "systems analysis". The concept of adaptation signifies a relationship between a given population and its environment. In biology, where the concept originated, it denotes processes by which an animal, or plant becomes fitted to its environment. Encyclopedia Britannica states that:

even the simpler organism must be adapted in a great variety of ways; in their structure, physiology, and genetics; in their locomotion or dispersal; in their means of defense and attack; in their reproduction and development; and in other respects.(Vol. 1: 89).

A similar perspective is also found in the use of the concept for human society. One tradition focuses on studies of small-scale, tribal societies with an immediate relationship to nature. The basic emphasis is on how such groups existed in a synchronic homeostatic equilibrium and in symbiosis. Drawing closely on biological ecology (see e.g. Odum, 1971) these studies share a number of assumptions in spite of their internal variation. They all see the social organization and culture of specific populations as functional adaptive mechanisms which permit the population to exploit their environments without exceeding their carrying capacity. If carrying capacity is exceeded the response will be mal-adaptation which might imply an adaptational change. In these approaches human populations are believed to function within ecosystems as other populations do, and the interaction of different human populations is like the interaction of different species within ecosystems.

Such contributions make up a certain direction through their use of concepts taken from the field of biology, such as ecosystem i.e. the whole biotic community in a given area plus its abiotic environment (Deshmukh, 1986: 5) and niche, being a concept which ties together different sets of conditions which influence specific populations ability to survive and reproduce. Others argue that there are limits to the extent to which Man can be included in this equation. The following quotes from a discussion of UNESCO's widely known as MAB (Man and Biosphere) programme may illustrate the point:

Human uses of the environment are not confined within ecosystems. Economic systems are specifically organized around the exchange of material, of energy, and even of people between

ecosystems they cut across ecosystems in order to take advantage of the complementarities and contrasts of different ecological zones (di Castri, 1976: 245).

One way around this again has been tried by introducing the concept of "human use system". This obviously introduces Man into the resource use, but at what level should we focus, a social group, a spatial group, a tribe, a household, an individual (men vs. women) etc. (Vayda, 1983)

These qualifications, we feel, are important, as they lead on to a number of problems related to the narrow usage of biological concepts in order to understand human society. We shall highlight a few.

First, **social organization and land tenure systems are not necessarily "adaptive"**. Rather than seeing such socio-cultural levels as adaptive mechanisms keeping a society in balance with its resources they must be seen as integrated systems in their own right, with dynamics that are not necessarily related to the reproduction of society within a natural environment.

Second, **adaptive groups are not constrained by locally available energy only**. It is the energy available which decides population growth and social complexity. On a general evolutionary level this is probably right but, the involvement of local groups in larger systems makes this argument problematic. The local groups are today part of nation-states and wider systems of economics, politics etc. One implication of this is that an increasing part of the population is not directly involved in local production and their lives are not directly affected by resource utilization and factors such as land tenure or the yearly cycle of agronomic activities. Secondly, people from local groups participate in these wider systems, thus bringing in incomes and resources from other systems into their own local systems. Many groups, living in different areas are part of the gross human ecological systems because they in one way or another consume the products of energy transformations. How can we show then, that the key variable, which is the social system, i.e. human needs, skills, population etc., all interact with subsistence techniques?

Thirdly, to solve this it is **not enough to stick to the local population as a unit of study**. By necessity we have to develop ways of analysis that open up for the working of supra-local processes, and also the emerging internal differentiation of local systems. Such internal differentiation shows that adaptation is not a group process in which the goals are common for everyone. There are internal conflicts that also give dynamics to the adaptational process.

This third point also bring us to a fourth one, relating to the **time scale**. To analyze such wider processes may prove a good way to bridge the gap in these studies between their short-term analysis of local populations being in homeostatic equilibrium, and the long term macro-evolution of new adaptive forms. Synchronic and diachronic studies thus become this complementary.

This more open-ended perspective of the concept of adaptation does acknowledge change but does not assume anything about the direction of change. Furthermore, it does not maintain that the direction of change is defined by a given systems' logic of maintenance. Indeed, arguing that people exist at or below carrying capacity levels, or else there will be an adaptational change, is clearly not being confirmed by the developments relating to African pastoralists nor by African agriculturalists. Neither the idea of a fixed carrying capacity, nor the argument on a necessary change occurring when carrying capacity levels are exceeded, are borne out. African pastoralists, for instance, continue with old adaptive practices, also long after the destructive effects on nature have become evident, and people farm in increasingly thin top soil.

4.2 Human Adaptation as a Process

To solve some of the above problems alternative perspectives are necessary on the study of adaptation only common looking at adaptation as a process and focusing more closely on the mechanisms of change. This implies a shift from a focus on group adaptiveness to a natural environment to a focus on how individual adaptive strategies are emerging within different constraints, natural environment being only one among many. Other types of constraints may be provided by the economic system or political system and the concomitant opportunities and constraints available within them. The focus here is on decision making. But the various contexts for decisions are not given. It is necessary therefore also to examine the working of such contexts. This may imply a "political economy"- type of analysis in which one may find the source of the constraints operating. Different people have different interests and pursue different goals in their choice of adaptation, and they are in different strategic positions to reach their goals. Furthermore this means that one can incorporate conflict into other fields, i.e. the one relating to the immediate local environment as an element in the ecological analysis. By linking behavior and environment in such a broad sense one is not constrained by assumptions about equilibrium maintenance.

This question of the differences between adaptive strategies of individuals and adaptation on a group level relates to the question of rationality. Through field-work one can always find the individual rationality for specific adaptive strategies, depending on the skills, aims, information etc. of a given actor. An individual adaptation may thus be rational and adaptive. On a group level the accumulated effect of all actors pursuing such strategies may, however, be one of systemic mal-adaptation. Whether this is so or not is dependent on the feed-back mechanisms of the systems. Such mechanism may have positive feed-back or negative feed-back. The first situation may describe, e.g. the African pastoralist situation in which a communal land tenure system keep people on the land, thus increasing pressure creating a communal problem out of all the individual strategies. A negative feed-back would be a system in which a thermostat-like mechanism would be at work to keep balance within the system.

The above argument should not be taken to mean, however, that one is moving back into a purely ecological model. As we have argued: the contexts within which adaptations operate are also man-made and have to be studied within their own terms. Historically-oriented studies (e.g. Anderson and Johnson, eds., 1988) may show how land has been redistributed between groups, or taken away, for development purposes. National policies of development and national policies towards nomads and farmers etc. all, of course, provide contexts for this. Our main focus should not be to adaptation *per se*, but on the *economic, political and historical events*. Some of these events contain the exploitation of local people by native and foreign groups. All this constrain adaptive processes and must be incorporated in the study of adaptation.

A particular aspect of this is the relationship between the state and a population. State exploitation of its population is not new to the areas under discussion. The old Savanna state formations in the arid areas clearly had exploitative relationships to the people living within their boundaries. But the state also had a very clear redistributive function. Although surplus produce was appropriated from the people in an extraction/coercion cycle, at times of need the state was obliged to help. Thus, there were royal granaries and stores that were kept for the recurrent droughts (Cf. Kapteijns on the Masalit state of Western Sudan) to help people in times of famine. In the contemporary context of African state formations this redistributive aspect is disappearing and the state is becoming much more exploitative. The basis for legitimacy seen as a "social contract" is thus changing.

Finally, we shall end this discussion with some comments on how adaptations must also be seen as socio-cultural systems and how those aspects also change. Production is, of course, not only a technical process but is a *socially constructed activity*. Productive resources are not only providing energy but they are also carriers of meanings. Animals among African pastoralists are

thus the basis for a number of social relationships and they also symbolize important cultural elements in society relating to cosmologies and identities. Similar aspects can be found among settled agriculturalists relating to land and crops. The utilitarian aspects of the adaptive process must, therefore, be combined with an understanding of how the same process is, simultaneously, a carrier of "culture" and therefore adaptive change is also, to varying degrees, a socio-cultural change.

One important aspect of this is that when local communities are more directly articulated with other groups within larger systems, they also enter socio-cultural universes that are different from their own. This is particularly true in an ethnically plural setting like the one we encounter in African arid lands. Knowledge about such larger systems is necessary in order to be "adaptive", and this does not only relate to ecological knowledge. But knowledge about larger systems may not be sufficient. People also need socially acceptable competence in order to participate. To be "adaptive" in this wider context may, thus, also mean to be adaptive to cultural change, identity changes as well as ethnic changes. As we have argued earlier, such elements should not be reduced to their narrow adaptive implications but should be analyzed as independent variables.

4.3 System Analysis as Heuristic Device

Keeping the above points in mind, there is, to my mind, still a need for some sort of system studies. It is necessary, however, to distinguish between general systems theory and systems analysis, i.e. system as a definition of reality vs. heuristically to discover regularities in real phenomena. One way out of this type of problem, is provided by Andrew Vayda in a paper called *Progressive Contextualization* (Vayda, 1983). His argument is that the point is not to define such systems a priori, nor to assume any privileged level of study, but to leave that as a major component of the research task itself. The definition of such a system will vary according to what problems one is addressing and is, therefore, part of the discovery procedure.

It is important then to distinguish and describe different types of systems and to link analyses of dynamics at different levels. For the contexts in which the relationships between Nature and Man is most pronounced, it might still be necessary to treat a human population as commensurate with other ecological units with which they interact. The human capturing of energy and exchange of material can indeed be measured and described in quantitative terms. In this context, the concept of population allows for a common denominator between the levels of human and non-human ecology. However, the moment we broaden our perspective to include culture we need qualifications like the one expressed by Vayda and Rappaport:

No such advantage of commensurability obtains if cultures are made the units, for cultures, unlike human populations, are not fed upon by predators, limited by food supplies, or debilitated by disease (in Vayda, ed., 1968: 494).

When discussing elements of a culture one should therefore make use of other types of concepts than the biological ones. This is not to say that the products of human activities also on this level do not feed back on a natural environment. Rather, it is to say that we have to do a different type of job before we conclude on this particular relationship.

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From Adaptation to Marginalization: The Political Ecology of Subsistence Crisis Among the Hadendawa Pastoralists of Eastern Sudan

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1. INTRODUCTION

Drought and food shortages are not new to the desert edge. Rather they are recursive and the historical landscape of the African Sahel is littered with references to the drought and famines of the past (Balamoan, 1981; Grove, 1977). The recursivity of drought and food shortage constitute the major hazard to the Hadendawa pastoralists of the Red Sea Hills of Eastern Sudan. As one of the realities of their daily life, drought and food shortage have been incorporated into the most fundamental elements of the Hadendawa society and reflected into a multiplicity of practical and cultural activities. These involved raising of locally adapted animals, preference for the consumable versus the marketable, reliance on a historically transmitted agricultural technology and the evolution of a number of social institutions that are geared towards the a version of risk and the guarantee of a minimal subsistence and margin of security, what Scotts (1976) calls "moral economy" or "subsistence ethics". All this suggests that the Hadendawa are living not only in an environment constituted by natural processes but also in a world of their own making, constituted by their actions and practices, but one which is also undergoing historical transformation and subject to change.

The Hadendawa society today has been caught in a protracted crisis that has its most dramatic manifestations in frequent famines, latest in early 1990s, the decreasing capabilities to cope with recurrent drought, adoption of strategies that induce the degradation of the environment and a general collapse of their pastoral way of life.

There are no simple explanations for the crisis affecting the Hadendawa pastoralists and the problems they face. However, it is important to recognize that there is a great deal of continuity between the problems affecting the 15 million or so traditional producers in rural Sudan and those specific to the Hadendawa pastoralists, though for the pastoralists there is a greater degree of severity and intensity. It is also important to recognize that the Hadendawa pastoralists, as elsewhere, are not isolated from the broader political and socio-economic forces that operate at national and international levels and which make up the global context.

My main concern in this paper is the adaptation of the Hadendawa in relation to food and subsistence needs and how the Hadendawa adaptation operates in relation to short-term climatic change, particularly drought. The objective is to investigate the causal factors linking the environment, food production and the incidence of famine and to show how structural processes of marginalization turn a natural event into a human disaster pushing traditional societies to the edge of existence.

2. THE STUDY AREA

The study covers Sinkat District which is part of Sinkat Province, one of the four provinces comprising the Red Sea State. Sinkat district lies just inland of the Red Sea coast, about 100 kms to the southwest of Port Sudan (fig. 1). The district covers an area of approximately 8,000 sq. kms, most of which dominated by the Red Sea Hills series and the rigid relief associated with it. The district is an ecologically marginal area and exhibits a typical Sahelian Zone with its characteristics of low rainfall (av. 120 mm per annum) with a high degree of variability over both space and time. Investigations of the long-term pattern of rainfall show that drought is a common feature of the climate and periodical droughts lasting two or three

years are quite frequent in the area (fig. 2). Perennial streams in the district are completely absent and its geological formation is dominated by the non-water-bearing Pre-Cambrian Basement complex rocks. This makes rainwater, though limited and variable as it is, an influential resource.

The physical limitations of climate, coupled with the solid geology and the hilly nature of the terrain impose great limitations on the natural resource base and man's economic activities. The distribution of the available resources is, therefore, highly governed by the drainage system and the seasonal water courses (*khors* and *wadis*) that flow down the hill slopes. It is particularly along the sides and beds of these khors that trees, the main grazing resource in the area, are found, agriculture is practiced and hand-dug wells, the main source of water supply, are located.

The total population of the district in 1983 was 66,709 persons of whom 70% were classified as nomadic, 7.6% rural settled and 22.4% as urban comprising the population of Sinkat and Gebeit towns, the only two urban centers in the district. Apart from these towns and Erkoweit, the largest village in the district, permanent settlements are very small and widely scattered reflecting the ecological marginality of the natural resource base that restricts population concentration and the development of large human settlements. Ethnically, the population of the district is relatively homogenous, mainly the Hadendawa, one of the main Beja groups; the others include the Bisharyien, Amarar and Beni Amir.

3. THEORETICAL FRAMEWORK

The subsistence crisis in the African Sahel since the early 1970s have stimulated a substantial body of academic debate and theoretical modeling. While the dimensions of the tragedy are, to some extent, clear, its secrets and causes are not. This is, at least partly, because of the failure of the most of contemporary social science research to recognize the political, economic and social determinants that mark the onset of the crisis while conceptualizing it as the outcome of malevolent nature, population pressure, ignorance and/or irrational land use practices (D'Souza and Shoham, 1985; El Sammani, 1990).

Recognizing the limitations of the classical theoretical models, the approach adopted in this study is the 'Political ecology' model that sees the Hadendawa herdsman as culturally adaptive agents to the limitations of nature but whose basic relationship to nature has been negatively affected and eroded by the working of structural processes of marginalization. Political ecology combines the concerns of ecology and a broadly defined political economy with emphasis on the constantly shifting dialectic between society and nature and also between classes and groups within society itself (Blaikie and Brookfield, 1987: 17). The main elements of this model are:

1. a relational definition of nature and natural resources.
2. the contextual analysis of human-environment relationship at different levels of inquiry, what Vayda (1983) calls "progressive contextualization"
3. an historical approach emphasizing the transformation of indigenous resource management systems in the process of incorporation into the market economy.
4. an emphasis on the influence of state interventions in rural economies and landuse patterns; and
5. a focus at the local level on differential responses of decision-making units to changing social relations of production and exchange.

The basic argument of the model is that traditional producers, cultivators and herders, in the Third World are not in a chronic state of crisis, but it is the way in which human interference with nature is managed

under the market economy that is the cause of much of the impoverishment among traditional producers in most of the Third World.

From this perspective, adaptive processes and individual choice of response to hazards (e.g. drought) are constrained not only by nature and/or imperfect information but also by the relationship between agency and structure, particularly power relations and the social relations of production. Following this, the vulnerability to hazards is a structural historical process shaped by the effects of geographical, ecological, political and economic marginalization. This view, according to Watts (1983) suggests: (a) that Subsistence crisis are reflection of the structural ability of the socio-economic system to cope with the harsh ecological conditions and their effects, and (b) that appreciating that hazards are mediated by the socio-economic structures of societies affected shows that development and modernization have failed to resolve the age-old problems of subsistence crisis and, in some cases, have aggravated them.

4. THE HADENDAWA PASTORAL ADAPTATION

Pastoralism in the form of livestock rearing has always been recognized as the basic element of the Beja life and they were believed to be among the earliest pastoral groups in Africa (Murdock, 1959: 314). A characteristic feature of the Hadendawa pastoral economy before the Twentieth Century was the operation of their pastoral economy over a vast geographical area extending from Khashm el Girba on the River Atbara in the south to Suakin on the Red Sea coast including both the Gash and Tokar Deltas (Fig. 1). Utilization of this vast territory provided the Hadendawa with dry season grazing and water supply and enabled them to exploit resources spread out in time and space and, hence, escape ecological localized crisis and to maintain a balance between people, land and animals. The Hadendawa also utilized the deltas for growing of dura, the staple food crop, using traditional water harvesting system known as *shaiyoat* (Ausenda, 1987). Under this system large quantities of dura were produced for local consumption and for the market.

The Hadendawa pastoral economy had, for hundreds of years, also been supported by the caravan trade that developed between the Red Sea coast and the Nile Valley. The Hadendawa involved in that trade as the principal carriers of trade goods, hirer's of camels and guiders of travelers and caravans and as suppliers of water and firewood (Paul, 1954). Hunting of wild game and petty trade in firewood, animal products and traditional handicrafts provided them with additional source of food and/or income.

4.1 Present food Production Strategies and Drought Coping Mechanisms

Pastoralism and animal herding, small-scale cultivation, high population mobility and the commercial exploitation of trees constitute the main adaptive strategies and food production regimes practiced by the Hadendawa at the present.

Pastoralism among the Hadendawa can be described as both a system of production as well as a way of life. It involves nearly 84% of the total population in the rural areas. One important feature among the Hadendawa, however, is the absence of complete dependence on livestock as the single source of livelihood. The Hadendawa raise goat as the principal animal but raising of camels and donkeys is also widespread. The average animal holding per individual household is very small compared with that among other pastoral groups in the Sudan; the figures in 1990 varied from six to nine goats, one sheep, one donkey and one camel per two households.

Animals play important roles in the economic and social life of the Hadendawa; these include: (a) generation of cash income from the selling of animals, milk and milk products and manure; (b) supply of food, especially milk which, mixed with dura porridge (*O'tam*) constitutes the staple diet of the Hadendawa in the rural areas; (c) transport; (d) Supply of raw materials for personal use as well as for the market; and (e) animals also play an important role in the Hadendawa's social life or "moral economy". This takes the form of animal transfer, particularly goats, as initiation in marriage and birth. During periods

of drought and food insecurity these social mechanisms are extended to include sharing of animals either in the form of loans (*dangit*) or gifts (*tait*) both of which aimed at reducing the risks of food shortage while guarding against extreme destitution. Field investigations, however, suggest that such mechanisms and reciprocal relations have been extremely weakened during the last decade as a result of the sharp decline in animal wealth and the steep rise in the prices of food.

4.2 Cultivation

Cultivation is the second adaptive strategy. Cultivation in Sinkat district reveals three important characteristics:

1. It is small-scale subsistence cultivation supplementing and complementing the pastoral production system.
2. It is necessarily a static form of cultivation as it is tied to certain continually favored traditional sites, in marked contrast to the traditional shifting cultivation systems of most of tropical Africa.
3. It is governed by topography and soil type and characteristics. Both factors restrict cultivation to those favored sites that receive run-off from adjacent slopes and having good moisture retention capability. These sites are usually the khor and wadi beds and their floodplains.

Traditional run-off cultivation of food crops, mainly dura, on the khor and wadi beds as an adaptive food strategy based on the exploitation of a comprehensive knowledge of the local environment and the possibilities and constraints it sets. The practice also reflects the Hadendawa's continuing search for food among patchy, fluctuating and low density resources. Cultivators stressed the importance of selecting sites where moisture concentrates, usually depressions and the khor and wadi beds i.e. they are consciously practicing a particular form of rainwater harvesting.

Cultivation rights are held individually within the general communal land and handed down from generation to generation through inheritance. The total land holdings per individual household are very small with the majority (67%) own between 600-900 sq. metres. The decision to cultivate is significantly a function of the amount of rainfall and khor floods. The average number of times of cultivation during the 1980s, a generally dry decade, was once every three years, suggesting a very low crop yield.

4.3 Population Mobility

The Hadendawa have a long history of population mobility as a coping mechanism and a guard against rainfall uncertainties and the consequent fluctuation in food availability (Ibn Haugal 1979). Historically, the Hadendawa pattern of migration reflects two important characteristics: First, unlike that of other ethnic groups in the Sudan (Ruppert, 1988; Gore, 1990) the Hadendawa migration reflects a very strong attachment to their territory. Secondly, it is closely connected with other aspects of the Hadendawa cultural categories and social institutions, namely the *sakanab*. *Sakanab* (news) refers to the verbal transmission and exchange of information about matters of concern to the Hadendawa's social, political and economic life. The *sakanab* is a social practice embedded in the people's greeting ritual as its main institution of transmission and exchange. The *sakanab* usually involves a lengthy and detailed description of the current state of the environment including rainfall amount and distribution and the conditions of grazing resources. The *sakanab* extends to other spheres of economic life to include information about markets, prices of commodities and the labor market in towns and agricultural schemes. Two types of migration were identified among the Hadendawa. These are pastoral migration and wage labor migration.

4.3.1 Pastoral Migration

While the onset, direction and duration of these movements are largely determined by rainfall regime and the spread of *sakanab* about it, the movements have been made possible in the first place by the existence of flexible and environmentally responsive social institutions, namely, the *o'salif*, the Hadendawa customary law that regulates land ownership and ensures the entitlement of the entire members of the Hadendawa society to productive resources upon which pastoral life depends, namely, land, water and pastures. According to the *o'salif* the basic land-owning unit among the Hadendawa is the *diwab*, a group of people tied together in kinship obligations. The *diwab* land is owned, shared and inherited collectively among its members. Within this collectivity, however, individual rights to cultivable land, wells and residential sites are recognized, clearly delineated and could be inherited but with no power to alienate land from the ownership of the *diwab* either by sale or in the form of gift (Salih, 1976). People from different diwabs are free to graze and brows their animals on other *diwabs'* land through the payment of symbolic token, known as *gwadab*, to the owners. The same applies to the use of wells which is also open to all people. This is crucial as it shows that for the Hadendawa survival is a social issue and because of that, their social organization has been constructed to address principally the problem of the survival of all members of the Hadendawa society by ensuring their entitlement and access to land and other resources. It further reflects the Hadendawa's acute understanding and awareness of the potential risks and threats to the existence of the tribe and the survival of its members inherent in such a marginal area.

The Hadendawa pastoral movements take three forms; (i) migration to the winter grazing (*Gunub*) along the Red Sea coast during October-March period, (ii) migration to the *Aulib* (autumn grazing) in the inland areas to the western parts of the district during July-September, and (iii) the stay around their well centers during the hot dry Summer (March-June) where they also move extensively for short distances (10-15 kms) between the different *khors*.

4.3.2 Wage Labor Migration

It has been claimed that migration for wage labor was not part of the Hadendawa cultural tradition and has always been regarded as a minor and degrading activity (Hag Ahmed, 1988). Our empirical evidence, however, shows that this activity has become increasingly significant for the Hadendawa local economy and a characteristic feature of their adaptation to the increasing food scarcity and insecurity. This is particularly relevant to the rural areas where nearly half of the adult male population are involved in this type of migration and which has the following characteristics:

1. it is an exclusively male activity strongly governed and controlled by the Hadendawa cultural traditions that restrict female participation in the social and economic life.
2. migratory movements are significantly restricted to destinations within the Red Sea Area.
3. the strong tendency towards migration among the young generations; and
4. that, unlike the old, young people are more likely to move to towns, and Port Sudan in particular.

Wage labor migration takes place to the agricultural schemes (Tokar, Gash and New Halfa) and migration to towns. Our field data suggests that migration to towns has increased dramatically among that Hadendawa in recent times and has evidently become one of their main coping mechanisms and management strategies in relation to food and subsistence needs. Field investigation of the destination show that out of 172 migrants asked, 126 of them (73.2%) used to migrate to towns, particularly Port Sudan which receives 52.3% of all migrants. The result of this is the rapid growth of the Hadendawa population in the city, from 1446 persons in 1955/56 (First Population Census, 1957) to an estimated 70,000 persons in 1989 (Port Sudan People's Council, 1990). In Sinkat district and as a result of rural-

urban migration the number of urban population rose from 11,280 persons in 1973 (Sudan Second Population Census, 1975) to 29,533 persons in 1989, an increase of 161.8%.

4.4 Exploitation of Trees

Despite the Hadendawa's strict rules against the exploitation of woody vegetation and cutting of trees and their cultural stigmatization of firewood selling (Bonsaksen, 1991), available evidence shows that the sale of firewood has expanded and become increasingly significant as a livelihood strategy since the early 1980s, a decade of severe drought conditions in the area. The magnitude of involvement in this activity varies from 70% of households in places close to towns and the main roads to about 25% in remote areas. The livelihood and survival of a considerable number of Hadendawa households has also been supported through the collection and selling of tree products such as *arak* sticks, the green twigs of *Salvadora persica* which are used as tooth brush and the *dom* palm the leaves of which are used for rope, mats and basket making.

5. THE CRISIS OF THE HADENDAWA PASTORAL

ECONOMY

The resilience of the Hadendawa traditional coping mechanisms to drought have been seriously damaged and in some cases totally collapsed during the last decade. This is indicated by the sharp drop of household's purchasing power and the failure to meet food and subsistence needs, the frequency of famine and its severity, displacement of the Hadendawa and their failure to resume their traditional pastoral economy and the growing tendency towards settled life, and the urban life in particular. Empirical evidence indicates that the household purchasing power has severely dropped during the last decade, which can be clearly illustrated if we compared the economic situation of the Hadendawa households in 1986 with that of 1990, measured against the basic subsistence needs. While in 1986 the household could cover 81.6% of its needs, by 1990 households were not able to cover more than 27.4% of their needs (Egeimi, 1995: 132), a situation which culminated in the spread of famine conditions throughout the district and which forced about 12,000 persons to flee their homes to the neighbouring towns.

During the last hundred years the Red Sea hills was subject to seven major outbreaks of famine, in addition to the localized ones caused by the spatial variability of rainfall. As described by the Hadendawa, these: *Sanat Sitta* (1888-90), *Kurbajet* (1920-21), *Fouliya* (1940-41), *Sirar Hoyokoiya* (1947-49), *American* (1958-60), *Kiloiate* (1970-72) and *El-Khawaga* (1984-85). The 1984/85 was the worst famine during the century as it directly affected 350,000 people in the Red Sea Hills (Walker, 1987) and forcing 35,745 persons in Sinkat district (69.1% of the rural population) to leave their homes to the outskirts of towns and relief camps. One important point is that the destruction of the Hadendawa pastoral economy and the collapse of their resilience have not only caused a substantial short-term redistribution of population but also caused a significant long-term shift in population distribution in the district (Fig. 3).

In addition, sedentarization through impoverization, as Barth (1961) calls it, has been a steady process in the rural areas. The results of this study show that 43% of the Hadendawa people who used to move with their animals to the Gunub and Aulib, in search of pastures 15 to 20 years ago have given up such a practice during the last decade and they presently identify themselves as *damrkinab* (settled). Loss of animals through deaths and, in some cases, sale was stated as the main reason for that change.

6. THE PROCESSES OF MARGINALIZATION

Close examination of the nature and characteristics of the subsistence crisis among the Hadendawa pastoralists and the collapse of their pastoral economy show that the advent of colonialism and the rise of the modern state since the beginnings of this century have set in motion many of the crisis facing the

Hadendawa and other traditional producers in the Sudan today. This was the result of the massive state intervention in land use patterns and the related changes in the infrastructural base of economy which entailed the disruption and debasement of the existing modes of production and the rupturing of the existing forms of resource use and management. The resultant history is one of increasing impoverishment and marginalization.

Early this century, the Gash and Tokar Delta schemes were commercialized by the British colonial authorities and cotton growing was introduced. The result was the loss of large tracts of grazing resources and the loss of large areas of dura for cotton (Salih, 1976; Paul, 1954). For the Hadendawa of the Red Sea Hills this meant lack of access to important dry season water and grazing resources and an important source of dura grains and residues for fodder and eventually their geographical, ecological and hence economic marginalization:

For the Hadendawa pastoralists who arrived at the Gash Delta earlier than usual in 1926 because of drought and poor grazing in the hills, found their pastures diminished, their well centers surrounded by cotton and large proportion of West Africans in control. (Sinkat Council, File 19/B/4).

Ecological marginalization means the contraction of geographical space for the operation of the Hadendawa pastoral economy and the curtailment of their traditional pastoral movement their main defense against drought and the mechanism through which the balance between people and resources had been traditionally maintained. The geographical marginalization of the Hadendawa has further been reinforced through the damming of the River Atbara for the irrigation of the New Halfa Agricultural Scheme and the resultant decline in the amount of water in the river downstream (Abdel Ati, 1991) and the subsequent reduction in the grazing space available (Davies, 1991). Further encroachment on the Hadendawa resources in the hills has been exerted by the rapid rate of urban growth in the Red Sea Area, especially Port Sudan and its growing demand for firewood and charcoal, the main sources of domestic energy in the city. The annual consumption of trees converted to fuel in the city is about one million trees each year (Gammelsater, 1989). An estimated 30% of this amount is supplied from within the Red Sea Area, mostly from Sinkat District, the most important charcoal producer in the hills. The decline in tree densities along the main khors supplying charcoal and firewood to the city was estimated at 59% (Cole, 1989), which means the loss of a considerable amount of trees that provide the main dry season grazing resource in the district and the only alternative available for livestock survival during periods of drought.

The Hadendawa and other pastoral groups in the Sudan have also been politically marginalized and neglected by the state designed and implemented development policies as indicated by the Central Government budget allocations. Data available show that the average annual expenditure on the livestock sector (55 million animal units) was 0.5% of the total government expenditure for the period 1979/80-1989/90. The total sum of money spent on the sector during the same period was L.s. 178.1 million representing 19.3% of the total L.s. 922.2 million which the sector contributed to the government from livestock exports (Sudan Government, 1989).

The meager and limited investment in livestock has also been paralleled by a neglect of the people, specially pastoralists, as reflected by meager expenditure on education and health (5%). The irony is that while the pastoralists and their children in the Red Sea Hills, Kordofan and Darfur were dying from hunger and the spread of diseases and malnutrition during the 1984/85 famine, only 0.6% was allocated for health compared with 22.2% for the military (Ibid, 1989).

The ecological and political marginalization of the Hadendawa have also made them increasingly vulnerable to economic marginalization through the operation of the markets and trade relations, particularly livestock-grain prices price relations during episodes of drought. Empirical evidence from the district shows that during such episodes the Hadendawa become subject to severe stress and decapitalization not only from the direct effect of drought but more importantly from the unequal terms of trade associated with the steep rise in dura prices and the depressing prices of animals (Fig. 4).

As a result of herd decapitalization large scores of the Hadendawa have been thrown outside the pastoral economy while many others were forced to scramble for what they have seen as stop-gap opportunities such as irrigation schemes and towns hoping to return to their old ways of life, which resembles what Chambers (1983) calls the "poverty trap of the Third World". Closely connected with this economic marginalization is the erosion of the Hadendawa's "moral economy" that historically acted as an informal social welfare mechanism and an important source of social resilience. Economic marginalization has also forced the Hadendawa to depend more heavily on trees in order to adjust to market forces. In many respects this has taken place at the expense of traditional coping mechanisms, thus adding to the erratic nature of food production, while making the Hadendawa contributing to the process of their marginalization, but under circumstances within which they had no other options. This created a marked shift in the attitudes of the Hadendawa towards nature. Instead of being a sustained resource that was previously managed for the benefits of the present and future generations, nature has become a finite resource that can be exploited for short-term benefits for the purpose of survival.

7. CONCLUSION

Drought is an ecological reality and part of the general rhythm of nature in the Red Sea Hills. Being a reality of their daily life, the Hadendawa appear to be both conceptually and operationally prepared for it. In the past, that ecological reality of drought and food shortage has been internalized by the Hadendawa and was very much part of their social fabric. The Hadendawa are currently undergoing severe crisis in their subsistence supply and a general collapse in their resilience to drought. Investigations, however, show that it would be erroneous to assume that the current subsistence crisis in the Red Sea Hills is simply an outcome of malevolent nature, population pressure, ignorance or mal-adaptation. As argued in this paper, it is particularly the collapse of the Hadendawa traditional coping mechanisms and their inability to cope with the drought as a result of structural processes of marginalization that explain the breakdown of the Hadendawa pastoral economy. Yet, it is worth mentioning that in spite of the crushing blows of drought and marginalization and the seemingly overwhelming odds working against them, the Hadendawa pastoralists did not disappear; they are still maintaining some of their distinct life styles and cultural characteristics and at the same time showing a great deal of determination to build their lives, even if a small amount of hope is offered. However, it should also be emphasized that the increasing marginalization of the Hadendawa and the related current trends of change in their livelihoods, especially the strong tendency towards settled life, do suggest that the Hadendawa pastoralism is on the way of disappearing.

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Fig. 1: Northeastern Sudan: Location Map

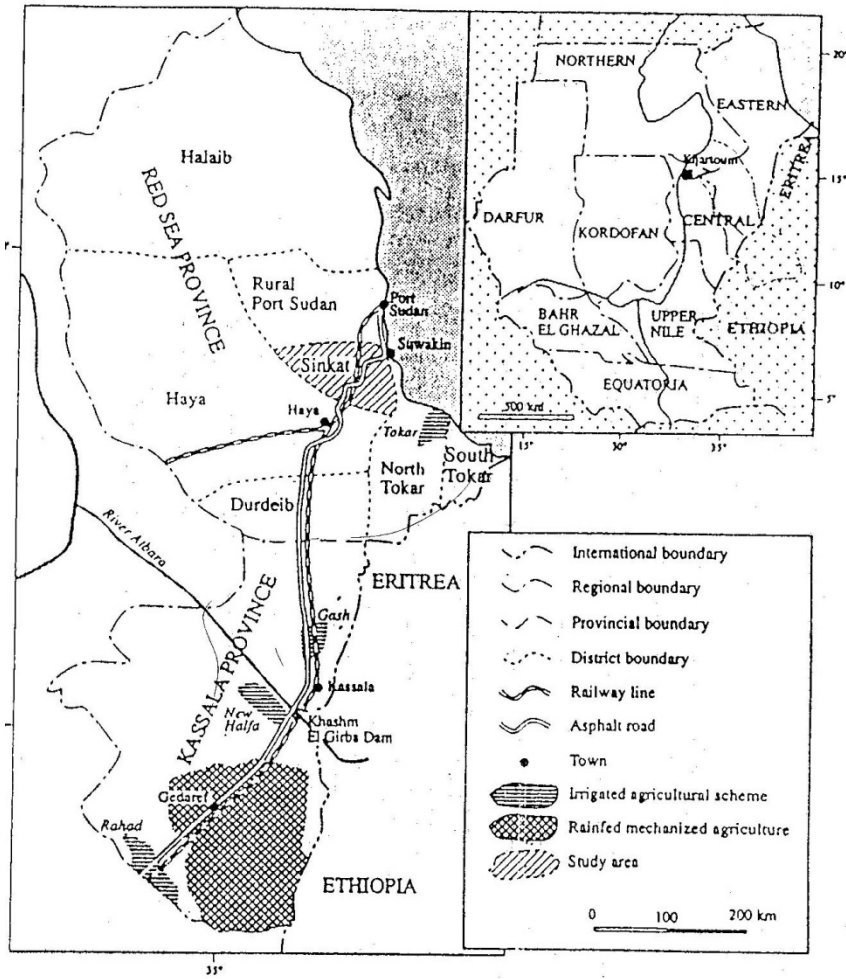


Fig. 3: Rural and Urban Population in Sinkat District (1973-1989)

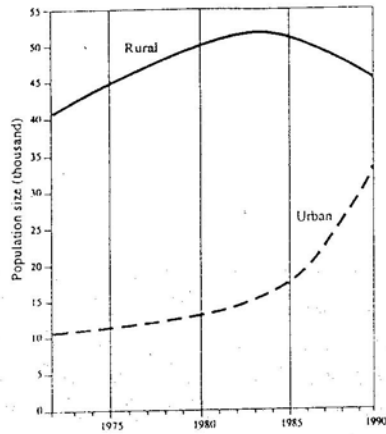
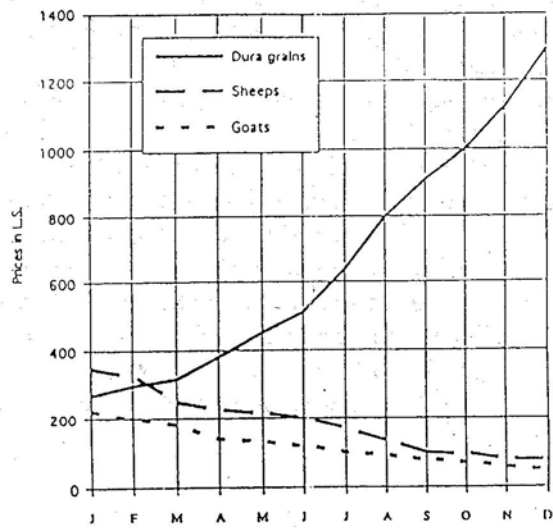


Fig. 4: Development in Prices of Grains, Sheep and Goats in Sinkat District (Jan.-Dec. 1990)



External Pressures on Indigenous Resource Management Systems: A Case from the Red Sea Area, Eastern Sudan

Hassan A. Abdel Ati

1. INTRODUCTION

This paper is based primarily on the findings of the Red Sea Area research Programme (RESAP)¹ and it actually highlights some of those findings. It attempts to trace some of the social changes that occurred among the Beja nomadic communities of the Red Sea Area in eastern Sudan as a result of the drought and famine conditions that hit their region during the 1980s. Emphasis will be on the influence of external factors on the indigenous system of resource use and management and how those processes have reflected on or have been reflected upon by the power shifts that occurred both within the local setting and in the wider context of the country.

I would like to argue that external pressure, rather than the much stressed severity of the drought or weakening of the inherent resilience of the system, that shattered the agro-pastoral system.

The Red Sea region, over this century, has been subject to cyclical incidence of drought and famine conditions. In the second half of the 20th century, like in other parts of the African Sahel, the Red Sea Area experienced a trend of environmental degradation culminating in the 1984/85 famine that caused almost the total collapse of the economic and social structures of the Beja community. Drought has almost-unanimously been blamed for the present crisis in the Red Sea Area. Although the level of rainfall has declined over the last 20-30 years, attributing the crisis solely to the drought is both *confusing* and *dangerous*. It is confusing because it views the Red Sea Area as one and uniformed unit and in a total isolation of the wider context (national/regional), and it overlooks the impact of factors such as population growth, expansion of the market economy, urbanization and other forms of modernization that occurred both within and outside the region. It is also dangerous because, by stressing apparent results rather than causes it laid the grounds for some technical rather than developmental solutions which might neither be desirable nor actually sustainable. As a result of those conceptions the Red Sea area was treated as an static entity and a state of dependency was set in motion by the various forms of intervention that were undertaken in the area.

1.1 Basic Parameters of the Physical Environment

The Red Sea Region covers an area of about 212,000 Sq. kms, composed of a narrow coastal plain in the east, the Red Sea Hills series (1500 metres above sea level) and a large plateau of about 1000 metres height in the west. It is estimated that 98% of the region receives less than 200 mm of rainfall annually and as a result surface drainage depends mainly on the short seasonal khors. Since most of the area is underlain by Basement Complex, ground water can only be found in small quantities deep between rock cracks. Hence life has largely been dependent on those seasonal khors and/or shallow wells. Population density has always been very low (about 2.8 persons per sq. km.), but following the drought years, now most of them (60%) reside within or in the vicinity of urban centers.

A study by Musa on the probability of run-off occurrence in the region based on the cumulative frequency distribution of rainfall produced the estimates of 168 million M3 of annual run-off (at a 90% probability level) and a maximum of 1662 million M3 (at a 10% probability level) for the region as a whole. Adjusting the figures to count for evaporation and other losses, he estimated that there is a surplus of 316 million M3, capable of irrigating 100,000 feddans for agriculture (Musa, 1991: 24-28). But both rainfall values and its geographical distribution (hence run-off) show a high degree of variability (Ibid: 3). Abdalla, using a moisture index, classified the Red Sea into five main arid zones corresponding to the rainfall zones and he stressed that the fluctuation of rainfall which occurred over the last 80 years showed a system of cyclical occurrence i.e. wet spells followed by dry ones of 3-6 years duration (Abdalla, 1992: 59-70), except the summit areas where the deviation from the mean rainfall is lower and the length of both wet and dry spells is shorter (Ibid: 100-115).

Thus the word variability becomes the key to understand and/or explain the changes in the physical environment and hence the forms of social adaptation or adjustment in the Red Sea Area. This assertion is based, in addition to the documented variability in rainfall patterns (**Ibid: 1992**), by:

1. variation in topography and gradients (mountains, alluvial plain slopes and khor basins).
 2. variations in land systems (desert, hills, pediment plain, alluvium plain and coastal plain).
 3. the uneven distribution of water on the landscape, hence variations in soil moisture and the presence or otherwise of different plant species and/or communities, a critical input for the survival of pastoralism in the area.
- The main problem of the area thus becomes, as far as the natural environment is concerned, rather than drought/aridity perse (the short cut conclusion), a combination of:
- a. predictability of environmental conditions from one season to the other and from one locality to another,
 - b. technological development/innovations to utilize natural land resources, and
 - c. adaptive mechanisms capable of allowing for survival under such conditions of uncertainty.

1.2 Traditional Forms of Adaptation

Economic adaptation varies slightly within the Red Sea State, depending on the conditions of the physical environment and the level of technology applied. Through out most of its history, the economic activities of the population were mainly animal husbandry and cultivation which was made possible by utilizing both rainfall and direct run-off. Historically animals seem to have been more significant to the Beja population, not only for their economic value (as opposed to that of agriculture) but also because they represent the main asset in social life and ritual occasions. Animals, for the Beja, represent the means of economic and social mobility and social structuring through inheritance, *tait*² (transfer of ownership via donation), *halagen** (transfer of ownership via presents, mainly associated with marriages), *yahamout** and *dangit** (borrowing of animals for use/utilization of their products). Through such mechanisms social and (at the same time) economic units were established and maintained and both equalities and

inequalities were generated and/or sustained. It is also through these mechanisms that herds were rebuilt and traditional life sustained. Thus, contrary to common belief that the Beja attachment to animals is not only ritual/social or sentimental but primarily an economic rationality since:

1. under conditions of climatic uncertainty animals, in the short term at least, are more reliable than agriculture.
2. animals allow for more flexibility in mobility, sale and direct use during times of crisis.
3. animals provide opportunities other than food such as transport..etc. which acquired more importance with the growing market relations and exchange.

However, animal husbandry and agriculture were always supplemented by other income sources to ensure the viability of the agro-pastoral system. Most important was the option of seasonal migration for grazing, manual/wage labor or for share cropping in the Gash or Tokar schemes.

The adaptation of contemporary rural Hadendawa is still as it has been for centuries based on opportunistic management of resources through migration thus extending the use period of the thin resource base in which grazing resources, trees and water played the most significant role. As such the Gunub and the khors of Odrus and Hadarbab for example still represent respectively the main winter and summer resorts for livestock. Although distance, duration and direction of migration might have changed as a form of adaptation in response to changing conditions, the overall pattern remained largely the same in most rural areas. The flexibility of the management system (through movements of man and animal) both at the community level and individual household level have sustained the agro-pastoral system. It is possibly true that under severe conditions the system could have been shattered temporarily but it never lost the ability to re-configure itself i.e. from a few animals herds start to appear every-time.

The key factor in this regeneration game were animals which occupy the central position in the reproduction of those adaptive units through the preservation of Beja traditions of *salif** in managing both animal and land resources, the two components of the agro-pastoral system. For animals as mentioned earlier *yahamout**, *halgen**, *dangit** and *tait**, while the systems of land rights; *as/** (ownership) and *amara** (use rights) have sustained the Beja community and its resilience. In fact the strong connection between the *salif** and the concept of honor (*durareit**) among the Hadendawa may actually help answer the critical question that many of us have been asking, that is of "Why do they insist on staying on this naturally poor area?".

Then if the rainfall system has always been variable and unpredictable and if the social system is resilient and with highly adaptive capacity, **what went wrong?**.

In one sentence and drawing from Red Sea Area programme (RESAP) research findings, it is the combination of two sets of factors; the first relates to pressures within the Hadendawa system itself and the second, which is the concern of this paper, is the **encroachment of the external system** that is believed to have hastened the process of degradation as it communized the use of resources on which the Beja agro-pastoral system depended and weakened the social and cultural sanctions over their utilization (Manger, et. al.: 1995).

2. THE ENCROACHMENT OF THE EXTERNAL SYSTEM

Irrespective of the relative value of its resource potential or the level of degradation of its natural environment, the Red Sea Area represents a part of the national assets. As such it becomes obvious that not all decisions relating to local resource utilization are necessarily local in origin or substance. Rather, many, if not most, of those decisions, and consequently action, have origins which are external to the local system. In what follows I will concentrate on the effect of the encroachment of that external system and its impact on the local system vis-a-vis natural resource utilization. The emphasis on the power shifts (social, economic and political) is based on the belief that it represents the determinant factor in the way natural resources are used and/or misused.

The Red Sea encounter the external system at three main levels: at the local level, in its relations with the State apparatus and in its contact with the international system, mainly through the intervention of NGOs into the area.

It is important to note, however, that the effect of the different levels of Beja interaction with external systems is not a one way process. Rather, the Beja too have their effect on those external systems of which some of them have, or had to, become part of, thus enhancing further the process of transformation among Hadendawa and their ways of utilizing local environment and natural resources. But again, this does not mean that Hadendawa are interacting on equal footing with that external system or, indeed, interacting by choice, since in most cases it represents a response which causes them to change their old ways of doing things.

2.1 Interaction at the Local Level

2.1.1 The Physical Environment

The natural environment of the Red Sea, which represents one of the contexts within which the interaction takes place is characterized by its relative isolation and harsh terrain, the highly variable rainfall system with frequent spells of drought, and the limited natural resources that could support life specially water.

As a result, the area has always been prone to famine outbreaks and loss of livestock and consequently human lives.

In the past the Beja coped with such situations by

1. adopting an agro-pastoral system with a highly subsistent mode of living,
2. dispersed pattern of settlements,
3. geographical and temporal migration up and down the hills in pursuit of water, pasture and cultivable lands.
4. temporary migration for work outside the home area which became more noticeable with the establishment of Port Sudan town and the construction of the railway line from the Port to the country's interior, and
5. for the herd recovery the practices of *tait**, *dangit**, *halgen** and *yahamout** described earlier together with social sanctioning were applied to allow for the regeneration of range and natural vegetation.

During the last drought the first three options were made impossible by the mass movements of the population caused by the drought, the sanctioning system was severely weakened by the abolition of the Native Administration System and the shifts of power that followed and the urban job opportunities were severely reduced by the ever growing technical skills required.

2.1.2 Urbanization

The growth of towns in the Red Sea area was enhanced by the establishment of Port Sudan as a sea port, the construction of the railway link between Port Sudan and Khartoum in the 1920's and that of the tarmac road during the 1970s. Other contributing factors were the establishment of military garrisons in Gebeit and the Gash and Tokar agricultural schemes.

The last two decades witnessed a massive increase in the rate of urbanization in the region. Urban population has increased from 160.000 in 1973 to 353.000 persons in 1993, an increase of 121% with an annual growth rate of 6%, paralleled with a drop of about 12% in the number of rural population. Port Sudan town alone accounts for about 89% of the Red Sea urban population. The main functions served by towns for the Beja are:

1. the provision of some centralized basic social services (schools, health centers, security etc.);
2. as administrative centers, they represent the refuge areas for the rural population during the repeated droughts and famine outbreaks. The intensity and long duration of the recent droughts and loss of livestock have in fact made the refuge period for migrants much longer and for many of them it became permanent settlement in town, an urban process which has been described as rural overspill (Abu Sin, 1991: 22);
3. they represent major water sources for the rural population even during "normal" years as most towns in the region, occupy areas with relatively high water resource potential (e.g. Sinkat, Tokar, Haya) and;
4. most important perhaps, the provision of opportunities for manual labor for rural migrants, specially in Port Sudan. This function, however, is highly threatened by the adoption of more technically advanced techniques at the port (e.g. loaders, containers, chains etc.).

However, there is little evidence of a trickling-down effect by these towns in terms of economic or social development. That is probably a result of the very peculiar characteristics of the urban process in the Red Sea Area which include for example:

1. Contrary to the common thesis despite the low rates of natural population growth, the adverse environmental conditions and the extreme conditions of poverty in the region, it has experienced rapid urban growth over the last two decades.(Abdel Ati, 1990: 7)
2. With the exception of Port Sudan, urbanization in the region has largely been a mere concentration of rural population in an urban location (Abu Sin, 1991: 9-17).
3. Urban initiation, structure and functions are largely non-indigenous and were generated either by non-Beja migrants within the province (*Ibid: 14*) or have grown in

response to demands outside the region. Even within towns (e.g. Port Sudan and Sinkat) most of the Beja reside in shanty settlements and squatters surrounding the town.

4. The Red Sea provides a typical case of regional primacy as Port Sudan, the main port of Sudan with a population of 314,000 is about 31 times the size of Sinkat, the second largest town in the region. The growth of Port Sudan as a sea port has largely been, and still is, linked to the development of the relatively more prosperous parts of the country, particularly the Central region (Gezira) and the capital Khartoum, more than that of the Red Sea area. This in fact led to the enclosure of the Beja migrants living in towns socially, culturally and politically into their traditional rural systems as indicated by their modes of living within the town. (Abdel Ati, 1990: 7-8). In fact, even access to work at the Port Sudan dockyards is largely governed by ethnic relations (Gutbi, 1989: 15-17).

5. There is no evidence of the large city influence in generating change into its rural surroundings or the lower order towns of the region. In fact according to Abu Sin, the Red Sea provides a classic example of urban exhaustion to the natural environment as the rural areas are scratching their meager resources to satisfy urban demands of wood, charcoal and livestock, thus accelerating the degradation of the rural resource base. (Abu Sin, 1991; 2, 16, 29). The tarmac road (Port Sudan - Khartoum) in fact contributed to further isolate the small towns from their hinterlands (Abdel Ati, 1990).

The market function of towns for rural products has been severely reduced by the decline in livestock population and other rural products in recent years. In fact for the vast majority of the Beja, towns are only for buying rather than selling goods. Furthermore, in the absence of livestock, the only source of cash for the rural population is the sale of wood and charcoal, both contribute to the hastening of the process of environmental degradation. Thus, under the present conditions, the cost of urbanization for the Beja has been generally high if measured in terms of the scale of resource depletion caused and its social impact. The most important effects are:

1. The excessive urban drain of the subsurface aquifers which are poorly replaced, depriving rural population from a vital resource for their survival strategy. Projects proposed for supplying Port Sudan with fresh water from Tokar area, pose a real danger of increasing the salinity of Tokar aquifer (Abu Sin, 1991: 12-17).

2. The heavy demand on the biomass especially for building materials and fuel. Over 90% of houses in Sinkat for example are roofed with dom stems. The same applies to all low class houses of Port Sudan. In fact dom wood is being transported inland as far as Khartoum, which has been further enhanced by the construction of the tarmac road (*Ibid: 17*). Such pressure on a selected species poses a threat to the ecological balance, raises its value and thus attract more clearance. Much higher demand and consumption of wood in towns is that of domestic energy (both wood and charcoal). As a consequence of urban growth, the Red Sea state supply of its domestic energy needs, declined from 70% in 1970 to less than 35% in 1990 (*Ibid: 18*). The study by Roy Cole on the intensity of biomass around Port Sudan shows very clearly the inverse relationship between the density and distance from Port Sudan as well as that of prices of charcoal (Cole, 1989). The increase in prices of charcoal have attracted intensive wood cutting and burning deep into rural areas, especially those areas considered "commons" i.e. not under the domain of any tribal group such as Odrus area.

3. Increasing urban demand on livestock and crops in the Red Sea area. (Abu Sin, 1991).

4. The growth of urban centers in the Red Sea has also attracted migrants other than the Red Sea inhabitants, who are competing with the locals for jobs and social services in

these towns. The locals are put at a disadvantage in view of their high illiteracy rates and relative lack of skills and hence compete among themselves for the manual jobs available, thus depressing wages. Also the presence of non-Beja migrants in these towns has reduced Beja access to social services e.g. schools above primary level. (Abdel Ati, 1990: 18-21).

5. The negative social effects of migration such as family disintegration, unemployment and other social diseases. One outstanding feature is the widespread child labor and child vagrancy -including girls- which represents a major change in the Beja system of social values and traditions (Abdel Ati, 1991). There is also no evidence of the Beja integration with other ethnic groups in town, but most of them remained linked to their tribal groups.

6. The impact of urbanization on the prices of rural products has also been negative. Under the conditions of drought and environmental degradation the supply of marketed goods from rural areas has declined substantially since most of the traded goods depended on the natural environment. The Beja also suffer the negative terms of trade as the prices of livestock tend to decline with the rise in grain prices (Gad Karim, 1991).

2.2 Interaction at the National Level

2.2.1 The Administration Level

The first regular contact of the Beja with the modern Sudanese State was established early this century through the administrative hierarchy that was set up by the colonial authorities. For most part, however, the traditional leadership of the Beja (Native Administration), played a prominent role. Points of interaction were mainly the collection of taxes, provision of basic social services such as health, education and security and quite often intervention in the form of relief during famine periods.

Since the abolition of the native administration in the early 1970's and up to 1994, despite the introduction of a number of Local and Regional Government Acts, the Red Sea has effectively been administrated from the Center in Khartoum. Appointments in all layers of administration above grade 6 were controlled by Khartoum and Kassala- the regional capital- and the development budget of the region has also been heavily centralized (Ibrahim et al., 1991: 10-13, 26-8). That excessive centralization of development-planning, finance and personnel functions has been accused for the failure and/or inability of the regional institutions to plan or utilize existing resources to contain the crisis caused by the drought or to undertake the task of rehabilitation in the region (Ibid: 18, 33). Consequently the economic dependency of the region and the adverse environmental conditions have contributed to the continued strong central control over the region.

The in-built administrative weaknesses undermined the system's ability to monitor environmental degradation or effectively respond to the crisis created. Since these weaknesses are typically old (exposed by crisis), this warrants Ahmed's statement that colonial and post-colonial planners have perceived the Beja, like other pastoralists as difficult to administer and/or provide services for. And, in view of their harsh physical terrain and their chronic economic difficulties, the permanent solution for them was seen as their resettlement in the more productive areas of southern Gedarif, Gash and Tokar. Thus government support to the Beja was mainly in the form of:

1. Relief provision at time of crisis to badly affected areas;

2. Introducing alternative means of subsistence such as mining; and fisheries;
3. Pasture improvement by damming some selected Khors; and
4. Encouraging Beja migration to government sponsored schemes elsewhere (Ahmed, 1990: 21).

Assessing these four options it could be said that obviously relief was critical to saving many lives, but nevertheless since the 1984/85 famine the government contribution has diminished substantially and largely taken over by NGOs. The second alternative offered to the Beja, that of fishing and mining, received little enthusiasm because the Beja distastefulness of fish and their lack of the technical skills for both activities. Also the technical solution of damming Khors has proved to be not cost-effective, difficult to maintain and is handicapped by the problems of rainfall variability (timely and spatially) and the nature of the Red Sea terrain (Abdel Ati et. al., 1992). This leaves the fourth option which will be discussed later, not in the form of Beja resettlement which in fact never has been the case on any significant scale, but on the basis of the Beja access to the government sponsored schemes within (Gash and Tokar) and outside the Red Sea area.

2.2 The Economic Level

At the economic level government intervention in the Red Sea area since the colonial period, was mainly in the sponsoring of two agricultural schemes (Gash and Tokar), the opening of a number of mines in the region and construction of the rail (1920s) and tarmac road (1970s) linking the Port with the interior of the country. In addition, mining in the Red Sea hills achieved little economic success and the small scale of the investment and the technical skills required have denied the local population any substantial job opportunities except for the few and seasonal manual jobs that were availed. On the other hand the rail and road lines are both considered "national projects" whose revenues go to the Central Government and though they made mobility easier in and out of the Red Sea, they do not seem to have any great economic reflections on the local economy and in fact, as mentioned earlier, in some cases the impact has been negative. This leaves the two agricultural schemes as the most significant form of government intervention in the Red Sea area in view of their location, the number of people benefiting from them and the processes of their interaction with the local agro-pastoral economy in its historical development. Taking the Gash scheme as an example some indicators of the impact of these government schemes on the local economy and on the environment can be illustrated.

The Gash scheme is located in the south eastern part of the Red Sea State. It was initiated in 1926 by Kassala Cotton Company to produce cotton over an area of 250,000 feddans. Land was originally distributed to Beja (mainly Hadendwa) but their preference of livestock herding and low output prompted the company to allocate lands to West-African migrants (Fallata) as tenants with the company. After the company pulled out in 1928, the scheme was taken over by the government, with the objective of producing cotton, dura and grazing resources for nomadic herds and more importantly perhaps the provision of a substance of authority to the then infant Native Administration. Again, Beja rights to land were re-asserted and their share of tenancies rose from 23% to 75% (about 87% of which to Hadendawa), and the remainder divided between the West Africans and other Sudanese groups. In fact in order to improve cotton production Hadendawa *sheikhs* were actually encouraged to employ West African migrants as share-croppers. (El Mustafa et al., 1991: 98).

Fluctuations of the river floods, siltation and bad management were blamed for the steady decline of the cultivated area which now averages between 40,000 - 60,000 feddans (20% of the planned area). By 1979 cotton production was stopped and replaced by castor oil as the main crop. Although castor oil was economically rewarding compared to other crops, the Beja were not particularly interested in its cultivation because of their lack of knowledge about it (in the absence of extension services), the disease they claimed it has caused, and more importantly perhaps was that it does not provide food for them or fodder for their animals. As a result in 1983 castor cultivation was stopped and replaced by dura.

When land was allocated to Beja they were 13,500 tenants in the scheme. After dura cultivation was started the number shot up to 36,000 and at present (1993) there are 54,000 registered tenants which means the average size of holding has gone down to under 1 feddan. In reality, however, enormous variations exist in land entitlements and size of actually cultivated plots (*Ibid*: 80, 105-7). Although the Beja claim to the Gash lands has been recognized as indicated by the ratio of tenancies allocated to them, all rights in the areas irrigated by the river are by law vested in the Sudan government, represented by Gash Delta Agricultural Corporation to whose instructions, tenants have to adhere.

In 1992, and just prior to the transfer of the responsibility of the scheme to the Eastern State Government, a decision regarding the privatization of the scheme was taken by the Central Government because, it is claimed, of the low agricultural output and huge water losses in the scheme. According to Government officials in Kassala, the Eastern State was neither involved nor consulted in that move which is believed to have been arranged between the Central Government and private investors in collaboration with the Beja traditional Native Administration leaders (i.e. Nazir) in order to ensure the Beja acceptance of privatization. In 1994, the Eastern State Government formed the Gash Delta Rehabilitation Committee. Chief among its objectives were the settlement of nomads (i.e. back to the old official wisdom), increasing the cultivated area to 400,000 feddans, the introduction of higher levels of mechanization into the scheme and the encouragement and promotion of private investment in the scheme.

The situation as it stands today and the impact of the new policy changes can be summarized in the following:

1. Although the Beja claim to the land has been recognized, in reality through the processes of lending, absenteeism and the systematic reduction in cultivable land, that claim is not reflected in their presence in the scheme or their economic benefits from it. For example according to El Mustafa, although Beja have rights to some 75% of tenancies in the scheme, the West African migrants, who now represent the resident population of the scheme, operate 14% of tenancies and share-crop 40% of the land in the scheme (from the Absentee Beja) (El Mustafa, et al., 1991: 88). Also according to officials at the State Ministry of Agriculture, most of the Beja now in the scheme are wage laborers who have lost their livestock during the last drought and usually migrate after harvest.

2. The low share by the Beja in the scheme's "real benefits", can mainly be attributed to the failure of planners to accommodate animals into the scheme in addition to the technical problems of the scheme. In fact it could also be said that the system as it is poses a number of important problems that are usually overlooked. For example although the preservation of the common ownership of land ensures individuals rights to annual irrigated areas, the lottery system of tenancy distribution reduces the incentives of farmers to care for the land especially if it is in the poorer areas (*Ibid*: 104). That also

secures the monopoly of the traditional leaders over land distribution and decision making. A major decision such as that of bringing private investors was taken by the traditional leaders while our field observation indicate strong resentment among the common Beja.

3. The land area allocated to private investors went up from 10,000 feddans in 1991/92 (most of which was supposed to be outside the irrigated area) to 30,000 feddans in the 1992/93 agricultural season, most of it within the irrigated area³. As a result the rotation of the irrigated area has stopped and tenancy size was reduced to under 1 feddan in 1993, which again makes it economically unviable and pushes Beja further away from the scheme. That reduction in size implied the diminishing of the likelihood for any rotation and caused a sharp rise in land rates (annual charges) from L.s. 6 in the 1970's per feddan to L.s. 650 in 1992 to L.s. 1,200 in 1993.

4. The expansion of private investment in the unirrigated areas also reduces the land area available to nomadic animals grazing which in turn threatens the irrigated area. At present animals are not allowed into the scheme between June and November. Although that might have been observed by nomads, they usually rely on agricultural residues while waiting for the grass to grow after the beginning of the rainy season, thus causing considerable delay in land preparation and cultivation in the scheme and, hence, the drop in productivity and output.

5. To supplement their incomes and compensate for the loss of agricultural output, some of the Beja opted to rent land to the West African migrants who also acquired more lands through share-cropping. Those who possess animals used the land to maintain them, while those who do not either became migrant/seasonal wage laborers or got involved in charcoal production that is marketed through a chain of traders within the Gash delta and in Kassala town.

Thus it can be concluded that the economic links with the Central Government neither contributed to the resource conservation nor the sustainability the traditional ways of resource use (i.e. grazing). While the expansion of Gash scheme has reduced the natural grazing area for the pastoralist, its economic problems pushed many of the Beja involved in the scheme to charcoal production, both of which considered major causes of degradation in the region.

2.3 The Political Level

Local politics in the Red Sea area like other parts of rural Sudan, was dominated through most of the colonial and post-independence periods by traditional leadership or Native Administration which was introduced by the British as a means of reducing the cost of administering the vast territory, eroding support of the educated and the religious sectarian forces and of maintaining comprehensive control using the hierarchy of tribal relationships. According to Bakhiet plans of making use of tribal elements goes back as far as 1916-17, as a conscious policy by the British not intended to accord these tribal elements any separate identity but to use them. (Bakhiet, 1970: 26). However, with the political developments in the country, these tribal elements were empowered with judicial and financial powers in addition to administrative authority. The native administration has thus been a form of government extended to very local areas (in tax collection etc.) rather than any form of real self rule or local government.

The abolition of the native administration in 1970, withdrew the official recognition of tribal leaders authority, but economic and social powers accumulated over the years have kept the allegiance of the populace largely intact. In fact these traditional leaders were frequently called upon by authorities to mediate in tribal conflicts, and at a latter stage (1980's) the *Nazir* was reinstated. However, since the beginning of the 1980's the traditional leadership of the Beja has come under the influence of a number of factors which undermined its authority and produced significant power shifts within the region. These include:

1. The emergence of a new educated elite class among the Beja who started to acquire influence and recognition through:

- a. the support of their sub-tribal constituencies
- b. government posts and participation in administrative decision-making
- c. access to NGOs resources, and
- d. political alliances with central and/or regional authorities

2. The demographic changes of population growth, mobility and urbanization, especially after the 1984/85 famine. The exodus towards towns has led to emergence of new sheikhs in the newly formed urban camps with new functions and obligations (relief/ration, distribution etc..).

3. The erosion of the traditional leaders economic resource base as a result of the drought that seems to have costed them their legitimacy and public support. (Authority that was mainly acquired by birth (inheritance) might also be gained through hospitality and positive response to problems of the masses) (Torkawi, 1991: 11).

4. Political changes at the national level. The formation of the SSU units and local government system during May regime is one example and at present the Popular Salvation Committees which took over all the authorities of the local councils and the traditional leadership. In fact, it has been argued that such committees have given some room for the traditional leadership to reclaim some of the grounds it lost (*Ibid: 9*).

It can generally be said that, except for the Beja Congress (an organization of educated Beja that aimed to withdraw power from the Native Administration and central authority), the legitimacy of leadership in the Red Sea area has been either imposed by or acquired through the Central Government. This is evident by:

1. The formation (appointment) of the native administrators by the Colonial Administration
2. Domination of national sectarian parties (especially the DUP) of local politics and nomination of candidates during the democratic periods. In fact it is well known that **Hadout** (Beja organization formed in 1980's) was fathered by the DUP to avoid a revolt in public Beja support.
3. Central Government control over civil service in the region since all the authority of appointments to top grade posts are retained in the center, and

4. The present centralization of power, in spite of the declared Federal System as indicated by the centers preservation of the power of appointing governors, regional ministers and all top level administrators.

It can thus be concluded that:

1. The Beja of the Red Sea area have never enjoyed a real local politics but rather internal competition for power was making them vulnerable to the influence of the Center. Competition for power is in a way a competition for resources (*Ibid: 12*) and vice versa. Control of water and land means control over decision making. This explains the shift of power to the new urban sheikhs and the educated who control the distribution of rations and relief materials. This gave the presence of NGOs some significance as the only new factor in the game of local politics.

2. Religion and ethnic/tribal links have always been used in the process of acquiring power and economic resources and central support in the process of empowerment.

3. Collaboration with the center has always been important at the level of local politics.

4. Local Beja organizations such as Beja Congress and Hadout have not been effective because of:

a. The interference of the center (sometimes in alliance with traditional leadership) in their activities

b. The use of tribal links by many of the educated as scaffolders to join the reign of power in the center, and

c. The conceptual problem in the approaches of most regional and/or ethnic organizations in Sudan, that of attempting to share power in the center rather than utilizing the center's resources and efforts in addressing local problems.

2.3 Interaction with NGOs

Following the declaration of famine in Sudan in 1985, a number of NGOs came into the Red Sea area to participate in relief operation. A total of 17 organizations was registered in addition to 4 UN agencies whose role was largely restricted to the material supply and coordination level, and 2 Sudanese NGOs on the ground both dependent on resources from foreign NGOs and UN agencies (Abdel Ati, 1993: 105-7). NGOs activities covered all the districts of the Red Sea area with a high degree of concentration in areas south of Port Sudan where most population live. With the receding of the severe famine conditions in late 1986 early 1987, some of the NGOs left, but most of the others declared their shift from food relief activities to long term recovery and development programmes (*Ibid: 104-5*). However, irrespective of the effectiveness and/or wisdom or otherwise of that shift, the impact of NGOs intervention was considerable on various aspects of Beja life.

Obviously the most important effects of NGOs work was the saving of human lives, (some estimates suggest that 40% of the population managed to survive only by NGOs' relief). With the massive loss of livestock that used to provide most of the food requirements, the "natural" balance between population demands and the natural resource output, was certainly influenced in the years that followed the drought and relief operations. With most NGOs' relief centers established in the main towns, NGOs have

also contributed significantly to the rural/urban drift, which has in many cases become permanent residences.

NGOs' attempts towards long term development and the revitalization of the natural environment achieved little or no results. Reasons for failure were many but the most important were:

1. The misconceptions relating to the understanding of the causes of environmental degradation in the Red Sea Area and/or the means of preventing famine i.e. approaches to development. Some examples of those misconceptions are;

- a. The fundamental principle underlying most NGOs' development endeavors in the Red Sea area, that of environmental degradation in the Red Sea area was exclusively the responsibility of man, thus failing to come to terms with the long term climatic change in the Sahel. Consequently, the declared dream objective of "putting the Beja back where they were before the drought" overlooked the various parameters that have changed such as population growth, technology, urbanization and migration; and

- b. The localized vision of problem and its solution (i.e. within the Red Sea) and in a fragmented form which isolates the region from the rest of the country and also gave little regard to variations within it, something clearly indicated by the patterns of internal migration. In that migration, which fares prominently in all NGOS reports, such variations were used as a resource/population balance mechanism. (Abdel Ati, 1993: 116-7).

Such views and/or misconceptions have prompted many NGOs to invest in some very costly projects which are technically advanced, developmentally unsustainable and economically not cost-effective.

2. The failure to utilize traditional social organizations both in the relief operations and their development efforts. Organizations such as *Okwaban* and *Tawiya* could have prevented the apparent disintegration of the Beja social groups, especially those who moved outside their home areas. They could have also acted as measures of sustainability for whatever development mechanism undertaken by NGOs.

3. The failure to coordinate and/or integrate NGOs activities with that of government departments and, in some cases, the antagonistic relationship that existed between the two. This resulted in disrupting of implementation of several NGOs' projects, hampered the formation of an overall environmental or development policy for the Red Sea area and considerably reduced the likelihood of sustaining any successful NGO-initiated projects (*Ibid: 113-5, 122-4*), and;

4. Some technical factors inherent in the NGOs' own structures and working methods which constitute a major impediment to development. These include:

- a. The centralized decision making which denies recipients any leading role in aid coordination (Cassen, 1986)

- b. The short time horizon and localized scale of operation dictated by uncertainties about funding and limited budgets (Adam, 1989: 157) and

- c. The engagement in diverse activities and fields for which, in the absence of coordination with specialized government departments, many NGOs lack the necessary technical expertise and/or inputs. (Abdel Ati, et. al., 1992),

2.3.1 The Impact of NGOs' Intervention

It was mentioned earlier that NGOs intervention has saved a large number of human lives during the famine period. But the impact on the long term development process was largely negative, both directly (impact of food aid) and indirectly on the local social set up. Food aid and food for work programmes have been associated with the adverse effects of reducing incentives to work, raising wages, depressing food prices in local markets and the disruption of the established labor migration patterns of the recipient community (Maxwell, 1988). Such impact is typical to the Red Sea area (Abdel Ati, 1993: 121-2). Other important effects of food aid and NGOs intervention include:

1. **Increasing the State's as well as individuals' dependency on food aid.** Devoid of basic resources most government departments completely surrendered some of their very basic duties to NGOs. In fact, in some districts some NGOs, with their relatively large resources, took over totally the role of the state except probably that of security and education such as NORCROSS in Sinkat, DANCROSS in Derudeib and Oxfam in Tokar district. This on the one hand, perpetuated the food gap since state money saved does not go into food production and, on the other hand, shook the people's confidence in the State apparatus as well as that of their traditional leadership, and

2. As a result of above, NGOs intervention produced an **important shift in power structure away from the state and traditional leadership and in favor of the educated, urban-based Beja who have access to NGOs' resources.** In fact this power shift, though largely by default, was so strong that it has been used by some political parties to rally support among the Beja. Another important indicator of that strong association between NGOs and social position, is that the *Khalwa sheikhs*, in order to reclaim their social position, have turned their *khalwas* (religious schools) into relief distribution centers and in fact a numerous number of them emerged during the relief distribution period (El Hassan, 1990: 10). The authority of the native administration has been weakened considerably (even compared to the early 1970s when it was officially abolished), especially among those (majority) who moved towards towns in their quest for food relief. However, although Native Administration effectiveness in resource allocation and use aspects has been significantly reduced, it remained in demand for some conflict resolution and mediation. In fact, this criterion has repeatedly been used by the State to enhance further encroachment into the Beja System e.g. the privatization of Gash Scheme.

Thus NGOs intervention was one, (though not the only) factor that marked a major shift in local political alliances, which is sought to justify claims to political power and economic resources (Ahmed, 1990: 8-9; Ibrahim A. 1990: 8, 12, 18), and hence influenced the way natural resources are utilized.

3. CONCLUDING REMARKS

The Red Sea Area has experienced some major changes in its physical environment mainly in terms of rainfall and the consequent reduction in plant cover. The change has mainly been quantitative rather than qualitative. Climatic and hydrological studies in the area have indicated a surplus in the region's water balance and strongly denoted the variability of the rainfall system. Botanical studies, using satellite images for the 1970-90 period, confirmed the quick regeneration of annual grasses (after the first spell of rain), but the gradual and systematic reduction in perennial cover. What this imply is that clearance rather than drought is the main cause of degradation in the area (Krzywinski, 1993a; 1993b).

Wood has always been cleared for home construction and other domestic uses but its large scale destruction was mainly linked to fuel wood and charcoal production which has intensified with the process of urbanization and the commercialization of the local economy. The involvement of the Beja communities in wood clearance and charcoal production was intensified as a result of:

- a. The collapse of the agro-pastoral system (as wood becomes the most easily accessible resource and the demand for it become high in urban centers);
- b. The collapse of the traditional coping mechanisms associated with the traditional system; and
- c. The decline in the social sanctioning system that used to protect natural resources, mainly as a result of population mobility and the communization of what is left of the natural resources.

The social implications of the combination of rainfall variability, encroachment of the external system and the degradation of the natural environment were enormous. They include:

1. Further decline of traditional coping mechanisms and social sanctions that used to preserve and protect the natural environment and sustain the socio-economic system;
2. The change in the division of family labor and the social role of the members of family units. Women went public, children joined the productive forces as income earners in town, and men migration grew larger in scale, distance and duration. Particularly significant was the population drift into urban centers which has, not only added to the urban problems (e.g. unemployment, housing and services), but also increased the pressure on the narrow rural resource base.
3. The progressive emergence of a state of dependency among the rural population and urban migrants, as relief supplies by NGOs continued long after the receding of the famine conditions in the mid 1980s; and
4. A significant shake up in the power structure among the Beja community in favor of those with access to rations and relief resources (NGOs resources).

NOTES

1. RESAP is a joint interdisciplinary research programme between the universities of Khartoum (Sudan) and Bergen (Norway), undertaken in the Red Sea hills of eastern Sudan (1988-1993).

*2. Words in italic with * are in Beja Language.

3. In 1994 some 25,000 feddans were allotted to a Saudi private investor, most of which within the annually flooded area.

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Agriculture and Pastoralism in Karamoja: Competing or Complementary Forms of Resource Use?

Frank Emmanuel Muhereza

1. INTRODUCTION

Over the recent years, there has been increasing attention on Karamoja because of its never-ending crises. These crises are manifested on one hand, by recurrent famine conditions, and increased pastoral mobility which has led to conflicts over the ever diminishing resources, on the other hand. Violence now defines the social relations between different pastoral groups and between pastoralists and other resource users, especially crop cultivators, with whom they have to compete for resources.

Since most literature on Karamoja comes to different conclusions on the causes, the extent and nature of this crisis, there have equally resulted different interpretations on the rationale of pastoral behaviour in this dryland ecosystem, as well as diverse policy conclusions. Two tendencies however seem to dominate. The first is that which identifies pastoral behaviour (largely considered as an adaptation to the constraints in nature) as being a major cause of ecological degradation, which leads to mobility and violence. Largely advocated for by bureaucrats in government, this perspective sees, not simply the sendentarisation of pastoralists as a solution to the crisis, but the transformation of cattle keepers into crop cultivators¹. For example, in calling for the establishment of settled agricultural communities in the wetter western areas of Karamoja, Wilson, (1985) argued that:

the current problem of the Karimojong is to move out of the past and wake up to the fact that perhaps 3000 square miles of agricultural land not at present utilized are available for exploitation.²

The second perspective, which is largely critical of the "official" position, is dominated by researchers and scholars who have studied dryland pastoral resource management systems and considers pastoralism as the most viable mode of production in an ecologically hostile environment such as Karamoja's³. Mamdani, Kasoma and Katende (1992) and Ocan (1992) have argued that because of the unreliable rainfall patterns in Karamoja, agriculture fails in four out of every five years. And according to Novelli's (1988: 24) calculations, five crops out of six bring bankruptcy. Survival, therefore, depends on cattle because cattle have an advantage over crops. They can be moved from place to place in search of water and forage. Mobility allows the pastoralists to maximize the use of seasonally available resources. It is also acclaimed as an ecologically non-destructive form of pastoralism.

Within both perspectives, there have been wide-ranging debates on the relationships between the pastoralists and the physical environment in which they live. The most common is that which views the dynamics of pastoral systems as non-equilibrium, and as a result, primarily dictated by variability in rainfall and other physical factors (cf. Ellis and Swift, 1988).

What, however, has not been adequately tackled in most of the literature is the trend in the changing relationship between pastoralism and agriculture, and other forms of resource use, such as hunting and gathering in a predominantly pastoral economy such as Karamoja's. In each of the perspectives above, agriculture and pastoralism have been presented as if one is mutually exclusive of the other.

Though Ocan (1992) recognizes pastoralism as the most ecologically viable form of production, he also notes the importance of agriculture in a pastoral setting, since according to his calculations, 70 per cent of the diets of over 50 per cent of the people in Karamoja are constituted by cereals. This implies that there are highly fluid processes of change, at some point, from agriculture to pastoralism, and at another, the reverse, not forgetting social formations eluded by these changes.

In Ocan (Forthcoming) and Novelli (1988), where the intervention by the state in pastoral systems of resource management is said to have undermined their ability to sustainably use natural resources, one process of change has been referred to. That is, the attempt by the state to resettle pastoralists in the wetter western areas of Karamoja has brought pastoralists in perpetual conflict with the settled agriculturists because the latter soon began to claim individual rights in areas traditionally recognized by the community as dry season grazing grounds.

Gira's (unpublished) study on the dynamics of the land question in the three counties of Kotido District is by far an illuminating study, in as far as it provides a different scenario from what we have been often made to believe. Gira has indicated that in Labwor county the main economic activity is agriculture, in Jie county it is pastoralism, while in Dodoth county, because of incessant raids and increasing droughts, a shift from pastoralism to agriculture is taking place.⁴

The implications of the fluidity of such a highly changing scenario which can reveal the relationships between different systems of resource use need to be understood. The dynamics and implications of the changing relationships between different systems of resource use have not been given appropriate analytical focus in the literature. For instance, has the relationship between pastoralism and agriculture always been antagonistic?. Has it changed? and if it has, why?.

It is fundamental to capture the changing nature of systems of resource use in Karamoja and to underscore the significance of the relationships between the permanent home where agriculture is carried out, and the grazing camps, where cattle are taken in the dry season. These changes have to be studied in a holistic, but comparative approach in order to generate information on the basis of which broad conclusions can be drawn.⁵

2. DRYLAND ECOSYSTEMS AND HUMAN ADAPTATION: SOME CONCEPTUAL ISSUES

Recent studies on resource management systems in the drylands consider such ecosystems as being vulnerable and fragile because of their hostile climates, as a result of which, there is no stable equilibrium between animals and plant populations (Behnke and Scoones, 1992). In these studies, attempts have been made to placate the analyses of resource use problems in what are considered as appropriate 'dis-equilibrium' environment in an attempt to critique previous perspectives whose major weakness was to define the problems of these systems from the point of view of "equilibrium" dynamics (Scoones, 1995; Behnke, Scoones and Kerven, 1993). Consequently, drylands have been described not positively, but in terms of what they lack rather than what they possess in abundance. In what is now referred to as the "New Ecological Thinking", they are defined in the context of dis-equilibrium dynamics, which, like perspectives they wish to critique, start from a vantage point of reference to other (stable equilibrium) ecosystems, rather than in their own right, as systems whose equilibrium exists, only that it is highly dynamic and changing. The fact that the equilibrium point, if it can ever be realized, is highly shifting, though that does not mean it is non-existent. We are agreed with De Vreede⁶, that dryland ecosystems are not as vulnerable or fragile as they are sometimes posited. They are not only among the most resilient systems of this planet, but also among the most dynamic and those so-called hostile climates, with their recurrent droughts, is what gives them their unique qualities.

Such a background suggests therefore, that definitions of man's relationship with nature in dryland ecosystems, have to be put in the context of this dynamism, defined either by his ability to live within the

constraints (adapt to) or exploit (appropriate) the possibilities offered by nature. Man, thus, relates to nature through either adaptation or appropriation.

It is argued in some studies that some systems of resource use (e.g. pastoralism) encourage the predation on nature, since cattle keepers are said to use resources up to the extent to which the constraints of nature can allow them to do so, while in others (e.g. crop production), man is able to mold nature to suit his needs. The former, where it is argued that human populations are likely to multiply beyond the capacity of resources to regenerate naturally, is considered a stage in the transition to the latter. Settled agriculture is depicted as the most efficient system of using scarce resources. Hunting and gathering are destined to a preconceived image of natural man at or near absolute zero of cultural development (Ingold, 1986).

The principle basis of the above distinction is whether man manipulates nature or lives within its constraints. This alone is not a correct exposition because man, both as a subject of nature and an object, of it, is engaged in both social and ecological relationships with nature. The social relationship is in as far as man appropriates resources from nature to produce - man is involved in economic production by expending effort, what is regarded as work. In as far as man eats food, and as a consequence of which grows biologically, man is said to be involved in ecological production - the bodily processes of growth and maintenance that go on inside living organisms, fueled by energy derived from food ingested - in case of plants, food synthesized (Odum, 1975, quoted in Ingold, 1986).

Plants do eat in order to grow, but this is not economic production because it is not consciously done. According to Ingold, (1986: 104) plants are endowed with a very specific behavioral project, which is not one it has designed, or it has knowledge of. Plants are not producers except to the extent to which they grow in an ecological sense. Alternatively, what sets a hunter from a Karimojong tribe apart from a lion predator, or a Karimojong gatherer from a foraging Chimpanzee, is that there is more to human hunting and gathering (i.e. predatory relationship with nature), than the behavior of a lion or a chimpanzee: the intention of the subject who experiences the activity as something he does in person. Sometimes they combine both hunting and gathering, making the distinction all the more irrelevant.

This, as a result, makes man both a predator (as a biological organism, it preys on another), and a hunter (a social action). The former interaction pertains to the ecological domain of the organism - the environmental relations, and is wholly contained in the natural world; while hunting is an action directed on the natural world, rather than interacting within it. It is social because it is consciously done. In the words of Marx, it is ones consciousness that determines his being, and not his being that determines his consciousness (Ingold, 1986). We are agreed with Mamdani, Kasoma and Katende, (1992: 17) that, to assume, like even the most sympathetic observers as Novelli (1988: 138) that, "herders do not produce, but rather exploit what nature offers", is misleading in as far it fails to capture the historical context of the changing nature of resource use systems in space and time.

Can we therefore, talk of the Karimojong as being pastoralists, cultivators or agro-pastoralists? For leaving part of their families behind, when they move in search of dry season grazing, the Karimojong cattle keepers could have been defined as being semi-nomadic. But because the family that remains behind in the permanent settlement predominantly survive on grain (some of it is cultivated in the settlements, and the majority obtained from neighboring communities) the Karimojong can be better referred to as transhumants. Among the settled Karimojong groups, the role played by cattle varies from one group to another.

Specific forms of resource utilization entail certain social relations. The social relations which result from specific forms of resource use depend on the forms of claims which the different groups or resource users make over the resources. It is these social relations that make it possible for one to decipher the way in which different resource users have been able to adapt to changing circumstances. The best way to start is to define the relationship, but not to tag resource use systems to particular groups.

3. HUMAN ADAPTATIONS AND THE APPROPRIATION OF NATURE: A THEORETICAL CRITIQUE

Many studies on natural resource management in Karamoja in general, and pastoral production in particular, have revealed that traditional cattle keepers evolved different resource management techniques in the various systems of resource use, which were modulated by constraints and possibilities within the physical environment.

These studies mostly take us through major areas of the "pastoralist landscape" in as much detail and clarity as is possible. Though the reader is usually left in little doubt that pastoralists know the areas in which they live only too well, one can see a problem of integrating current pastoral behavioral observations, and their politico-historical and ethnographic past without relying completely on either cultural-anthropological or environmental determinism. It is important to underscore what factors underline these human adaptations, which helps to explain how they adapt, when and where.

There are many examples of ethnographically observed pastoralism where patterns of resource use are juxtaposed on ecological systems in order to argue that the manifestation of pastoral production systems, and subsequently their behavior, is an adaptation to the physical environment. The dry season migration of one group of Karimojong households between different places has been explained by Dyson-Hudson and Dyson-Hudson (1969: 83) using fluctuations in rainfall, and the variations in pasture quality and quantity. The migrations were plotted to show how the distribution of cattle camps and location of their slash and burn gardens used over a period of time depended on the seasonality in climatic conditions⁷.

In such perspectives, the use of resources is portrayed as a function of ecological variables. Pastoralists will move as and where resources are available to the extent their social and economic formations are by and large determined in a mechanistic fashion, by the natural habitat. By arguing, like Randall, (1967) that:

higher rainfall represents a greater range of more settled alternatives which the Labwor people have exploited; a mean annual rainfall of 35 to 45 inches in Labwor is adequate for settled agriculture,

Hence, relegating those areas which receive low rainfall to the exclusive preserve of pastoralism, is to fall into a deceptive trap of mechanistic and simple unidirectional causation, especially so with Karamoja.

This is an idealist formal theory, and a classification into which presumably static societies are usually slotted⁸. Methodologically, such views are rooted in a positivist and statistical empiricism, that inductivist view of science which begins with careful unprejudiced observations, and ends with a correlation; a vision of science as simple cause and effect (Ellen, 1982).

While it is true that groups of Karimojong are beginning to move to the well-watered areas around Iriri and Namalu to take up settled agriculture, there are not only limitations to such a movement, but also in some other areas, this is not possible precisely because each ecological zone displays a multitude of variations, and changes over time necessitating skillful exploitation of the resource base to provide pastures to livestock, and grain for human consumption.

The mountain areas of Karamoja receive more rainfall which influences soil formation and growth of vegetation, therefore, making them favorable to agriculture. If this explains why the mountain tribes, namely, the Nyakwai, Teuso (Ik), Labwor (Tobur), Tepeth, Nyangea (Napore) and the Mening are more agricultural, why then do these same groups move into cattle keeping whenever they have a choice as recent evidence seems to suggest?⁹.

The tendency to view resource use in Karamoja, as if pastoralism and agriculture are mutually exclusive, or rather, to envisage the transition of society from pastoralism to settled agriculture is very problematic and has been subject to wide-ranging critiques.

First and foremost, available ethnography on Karamoja indicates that the above position is not an historical reality since agricultural production has been central to survival of Karimojong tribes. Cisterino (1979) has observed that among the Karimojong, one does not find the disdain for agriculture, shown by the great majority of the Masai or Bahiima. Wherever soils and rains allow, entire communities like the Labwor rely heavily on agriculture. The pastoral communities rely on agriculture to the extent allowed by the ecosystem, even if this extent is one or two months.

Depending on cattle for survival is not an exclusive choice, but the best possible balance since crops have a high failure rate. Lamphear (1976) has argued that this was the same among the Jie, who are said to have practiced agriculture since time immemorial, although they are predominantly cattle keepers. In Jie oral history, sorghum is regarded as their original crop; and it is common to hear Jie elders say, "God created sorghum and cattle on the same day".

Gulliver (1955) has also argued that cereals have been as equally important as animals, which had been the case for many generations, and indeed the Jie would starve without their agricultural produce. Among the predominantly pastoral groups, the importance attached to either agriculture or cattle varies from author to author, for instance Ocan (1992) has argued that for over 50 percent of Karimojong groups, cereals now constituted more than 70 percent of their diets, while Cisterino (1979: 42) indicated that it is the Dodoth who rely more on agriculture than the Jie, while the mountain tribes, though are involved in iron works, some hunting and gathering, are more of settled agriculturists.

Lamphear (1976: 6-7) on the other hand, has argued that the dramatic modification of the Jie settlement patterns since the 1950's have in fact been dictated by agricultural rather than pastoral considerations. The extreme demographic pressure on the diminishing resources led to emigration of the Jie to relatively more fertile land around Kaceri and Losikua. Most of the emigrants have been intensely agricultural in their outlook, cultivating large fields of sorghum, finger millet and maize.

While it is imperative not to turn the ecological advantages of mobile pastoralism as arguments against agriculture, the obsession to settle pastoralists so as to end mobility which places agriculture as being superior to cattle keeping is misleading. The current problems of resource use should be understood in the context of competition between different social groups over ever diminishing resources.

Resource competition has sometimes involved inter-ethnic clashes over some of the more ecologically well endowed areas of Karamoja. The stretch of land between Pian and Bokora has historically remained unutilized especially during the dry season when such areas are priceless. We propose that the harsh ecological conditions provide the limits, but the choices from limited alternatives available is a function of existing social relations, and the resulting social systems which regulate resource use.

4. THE INTER-SUBJECTIVE NATURE OF RESOURCE USE SYSTEMS IN KARAMOJA

4.1 Pastoralism and Crop Production

Karamoja receives rainfall ranging from 350 mm in the drier areas to 750 mm in the wetter areas. This low rainfall is not evenly distributed. From September to March are usually dry months. For much of the year, rain comes in less than half the number of months. The dry season which begins October to March,

lasting between five to six months coincides with sensitive crop growth stages which creates significant losses.

Annual rainfall, as shown in the table below, have been declining since 1988 which has affected traditional long maturing crops, grain filling and the maturing phase of crops. In 1989/90 and in 1993, much of the rain in Moroto fell outside crop growing seasons. These rainfall irregularities led to a failure by crops to flower. Early rains are usually insufficient for crops establishment. As a result crop output cannot keep up with the local demands for food.

There are other serious constraints to increase in output. The nature of rainfall distribution requires that more and more land be put under cultivation. Without draught power, the area of land cultivated will remain very small.

It has been argued that such rainfall fluctuations limit the range of choices available to producers in Karamoja, to the extent that in the absence of a regular water supply made available by irrigation, agriculture can only be complementary to stock grazing in most parts¹⁰. But if the arguments stopped at that point, it would easily pass for an ecological fact that no agriculture takes place in areas with such rainfall patterns. Mamdani, Kasoma and Katende, (1992) have argued that rainfall uncertainty had translated into high risks for producers, since it is difficult for farmers to know when to plant. Having planted, a farmer must contend with mid-season dry periods: should no rainfall for more than ten days, crops would quickly wilt in high temperatures.

The main crop grown in the different micro-climates zones of Karamoja is sorghum. However with respect to other crops, especially non-cereals, different areas present conditions suitable for the growing of different crops. In much of Bokora areas around Lorengechora and Iriri, in addition to the traditional sorghum, sweet potatoes and maize are grown. The areas in South Karamoja, mainly Chekwi which receive reliable rainfall, vegetables are grown. The *Abir* tall Sorghum variety is common in Bokora areas.

Table 1: Mean Annual rainfall for Kotido and Moroto Districts

(1982-1994)

	Kotido District	Moroto District
Year	Rainfall	Rainy Days
Amount	Days	Amount
Days	Days	Days
1982	7102.25	Unavailable
1983	654.4	Unavailable
1984	- -	449.8
1985	2238.3	230
	3034.8	215

1986 - - 638.19 41

1987 604 45 877.4 33

1988 606.6 72 1106.2 70.25

1989 896.74 73.3 835.65 60.5

1990 503.8 66 711.23 54

1991 651.7 107 761.1 63

1992 779.4 85 568.85 60

1993 527.38 85 517.8 32.25

Source: Agricultural Development Plan, 1995, DAO, Moroto and Ministry

of Agriculture Animal Industry and Fisheries.

There is an evident process of diversification of agricultural activities. Households are beginning to adopt improved agricultural practices, for example planting quick maturing seeds. The people of Karamoja are beginning to adopt the growing of root crops, including sweet potatoes and cassava, as well as fruit trees. Potato vines are collected from neighboring districts. The growing of oil crops such as sunflower and ground nuts is also on the rise because of the need to substitute animal fat with plant fat since fats from milk are not as readily available as they used to be.

Rainfall amounts vary from one place to another. Although they are inhibitive, the amount of land under crop production has generally been on the rise over the years (see appendix). It is not enough to say that the increase in area of land put to agriculture is because of the changing nature of perception of agriculture by the people of Karamoja. This scenario can be explained as follows:-

It would appear as if the poorer the yields per unit area of land, the more the Karimojong are driven to put more land under crop production as a way of compensating for poor returns. In Karamoja, is not every piece of land that is usually put to agriculture. - There are a number of considerations taken into account before devoting a piece of land to crops, such as, the proximity of a piece of land to settlement areas or to the road for purposes of security from theft. The pieces of land are usually enclosed with thorns to protect the crops from stray animals, implying that small land area is put to crop production at any one time. Most important of all, the decision made with respect to size of land, and where and when to plant are dependent on the family ability to marshal animal draught power.

Animal traction power is significant for agriculture largely due to the nature of the soils in Karamoja. Areas where crop production is possible have either black cotton soils or the heavy sandy loams. During the dry season these particular types of soils dry up to the extent that land opening cannot be done before the rains begin. When the rains start, the tilling of the land is also made cumbersome because the soils are very sticky. Only the use of draught power makes land opening easier. And this has to wait until the herds have been returned from the dry season grazing camps.

According to information available from the District Agricultural Office, Moroto, the increase in land opened up is accounted for by the increasing number of people using ox-drawn ploughs. It now gives the Karimojong men the masculine satisfaction if one ploughed more acres of land. The men now have found the use of ploughs more acceptable culturally. The average amount of land under crops for households does not exceed 5 hectares for most households, although amongst those without draught power the land

cultivated is so small, on average 0.5 hectares. This is because land is usually tilled by the women using small hand iron hoes and other tools like pangas (Field interviews, Lokopo, September 1995).

Sometimes the relationship between pastoralism and crop production is such that the latter has been seen as directly increasing the competition for resources with the former, as cattle keepers increasingly take on crop production. In Karamoja, formerly gazetted game and forest reserves, where human activities were prohibited to protect the environment from cattle keepers whose behavior was seen as being responsible for environmental degradation, have been encroached upon by cultivators. Sometimes this encroachment has not spared fertile grazing lands which has brought cattle keepers and cultivators into conflicts.

Rather than look at the increasing adoption of crop production as a replacement of cattle keeping, it is becoming clear that this sometimes is an attempt by cattle keepers to diversify their activities in order to reduce possible risks of starvation. In those communities where crop production is predominant, there is no discrete allocation of labor based on gender, which is the reason why despite being predominantly cattle keepers, communities which also grow crops shuffle labor between animal rearing and crop production. The men clear the land, fence the homesteads, plough and harvest the crops. While the women do on average, 70 per cent of hoeing and weeding, 60 per cent of harvesting, 80 per cent of transporting the food stuffs home, 90 per cent of food processing, they also play a significant role in tending lactating animals in the permanent settlement, churning ghee. The children herd the goats, sheep and calves.

Between crop production and cattle rearing, each system contributes to the other. Animals are grazed in sorghum fields once sorghum has been harvested. An Agricultural Officer in Moroto said of the relationship between crop production and pastoralism:

the Karimojong practice both concurrently. In one way or another, each contribute to the other. Cattle are used to open up land for crop production. In some areas, the animals are now being used for weeding. Donkeys are important as means of transport.

The Tepeth in areas around slopes of Mt. Moroto practice both crop production and cattle rearing. The herds are kept in the plains where they are looked after by part of the family, while the rest of the families remain in the mountain areas where they carry out crop production.

These forms of adaptation imply that the best possible technical solution can not be a choice between livestock production and crop production, or even a choice between the intensification of either of the two, but in the best possible balance between them that also intensifies their complimentary nature. This is because crop production and cattle rearing are integrated and are complimentary in different respects.

4.2 The Inter-dependence Between Agriculture and Cattle Rearing

Resource use systems in Karamoja are integrated in a manner that is geared at exploiting the possibilities offered under extreme ecological conditions. These range from hunting and gathering, pastoralism and crop production to agro-pastoralism. They not only co-exist in an inter-dependent manner, but their social systems are interconnected in a specific way although pastoral production appears to be predominant in the driest areas while crop production is, in the well watered areas.

When families predict a likelihood that available food stocks will not last them through the dry season to the start of the next harvest, a period which lasts between six to eight months, whatever little food is available is reserved for those who need it most. All the able-bodied in the *manyattas* accompany the herds to the grazing camps, including women and children. For example, if a man has three wives, only one wife is left in the permanent settlement to take care of the sick, elderly and disabled. Even school-going children are taken out of school.

While in the grazing camps, the women and children who have little to do with herding the animals are involved in casual labor in return for food stocks among the predominantly settled agro-pastoral communities near to where the grazing camps will have been established. Some of these food stocks are eaten by the families in the grazing camps, but much of the food is brought back to the permanent settlements in Karamoja to feed the people who remained behind.

In many parts of Karamoja, several factors are said to influence the decision taken by a community to shift the location of their permanent homes to another place. The most significant factor is a consideration based on the problems that constrain either crop production or cattle rearing. From interviews with elders in Lokopo sub-county, Bokora county, Moroto District, it was discovered that new manyattas had emerged over the recent years. Bad omen was one reason as to why they moved away from old homes, and this was mostly associated with either the death of the households most favorite bull, outbreak of a disease epidemic that threatens to decimate entire herds, or the decline in yields due to deteriorating fertility of soils around the permanent settlements.

Resource use systems are dynamic. The changes are caused by both internal and external factors. In the literature on Karamoja of the 1950 the mountain people of Karamoja were seen as predominantly hunters and gatherers although they also grew crops. These tribes were known to integrate their economies with those of the more powerful pastoral groups in their neighborhood. For example, it has been noted that once the Tepeth tried to expand their herds and grazing lands down the slopes of their Mt. Moroto, taking advantage of heavy policing methods of "Pax Britannica" which checked expansionism of the other Karimojong. But they were almost decimated by the latter stronger groups (Dyson-Hudson, 1966: 233). The Teuso (Ik) were predominantly trappers, who sometimes traded game meat, honey with the Dodoth for goats (Cisterino, 1979: 109).

This, however, cannot now be said of all mountain groups. For example, the Tepeth were forced to descend to the plains following the gazetting of forest reserves on forest on mountain slopes. Years of turmoil have led to the decimation of entire wildlife populations in Kidepo to the extent that the few animals which are still in the park are protected by armed game guards on a 24 hour basis. Today, cattle keeping is practiced among these formerly mountain communities, which effectively started after they acquired guns in 1979 following the fall of Idi Amin.

Cisterino (1979) has suggested that being agricultural, and/or trying out other skills for survival is not so much a choice as a necessity, imposed upon mountain people by the numerically stronger and organizationally powerful cattle keepers. They are usually compelled to diversify their economies in a way that integrates it with that of the powerful cattle keepers, or they are suppressed and the remnants absorbed. There exist diverse intra-group relationships between the different Karimojong social groups.

Apart from integrating cattle rearing, crop cultivation and other economic activities, the Karimojong try as much as possible to inter-crop their fields, for example, in some areas sorghum is inter-cropped with sunflower. Many households also undertake the following activities: pottery, making wooden bowls (*ngatubai*), head dresses (*etimat*) and shoes and cloth from hides, and gathering wild leaves and roots. In the 1994 famine, people were reported in Karamoja as surviving by, "boiling and eating green plants".¹¹

4.2.1 Rotational Grazing Systems

Cattle keepers in Karamoja practice a system of mobile pastoralism where animals are not simply moved across the three ecological zones in Karamoja, but where the movements are appropriately designed and timed in a pattern that ensures sustainability through rotational grazing and integration with agricultural activities. Movement between the moist western areas, to the middling central riverine areas, and the drier eastern areas is usually a deliberate attempt to maximize the use of scarce resources.

When the rains start around April, herds are quickly moved to the dry Eastern areas where coarse and stony soils preclude cultivation, but soft grasses sprout immediately after the rains fall and wilt

immediately when rains stop. The central plains are also where cultivation is carried out. This eastward movement is also an attempt to allow the cultivation of crops out of danger of being eaten or trampled over by the animals.

As the rains reduce in August, a time when crops will have been harvested in the settlement areas, the herds are returned to the permanent settlements to take advantage of the abundant water and stems of harvested crops rich in food value. At this time takes place the burning of westward grass - where the herds will move once the dry season starts in September.

Pastoralists avoid the western area with perennial grasses not only to preserve it for the dry season, but also to avoid disease pest in these bushes, and also because the freshly burnt grass that sprouts is more nutritive and palatable to stock, and also to protect their cattle as raiders will be visible from a distance. This is also the time when crops are grown in the wetter western areas. This means they "productively adapt" to the environment.

Mamdani, Kasoma and Katende, (1992) have noted that mobility allows the herds to access fresh protein-rich pastures when most digestible, leaving until last pastures of low nutritive value. The fluctuation of levels of milk yields provides pastoralists with a sensitive indicator of pasture quality. This helps them to decide when to move.

Ingold, (1986) has rubbished the uncritical description of the system of mobile pastoralism (sic nomadism), as the unfettered physical movement across the landscape in the course of the practical business of resource extraction which pays little regard to the engagement in social relations in resource use.

This is because to do so would imply that pastoralists are nomadic only in the material sense, (mobility in resource extraction), and not in the social sense (the appropriation of natural resources in social locales). The way the different resources are used in the different places varies from time to time. The relationships between the different forms of resource use equally vary. Both have been changing because of reasons ranging from physical/ecological, socio-cultural, political to purely economic factors. Some of these have undermined the role that agriculture played in the predominantly pastoral economies.

4.2.2 The Relationship Between the Permanent and Temporary Settlements

The system of mobile pastoralism we have referred to above can not be described as nomadism, but transhumance because of the dynamic relationship between the temporary and permanent settlements. The temporary settlements are the grazing camps (*ngireria*) where cattle is taken once the dry season sets in, that is, it is the settlements where pastoral production is the exclusive economic activity. The permanent settlement on the other hand, is where the rest of the family, children, the aged, women and the disabled remain. These permanent settlements in Karamoja are located in the central plains which have a better drainage and fertile soils. The houses are constructed on less fertile soils, in order to leave as much land for cultivation.

When animals are moved, a few milking animals, the calves and sometimes old animals and oxen are left behind. Their movements are in such a way that the women are able to regularly visit their husbands in the grazing camps, taking with them ghee which their husbands will sell to settled agro-pastoral neighbors and buy food crops which the women will return with to feed family members who remain behind.

Today more and more time is being spent in the grazing camps. Animals are more secure with the warriors than when they remain in permanent settlements. Also the environment around the permanent settlements has been heavily degraded such that animals have to be moved away to find pastures. Such a situation has also affected resource allocation between pastoralism and crop cultivation because those who are left behind in the permanent settlements have to depend more on cereals for survival.

Sometimes, such a relationship has affected crop production because oxen which have been moved away for dry season grazing cannot be returned in time for the opening of land. Likewise, in the permanent settlements, children have to remain out of school to guard the crop from birds, a great cause of pre-harvest losses.

4.3 Pastoralism Across Borders

The difficulties faced by the Karimojong resulting from the harsh climatic conditions have been exacerbated by government policies that increased conflicts between the different ethnic groups. Such conflicts limited the access to grazing areas and interfered with the transhumance patterns. The effect, among others, has been an increasing demand for out-migration, either in search of better pastures and water, or to rustle animals in order to replenish stocks lost due to drought and epidemics.

It is usually argued that one of the compelling factors that drives Karimojong cattle keepers into Teso and other areas is the need to rustle animals in order to replenish stocks that may have been lost during previous raids or drought periods. Ocan (1992b) has demonstrated how the need for private accumulation by young war-lords had over-shadowed previous justifications for raiding. Pulkol (1994) argues that once all the cattle from Teso had been rustled by 1986, different Karimojong ethnic groups turned onto each other which explains the intensification of inter-county raids in Karamoja around that period.

Although it is estimated by Veterinary officials in Moroto that up to about 1,000,000 animals were rustled from Teso between 1980 and 1986, recent cattle census in Moroto District projected the number of animals at about 300,000 only (DVO, Moroto, interviewed September 1995). At the height of cattle rustling in Karamoja when cattle population plummeted, there was an outbreak of tick-borne diseases that decimated more than half the cattle population in Karamoja, including both raided and local Karimojong animals.

With tightening of security along Karamoja's borders with its neighbors, and increased civic vigilance, cross-border raids have been reduced to single acts of theft by habitual criminals. Whenever an animal has been rustled, the Local Defense Forces, Local Administration Police, and Karimojong vigilante work closely with the army to recover rustled animals. The ability of security forces to identify and recover stolen animals in Karamoja has over the years increased with greater involvement of local communities in policing their own areas.

The fact that movement of cattle keepers into neighboring districts has not stopped implies that there are other very compelling factors which explain why they move, which have hitherto only been under-shadowed by cattle rustling for very obvious reasons. Although it is generally argued that the Karimojong cattle keepers drive their animals out of Karamoja into the neighboring districts in search of water and pastures when the dry season starts, recent incidents have increasingly cast doubts on the extent to which this is true for all Karimojong all the time.

It has been noted that during the 1994 dry season, despite the availability of water and pastures in different parts of Bokora territory, many Bokora cattle keepers along the border with Teso migrated as early as December 1994 before the worst of drought was yet to come¹². While this could be seen as an attempt by cattle keepers to take advantage of being first to move, which ensures the maximum benefit from available resources outside Karamoja, discussions with elders and Veterinary officials in Moroto have pointed to two other issues which relate to attempts to cope with food insecurity in Karamoja. First, cattle keepers move out as early as they do in order to ensure whoever remains in the permanent settlement, either is left with enough food to sustain them through the dry season, or those who go to the grazing camps are able to obtain sufficient food stocks to send back to Karamoja. Secondly, Karimojong pastoralists often by-pass well watered areas and good pastures, in order to move to as far as they can get better prices for their livestock in more organized cattle markets in Northern parts of Teso, such as the Ocor-imongin cattle market.¹³ It has also been argued that the Karimojong now move into Teso in order to take advantage of the existing better marketing opportunities for milk, ghee and other animal products.

While much of this money is spent on drinking and buying household items, quite a substantial amount is used to buy dry rations of cereals to send back to Karamoja.

Initiation ceremonies in Karamoja are now not held regularly because consideration is given to availability of food reserves. Likewise, movements out to the dry season grazing areas are determined by food availability. That is, among other factors, the decision about the timing of the movement to the dry season grazing camps is influenced by how much food stocks the families have.

There have been isolated incidents where Karimojong pastoralists (read warriors) are said to sometimes take advantage of their military might to solve problems associated with food insufficiency. It is said that they sometimes capture young men and women from Teso and force them into forced labor on fields in Karamoja. In June 1989, it was reported that Karimojong warriors while returning to Karamoja after the dry season abducted thirteen young men and women from Usuk and Amuria and forced them to do manual work in their gardens. They were set free after planting cassava for the Karimojong over a period of one week¹⁴. There are also cases where some warriors have forcefully taken advantage of meals and food stocks from their hosts.

Some Karimojong groups, however, have established cordial relationships with their neighbors which enables them compliment each others' needs especially with regard to food production. Nomads when returning to Karamoja after it rains, leave a few bulls with their friends for ploughing in the hope that the gesture of good will be reciprocated next dry season when they return. When rains start in Teso, the Karimojong quickly return their herds to the permanent settlement where oxen are needed for opening up land although one of the kraal leaders, Yoanna Nangiro, asked why they leave Teso to return to Karamoja after the rains begin, among other factors said, the return of the rains brings with it plenty of mosquitoes which kill their calves, and the greener pastures that shoots up from burnt grass is not good enough for their heifers as it gives them diarrhea and East Coast Fever¹⁵.

4.4 Tenure Regimes

4.4.1 Land Distribution in the Permanent Settlement Areas

In the permanent settlements, the use of land is organized in a manner that takes into consideration the necessity to combine the demands of cattle rearing and crop cultivation, other requirements not withstanding. The land is distributed between different uses in order to ensure security for the herds and protection of crop planted around the settlements.

Fig. 1: Graphical Representation of a (lore) Manyatta

An attempt has been made to graphically represent land distribution in one manyatta in Fig. 1 below. The households are mostly constituted by a head. An acronym is added to the respective fields belonging to the different households. The outer circle forms a thick thorn stockade for protecting the entire homesteads, while the inner circle is a lighter thorn stockade that protects the kraals in the permanent settlement. Homesteads are built in a such a way that the inner circle is left as a central kraal where all animals are returned from grazing every evening. Within this communal kraal, every family herd has a designated small kraal area.

There is one main entrance to these manyattas which is used by animals. Each family has its own small gate adjacent to the families main house. One has to enter by crawling. Outside the manyatta, are located small field of maize, cassava or sorghum surrounded by thorny branches of trees to protect them from animals. The plots of land just adjacent to a family are automatically assumed to belong to that family. Family members have equal access to this land. Permission has to be sought by another family or family member to use such pieces of land. They are never rented, only borrowed.

There are also areas left open for village meetings. These are usually areas with big trees. These trees conspicuously stand out above the short shrub vegetation. Different manyattas may have separate meeting places. Sometimes several manyattas may have a common meeting place with several trees. These trees are protected customarily. In a village in Lokopo, a tacit agreement had been established to protect trees where village meetings are held. Whoever contravened this arrangement by cutting or destroying the trees, was liable to a heavy fine, involving the sacrifice of several bulls to appease the gods which rest in the trees to guide discussions and offer wisdom to the elder while sitting under the trees.

Although this representation is in its very simplified form, since the number of households may vary between 50 and a maximum of 450, there seems to be great similarity between them all.

It is also important to add that extensive cultivation takes place in designated areas which are usually a distance away from the location of settlements. In these areas, the right to land is determined on the basis of one's membership of a community. But effective rights to exclude others are dependent on who is first to open it up. The rights to land, and how these are exercised varies significantly.

In the permanent settlement where agriculture takes place, land is individually owned by the respective members of the community (usually by a family). In the grazing areas, land belongs to the community, and grazing is communal. The loss of grazing areas is already a cause of concern among cattle keepers. As cultivation eats up former grazing areas, individual rights to land get increasingly entrenched in formerly communal grazing areas, which has led to several conflicts.

4.4.2 Cultural Tenure Controls

Apart from rules and regulations intended to protect trees where village meetings are held, there are also cultural practices with the sole objectives of protecting the environment and ensuring that agriculture can succeed. Trees along banks of rivers are believed to be the seat of gods. It is a taboo to cut these trees. It is believed that whoever cuts any one of these trees annoys the gods living in these trees who therefore withhold rain. During famine, however, people feed on the green leaves of such trees.

Secondly, until recently, the construction of brick houses was regarded as a taboo because it was believed brick-making scared away the rain, and whoever constructed a brick house was considered as an enemy of the people. The logic, however, is that brick-making increases competition for both the top soil and water with agriculture and cattle rearing. Hence, it was regarded as an act of selfishness for one to build a brick house, especially if the bricks were prepared during the dry season.

4.5 Coping with Food Insecurity

Due to the erratic rains, Karamoja experiences perpetual annual food shortages. Families have adopted a number of measures to cope with chronic food shortages, and these include the following:

1. Consumption is delayed or extraction curtailed through a conjoined system of social relations, defined in terms of taboos, norms and cultures. In communal systems, it is possible to regulate the use of resources because a number of social sanctions and norms prevail which ensure that people are protected from risks. Novelli (1988) has argued that among the Karimojong, reciprocity provides a mechanism of interaction on which successful joint use of the commons depends. Individuals are able to contribute to each others welfare;

2. An attempt is usually made to intensify pastoral production by diversifying the composition of the herd so that different animals which make different demands on the environment are kept, or the risk of losing all animals at once is reduced by keeping smaller herds, and distributing animals to friends;

3. During famine situations, survival by the agricultural people depends on availability of relief food by Government and donor agencies. The Ministry of Education has a World Food Programme sponsored School Feeding Project in which food is provided to school children. Enrollment rises during this period because children are sent to school, not to learn, but to reduce the burden of children on limited family food reserves. Some of the children brought to these feeding centers are too young for school, while sometimes even adults come and sit in classes so that they could benefit from free school food; and

4. Most communities survive by gathering edible wild fruits, roots and tree leaves. These are either eaten raw or boiled¹⁶. The following trees were identified by Karimojong elders as useful famine reserves.

Table 2: Wild Fruits used as Famine Reserves in Karamoja

Name of Tree or cereals eaten	Part(s) eaten and local name	How it is prepared
Ekorete Tree	Seeds (Abalit)	Seeds are boiled with ash to remove bitterness.
Ekorete Tree	Leaves (Edya)	Mixed with sorghum to make sorghum bread Leaves are boiled and eaten as any other vegetables
Ebobore Tree	Seeds(Ngaborio)	Only the outer coating on the seeds is eaten. It tastes like a ripe banana.
Edapali Tree (Cactus)	Young Bulbous Fruit	The outer coat is removed to allow easy extraction of its juice.
Epeduru Tree (Tamarind)	Seeds (Ngapeduru)	Only outer coat on the seeds is eaten.
Ekale Tree	Seeds (Ngakalyo)	Both the coating and the seeds are eaten
Eputen Tree	Root Tuber	Looks like cassava. Outer coating is removed and tuber eaten.
Alamilam Tree	Root Tuber	Outer coating of the tuber is removed and tuber eaten.
Akurukurui Tree	Root Tuber	Outer coating of the tuber is removed and tuber eaten.
Ekamuda Grass	Seeds	Ekamuda is like wild bulrush millet. Massive quantities collected and threshed to obtain the small seeds.
Ejor Tree	Seeds (Ebei)	Seeds are eaten with its outer coating.
Elamai Tree	Seeds (Ngalam)	Only the seed coat is eaten

Ekadolwai Tree	Young stems	Used to make cooking faster. During very serious famine they are cooked for a whole day to remove its bitterness.
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Source: Field interviews

5. CONCLUDING REMARKS

Crop production plays a very central role in the survival of all the Karimojong groups, but the significance attached to crop production varies from one group to another. There is an increasing tendency towards the adoption of settled agriculture in the more endowed areas of Karamoja, but there are still several groups where pastoralism is still an important source of livelihood. The question of the relationship between agriculture and pastoralism is so critical because it is only in concretely understanding their complementary nature that will determine the extent to which intervention measures will succeed.

The choice is neither between agriculture and pastoralism or even the intensification of either of the two, but to seek a practicable integration between the two systems without necessarily undermining any one of them where one appears to be dominant. This is because the intensification of cultivation in marginal ecosystems will hasten environmental degradation, while promotion of agriculture in the well watered areas is bound to create conflicts with pastoralists who use the same areas as dry season grazing grounds.

Due to the unfavorable ecological conditions that limit the extent to which crops can be grown in Karamoja, the predominantly pastoral communities depend on their agro-pastoral peoples in the neighboring districts, with whom they exchange animal products for cereals. Sometimes animal products are sold and proceeds are used for procuring food items from the open market.

In Karamoja, a number of efforts are being undertaken by local communities to improve their food situation. The following are worth our attention:

- a. attempts are being made to reduce post harvest losses caused by insect pests by smearing granary walls with a combination of wood ash, cow-dung and the bark from the neem tree;
- b. initiation ceremonies (*asapan*) which involves a lot of feasting and merry making are no longer held regularly because a lot of food is wasted in making brew; and
- c. where the conditions allow, some groups have moved into the growing of root crops and vegetables in an attempt to diversify their crop base from depending solely on sorghum.

This means there is an increasing shift not necessarily towards expanded crop cultivation, but resource use systems in which crops are grown as and when they can best survive. This is irrespective of whether it is in the drier or wetter areas and is done in a manner that as much as possible, compliments the raising of stock.

NOTES

1. For a very long time now, government has been nursing the idea of enacting a law that will make it an offense for pastoralists to engage in nomadism (see "Nomadism will be Outlawed - Museveni", in *New Vision*, 18 February, 1992). In December 1994, a Minister of State for Agriculture, Animal Industries and Fisheries responsible for Ranch Restructuring, Water Development and Anti-nomadism was appointed by

President Museveni. Some of their arguments have been summarized in *Muhereza and Ocan, (1994)*. *Cisterino (1985)* provides an anecdotal account of the various attempts at forcing pastoralists to adopt agriculture in Karamoja.

2. *Wilson, J. G. "Resettlement in Karamoja", in Dodge and Wiebe (1985)*. Suffice to mention that such a point of view ignores the fact that the availability of agricultural resources is not enough to justify why pastoralists should abandon cattle keeping for agriculture. It is largely oblivious of the dynamic relationships between agriculture and pastoralism. Resettlement programmes in ecologically better endowed areas of western Karamoja has increased competition for resources, and the resulting violence makes it impossible for any economic activity to take place.

3. Karamoja receives mean annual rainfall ranging between 350mm to 750mm, with variations from year to year and place to place. This rainfall which diminishes as one moves eastwards, is very erratic and unreliable, coming in short and heavy storms. There is a high run-off and evaporation, resulting in poor moisture retention. The rainfall regimes have influenced soil formation and growth of vegetation. The soils in the drier Eastern areas are coarse and sandy, while the west has sandy clay loams. The central plains have alluvial soils benefiting from run-off from the highlands. The vegetation broadly comprises three categories: the savannah, steppe and thicket. The savannah is associated with black clays and sandy clay loams in the moister western parts, while the steppe is associated with black clays and sandy clay loams in the moister western parts, while the steppe is associated with sandy soils, and the unfavorable climatic conditions prevalent in the drier eastern and low-laying areas of the region (*Mamdani, Kasoma and Katende, 1992*).

4. See *Gira Chris Otim, "The Dynamics of the Land Question in Karamoja: A Case Study of Kotido District", Center for Basic Research, Kampala, Mimeograph*.

5. This approach is important because it overcomes limitations of many previous studies whose focus has been on specific aspects of resource use; or those where in their analysis, agriculture has been mentioned in passing to explain other issues. *Herring (1971)* focuses on the penetration of commodity exchange in a traditional agricultural economy. *Chaundry (1939: 22-30)* dealt with the introduction of ox-driven ploughs in agriculture. *Gulliver (1954: 65-70)* is perhaps still the most extensive ethnographic account of how agriculture was organized among the Jie. *Novelli's (1988)* sociological interpretation of Karamoja's ethnography discusses social forms of insurance against crop failure, and the role food aid played in undermining such social systems.

6. *De Vreede, Matthijs, "Sustainable Income Generation in Arid and Semi-Arid Lands", paper presented to the Karamoja Forum, 17-20 May, 1995, Kangole, Moroto*.

7. The plotted migrations are cited in *Ingold, (1986: 185)* and *Mamdani, Kasoma and Katende, (1992: 24)*.

8. This is typical of *J. G., Wilson, "Resettlement in Karamoja"*. He has noted that Karamoja was a place in which, "time had virtually stopped a thousand years in the past" in (*Dodge and Wiebe, (1985: 163)*).

9. Mamdani has argued that in Karamoja, without irrigation the people who practiced agriculture are usually the militarily weaker ones who have no choice. Whenever they have a choice, they move into cattle keeping because cattle have an advantage over crops. They can be moved from place to place in search of water and forage (quoted in *Muhereza and Ocan, 1994*).

10. This is a point which had earlier been made in *Wayland and Brasnett, (1938: 34-36)*. It was cited in *Mamdani, Kasoma and Katende, (1992: 3)*, though wrong figures were quoted. The latter give the number of days without rain (dry days) as 211 instead of the 154 originally provided by the former. The figure 211 was given by the former as the number of rainy days. The amount of rainfall received in Moroto, was 68 per cent of that received in Entebbe, and not 66 per cent. Though the calculations in the latter give a lower percentage of rainy days than actually was, 28 per cent instead of 38 per cent, the same point has

still been made - that the variation in rainfall between the two places determines the difference in systems of resource use.

11. See, "Hunger Finishes 167 Karimojong", *The Daily Topic*, 31 May, 1994, pp.2, 10-11.

12. This was established from interviews with DVO, Moroto, and also corroborated with accounts from elders in Karamoja, and Northern Teso.

13. "Ocor-imongin", Isan Itesot word which means, "the well of bulls". I am grateful to my colleague Peter Otim, who brought this to my notice

14. See "Rustlers Abduct Youths", *New Vision*, August 1, 1989.

15. See "Karamoja Nomads Leave Kumi", *Daily Topic*, 23 May, 1994.

16. See "Hunger Finishes 167 Karimojong", *The Daily Topic*, 31 May, 1994.

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Appendix

Table 1: Area in Hectares Planted in Kotido District, Karamoja

Crop Grown	1982/83	1988/89	1991/92	1992/93
Sorghum	12495	5618	17928	9030.7
Finger millet	6951	1767	1966	1245.4
Maize	3459	2205	7242	3082.3
Cow Peas	390	601	4503	no data
Pine apples	720	395	2370	no data
Ground nuts	573	1559	1901	1756.8
Beans	827	625	747	628.8
Sim sim	3333	1392	6580	no data
Cassava	177	114	157	no data
Sweet Potatoes	166	242	288	no data
Onions	33	7	12	no data

Table 2: Area in Hectares Planted in Moroto District, Karamoja

Crop Grown	1982/83	1988/89	1991/92	1992/93
Sorghum	12344	6610	15250	12955.0
Finger millet	319	965	1002	24
Maize	5668	4684	6374	7914
Cow Peas	177	384	121	-
Pigeon Peas	29	20	16	-
Ground nuts	110	259	279	741.5
Beans	1968	1449	1513	133
Soya beans	3	21	27	-
Sim sim	222	265	466	-
Cassava	422	169	192	-
Sweet Potatoes	123	617	715	-
Sun flower	0	0	501	7662
Onions	29	5	8	-

Source: DAO, Moroto and Kotido.

**Management of Aridity:
Water Conservation and Procurement
in Dar Hamar, Western Sudan**

Mustafa Babiker

1. INTRODUCTION

One of the views circulated in many academic and policy-making circles is that it is "a lack of knowledge" on the part of "traditional" cultivators and pastoralists which leads them to employ unsound natural resource management techniques. Such a view has been expressed in both liberal and radical theoretical perspectives that dealt with the management and/or mismanagement of natural resources in the semi-arid parts of sub-Saharan Africa. Both theoretical perspectives tend to share a common conception in which traditional cultivators and pastoralists are portrayed as victims of some system, no matter whether this system is constituted by the natural environment, a primitive culture, or world capitalism. Such conceptualization, however, has two interrelated grave methodological and strategic/practical implications. On the one hand, it renders us theoretically unprepared and conceptually unequipped to enter an important arena of investigation related to the cultivators' and pastoralists' knowledge and strategies to overcome technical and relational problems in their everyday life. On the other hand, and by insinuation, all effort to redress natural resource management and other problems should necessarily arrive from outside i.e. interventions that mostly provide some technical solutions to those problems. It is therefore no coincidence that both liberal and radical theoretical perspectives have been dismissed as being "colored by simple deterministic and centralistic thinking", that their "interpretations are tainted with a dreadful sense of fatalism" and hence "make for a depressing reading" (Long, 1984: 168-69).

Although the allegation of "a lack of knowledge" appears in the literature in a covert form, it is not uncommon to come across statements such as: "Overcultivation often results from ignorance" hence, the importance of the "Education of local people ...in the basic principles of land use, water conservation, agriculture and pastoralism" (Cloudsley-Thompson, 1985: 150-57). Although no one would deny the important role education can play in natural resource conservation and management programmes, yet the very persistence of the notion of "ignorance" could be held responsible for the deprivation of such programmes of a source of knowledge that might have been as indispensable for their success as "modern" scientific knowledge. Fortunately, the notions of "ignorance" and/or "lack of knowledge" have long been dismissed as moot points (Blakie, 1985). In fact there are numerous examples in the literature that show knowledge as not being the scarce commodity among traditional cultivators and pastoralists. Many of the so-called traditional farming and herding practices which were once regarded as primitive and misguided are now recognized as sophisticated and appropriate (O'Brien, 1978; Belshaw, 1979; Sandford, 1982; Chambers, 1983; Richards, 1985; Wolf, 1987).

Moreover, there are many examples that clearly demonstrate how traditional cultivators and pastoralists possess systematic and sophisticated technical knowledge in such vital areas as climate, soils, trees, seasons, water, grazing resources, pests and diseases, animal behavior etc.. (Conklin, 1961; Allan, 1965; Cunnison, 1976; Asad, 1976; Saint and Coward, 1977; Brokensha, et al., 1980; Dorga, 1985; Stigter, 1987; Johnson, 1992; Wood, 1992; Shepherd, 1992; Ahmed, 1994). These insights, however useful they may be, are by no means new and, indeed, they would have not surprised earlier generations of anthropologists whose discipline strength was its built-in presumption that African cultivators and pastoralists knew about the ecological processes at work in their environment and were apt to act accordingly (Forde, 1934; Richards, 1939; Evans-Pritchard, 1940; Nadel, 1947) Equally, colonial administrators would not have been impressed as they were very quick to recognize the wisdom of traditional practices especially when they encountered resistance to change (Fuller, 1984: 145).

Unfortunately, policy makers and development planners, who were convinced of their intellectual and cultural superiority, not only failed to appreciate indigenous systems of knowledge but, more disastrously, "to understand both how particular and place-bound were their own principles of environmental resource management " (Richards, 1985: 11; Chambers, 1983: 75-82). This failure, by and large, accounts for the disappointing results that bedeviled various government sponsored natural resource conservation and management programmes.

However, it should be clearly stated that the argument delivered here should neither be construed as a romanticization of the traditional cultivators and pastoralists technical knowledge and/or practices, nor as an attempt to underplay the crucial role modern science and technology can perform in addressing natural resource conservation and management problems. Rather, what we want to stress is that "though traditional methods have limitations, they are not archaic practices to be swept aside. Traditional farming constitutes a foundation on which scientific improvements in agriculture can be built" (Wolf, 1987: 23-24). Thus, without a solid base that ensures a continuous dialogue and mutual understanding between "traditional" knowledge and "modern" science (Chambers, 1983: 92-101), any effort to confront natural resource management problems would at best be wasted.

The basic argument of this paper is that, contrary to the allegations of some contemporary views, the so-called traditional cultivators and pastoralists have developed their own effective methods of natural resource conservation and management that suited their social systems , ecological conditions and technical abilities. In the following sections of this paper I intend to support the above assertion by providing an empirical evidence taking the case of the indigenous techniques of water harvesting in Dar Hamar. The following sub-section provides some background information on the study area, Dar Hamar, with emphasis on climatic and physical conditions as the understanding of rainfall pattern, geology, topography and soil characteristics is vital to appreciate the nature and scale of the water supply problem in Dar Hamar and the technical rationality behind the indigenous methods of water harvesting and preservation. These two issues shall be dealt with in section two and three, respectively. The final section proposes some guidelines for future action and research.

1.1 Dar Hamar: An Overview

Dar Hamar (i.e. the Home of the Hamar tribe), falls within two administrative units; En-Nahud and Ghebeish provinces of West Kordofan State. It lies between latitudes 12° and 14° North and longitudes 27° and 29° East. This comprises an area of about 51,634 kilometers.

According to 1983 Census, the Dar Hamar total population is 465,261 persons, 83% of whom are classified as rural sedentary, 8% rural nomadic and 9% urban. The area consists of 473 villages and more than 6,000 small *arîṭ* (hamlets) with sedentary rural population, 61 nomadic camps and the two towns of En Nahud and Abu Zabad.

Dar Hamar's agricultural economy is based on a mixed subsistence (food) and cash crop production. Most of the inhabitants, with the exception of a few town dwellers are involved in agricultural production. Besides the cultivation of annual crops (millet, groundnuts, sesame, sorghum, and water melons) and the tapping and collection of gum arabic, Dar Hamar is rich in livestock. The camels and sheep of Dar Hamar also contribute significantly to the domestic and export trade of the country.

1.2 Climatic and Physical Conditions

By virtue of its geographical location, Dar Hamar has a continental tropical climate. The climate is characterized by four distinct seasons: a warm rainy season from June to September; a hot dry spell (*darat*) from October to November; a cool dry winter from December to February; and a hot dry summer from March to May.

The whole of Dar Hamar falls within the semi-arid region of summer rainfall, which increases from 250 mm per annum in the north to 550 mm in the south. Like all semi-arid areas, the climate of Dar Hamar is characterized by extremely high rainfall variability, both spatial and temporal. The spatial variability can be easily observed even within an area of a few square kilometers. However, since rainfall statistics is only available for three stations (El-Khuwei, En Nahud and Abu Zabad), it is extremely difficult to establish with some degree of certainty the geographical variability of rainfall in any one year for the whole of Dar Hamar.

However, the mean annual rainfall for El-Khuwei, En Nahud and Abu Zabad are 345, 403 and 461 mm respectively. One further problem with these averages is that they do not show the substantial year-to-year variations or the distribution over the rainy season which are important for explaining the annual variation in crop yields, pasture conditions, and water supply situation. En Nahud, for example, has had annual extremes of rainfall this century that range between 150 mm and 500 mm.

In Dar Hamar the surface topography is gently undulating, covered with a mantle of grasses and herbs and scattered trees whose size and density increase gradually from north to south in accordance with the conditions of rainfall. The ground is predominantly covered by sand-dunes (*qoz*) which form a rolling plain on which drainage lines are suppressed due to the high degree of percolation of rain-water. Older drainage lines are obliterated or dammed, often forming shallow seasonal ponds (*rahad*), floored by a thin sheet of clayey deposits. The silting of some of these drainage basins in the south (e.g. Wadi El-Ghalla) has formed huge shallow lakes (*turda*) at the confluence of tributary valleys near Abu Zabad and El-Odaya in the south and Foja and Armil in the north.

The main geological formations in Dar Hamar are the Nubian Sandstone, Basement Complex and Um-Ruwaba Series. The Nubian Sandstone forms about 45.7 per cent of Dar Hamar's geological formation. Underground water supplies are generally good. It is found in the western parts of Dar Hamar and extends from Um Dibeiba in the south to Jebel El-Hilla in the north. It also exists as a large aquifer in the center of Dar Hamar to encompass En Nahud, El-Khuwei and Khammas area. The Basement Complex which covers about 37.7 per cent of Dar Hamar, is totally impermeable and lacks any underground water except along the cracks (*shag*), like those of Shegg El-Dood, Shegg El-Hafadha, Shegg El-Gawadnd and Shegg El-Gumaniya. These aquifers have mostly very limited capacity since the recharge is very slow and entirely depends on rain water during the short and uncertain rainy season. In areas where the Basement Complex is covered by fine texture soil (*gerdud*), the recharge is extremely slow due to the low infiltration rates. This is typical of the area known as the "thirst triangle" between En Nahud, Abu Zabad and El-Odaya, the area south of El-Khuwei, the area east of Wad Banda, and Iyal Bakhit area. The third formation, Um-Ruwaba series covers about 16.6 per cent of the Dar Hamar and since it occurs in depressions, it is an excellent aquifer with good quality water and in reasonable quantity. The largest aquifer being at Ghebeish and El-Magrur in the south-western parts of Dar Hamar.

Broadly speaking, the soils of Dar Hamar fall into two main groups; the *qoz* and the fine texture silty soil. The *qoz* is the predominant soil type and the fine texture soil is found all over Dar Hamar scattered in small pockets within the *qoz*. The *qoz* sand, despite the very low nutrient status and low water-holding capacity, is intensively cultivated. The loose structure of the soil makes it easy to cultivate with hand tools, facilitates the development of fine root systems of crops, preserves practically most the rains that fall for the use by crops and prevents leaching and accumulation of soluble salts that are associated with problems of alkalinity and salinity.

In addition to the predominant *qoz* soil, there are also scattered pockets throughout Dar Hamar of fine-texture soils which consist of non-cracking sandy clay that is hard to cultivate with hand tools.

2. THE WATER SUPPLY QUESTION

Given the geological, topographic, soil and rainfall characteristics, discussed in the previous section of this paper, it is safe to say that Dar Hamar is an extremely poorly watered district. It is not surprising to

hear the common saying by the Dar Hamar population "We cultivate to drink", since the procurement and preservation of water for both human and livestock consumption dominates eight or nine months of the rural population's annual activities and in some parts of Dar Hamar, people estimate that about 60% of their farm income is spent on purchasing water. However, the degree of the water problem in Dar Hamar can be seen from the very strict use of water. Even when water is available, very little of it can be spared for washing. Indeed it was told that when it is time for children to have their heads shaved, they are usually asked to run about until they are sweaty to be shaved without using any water.

Moreover, the issue of water supply plays an important role in national, provincial, district and village politics. The reports of Kordofan Province, the district councils and the rural councils, have all included the "thirst problem" in the agenda of very single meeting since the early 1940s. This is why, in Kordofan, the success or failure of a political party in mobilizing mass support in a general election has rested on, among other things, the promise of "solving the thirst problem" (*hal mushkilt al-atash*). As one commentator recently puts it:

With the present extent of the 'thirst problem', it seems today that many of the people of Kordofan have a deep-rooted belief that politicians under different governments and since Independence have not understood that the road to 'Kordofanis' hearts begins with the importance any government attaches, and the serious effort it expends, to solving the 'thirst problem' and hence to transforming this dream into reality. (Hafiz, 1987: 36, author's translation).

The issue of water supply in Kordofan in general, and in Dar Hamar in particular, has preoccupied the mind and effort of the colonial authorities as early as the beginning of the twentieth century. In 1916, for example, it was reported that 13 villages in Dar Hamar had been abandoned owing to the failure of water supply in their neighborhood. A further instance of population mobility reported in Dar Hamar was interesting. In 1913 all gum gardens in Dar Hamar were registered at the time of tax assessment and collection. Four years later, the district authorities declared that register out-of-date for so many population movement had taken place between 1913 and 1917 because of water supply problems. Inspired by this incidence the Governor of Kordofan at the time, recommended that "every piaster available should be spent on bettering the water supply". This was considered by the Governor as an essential first step to bringing about two interrelated desirable results; the population will be able to settle permanently and the administration will be simplified and the population become less migratory, thus it will become more and more possible to enforce regulations²

Furthermore, while the lack of permanent water supplies has been regarded as the principal constraint to the economic utilization of natural resources in Kordofan (Hill, 1968: 58; Lebon, 1968: 546), government intervention to improve the supply of water has been viewed as one of the major factors that contributed to environmental degradation and desertification (Adams and Hales, 1977; Ibrahim, 1978: 35-37; El-Sammani, 1981; Adam, 1982: 275).

Thus, it is clear that the question of water supply is an important issue not only to the Hamari cultivator/pastoralist but also to politicians, administrators, development experts and academics. However technical and organizational aspects related to, and environmental impact associated with, external interventions (deep boreholes and *hafirs*), have so far attracted much of the academic interest on the water supply problem. Comparatively, little academic attention has been given to local initiatives and indigenous techniques of water harvesting and preservation. Although the spanning of this gap is too prodigious for the present paper to fill, nevertheless we hope that its description, analysis, and explanation, will be proficient enough to stimulate further inquiry.

3. INDIGENOUS WATER HARVESTING AND PRESERVATION

The majority of the inhabitants of Dar Hamar are faced with the difficulty of getting enough drinking water for human, watering livestock or preserving sufficient water for the irrigation of their crops. For eight or nine months of the year most parts of Dar Hamar are without rainfall. Moreover, even when it rains in Dar

Hamar, a high proportion of the rain water is lost due to the high evaporation and percolation rates which characterize the semi-arid regions, specially those with sandy soils. Research on the appropriate methods to reduce evaporation as well as to cut down percolation is still in its infancy. Nevertheless, the people of Dar Hamar have developed their own methods and techniques to harvest and conserve as much as possible of rain water to use for crop production as well as for human and livestock consumption.

3.1 Water Preservation for Crop Production

The unpredictability and unreliability of rainfall, its the high degree of temporal and spatial variability, and the very short rainy season, together with the predominance of the extremely permeable sandy soil, all combine to impose severe constraints on farming in Dar Hamar. However, cultivators have evolved centuries old practices and techniques with a view to overcoming such constraints. The most important techniques and practices are the dispersion of farming units, dry planting and mixed or intercropping which are described below.

3.1.1 Dispersion of Farming Units

The high degree of spatial variability of rainfall in the area is perhaps among the major factors behind the absence of compact farming units in Dar Hamar. Instead, the dominant pattern is one in which farming units are generally composed of several scattered plots located at different directions from the settlement. Most farming units will have equal chances to benefit from whatever rain that falls in whichever direction and this represents an insurance against the uneven spatial distribution of rainfall.

3.1.2 Dry Planting (*Remail*)

In Dar Hamar, as elsewhere in northern Kordofan, due to the unpredictability and unreliability of rainfall and in order to benefit from every chance of rainfall and to avoid labor bottlenecks imposed by the necessity to plant the seeds of different crops at the same time, most cultivators resort to the practice of planting before the onset of the rainy season. However, this practice of dry planting (*remail*) is plagued with two types of risk. The first is the common occurrence of intermittent dry spells (*subna*) during the rainy season which were observed to be particularly damaging to the crops in their early stage of growth. However, this is a risk the majority of cultivators are willing to take and this further reinforced by the widespread practice of replanting. The second type of risk is that the seeds are susceptible to attack by pests such as ants, millipedes and rats. Recently, however, this risk has significantly been reduced by the introduction of seed dressing chemicals such as Alderx-T powder.

3.1.3 Mixed Cropping

Mixed or intercropping refers to the growing of two or more crops simultaneously on the same plot of land. In Dar Hamar water melons, for example, are usually intercropped with millet and sorghum is mostly grown mixed with another crop. Although mixed cropping has been and remains a widespread technique in tropical Africa, yet for many years it was regarded as backward and "unscientific". Since agronomic research is based on pure stands of crops, it is not surprising that the technical messages emanating from research stations call for pure stands. As a result, when cultivators continued to intercrop they were branded as conservative, ignorant, lazy, unprogressive or primitive. However, it took organized research decades to realize the technical, economic and organizational rationality of mixed cropping. Among the numerous benefits of this practice it suffice, for our purpose, to mention only the following; (a) that different rooting systems exploit different levels in the soil profile in quest for moisture and nutrients, (b) one crop may provide a favorable micro-climate for another and (c) more moisture is retained in the soil (Chambers, 1983: 86-87). Thus, in a semi-arid climate characterized by high evaporation and percolation rates (on sandy soil), the rationality of mixed cropping hardly invites further elaboration.

3.2 Water Conservation for Human/Livestock Consumption

As we have already seen the topographic, geologic and soil characteristics of the physical conditions in Dar Hamar render it a poorly-watered country. In the face of this, the Hamar have developed a variety of techniques to conserve as much water as possible during the very short rainy season. These include the storage of rain water in the hollowed out trunks of the baobab trees, digging of shallow and deep wells, use of "natural" ponds and large depressions, cultivation of water melons, water transport and, finally, the practice of transhumance.

3.2.1 Baobab Trees (*Tebeldi*)

Baobab tree (*tebeldi* or *hamaraya*) is to be found all over Dar Hamar in varying densities and constitutes the chief water storage place and dry season source of supply for many villages. Before the drilling of deep boreholes in the late 1930s, it has been estimated that the siting of 90 per cent of the Hamar villages was originally determined by the location of baobab (Blunt, 1923). A good example of this may be observed in most of the villages in the north and north-west of Dar Hamar.

The technique of storing rain water in the hollowed out baobab trunks represents an ingenious response and adaptation to the prevailing conditions (de Vajda, 1966: 17). As a matter of fact, it was long ago mentioned by Ibn Battauta in his account of the visit to Timbuktu in the fourteenth century A.D., where he observed the hollowing out of the soft pith of baobab, leaving a 'tank' which is used to store rain water for use during the dry season (Gibb, 1929: 322, 378). The introduction of the technique into Dar Hamar has, however been the subject of unresolved debate (Newbold, 1924a, 1924b, 1929; Blunt, 1923; Parr, 1924).

The number of baobabs holding water in Dar Hamar in the 1920s was estimated to be around 30,000 trees (Blunt, 1923). The average maximum capacity of a tree was estimated to be in the region of one thousand gallons (Hodgkin, 1951: 27), but the actual average amount of water stored in each tree was found not to exceed 250 gallons (Blunt, 1923: 116). This would make a total annual storage of 7.5 million gallons for the whole of Dar Hamar. However, it should be noted that despite the great service a baobab tree does to the Hamar, it becomes totally useless, from a water supply point of view, when the rains fail. The technique essentially involves the construction of a small pond around the bottom of the tree from which rainwater is scooped into containers which are emptied into the hollowed out trunk of the tree through a hole in a height of several meters. This operation needs at least two person, one to scoop water into the containers and another to lift up and empty them into the tree trunk³. Thus, it is no coincidence that the baobab tree figures prominently in the Hamar folklore, in their legends about their origin⁴ and in boundary disputes from the individual, to the district levels (Ibrahim, 1971; Babiker, 1987: 212-14).

Since the early 1920s, several British colonial administrators observed the rapidity with which baobab trees were disappearing. Various arguments were advanced to explain that phenomenon. These include the general climatic change and desiccation, the loss of the art of hollowing out baobab, the 'laziness' of the Hamar and the effects of the provision of alternative sources of water supply in the context of government-sponsored 'anti-thirst campaigns' during the last fifty years. No matter to which argument one subscribes, the fact remains that baobab trees no longer constitute the predominant rain water storage "tanks" as was the case in the past. Thus, a significant number of Dar Hamar villages are today dependent on water supply sources, the running and maintenance of which is beyond their immediate control compared to baobab tree. the ultimate and unfortunate consequence is that more often than not the majority of villages are faced with severe water supply bottlenecks very early in the dry season as a result of lack of spare parts and fuel necessary for the maintenance and the efficient running of "modern" water supply facilities.

However, for several decades, the storage capacity of baobab trees has been supplemented by cement-rendered masonry cisterns (*khazan*) constructed below ground level. Capacity varies from 5 to 50 cubic

meters and are used to store water delivered during the dry season by water tankers, lorries and horse-drawn carts (See section 3.2.6 below).

3.2.2 Surface Ponds and Lakes (*fula, rahad*)

In some localities, run-off generated in the wet season will often collect in natural depressions, especially in basins with a higher clay content than the surrounding *goz*. Depending on size, these surface ponds are termed *fula* when they are small and *rahad* when they are relatively large. Thus, while water in a *fula* may only last for about three weeks into the dry season, a *rahad* may provide enough water for up to ten weeks. Although sometimes lakes (*ruhud*) are described as "natural" lakes which might be partly true, it is a fact that *rahad* de-silting and the construction of in-let ditches is a well-established community activity whereby each household is assigned a certain area to de-silt. De-silting operations are carried out with a view to enhancing the *rahad* water-holding capacity.

3.2.3 Shallow Hand-dug Wells (*idd*)

These may be anything from 2 to 20 meters deep and only occasionally do they have lining of wood, bark or straw. Always located in the beds of, or alongside ephemeral wadis (e.g. Wadi El-Ghalla), these features are often temporary and they require redigging at least once a year after the wet season. These wells tap shallow aquifers in the surface deposits which are rarely connected to the more extensive groundwater basins. They are, therefore, highly dependent on the annual recharge by wadi flow and only the more favorably sited wells could maintain water between the end of any one wet season and the beginning of the next.

3.2.4 Deep Hand-Dug Wells

These are more permanent features than the shallow well, often lined with stone, bricks or concrete at the top to prevent sides from falling. The well can be between 20 and 100 meters deep and they often tap the more extensive aquifers in the Nubian Sandstone (Hodgkin, 1951: 31). Such aquifers may be fed by subterranean flows or possess recharge turnover of decades rather than years (Rodis, et al., 1968). Although commonly located in favorable topographic sites which are natural depressions (e.g. En Nahud well center) or near wadis (e.g. Wad El Hileiw and Awadalla well centers), it is possible to find these deep wells located some distance away from surface hydrological features (e.g. Bir Minim), which again suggests that they tap aquifers with long-term recharge regimes.

3.2.5 The Cultivation of Water Melons

Large areas are cultivated with water melons in most parts of Dar Hamar, especially those which are described as waterless. In such areas water melons are very popular and could be considered as the main source of water at least during the first three months of the dry season. It has been estimated that between 200,000 and 275,000 *makhammas* are annually cultivated with water melons with an average annual yield of 15,000 tons. It also estimated that this quantity yields about 5.2 million cubic meters of water which equals the quantity of water provided by 130 *hafirs* (excavated tanks), each with a capacity of 40,000 cubic meters (Abdel-Ghaffar, n.d.). The flesh of the fruit is eaten or pressed to extract water for cooking a stew known as *mulah umm zamata* and brewing a kind of beer known as *umm shaoshao*. The husks are fed to domestic animals and the seeds are an important export cash crop.

Thus, water melons can be an extremely important supplementary source of drinking water for people and livestock. Moreover, water melons make possible the harvesting of remote fields and the tapping and collection of gum arabic in waterless areas.

3.2.6 Water Transport

When all the above-mentioned sources of water supply fail in any one village at one stage or another during the dry season, water transport from a permanent source elsewhere in the locality constitutes the only option. Depending on their distance from villages such sources can be divided into nearby sources and distant sources. In the first case the water supply sources are generally within the range of half a day's journey i.e. 25 kilometers. The people from villages visit the water source daily or every other day and the quantity of water carried by each individual is generally small to meet the daily needs of his/her household. This is evident in the means of transport (usually donkeys) and containers used (goat-skins and the four-gallon plastic jerry cans). Transporting water in this way is generally the exclusive domain of boys and girls and to some extent young women. Young men are generally involved in carrying larger quantities of water in bigger containers such as cattle-skins and barrels with camels used as means of transport in the first case and horse-drawn carts in the latter.

In cases where the water sources are far beyond half day's journey from any village, water transport rather than being a household concern becomes a commercial undertaking. In this way water is transported in barrels by lorries to be stored in *khazanat* (cisterns) owned by village traders and shopkeepers who sell it to villagers. These cisterns are invariably built of reinforced concrete with a full capacity ranging between 50 and 300 barrels each. A commercial lorry can carry 30 barrels at a time and hence 10 trips are needed to fill a large cistern. Water is sold to villagers in small quantities in 4-gallon containers and prices are exorbitantly high, often justified by the black market prices of the fuel.

Again, when the option of water transport is not forthcoming or when the price of transported water is prohibitively high, village population wholly or partly, has no choice but to move away to stay near a permanent water supply source until the next wet season.

3.2.7 Transhumance

Transhumance is one of the established modes of adaptation to water supply conditions in Dar Hamar. In some localities it constitutes the only option available and starts after the end of the wet season. Thus, where transhumance is imposed by financial considerations only the poorer sections of any one village population might resort to it; and where it is an absolute lack of water the whole village might move to the nearest water point\center. It should, however, be noted that with regard to the decision of choosing destination by a family or a group of families, other than distance, consideration is given to the possibilities of causal work or self-employment in the area.

These "seasonal water-seeking refugees" are generally known in the water supply center as *dammara* (sing. *dammari*) to distinguish them from the local residents, *ummar* (sing. *ammari*). The poorest among the *dammara* usually make a living from casual work, such as hut construction, clearing agricultural land and gum tapping or from self-employment in the selling of firewood or building materials in the water supply center. In many cases the *dammara* are families made up of women and children as the adult males either stay behind in the home village or seek casual work elsewhere within or outside the locality. In such cases women make a living from selling cooked food, tea and coffee, brewing local beer (*marissa* and *asaliya*), and sometimes, occasional prostitution. In this Muslim society, incidence of brewage and prostitution provided the *ummar* with ready-made arguments in their complaints to the authorities against the presence of the *dammara*, especially in cases where the latter exert enormous pressure on available natural resources, social services, the food supplies or other essential consumer goods in the market.

4. CONCLUDING REMARKS

The present paper has provided yet another empirical evidence that the so-called traditional cultivators and pastoralist do possess and make use of a relatively sophisticated knowledge relating to their environment and natural resources in the areas that are vital for their lives such as climate, soils, natural

vegetation and ground water resources. Moreover, taking the case of Dar Hamar, the paper also demonstrated how this knowledge is made use of and utilized in the process of coping with the kind of problems imposed by the prevailing climatic and physical conditions.

Although the basic features of indigenous technical knowledge and the associated coping mechanisms are very difficult to isolate since they are deeply embedded in the everyday functions of the livelihood systems, the question of water conservation provides an attractive agenda for future basic and action research. In view of the ecological disasters associated with the poorly planned drilling of deep boreholes, we need to know more about the feasibility and reliability of indigenous techniques of water conservation whether for the use by the crops and/or for human and livestock consumption. In other words indigenous water conservation techniques require more investigation to answer the questions of What are their limitations? And how development efforts can strengthen them?. It is from here that any effort to improve the conditions of water supply should start.

One encouraging guideline along this direction is provided by the practice of dry planting. As the present paper has demonstrated, dry planting is essentially a measure to conserve as much rainwater as possible for the use by crops as well as to relieve labor bottlenecks at the beginning of the cultivation season. Although seeds sown in this manner tend to be susceptible to attack by ants, millipedes and rats, the introduction of seed dressing chemicals helped to reduce that risk. It is in this manner that social science research and development planning should work together to bring about the successful integration of "modern" agricultural innovations into 'indigenous' technical systems.

NOTES

1. Information on the physical conditions in Dar Hamar are based on Andrew, 1948; Greene, 1948; Tohill, 1948; Barbour, 1961; Grove and Warren, 1968; supplemented with field observations.
2. J. W. Sagar, *Governor Annual Report, 1917 Kordofan Province*, 10 September 1917, El-Obeid, (Kn.p/1.F1/34-1).
3. For a detailed description of the art of using baobab trunks as storage 'tanks', See Hodgkin, 1951, pp. 27-30.
4. According to a local legend, the father of the Hamar was a *hamaraya* (a baobab tree). One day a strong wind caused a *gunguleisa* (a fruit of baobab) to fall to the ground where it broke into three pieces. The first piece *tarat* (flew away) and became the Taradat section of the Hamar; the second turned into *dugga* (ground to very small pieces) and became the Degagim section; and the third *gherasat* (pierced the soil) and became the Gherisia section.

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Subsistence Economy, Environmental Awareness and Resource Management

in Um Kaddada Province, Northern Darfur State¹

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1. INTRODUCTION

This paper is an attempt to assess the environmental situation in Um Kaddada province, Northern Darfur State. This will be sought through highlighting the dynamics of the subsistence economy and environmental awareness in two villages in the province; Burush and Um Gafala. Um Kaddada lies in the semi-arid Sahelian Zone which was severely stricken by the drought of 1980s. The impact of that drought has brought strong side effects which are still enduring. The paper seeks to highlight some of the measures and means applied by both the local population and government institutions to conserve the environment and utilize the meagre resources of the area. It also touches on the extent to which local inhabitants "benefited" from the drought of 1980s and on the relevance of their accumulated indigenous technical knowledge to environmental conservation and resource management.

By subsistence economy we mean that type of production which is not geared towards accumulation. However, since the traditional societies are not egalitarian, the possibility of accumulation exists but not on a wide scale.

It is generally argued that neither governments (at various levels) nor the local inhabitants questioned the wisdom of their actions in utilizing the available resources or pondered the possible consequences of these actions. However, such sweeping generalizations overlook the fact that inhabitants at the local level, being affected by the subsequent droughts, have begun not only to adopt coping and/or survival strategies, but also to employ and activate measures to conserve their environment and to manage the meager resources at their hands. The focus in this paper will be laid on the relevance and viability of subsistence practices as one means of environmental conservation.

2. THE STUDY AREA

The name Um Kaddada refers originally to a well that existed long before any settlement was established around the water source¹. It is a part of the Berti tribal land which extends from the Berti Hills in the central parts of northern Darfur eastward down to the borders of Kordofan. The Berti are millet cultivators. They also keep small stocks of sheep and goats, and some have small herds of cattle (Ibrahim, 1984: 162, Holy, 1974: 186). Before the advent of the colonial administration in Darfur (1916) the most important settlement in the eastern fringe of this region was Jebel Hilla, which was used as a front-line post. In 1916 the condominium troops managed to subjugate the kingdom of Ali Dinnar in Darfur, and in 1918 the Anglo-Egyptian administration chose Um Kaddada for the district headquarters (El Mangouri, 1985: 17).

The presence of a water source in Um Kaddada, better in quality than that of Jebel Hilla (49 kms east of Um Kaddada) has stimulated the Anglo-Egyptian administration to establish a new settlement (at present Um Kaddada). Because of its location within a sedentary zone, Um Kaddada served as a crossroads in the transport zone of central Sudan and as the main truck route across the continental Savanna Belt.

The total population of Um Kaddada province is 168,002 persons¹. The province is made up of three rural councils: Um Kaddada, El Leit and El Towesha. The northern council (Um Kaddada) was the most affected part by the drought of the 1980s. Many measures were taken and/or applied within the area

aiming at combating desertification, conserving the environment and improving management of natural resources.

Um Gafala and Burush Villages

Burush and Um Gafala villages are located in the eastern part of Um Kaddada province. The two villages are located in Um Kaddada Rural Council, respectively 29 and 51 kms from Um Kaddada town. They were selected because the measures of environmental conservation and resource management undertaken are clearly articulated in them. However, as that does not imply the absence of such measures elsewhere since other villages started to follow the same route of Burush and Um Gafala. The total population of Um Gafala is 4,600 and that of Burush 4,000¹. The main economic activities in the area are subsistence cultivation, animal raising and the collection of Gum Arabic.

3. ECONOMIC ACTIVITIES

3.1 Agriculture

The economy of the study area is composed of two poles that often compliment each other and sometimes contradict: agriculture and pastoralism. These represent old-aged human adaptation methods in the environmental niche of the semi-arid zone and both agriculture and nomadism may be viewed as traditional and subsistent. The main subsistence crop in the area is *dukhun* (millet), the staple crop. Millet, besides being the staple food, has other benefits. Its stalks are the main building material and this, in addition to being deep rooted in the culture of the local inhabitants, supports the assertion that millet will never be totally replaced by another crop unless another building material is introduced (Mohamed, 1994: 183).

However, although cash cropping (e.g. sesame, groundnuts..etc) is present in the area and is gaining importance, especially in El Leit and El Towesha rural councils (see table 1 below), its implications on the situation of food security in the area is beyond the scope of this paper.

Dukhun is usually cultivated in Qoz area (sandy soil). In the case of subsistence agriculture in the area, hired labor is rarely involved. The household members (i.e. are linked by decent or affinal relationship), carry all agricultural activities. But in the case of cash crops, which is usually pursued by rich farmers, some hired labour is involved. In Burush and Um Gafala, the area cultivated by the household under the subsistence level ranges between 10-20 *makhamas* (Makhamas= 1.08 hec.). This depends on the size of the household, size of the area available for the whole village and the availability of rainfall.

Besides cultivating in sandy areas, the inhabitants in the study area began to shift to the clayey soils (*wadi* cultivation), where available. Although compared to clay soil, sandy soil cultivation is less demanding in terms of labour requirements, the shift has been dictated by both economic and environmental factors. First, the clay soil has the capacity to retain moisture more than sandy ones, hence ensuring higher productivity. Another crucial factor for this shift is the intention of farmers to allow for the regeneration of the *hashab* (*Acacia senegal*) trees, a very important source of income. The shift from *qoz* also ensures that the plot(s) previously used for millet will be spared for the production of Gum Arabic. So whereas previously the fallow system operates within *qoz*, it now began to alternate between sandy and clay areas. However, the shift to clay soil which represent one form of adaptation to environmental requirements and/or economic needs, has some very significant and far reaching implications. One crucial outcome of this shift was the inevitable conflict between pastoralists and cultivators. The clay soil represents *damar* and water points for the pastoralists in the rainy season. The authorities' policy of encouraging this shift to the clay areas is futile and doomed to failure, since due attention and precautions were not given to its consequences i.e. the conflicts between pastoralists and cultivators. Such a shift requires, on the part of the authorities, a comprehensive land reform required to avoid conflicts between pastoralists and cultivators.

Cleaning farms for the new season, was previously carried out by farmers early in February and March. Recently they began to delay the time of cleaning until the beginning of rainfall. The rationale behind this, according to farmers in Um Gafala, is that, in addition to providing an important grazing resource during the dry season, it protects soil from erosion and combats sand dunes.

Concerning land tenure system in the area of subsistence farming, it is organized by local customary laws and traditional apparatuses. The distribution and/or allocation of land is the responsibility of *sheikhs* and *omdas* towards their followers. Asking the omda of Um Gafala about the possibility of disposing land to anyone who wishes to cultivate, he argued that: " Anyone who wishes to affiliate and come under our patronage will be given a plot to cultivate, even if he is an outsider". The statement of the Omda however, touches only the tail of the whole issue since in reality these destitutes who will be given lands to cultivate have no right to collect Gum and are discouraged to let it grow. This negates the usefulness of one of the most important local measures adopted for environmental conservation and will have its adverse effects on the environment

3.2 Animal Raising

Villagers raise goats and sheep though in small numbers and some camels usually for transport. Cattle is very rare in both villages. However, small herds of sheep are found in the adjacent small villages. Herders in these small villages utilize natural pastures, agricultural residues as well as water sources represented by the boreholes in Um Kaddada, Um Gafala and Burush. It is important to note that boreholes are the main sources of water in the two villages under study. Although there are some shallow wells (e.g. 11 in Burush) their recharge rate is very slow and most of them can not sustain the demand during the dry season. Due to the slow rate of recharge and the lack of spare parts for the boreholes, there is a critical drinking water problem during the dry season. But nevertheless, the shallow wells in Burush have helped in availing water for irrigating vegetables during winter and for watering animals in the dry season.

As for the pasture situation, the 1994/95 season witnessed conspicuous regeneration and vegetation cover as a result of the high rainfalls (see table 2 below). The villagers argued that some plant species appeared in this season after many years of disappearance. Range and Pasture Administration in El Fashir and Um Kaddada endeavor to protect pastures through the opening of fire lines.

As a result of the improvement in pasture conditions, the area experienced extensive movements of nomadic groups, including the Kababish, Kawahla and Shanabla. They crossed the area between En Nuhud and Um Kaddada (171 kms) twice in the year; at the beginning of the rainy season, these nomadic groups cross the area on their way to the south to utilize the *shogara* (fresh grasses) and when they return to the north by the beginnings of the dry season. Conflicts are encountered during these movements as animals damage the crops. According to the village inhabitants, herders are reluctant to look carefully after their animals while they are moving to the south. These conflicts are usually resolved through tribal mediation and other traditional mechanisms. However, the nomads also argue that farmers, by their very nature, are sensitive and hostile towards herds.

3.3 Gum Collection

Acacia senegal, the Gum Arabic tree, became part of the bush fallow cycle and is well integrated in the farming system in Western Sudan. This multi-purpose tree has many economic and conservational benefits. In addition to its economic value, it tends to fertilize soil through nitrogen fixation (Mohamed, 1994: 174). The study area falls in the Gum Arabic belt. The 1984/85 drought has drastically affected the stock of Gum trees which was the main source of cash in the study area. Following the drought years and loss of other sources, the inhabitants have begun to take greater care about Gum trees, and issues of *hashab* (Gum trees) are ones of major concern to them. Gum Arabic has been attractive to farmers not only because of its economic value or its protection of soil but also for the very low labour inputs it requires from farmers.

Due to the increasing importance of *acacia senegal*, both economically and environmentally, incipient forms of planting is widely practiced now in most villages which fall in the Gum belt including Burush and Um Gafala. However, such planting takes place only during the rainy season as most villages suffer from shortage of drinking water. Forestry Department, the Gum Arabic Belt Project, based in El Fashir, and the Area Development Schemes project (ADS), based in Um Kaddada, provide seedlings and extension services to the villagers. However, in relation to the efforts of rehabilitating the Gum belt, it is to be stressed that the first priority should be given to the rehabilitation of water sources since it is meaningless to endeavor in rendering seedlings while the inhabitants are suffering from the lack of drinking water.

Farmers in both villages argue that they practice fallow system in their cultivation. They cultivate millet and after 3-4 years they shift to another plot, thus allowing for the growth and regeneration of Gum trees. When the trees become old, farmers cut them down and cultivate millet, allowing trees regeneration in the abandoned plot(s). Possession of a Gum garden comes through inheritance usually by the members of the extended family. No reliable figures are available on the size of the gardens.

Since 1970 the marketing of Gum Arabic has been monopolized by the Gum Arabic Company which controls all marketing aspects of the crop. It is a share-holding company in which 70% of shares are held by private individuals and the remaining 30% by the Sudan government (Ibrahim, 1984: 128). The policy adopted by the company in the utilization of *hashab*, however, has for long been based on the assumption that it is "a natural gift" and hence it has never been seriously involved in any effort towards the protection, conservation or rehabilitation of the *hashab*. Such policies has stimulated the smuggling of Gum to Chad, the Republic of Central Africa and Ethiopia, a process which is damaging to the national economy.

The price of Kuntar (1 Kantar = 45 kg) ranges between £.s 18,000 and L.s. 35,000. The ton amounts to L.s. 750,000 whereas the company sells it for 10,000 US Dollars. Moreover, farmers suffer because the company takes Gum without immediate pay. Despite this discouraging situation, farmers are enthusiastic to be involved in Gum production.

Table 1: Cultivated Area per Crop in Um Kaddada Rural Councils 1994/95 (in feddans)

Crop Council	Millet	Groundnuts	Sesame
El Leit	100,000	100,000	577
El Towesha	150,000	200,000	500
Um Kaddada	200,000	--	200
TOTAL	450,000	300,000	1,077

Source: Um Kaddada Province, Annual Report, 1995.

Note: Um Gafala has registered 422 mm of rainfall which was

the highest record rainfall during the 1994\95 season.

Table 2: Rainfall in Um Kaddada Province 1993\94 and 1994\95 (in millimeters)

Council	EL LEIT		EL TOWESHA		UM KADDADA	
	1993\94	1994\95	1993\94	1994\95	1993\94	1994\95
Rainfall in mm						
June	--	46.2	33	46.2	--	7
July	77	191	--	89.7	121	96.2
August	41	121	34	39.2	2	50
September	28	126	--	14.7	--	46
TOTAL	146	484.2	67	189.8	123	199.2

Source: Um Kaddada Province, Annual Report, 1995.

4. ENVIRONMENTAL AWARENESS AND RESOURCE MANAGEMENT

The recent attention to sustainable development and environmental issues has increasingly highlighted many situations of stress. With reference to environmental conservation, and in the words of Andres Hjort af Ornäs (1993), the aspired goal is to achieve improved production through suitable measures so as to gain more sustainable use of natural resources. Hence, environmental awareness is more than a rational positivistic analyses. It contains a set of values and symbols, ranging from human health and property values to beauty and concern for future generations.

As scarcity has become a key dimension in dealing with livelihood in dry lands, careful resource management is indispensable. Resource management is construed here in line with the definition forwarded by Greenland (1982) quoted in Taha (1994) as "a process of decision making that involves the establishment of new grid lines for the basic use of resources and expanding the life of these resources as much as possible for the general good of humans. By an extension, resource management is the process of decision-making whereby resources are allocated over space and time according to the needs, aspirations and desires of man within the framework of his technological inventiveness, his political and social institutions. So the issue involves both the management of production of specific resources as well as the overall planning of development and the use of resources (Taha, 1994: 24). Hence, resource management is a process not only geared to environmental conservation, but also to development and change. This involves the adoption of a strategy or a number of strategies designed to meet both short and long-term objectives.

With reference to the study area, the catastrophe of 1984/85 has led to mass population movement and the destruction of various plant species (*acacia senegal* in particular), as well as to the reduction of crop yields and livestock losses. Accordingly, it is hardly surprising to encounter a relatively high degree of environmental awareness and sound means for resource management. While previously the socio-economic behavior has largely been influenced by survival strategies and long term concerns rarely influence the decision made, now every action seems to be very well calculated before its execution. The catastrophe has led the inhabitants of the area to think and behave more cautiously about the environment which reflects their awareness about the vulnerability of their fragile local environmental area. Also in order to lessen the possibility of another catastrophe, many measures were taken by both local inhabitants and the authorities.

5. MEASURES OF CONSERVING AND SUSTAINING THE ENVIRONMENT

5.1 Local Measures

1. Prohibition of cutting green trees: To follow this, local authorities (sheikhs and omdas) appoint guards to look after forests and tree cover around the villages. Also any inhabitant is delegated or authorized to look after the "communal property".
2. Punishment of those found guilty of cutting green trees: The punishments include *Gharama* (fine) imprisonment and/or both. However, that punishment varies in severity from one area to another depending on the degree of aridity and the level of environmental awareness among villagers and their leaders.
3. The cultivation and/or protection of green belts around villages: These belts are either natural or man-made. In the case of Burush and Um Gafala, the width of the belt ranges between 1-2 kms. The function of these belts is to stop sand dunes and reduce soil erosion.
4. The formation of Environmental Conservation Groups: This has taken place in Burush where an Environmental Conservation Committee (ECC) was formed in 1994, the objective of which is to forward effective measures to preserve the environment. The committee is formed from the youth members of both sexes in the village¹.

5.2 Official Measures

1. The rehabilitation of the Gum Arabic Belt: In collaboration with Forests Administration in El Fashir, the Gum Arabic Belt Corporation attempts to rehabilitate *acacia senegal*. The attempts are manifested in the provision of seedlings and extension services to farmers. According to the officials in the Gum Arabic Belt Corporation, the problem which paralyses their efforts is the lack of transport facilities. Consequently their efforts were concentrated in areas around El Fashir town.
2. Production and distribution of improved cooking stoves: This represent an attempt to reduce the volume of biomass consumption by the Gum Arabic Belt Corporation which is engaged in the production and distribution of the stoves. The officials in the corporation argue that this kind of stove reduces energy consumption by 50%. During 1993/94 5000 stoves were produced to meet the increasing demand.
3. Assessment and protection of natural pastures: Range and Pasture Administration conducts periodical surveys to assess pasture situation and open fire lines. Again, like other governmental bodies, it suffers from the lack of facilities. Along the same line, the Area Development Schemes (ADS), based in Um Kaddada, is involved in environmental conservation through range and pasture protection programmes. However, better results could have been achieved, had there been a strong coordination between the government and NGOs, whereby the facilities of the ADS would have been utilized optimally.

6. CONCLUSION

The paper has tackled the issue of environmental awareness and resource management with reference to the subsistence economy of Um Kaddada province. The environmental situation is very delicate, though there is some hope and prospects for environmental conservation. Local measures forwarded by the inhabitants for environmental conservation and resource management were promising, sound and viable. It was found that, while previously the socio-economic behaviour has been influenced by

immediate survival needs and strategies, now the situation is different as the long term effect of any action is carefully calculated before it is undertaken. However, these local measures should be supported by strong official steps which could add up to the local initiatives and to counter the conflicts that might ensue as a result (i.e. in the shift from sand to clay and issues relating to *hashab* tree) or the sanctioning of environmental damage at the village level (punishment).

Government response has been stimulated by the recent global concern about environmental issues. The concern about environment has culminated in the recent formation of the Ministry of Environment and Tourism at the national level. Yet, at the local/regional level this is lacking and coordination between various governmental and non-governmental bodies (NGOs) in the area of environmental conservation or the utilization of the available facilities is currently nonexistent.

However, although the ability of the political economy to maintain the intricate balance and resolve the contradictions vis-a-vis environmental conservation and resource utilization is difficult to predict, the acknowledgment and support of the important role of indigenous technical knowledge, and greater coordination between all parties concerned are the two critical components of for the success of any effort towards environmental conservation, resource management and sustainable development.

It must also be stressed that the contradiction between environmental and development policies might be resolved if both local awareness and government support are combined and environmental education programmes are applied in these villages in order to strengthen these measures and efforts that have already been started by the locals.

NOTES

1. This paper is based on a field work conducted in the study area during June-July 1995. The methods employed in data collection include interviews with prominent figures in the villages (Omdas and Sheikhs), farmers, herders in addition to group discussions with the villagers and their leaders. So the approach was participatory one. Respondents were encouraged by the author to articulate their views frankly in issues relating to their environment. Officials in these various departments were also interviewed. Official reports and other written material were collected from the Ministry of Agriculture and Animal Resources in El Fashir, Range and Pasture Administration and Provincial Reports in Um Kaddada. One main limitation of the data is the lack or inadequacy of official records.

2. The name Um Kaddada means salty soil around the settlement.

3. Source: Department of Statistics, Fourth Population Census, 1993.

4. Source: Popular Committee Records in Um Gafala and Burush.

5. It is worth mentioning here that the *shartai* (Chief) of Burush (Ali Mahdi Sabeel), who died few years ago, has been awarded the prize of Five Hundred Globals by the UNEP as a result of his great efforts to protect the environment.

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Economic Strategies of Diversification Among the Sedentary 'afar of Wahdes, North Eastern Ethiopia

Assefa Tewodros

1. INTRODUCTION

This paper is based on the research carried out among the sedentary 'Afar of Wahdes in 1994-95. Wahdes is situated at the foothills of Atsbi Woreda, Eastern Tigray, Northern Ethiopia. It is located in Koneba Woreda (Zone Two) of the 'Afar regional administration. Wahdes is considered one of the lowest in altitude among all regions of the country, with a general elevation of 1000 - 1200 meters.

The 'Afar of Wahdes live in thirty-one clusters of villages locally known as *bura*, scattered all over the area at varying distances. While the closest *buras* are less than 500 meters apart, some are as far as three kilometers. All residents of the area are Muslims, and each *bura* has its own mosque which the residents use for worship and for religious education. In Wahdes *Kebele* there are 2,083 residents out of whom 1,107 (53.1%) are males and 976 (46.9%) are females. The number of households differs from one *bura* to another. Most of the residents of the small *buras* are kins of the same clan, while the large *buras* consist of residents from different clans but most of them have some affinal relationships. As a result, the inter-*bura* relationships are also largely influenced by kinship. All *buras* share the same grazing land and water springs.

Patrilineal descent plays an important role in the social organization of the 'Afar of Wahdes. Every 'Afar belongs to a specific clan through his/her father's line. All clans are endogamous patrilineal clans. There are twenty-two clans in Wahdes, with varying numbers of membership. Each of these clans has neither an independent territory nor political organization. They do not have separate pattern of settlement and the 'Afar are dispersed in clusters irrespective of clan membership. Nevertheless, the members of all clans consider themselves as one large group when they identify themselves vis-a-vis their neighboring 'Afar, and call their area *Fantoita*.

For centuries the 'Afar of the study area used to move from place to place with their livestock in search of pasture and water. They had no permanent settlements, nor did they perform any type of crop cultivation. By and large, they relied on their livestock production as the mainstay of their livelihood. However, as a result of recurrent droughts and animal diseases that struck the area, they lost a substantial portion of their livestock wealth. This is the main reason why they started permanent settlements (Ayele, 1986; Helland, 1981). One of my informants, told me that;

after we repeatedly suffered from our absolute dependency on livestock, we started to compare our nomadic life with that of our highland neighbors who have permanent settlements and who have their farms next to their houses and who don't suffer like us because they are not dependent only on their livestock. Then, using our pick-axes we started to dig, the land nearby our houses and grew small amounts of maize and with that we gradually started to cultivate crops in small amounts and began our permanent way of life.

After their settlement, the 'Afar of Wahdes started to send their children, especially older boys, to herd the animals and the households ceased to wander around with the herds and flocks.

2. ECONOMIC ACTIVITIES

2.1 Livestock Production

Previously livestock had been the backbone of the 'Afar economy when they used to pursue the nomadic way of life (Lewis, 1969; Ayele, 1986; Cossins, 1972; Tegegne, 1991). Their livestock wealth was considerable and they were almost entirely dependent on it for subsistence. Currently, however, their livestock wealth has deteriorated tremendously as a result of recurrent droughts and animal diseases.

The livestock of the 'Afar of Wahdes comprises camels, cattle, sheep, goats and donkeys, though small in numbers. According to the household census of February 1995, in Wahdes numerically goats take the leading place, followed by cows, sheep, camels, oxen and donkeys, respectively. The following table shows the number of livestock by type.

Table 1: Types and Number of Livestock

Camel	Oxen	Cows	Goats	Sheep	Donkeys
643	220	1456	5759	707	237

Source: Household survey, February 1995.

Among the 'Afar of Wahdes, animals are individually owned by men, women and children and each household has its own animals composed of different stocks. Every 'Afar starts to build up his/her own herd from the time of birth when a child is offered an *ikoita* animal (usually offered from the father's herd and not the mother's), preferably one female animal of each species. Hence there is no family ownership of animals as such and the ownership is strictly individual though the members of a family use the products of their livestock collectively.

Though every child has his/her own animal he/she does not have the right to sell or to do what ever he/she likes before starting his/her own independent life. Hence, he/she can only gain the right to decide over his/her own animals after marriage when he/she takes his/her *ikoita* and their offsprings. In some cases when the child needs money, his father can allow him to sell one of his own animals. In fact, it is only male animals which can be sold and the sale of female animals is strictly forbidden unless there is no other alternative.

The 'Afar of Wahdes prefer to herd the different livestock species separately depending on the availability of pasture and water supply and the nature of herds. Accordingly, camels and cattle are herded by older boys and younger men because the herders should be those who are able to milk animals and protect them from wild animals, such as hyenas, at night. Goats, sheep and lactating animals are herded by young boys and girls. This is considered by Helland as an "ecologically sound strategy" (Helland, 1980: 106). This type of herding operation is in fact more labor-intensive since it demands the subdivision of herds.

2.1.1 Camels

Although camels take fourth place numerically, they play the leading role in the economy of the 'Afar of Wahdes compared to other livestock species. In Wahdes the role of camels as pack-animals is very important because they bring salt bars from Reged¹. Since they can stay without drinking water for days and can carry more salt bars than a mule or a donkey, camels are preferred by the people of Wahdes and others for transporting salt bars from Reged to the market places at Koneba and Feresdege. Moreover, camels are also used by merchants to bring goods from Djibouti into the region. The cost of renting a camel to go to Djibouti is 400 Birr, which is considered a good sum of money for the camel owners.

In fact, in Wahdes the camel stock is very small. There are only 643 camels and the largest number of camels owned by an individual household doesn't exceed ten camels. As revealed by our 1995 census, there are only two households who have ten camels each, while 72 households (representing 26% of the residents) have no camels at all.

2.1.2 Cattle

Cattle come next to camels in importance to the economy of the 'Afar. According to the 1995 census, the number of cattle in Wahdes *kebele* is 1,676 heads, of which cows constitute 86.9%. While cows give milk, which is an important element of diet for the 'Afar of Wahdes, oxen are used for ploughing and as a source of cash.

In the area the largest number of heads an individual has does not exceed 40 cows and 5 oxen at most. Before the drought of 1988 there were individuals who had up to 80 cows and the smallest number of cows an individual had was 20.

2.1.3 Goats and Sheep

As shown in table (1) above, the numbers of goats and sheep in Wahdes *kebele* are 5,759 and 707 respectively. The number of goats in fact is greater than all the other livestock put together. Almost 90% of the goats are female goats. While there is almost no one who does not have at least a single goat, the highest number of goats owned by an individual is 90. However, this number is not high if compared to previous years and, according to my informants, there were many individuals who had more than 100 goats before the severe drought of 1988.

Both goats and sheep are economically important for the 'Afar of Wahdes. Goats provide the largest quantity of milk used for a porridge meal and they represent an important source of cash income. The price of a goat or a sheep varies between 50 and 120 Birr depending on the condition of the animal. Although not frequently, they are occasionally slaughtered and used for food. The skin of a goat is also used for making water containers.

Generally speaking, it is very difficult to include milk as a major component of the diet through out the year. In fact, during the seasons of *Dedae* (the period of shower usually during January-February) and *Karma* (the main rainy season during July-August), when pasture is available milk is plentiful, the 'Afar get the opportunity to use the cows of their *fiqur* (a bond-friend) which come from highland Tigray for pasture. Hence, nearly all 'Afar, whether they have their own cows or not, drink milk during those seasons. However, they do not get sufficient cow's milk, even for children, during dry seasons. They get the greatest amount of their milk from goats and mainly use it for food that is to be eaten with porridge and for drinking by their children.

2.1.4 Donkeys

There are not many donkeys in Wahdes and they are the smallest in number among the 'Afar animal stock. They are used for transporting wheat flour from the highlands but mainly for transporting water from springs, especially for those who live very far from the springs. Some owners also use them for bringing salt bars from Reged as a source of extra cash income.

2.2 Crop Production

2.2.1 Land Allocation

Following the 1975 land proclamation that brought all land under the ownership of the state, a new land allocation in the area was decided by the Ministry of Land Reform and Administration whereby all heads of households received their own farm land. Government officials not only distributed the land but also promised to render every support to enable the residents to cultivate their land. However, that promise was never fulfilled and no support was provided. As a result, most of the 'Afar did not cultivate their lands for lack of material and technical support. Moreover, it was not easy for the people to shift immediately to an agricultural life without the necessary extension work or the effective and close follow up by Government officials. Hence, only those who settled near the water springs started some small scale cultivation using water from the springs.

The fighters of the Tigrean Peoples' Liberation Front (TPLF) who had been moving in the area while they were fighting against the Derg's army in Tigray, started to teach the society to cultivate their land and, in 1985, made a new land allocation in a place called Belbel. Belbel is one of the *kebeles* of Koneba *woreda* which is endowed with fertile land and a river which provided irrigation water. Some residents of Wahdes moved to Belbel and received land. Since the area is only four hours' walk from Wahdes, some residents of Wahdes also use hired labor to cultivate their land. However, most of the residents of Wahdes do not possess land at Belbel since they did not get land during the land distribution.

Recently, in 1992, another land allocation was carried out at Wahdes by the Transitional Government of Ethiopia. The people elected three members for the "Development Committee" to allocate the land to the residents. The land allocation for all households was based on the size of the household and irrespective of sex. The size of land area allotted for an individual was 50m², and this is multiplied by the number of the household members to have the size of land allocated to the household.

2.2.2 Cultivation

Although all the 'Afar of Wahdes have their own land which they have held since the land distribution which took place after the 1975 land proclamation, only a few individuals ploughed their plots. According to the household census of February 1995, out of the 277 heads of household, 117 (42.2%) never used their lands. Even the remaining 160 households did not plough their lands regularly and the majority of them only began to use the allocated land quite recently. Usually people plough only the small plots which are situated near their homes where they grow maize and barley, although, because of their small size of plots, the produce is so small that it can only serve as supporting income.

The residents of the area give different reasons for their inability to use their lands. These include:

1. There is no governmental or non-governmental institution which could render financial, material and technical support for the 'Afar of Wahdes to cultivate their land. The failure of the Ministry of Land Reform and Administration officials to fulfill their promise of providing the 'Afar with ploughs and seeds, has discouraged the 'Afar of Wahdes from cultivating their land.
2. The high cost, for an individual, of fencing the field to protect it from animals, because the farmlands are far from the places of residence.
3. The high risk attached to rainfall irreliability and frequent droughts. If they failed once because of lack of rain, they do not want to make another attempt.

None of the respondents mentioned the lack of vigor to engage in cultivation which requires hard work. However, although they are idle, most of them use hired labor even to fence their compounds let alone to

cultivate. This is most likely a result of their pastoral background and their cultural attitudes towards manual labor. Although most of them own their farming equipments, only a few of them plough their land themselves and the majority employ hired labor. According to the 1995 census, out of the 160 households who cultivated their land, only 39 (24.4%) used their own labor to plough their farmland, compared to 122 households (75.7%) who use hired labor, mainly from the neighboring highlanders.

Although most of the 'Afar of Wahdes still use hired labor to cultivate their land, the majority of their fellow 'Afar who live at Belbel cultivate their irrigated land themselves and totally depend on their land for their livelihood. However, at present there is a general tendency among the 'Afar of Wahdes to fully engage themselves in crop cultivation, mainly because their other means of livelihood are steadily declining.

2.2.3 Irrigation

In Wahdes there are four water springs named; Wahdes, Gahar, Behti and Leado. These water springs are used for drinking, washing and for small-scale irrigation. According to my informants, one of the major factors accounting for the permanent settlement of most of the residents at Wahdes was the presence of these springs. However, although the first settlers there were obviously attracted by the water springs, they did not have the intention to use irrigation to cultivate their land. Irrigation is carried out on a very small scale in the small plots just in the compounds of the residents.

According to my informants, the first irrigation works were undertaken around 1968, when the idea was brought by migrants who returned home from Sudan. Then maize, pepper and sweet potatoes were the main crops cultivated.

Small-scale irrigation, however, became widely practiced by the residents of the area with the encouragement of the TPLF fighters who distributed land to those who came from other *buras* and offered free papaya and banana seedlings to those who adopted irrigation. Irrigated agriculture was further enhanced during the severe famine of 1985 when those who settled near the water springs clearly benefited from planting maize.

Recently the number of residents who adopted irrigation increased at a fast rate and exceeded the capacity of the springs. The use of water from springs for irrigation is supervised by a "Development Committee" which is composed of three men elected by the people. The committee members are usually from other *bura* and do not use water for irrigation themselves. This was done in order to avoid unfair practices that could arise from the vested interest if the committee members were from the same *bura*. The distribution of water is based on a fixed schedule for every resident who has a cultivated plot.

Since the demand of users is greater than the capacity of the springs, because the springs are the only sources of water for the people of Wahdes and its environs, the cultivators do not get sufficient water for their plantations. According to one of the users near Behti spring, water is supplied for three consecutive days once every thirty-three days.

Most of the residents of Wahdes plant papaya, bananas, oranges, lemons and peppers. Other types of crops are not cultivated for two main reasons; first, the springs produce a small quantity of water and couldn't irrigate vast areas of farm land and, second, since the plots are too small, that suits fruit production more than field crops, since it is more profitable to residents, especially papaya and banana.

2.3 Salt Production

Salt had played a paramount role in the history of the Ethiopian economy. In the nineteenth century, it had been used as an "official currency all over Ethiopian highlands from Tigre to Kaffa and from Wallaga to Argoba" (Abir, 1966: 1). In fact, "it facilitated the inter-regional trade" (ibid:1) since at that time, the salt *amoleh* had more acceptance by the people than the Maria Theresa Thaler. The "source of all *amoleh* in

circulation in Ethiopia was the salt plains in the Taltal area" (ibid: 2). Taltal area is the salt mining area in northern 'Afar region. It has been claimed that "from time immemorial salt has been mined in the Danakil depression. Cosmas mentioned it as early as the sixth century A.D." (Baldet, 1973: 227). The 'Afar have been involved in the practice of salt mining since the commencement of salt mining and salt was the mainstay of the 'Afar economy for a long time and it still plays a significant role in the economy of the area.

The salt mining area in the northern 'Afar region is known as Reged, some times called Arho. Reged is the lowest depression in Ethiopia, 116 meters below sea level. It situated around 200 Kilometers northeast of Mekelle and in the northern part of the 'Afar desert (ibid: 227).

The 'Afar of Wahdes are involved in different types of activities in the salt mining and salt trade. According to the household census of 1995, out of the 277 households surveyed, 115 (41.5%), depend mainly on salt for their livelihood. In addition, out of those 115 heads of households, 43 (37.4%) are engaged as casual laborers in Reged, and out of these 43 casual laborers, 22 (51.3%), are working as *fokolo* (salt miners), while the remaining 21 work as *hadelimera*, shaping the large blocks of salt into small bars. Moreover, the remaining 72 households are involved in salt trade (50) and renting *Sa'ar* (Water container made from goat skin). In what follows we consider these different types of activities in detail.

2.3.1 Casual Labor (*Fokolo*)

These are men who go to Reged to work in the salt mining as casual laborers. The salt mining area is a vast landmass of salt rock. The salt beds were created over millenniums by the evaporation of sea water. Geologists have determined that this area was once an arm of the Red Sea which was separated by the uplifting of a mountain" (Engelbert, 1970: 194; Baldet, 1973: 231).

The actual salt mining is performed by a group of three men. They use an axe (*godma*) and a long thick stick (*hodu*) to separate and lift the block of salt. After the salt block is lifted up, it is cut into two or three parts to make it convenient for the *hadeli* that is the one who shapes it into salt bars of different sizes, *gole'o* or *ganfur*. According to Baldet "the whole slab may be as big as a square meter and 30 cm thick"(Baldet, 1973: 231).

The *fokolos* get their money based on the number of donkeys, mules and camels loads they produce. The payment for one camel load (thirty *ganfurs*) is seven Birr, one mule load (twenty *ganfurs*) five Birr and one donkey load (ten *ganfurs*) three Birr and fifty cents.

In addition, they obtain two *burkuta* (a locally made, spherical shaped bread), and one *sa'ar* (skin container) of water. At times some *fokolos* return back home without getting the opportunity to work because of the large number of casual laborers at Reged.

2.3.2 Hadelimera

These are men who shape the salt blocks into rectangular bars of manageable size. Unlike *fokolo*, to be a *hadeli* requires more skills and long experience. Those who work as *hadeli*, most of the time, start to work at Reged when they are young boys (*Kudub*) helping the *hadeli*. The task of the *kudub* is to cut the slabs into manageable bricks and make it ready for shaping. The *kudub* learns how to shape salt bars into the standard size while he is working with the *hadeli*. The *hadeli* knows the size of the *gole'o* and the *ganfur* without using any measurement, simply using his own hand. However, the *kudub* works only if the *hadeli* has too great a load of work i.e. more than ten mules (200 *ganfurs*), otherwise the *hadeli* doesn't need a *kudub*. The *kudub* is paid by the *hadeli* himself and not by the salt trader who only pays the *hadeli*. If the *kudub* works up to "twenty-two mules" (440 *ganfurs*), he gets between fifteen and twenty Birr, based on the will of the *hadeli*, and he shares the *burkuta* and water with the *hadeli*.

Unlike the *fokolo*, the *hadelimera* have better job opportunities because they work at the demand of their customers, the salt traders. Hence, a *hadeli* who has more customers is more successful than one who has less customers.

The *hadeli* charges the salt trader based on the amount he produces; 0.75 cents for *ganfur* and one Birr for a *gole'o*. In addition, he gets two *burkuta* and one *sa'ar* of water from the salt trader (*arhotai*). Most of them send money to their families although some of them takes it themselves when they return.

Most of the casual laborers stay in Reged area for two or three months before returning back home, mainly because of the high temperature and the hazardous nature of work that prevent them from staying for longer periods. In fact it has been observed that the skin of most of the people who stayed in Reged becomes black and very rough. The area has been described by Engelbert, who went to Reged with a salt caravan, as "a terrifying land of fantastic volcanic ruins, rock, lava, dried lakes; of violent colors and merciless desert"(Engelbert, 1970: 186). Baldet also wrote "mining in Reged is a tiresome and risky occupation. It requires the will to work under almost unbearable desert conditions. There are dangerous heat waves that are dreaded by the miners. The vastness of the place and the severity of the climate are a constant test to virility"(Baldet, 1973: 231; Haile Michael, 1966: 128).

Previously almost all the mining work was carried out by the 'Afar themselves. Engelbert witnessed that "although Ethiopians who live on the more heavily populated plateau sometimes come down to the lowland to mine salt, most of this work [mining] is done by Danakil, who over the centuries have grown used to the fearful heat"(Engelbert, 1970: 191). There are many highlanders these days who come to Reged as casual laborers, although the *fokolo* and the *hadelimera* are still predominantly 'Afar.

2.3.3 Salt Traders (*Arhotai*)

This term *Arhotai* refers to those men who are engaged in transporting and selling salt. Although most of these people come from the highlands of Tigray as far south as Alamata, there are some 'Afar from Wahdes who are also involved in the salt trade. The case resembles the situation in the nineteenth century. Abir wrote: "the Tigreans stayed for few weeks in the Taltal area and then returned to the highlands with many thousands of amoleh which they shaped into acceptable form. The *Taltal* themselves brought great quantities of rock salt to Agame which they sold to the local population who later formed them to the desired amoleh" (Abir, 1966: 2). At present, however, the 'Afar of Wahdes do not go to the highland to sell their salt but they use the *Arhotai* from the highlands.

Those *arhotai* who do not have their own camels rent them (mostly from members of their clan) or from others local owners. The agreement is that the owners of the camels take two-thirds of the *ganfur* for themselves (a camel load is thirty *ganfurs*) and, hence, they are the main beneficiaries compared to those who carry out the hard task of bringing the salt from Reged and take one third.

2.3.4 Renting *Sa'ar*

The other important means of generating income from salt works is the practice of renting *sa'ar*. As indicated above, water is very scarce in Reged and is mainly supplied by the salt traders, together with *burkuta*, to those who work at Reged. The water container of the 'Afar is made from goatskin because it is convenient to carry, not fragile and it cools its content. Salt traders who go to Reged, whether highlanders or 'Afar, rent *sa'ar* from Wahdes where, for some residents, especially old women who don't have other means of livelihood, renting of *sa'ar* has become a lucrative business. The rent for one *sa'ar* is two *ganfurs* and the price of one *ganfur* is four Birr. In Wahdes there are twenty-two individuals to whom the rent of *sa'ar* to salt traders is the main occupation. In fact there are also other residents of Wahdes who are benefiting from renting *sa'ar* as a supplementary form of income. The income of the *sa'ar* renters depends on the number of their *sa'ar* and their customers.

Both the 'Afar salt traders and the *sa'ar* renters sell their *ganfur* at the markets of Koneba and Feresdege and sometimes at Wahdes to the merchants who come from the nearby places of highland Tigray. These merchants prefer to buy salt from these markets and sell it in the towns of Tigray either because they do not want to undergo the wearisome task of bringing salt from Reged, or because their pack animals are too weak to go to Reged.

2.4 Trade

Trade is the means of livelihood for some of the 'Afar of Wahdes and it plays an important role in the local economy. Those 'Afar who are engaged in trade perform two types of activities.

2.4.1 Petty Commodity Trade

Here traders bring different commodities from the towns of Tigray, particularly Atsbi and Wuqro, to sell them at the markets of Koneba and Feresdege With a small profit margin. The main types of commodities are sugar, tea, sweets, batteries, beads, shirts, second-hand clothes, soap, detergents, notebooks, pens, pencils, torch lamps, plastic utensils, cigarettes, earrings, rings, and sandals. Since modern means of transport are not available between Wahdes and Atsbi (the nearest town of Tigray), traders go on foot and carry their commodities themselves, except for sugar traders who rent a donkey from the highlanders. Most traders have a small capital, sufficient only to buy a small number and/or varieties of commodities. While women mainly sell sugar and tea, other types of commodities are sold by young men who can afford to climb up and down the high mountains of Tigray to bring these commodities. In Wahdes there are about six young men who are involved in this activity, all students performing this task as a part-time activity during school vacation. Since they are living with their parents, they do not depend for their livelihood on trade but assist their parents with the small amount of profit they generate. They usually go in groups to Atsbi and Wuqro and to the markets of Koneba and Feresdege. Except for the distance from Atsbi to Wuqro where vehicle transport is available, they move on foot from one market place to the other in a trip that normally takes about a week. The work is wearisome and hardly seems worth the profit.

In the past this activity was carried out almost entirely by Tigrean highlanders. They had been the only people who supplied the 'Afar with different types of agricultural and industrial goods and there are still many highlanders, men and women, who bring and sell commodities to the 'Afar.

2.4.2 Contraband Trade

The other trading activity in the area in which merchants bring goods from Djibouti and sell them in the market places of 'Afar and Tigray. This type of trade is a contraband trade in which the goods are smuggled using routes across the desert and avoiding the main road and, hence no taxes are paid.

The journey to and from Djibouti takes between 37 and 40 days depending on the walking speed of the traders. The only means of transportation is camels because there is no modern means of transport and it is impossible to cross the desert using other pack animals. Those merchants who do not have their own camels rent some from those who do, paying 400 Birr for the camel and 125 Birr for the man who pulls the camels. Moreover, although no taxes are paid to the government, there are different groups of bandits who tax the traders, usually, 30 Birr per camel.

Commodities brought from Djibouti are mostly textile products of different types, mostly polyester. Usually the merchants themselves go to Djibouti from their villages using public transport and send their goods through the desert routes. They fix a date and a place to meet the man who pulls the camels. The Ethiopian Birr is used for exchange in Djibouti to buy goods and immediately return to their villages with those goods.

During the last decade there were many individuals who had been smuggling contraband goods from Djibouti. Some of my informants estimated that there were about 50 contraband traders from Wahdes, but currently they are not more than 10 individuals who continued their contraband trade. There are two main reasons why most of these merchants have abandoned the trade. First, the prices of commodities has declined more and more because other contrabandists who smuggle their goods through Alamata sell their commodities at Mekelle at lower prices. As a result, the trade became less profitable and led many traders to bankruptcy. Moreover, the traders who buy their goods through Alamata do not suffer from such types of crisis because they bring their goods in large quantities and without much difficulty. And secondly, some of them abandoned the business because they were caught by the Ethiopian Finance Police while smuggling goods and their goods were confiscated and they were left empty handed.

Other trading activities practiced by the 'Afar is the selling of honey, butter and fibre mats by 'Afar women at market places and the sale of papaya and banana fruits by those residents of Wahdes who plant them.

2.5 Migration

Migration is one of the major income-generating activities among the 'Afar of Wahdes. Many 'Afar men of Wahdes migrate, mainly to the Saudi city of Jizan and to Djibouti, in search of jobs. Most of them take the illegal ways of crossing the desert and the Red Sea and, hence, need no entry or exit permits from any of the governments. There are individuals who are involved in the illegal act of transporting people for which they get a good sum of money. In Wahdes it is difficult to find a family of which some male members did not experience migration to Saudi Arabia, Djibouti or both. This is clearly indicated in table 2 below.

Table 2: Frequency of Migration to Saudi Arabia and Djibouti

Destination	Frequency of migration							Total No.of Trips
	Once	Twice	3 times	4 times	5 times	6 times	7 times	
Jizan, Saudi Arabia	45	62	54	22	5	--	--	188
Djibouti	50	75	48	22	7	1	14	217

Source: Household Census, February 1995.

As shown in the table above, out of the 277 heads of the households surveyed, 188 (67.9%) have migrated to Jizan and 217 (78.3%) to Djibouti. In fact, it should be noted that some of the migrants have been to both places at different times, hence, not necessarily included in the table. Moreover, the data only refers to heads of households although other members of the household might have been involved in that migration and are not covered by our data.

Migrants who went to Jizan were hired as shop keepers, waiters, drivers, shepherds, painters and daily laborers; while those who went to Djibouti were hired as wage laborers at the port, porters and as daily laborers in construction companies. According to the estimate of one of the contraband traders who frequently shuttles between Wahdes and Djibouti for trade, there are about 150 migrants in Djibouti from Wahdes and its environs, most of them have no jobs and, hence, do not send money to their families.

Migration to Jizan started in the early 1980's and the number of migrants grew steadily during and after the severe drought and the subsequent famine of 1984-85. Most of the young men of Wahdes preferred to go to Jizan rather than to Djibouti because of the wide job opportunities in Jizan. In fact, the recent

policy of the Saudi government of expelling all foreigners who enter the country illegally created a big problem for the Wahdes migrants in Jizan, and the number of migrants who are being deported is increasing.

Most of the migrants of Wahdes went to Jizan to collect money for two main purposes. First, to support their families by sending them money and clothes. Secondly, to collect money for their marriage and to invest in their villages for their future livelihood. However, most of the returnees bought a few camels, cows and goats. They also distributed money among the clan members of their fathers and mothers. In Wahdes it is not uncommon to ask money and clothes from a clan member who returns from migration with some money because every member helps the migrant's family in his absence. This apparently shows a strong sense of kin-based reciprocity.

Although there are a number of returnees in Wahdes, no one of them became rich compared to their counterparts in Tigray who now own cars and/or shops. Most of them spend their money in marriages and in buying livestock. Although buying livestock is one form of investment, they lost a considerable portion of their livestock because of drought. Though they complained for their culture of sharing money among their clan members, the major problem is their own weakness in managing their money properly.

Until recently however, 'Afar families who do not have a sustainable means of income in their village have been greatly supported by their migrant family members or relatives. They receive money, though not always regularly, from their migrant family members and thereby solve their economic problems. Besides, families also enjoy a relatively higher standard of living compared to the families of non-migrants.

Although labor migration for most of the 'Afar of Wahdes has played a significant role in improving the life of the 'Afar especially in the last few years and helped them overcome the problems created by the drought years, it also has its negative effects on both the migrants' families and, to some extent, on the migrants themselves. Of all the social groups of Wahdes, women are the primary victims of the migration. Many of migrants in Djibouti have no jobs and hence are unable to send money regularly to their families. Those migrants who are in Jizan are also currently facing problems because most of them have no residence permits, cannot find work easily and risk being deported any time if detected by the Saudi authorities. Besides, and because it is not easy to go and come back crossing the desert and the Red Sea, most migrants stay abroad for so many years before returning home. That situation created enormous difficulties, especially for wives of migrants. Some of these include:

1. Most of the migrants' wives who have children and have no other sources of income suffer financial problems since their husbands do not send them money regularly. According to 'Afar culture women do not freely move from place to place in the absence of their husbands, not even the market. Therefore, they cannot carry out any activities to support themselves and their children and at the same time they are not allowed even to sell from their livestock upon their own decision. They become totally dependent on the clan members, especially the close relatives of the husbands. They are even forced to wait until the return of their husbands to request a divorce. In Wahdes there are many women who did not see their husbands for more than three years.
2. Most of the 'Afar women want to have as many children as possible which increases the need for financial support. However, that tendency has been reduced by the absence of their husbands.
3. The wives of migrants in most cases feel insecure in the absence of their husbands because there is a danger of being raped. Such cases are not uncommon and often lead to divorce. There are also many incidence of divorce reported because migrants stay away for too long.
4. Life is becoming difficult for women since they shoulder a double responsibility: they perform their own traditional tasks and that of their husbands.

5. Since most of the young men of Wahdes have migrated and there are few young men around, late marriage of girls is becoming an emerging problem among the 'Afar and it is not uncommon now to see many girls of marriageable age who are not married. Although a decision to reduce the amount of money to be paid for marriage was taken by the Council of Elders in order to encourage young men to marry, that did not solve the problem because most men are still away and have their own problems of unemployment and inability to gain money, which aggravate the situation further.

6. Families whose young male members are away and do not have other children present to look after the livestock experience great difficulties because they cannot herd their livestock themselves, and risk the attack by wild animals.

7. Currently, migration to Djibouti and Jizan has become very difficult and many migrants were expelled, especially from Jizan, because they entered the country illegally and have no residence permits. This creates a new problem for both the migrants and their families because they come back to their villages empty-handed and no jobs are available in the home villages at least for the time being.

8. Most of the returnees do not want to return to their former occupation because they find it difficult to adapt to life in their village since they had a relatively better standard of living while they were in their place of migration. Hence, most of them want to be employed in the newly opened government offices rather than engage themselves in productive activities. As a result, many remain unemployed since they are not qualified for these jobs.

3. CONCLUSIONS

Considering the different types of economic activities of the 'Afar of Wahdes from a time perspective, we find that their respective roles as means of subsistence have varied over time. Prior to the 1974 Ethiopian Revolution livestock and salt had been the mainstays of the 'Afar economy. Their livestock wealth was apparently greater than today and the working opportunities at Reged were also better than at present. The earliest record about salt we have so far is the sixth century A.D. by Cosmas, though the exact time for the commencement of salt mining, is still unknown and many writers (Abir, 1966; Engelbert, 1970; Baldet, 1973) speak of "time immemorial". During the period prior to the 1970s the 'Afar mainly depended for their grain consumption on the neighboring highlanders. It seems that their relationship due to salt trade for centuries gradually strengthened their economic ties. This suggests that exchange for survival has been a central part of their economy for centuries.

The severe famine of 1974 which occurred all over the country could be considered a turning point, not only because it became one of the factors for the Ethiopian Revolution but also it drove the 'Afar of Wahdes to seek other means of subsistence since their former sources of incomes were no longer sufficient. Since that drought made migration to the highlands to collect grain unrewarding as it used to be before the 1970s, they decided to migrate to another place where they could gain a better income. At that time the possible choice was Djibouti where a few individuals had already migrated. Although crossing the boundary was not easy for migrants because of the strict control by the French colonial rulers of Djibouti, a few 'Afar men succeeded and managed to return to their villages better off and with some savings which attracted more 'Afar Wahdes to migrate. The independence of Djibouti from French colonial rule in the 1970s provided a golden opportunity for those 'Afar who had the desire to migrate to Djibouti and were then able to enter the country without difficulty. However, during this time livestock and salt still continued to play their important role in the 'Afar economy, supported by the additional income generated through migration.

The Land Reform of 1975 and the land distribution that followed did not improve the situation of the 'Afar, since most of the 'Afar did not cultivate their land for various reasons. The situation continued without any significant change until the early 1980s which was a landmark because of the commencement of contraband trade from Djibouti and the opening of the new opportunity of migration to Saudi Arabia. The

easy entry, better job opportunities and the high wages attracted almost all able males of the 'Afar to migrate to Saudi Arabia.

The period from early 1980s to the beginning of 1990s could be considered as a "golden period" for the 'Afar of Wahdes who enjoyed more prosperous living condition than their pre-migration period. They had different sources of income including migration, contraband and petty-commodity trade, livestock, salt and cultivation. The combined contribution of these activities to the economy has greatly improved the living conditions of the 'Afar of Wahdes. This had also been reflected on their relations with their highland neighbors who, unlike the pre-1974 period, started to migrate to the lowlands, seeking help from their 'Afar neighbors who were by far better off economically.

However, the situation changed dramatically in the 1990s. Opportunities in migration and contraband trade were curtailed and ceased to be important means of income for the 'Afar of Wahdes who also lost a considerable portion of their livestock because of drought. The role of cultivation as a means of subsistence is still at an embryonic stage. Working opportunities at Reged are becoming narrower. The cumulative effect of the decline of these activities made the 1990s a period of serious economic problems for the 'Afar of Wahdes which actually forced them to rely on relief aid.

Generally speaking, as one can see from the spectrum of these inter-dependent activities, it is difficult to single out one of them as the only sustainable means of living for all the 'Afar since each has its essential contribution to the 'Afar economy. However, contraband trade and migration have in practice ceased to be major economic activities for the 'Afar. Besides, although the 'Afar still have a strong desire to increase their livestock, the recurrent droughts and the absence of veterinary services in the area have greatly reduced the viability of raising livestock. As a result, milk ceased to be their major diet as before and family members, other than children have the chance to drink milk only during the seasons of *Dedae* and *Karma* when pasture is available and the highlanders send their cattle to the lowlands.

However, salt is the only activity that still plays an important role as a sustainable means of livelihood for the 'Afar of Wahdes. Those 'Afar who have no other means of income can go to Reged any time work as casual laborers. One informant, in illustrating the importance of salt to the local economy, stated that "what agriculture is for highlanders, salt is for us ... Salt is our agriculture".

Most of my informants stressed that they have a great desire to depend on agriculture as their major means of living. They found it very difficult to rely entirely on other types of economic activities because all have their own setbacks. However, they need financial, material and technical assistance from the government in order to fully engage themselves in agriculture. There is no government institution to support them and life has become difficult for the 'Afar of Wahdes to the extent that, at present, they became highly dependent on government aid which is not provided regularly.

NOTE

1. Reged is the main salt mining area in the northern 'Afar region.

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**Management of Scarce Resources:
Dryland Pastoralism Among the Zaghawa
of Chad and the Crisis of the Eighties**

Sharif Harir

1. INTRODUCTION

Being in the Zaghawa areas of Am Djeris, Barbada, Bahai, Tine, Mutur and other settlements in northern Chad in 1994 and 1995, gives one the strong impression that the Sudano-Sahel drought of the seventies and the eighties, which have decimated herds and turned land into waste, did never occur. This impression comes as a result of the fact that the livestock population is really huge and the regeneration of the plant cover is amazingly quick after 1990. In any case one does need to ascertain the facts around the quick recovery. The only indicator that a severe and a persistent drought has taken place is reflected in the absence of big trees compared to the 1960's. Most of the Zaghawa area, with the exception of major Wadis, is now an open grassland. However, one does observe a dense regeneration of small trees. It is also the case that certain palatable grasses of high nutritional quality, such as *Garba* and *Amancha* (local Zaghawa names) have disappeared. The herders are aware of these changes and they believe that if the rainy season of 1995 is good, the tree stands will recover fully, and the pastoral land will revert to its pre-drought condition. They, in fact, actively protect the trees by socially outlawing tree cutting.

On average the herds are also bigger compared to the late seventies and early eighties. A camel herd of around one hundred heads and sheep herds of around 300 are normal for an extended family which is the unit of production (*elbe*) (Zaghawa). However, there are herds which are exceptionally big: 200 to 300 for Camels and 300 to 1000 for a sheep herd. Cattle herds are less visible as those who keep cattle remain on the Sudan side of the borders in the areas of lake Andur Basawe and Hilaliya Dams. Camels and sheep are the dominant species in the Northern tracts of Dar Zaghawa which are collectively referred to as Biriye.

Asking the pastoralist about how could they restock and recover so quickly from the prolonged drought of the seventies and the eighties, their uniform answer would be "Allah is gracious"; an answer which leaves much to be desired. My investigations reveal that the Zaghawa herders of Biriye were not unaccustomed to recurrent droughts for which they have a vivid memory and a clear oral history. Hence they have developed complex mechanisms of facing droughts and coming out of them rather well. This does not mean that all the households survive droughts with their herds intact. In fact, some households are sloughed off after prolonged droughts but many survive them. This was because of their mobility which made it possible to reach out to far away pastures in hostile territories in which their military power and negotiating acumen made it possible for them to survive. During the latest drought the Biriye Zaghawa moved away from their traditional territories and into Sudan; sometimes 600 to 700 kilometers away.

The theme of this paper will revolve around the fact that while the latest drought was specially prolonged, and was made dramatic by the available information and the explosion of written material, for the Biriye Zaghawa it was not an unusual event. In fact they always lived under the sombre threat of famine and drought. Contrary to the impression one gets from the literature which purported to dramatize the predicament of the Sudano-Sahel pastoralists, the droughts of the 1970s and 1980s were not so unusual; looked at the phenomena in a wider time perspective. And since people operated always with notions of uncertainty about how the next rainy season will look like, the pastoralists were always on the alert to make a move as soon as the signs were indicative of a bad rainy season. Thus there has accumulated, over time, a deep knowledge about the meanings of the directions of winds, certain terrestrial phenomena such as the position of certain stars, the appearance of certain insects and creepers etc., which

constituted an early warning system. On the background of such a knowledge, the pastoralists have also developed ways of minimizing livestock losses through drought and shortage of fodder by timing their moves. Hence, pastoralists do not only maximize the herds in wetter periods but equally minimize the loss in drier years through recourse to spreading the herd, building fodder reserves for lactating animals and also by evacuating certain territories at the appropriate times. A theme related to the above is that the amazing quick recovery of herds, i.e. restocking the range in good years, comes as a result of minimizing the loss by using the above mechanisms and strategies. Raiding other groups for stock has also been one way of rebuilding a herd. Hence the reputation of the Zaghawa for camel thieving and livestock rustling, though no doubt exaggerated, is not completely without foundation.

Though the idea of the "commons" is prevalent in terms of access to grazing since the range are communal, the pastoralists are clearly aware of the dangers of livestock reaching a certain threshold of density in a limited range. Though they do not use the term "carrying capacity" as an expression, the pastoralists are also aware when the range is about to reach levels of saturation. Some enterprising and diligent pastoralists make their exit out of a saturated range in good timing that would not harm their stock. As such "exits" become numerous, and those sectors of the pastoral community which are less mobile are left behind. As owners of big herds are the ones who are likely to move out first, owners of smaller herds may remain within such a range benefiting from the fact that the immediate pressure has been reduced. Thus access to external resources and territories, through mobility, and flexibility which is based upon prior knowledge have always been a part of the Zaghawa adaptive strategies. This based on their experience that a single range in that climate zone is big enough to provide complete or partial security against droughts.

In fact, looking at the Zaghawa case, one does not help but wonder if not most of the literature about the demise of the Sudano-Sahel pastoralism, is contingent upon a logical argument based upon unproven assumptions about the likely responses to a drought situation. One such entrenched assumption is that the carrying capacity of the range will soon be exceeded under conditions of uncontrolled increase of the numbers of animals. Animal numbers are said to increase through natural reproduction under conditions where market off-take is nearly absent or because pastoralists do not sell their animals; since social orientation rather than market orientation is at the base of a pastoral economy, i.e. it is a "moral economy". Furthermore, the improvements which occurred in animal health through introduction of veterinary services are conducive to "strengthening" of such assumptions since it reduces animal mortality. In addition, the relative peace imposed by various governments by curtailment of inter-tribal raiding, might be conducive to such a situation. All these factors, the assumption goes, will lead to dramatic increases in livestock numbers beyond the carrying capacity of drylands ranges which will result in over-use and over-grazing; i.e. the tragedy of the commons. This will, in its turn, lead to the depletion of fodder resources which will lead to decimation of herds because of lack of fodder. In the end the pastoralists are turned into destitutes ending up in urban slums or perishing utterly because of famine. With drought on top of all this, the bleak conclusion of the demise of the dryland pastoralists is sustained in literature even if it is not sustainable on the ground as my Zaghawa case might illustrate.

2. THE HABITAT AND SOCIETY

The Republic of Chad covers 1,284,000 square kilometers of a wholly tropical area with more than half of this area being constituted of drylands of 0-500 isohyets. It also hosts a population of about 6,000,000 people according to the 1994/95 census - population of extreme ethnic multiplicity and economic diversity. The Zaghawa area, known as Biriye, lies within the Ennedi *Sous prefecture* (equivalent to a Rural Council) which is part of the Borkou - Ennedi-Tibesti (B.E.T.) *prefecture* (equivalent to a province). This area is characterized by extreme aridity, i.e. zero rainfall in the north towards the borders with Libya to 100-150 rainfall in Biriye towards the borders with the Sudan. Biriye area lies between latitude 15° N - 17° N and longitude 22°-23° East.

There is a great deal of uncertainty about the numbers of the Zaghawa in Biriye because most of the pastoralists spend much time outside their territory with their herds. However, a rough estimate of 90,000

to 100,000 people usually spend the rainy season (July - October) within their Dar. As there has never been a herd count it is extremely difficult to estimate their numbers. However, field observations and the opinions of the pastoralists conclude that there are more animals than what the scanty and highly dispersed resources could support all year round. Even vaccination counts are unavailable as there does not exist any kind of veterinary services in this area apart from what the pastoralists themselves purchase from various Sudanese markets for the occasional application. Not a single school exists in this area. Only recently (1991) a Quranic school was started in Tine, by some Zaghawa theologians who have studied in a Sudanese Quranic institute. In terms of services the government is completely absent despite the fact that president Deby comes from this area.

The dominant species are camels and sheep while cattle and goats exist only in very small numbers as they are not preferred by the pastoralists out of their experiences with these two species during the droughts of the last two decades. The pastoral society is organized through a version of the classical segmentary lineage system wherein the four dominant clans (locally these are identified as separate tribes) of Biriara, Geligargira, Erdibara and Shigera claim certain areas of their concentration as clan territories though access for any purpose is not curtailed for the rest of the Zaghawa clans. Each of the big clans or tribes, to use the local equivalent, is again divided into main segments, e.g. the Biriara is divided into Kuriara (president Deby's segment), Orara, Itinga and Burunga, with main areas of concentration constituted by Wadis of AmDjeres, Birdowani and Bahai. Politically, all of these clans are under one *Sultan*. Presently, this office is occupied by brother of President Deby; *Sultan* Timan Deby. However, the centralization of political power into one apical office is a recent development.

The production unit, which is the household, locally known as *elbe* unit, is made of extended and compound families of three generations with polygamous marriages at various levels. The *elbe* unit is the property holding and managing unit with the male of the highest generation constituting its spokesman and decision making authority. A number of such households that belong to a certain section of the clan (Tribe) camp in adjacent camps (*herik*). They coordinate their movements when they are outside their tribal territory, but each household is an independent unit when it comes to the management of its herds. Within this area, also, exist livestock markets; the most famous of these as from 1990 (the year in which President Deby gained power) is the Chadian Tine, which is a terminal for trucks to Kufra in Libya. It is a thriving livestock market and an expanding trade center. It is also a garrison town and an educational center in which the Mabrouka Institute for Teaching Quranic Sciences, (Islamic theology) is located with around 300 children and 73 adults learning to write and read the Quran. The period falling between the end of the rainy season in October and the beginning of winter in December, is spent in the Wadi Howar basin to the east of this area and in good years, the herds move to the Teiga Plateau to the north on the fringes of the desert proper to take advantage of the Lush Jizu growth. Hence the range can expand or contract according to the levels of the rainfall. Rain is the limiting factor. The British District Commissioner, on the Sudanese side of Dar Zaghawa in 1951 wrote the following:

But it should be remembered that in spite of these migrations, which are heavy in two years out of four, the vast majority of the tribesmen return faithfully in the early rains to the country which has been theirs for 500 years, and to which they are attached by the potent bonds of usage and traditions. No matter that rainfall is precarious, that crops often fail, that scarcity of summer water will drive them out again, while their womenfolk must be sent abroad for hire: no matter that life is hard, dogged by disappointment, and often lived under the somber shadow of famine, still they come back to the steppes and wadis which they know as home, and which they will not willingly abandon (Charles, D.C., 17\3\1951).

The District Commissioner elaborates the reasons behind this situation in the following manner:

with its present rainfall Dar Zaghawa will not produce sufficient grain to feed its inhabitants in more than one or two years out of four. The Zaghawa could improve their methods of cultivation, but they cannot hope to become self-supporting in grain, and caravans for the import of grain must be accepted as a permanent feature of their life. Their staple wealth, by which they should

be able to purchase the grain they need, is in their animals (cattle, sheep and goats), and the welfare of the Zaghawa is entirely dependent upon a healthy pastoral economy.

In bad years (in terms of rains and pasture) the pastoralists evacuate Biriye to the Sudan. In fact, many of them have lived in Sudan (in the areas of Shengil Tobai, Zalinge and Jebal Marra), 400 to 600 kilometers away from Biriye for at least ten years (1980 - 1990). This is normal for Zaghawa herders since two out of four years is usually dry and the necessity for emigrating their territory occurs. However, it was not only the environmental factor which led the Biriye pastoralists to emigrate their territory. Political factors which related to the Chadian State have significantly contributed towards forced evacuation of this territory many times during the seventies and eighties. The various Northern Chadian factions fighting the central government in Ndjamená used this territory as a hideout and recruited their fighting men among the various clans of the area. As many young people were forced to join the various northern armies, many households took temporary refuge in the Sudan in order to avoid such forced recruitment. Asked about this period, the pastoralists state that the "revolutionaries" (reference to the various rebel groups) were the worst colonizers for they forced your children into their armies and appropriated your animals for food.

However, the rise of their children into prominence when Habre conquered Ndjamená (in alliance with Zaghawa army commanders) from Goukoni Weddey in 1982, gave the Biriye pastoralists a respite. In 1982 Ibrahim Itno of Kuriara Biriara became the minister of interior and administration and col. Idris Deby (his cousin) became the chief of staff of the Chadian army. Thus for the first time in the history of Chad the Biriye Zaghawa pastoralists got representatives in power. However, the period between 1982 and 1985 was a period of extreme drought and most of the pastoralists of this area were some 500 - 600 kilometers inside the Sudan. The period 1986-1989 saw the ebbing of the drought period and many pastoralists returned to their home territory. But the turn of events in April 1989 in Ndjamená, 1160 kilometers away (power struggle that led to Zaghawa leaders in the army to flee the country), forced most of the pastoralists of Biriye to evacuate their territory and moved back to the Sudanese Ranges. The recapture of power in Ndjamená in December 1990 by President Deby made it possible for the pastoralists to reoccupy their territory again. Here the role of higher scale political processes in influencing the lives of the pastoralists should be noted as "very significant".

3. FACTORS OF CHANGES

3.1 Access to Government

As was indicated by M. Horowitz (Quoted in Timberlake 1991: 74-86).

with the exception of Mauritania and Somalia, the ruling elites in African states are drawn from non-pastoral groups which also view pastoralism with ambivalence at best and often with outright hostility.

In the case of the Biriye pastoralists their sons are the ones who are running Chad today. Beginning with President Deby and ending with the leaders of the army we find not only people who have had a pastoral career as background but quite a number of them still own big herds of camels and sheep. In fact many of these leaders depend on their herds for subsistence as the state of the Chadian economy makes waiting for government pay an uncertain business. Some people in the government have not received pay for the last nine months of this year. Hence they depend upon their herds in the dryland ranges of Biriye. While the state of the Chadian economy does not allow for the time being the extension of any services to the pastoralists of Biriye even if the president himself is a Biriara from Am Djerés, Zaghawa pastoralists enjoy today a privileged position in Chad. Even in the absence of services they enjoy the fact that they are no longer persecuted or harassed by government forces and agents. Being left alone, in fact, is one of the best services that an African government can give to pastoralists. This is their view and I concur fully with them.

Thus while Chad as a state is unstable, the Biriye area enjoys stability and peace. The moody and the volatile climate is still the same but for the last five years (1990 - 1995) there has been a change for the better as indicated above. Being rid of the political problems relating to African states, pastoralists have the knowledge and the capacity to deal with environmental problems. Harrison has rightly pointed out in 1987 that,

Africa's rain belt are mobile, drifting north and south with the seasons bringing water to parched lands and coloring the desert margins with flushes of green. The Nomads who exploit these shifting resources must be mobile too, often over distances of hundreds of kilometers. Their mobility is their principle defense against the fluctuations of Africa's climate, her periodic drought and her uneven, spotty rainfall..... Pastoralists have to be masters of insurance and they take out multiple policies (Harrison, 1987: 22).

Of these multiple insurance policies, the Biriye Zaghawa keep mixed herds, split herds among relatives and in cases of long-term fluctuations of rainfall, they recourse to flight out of their territories. Although flight is not problem free, it, at least, minimizes the losses in terms of livestock. For the pastoralists the fact that some of their ranks might lose life in the course of tribal warfare resultant from moving into a hostile territory, is a risk not to be shied away from. Loss of herds means the death of a way of life.

In fact one can say it was good fortune that an African president has a nomadic background because nomadic pastoralism was long considered by many African governments as hopelessly inefficient and destructive. Now, perhaps people will realize that pastoralism is an excellent way of converting into food the vegetation which grows as a result of the irregular and variable rainfall on large areas of arid and semi-arid rangelands (Grainger, 1990: 77). Another example of African elites recognition of the importance of livestock in the Sahel is the statement by president Seyni Kountche of Niger who was quoted by Timberlake as saying:

You cannot ignore what livestock means in the Sahel. They are not just an economic resource; they are a measure of social good, a sensitive barometer of moral health of Sahelian people. Raising cattle is a way of life for a great many of my fellow citizens" (Timberlake, 1991: 86).

3.2 The Market

3.2.1 Proximity to Markets

The social importance of livestock alluded to above has always frustrated planners and statesmen because, "they see them in terms of beef on hoof and seek to make herds more "productive" in terms of meat and milk for outside consumers" (Timberlake, 1991: 76). Earning hard currency become an obsession. As such the pastoral sector is considered useless since it does not take part in the market economy.

What such planners have in mind is the total modernization of livestock production in the drylands' ranges and not a mere market relation where a pastoralist might join at his own pace and in his own terms. However, the Sudano-Sahel pastoralists including those of Biriye have had a long history of relation with the markets in the region and beyond. This was because dryland pastoralism produces very little milk and for that very reason Biriye pastoralists depended on farm produce as their staple diet. Up to the 1970's women used to harvest and collect cereal substitutes such as *difra* (wild rice) from the beds of wadis such as wadi Howar. However, the droughts and the political situation which pushed pastoralists into the Sudan exposed them to the consumption of millet porridge. Hence, they sold livestock in the markets and purchased millet. In addition to the needs of the kitchen, they also sold animals in order to pay herd taxes and to purchase manufactured goods for consumption. Thus they used to relate to livestock markets within Darfur and occasionally through Darab al-Arbain (i.e. the forty-days road) to Egypt and the desert road to Kufra in Libya.

But as from 1990 and the take over of power in Chad by president Deby, the normalization of relations with Libya and the relative peace and stability which the Zaghawa territory enjoyed, the Tine market has been revitalized. Moreover, Tine became the desert port and a terminal for trucks carrying goods from Libya. It also became one of the biggest livestock markets in the area. With truck transport available through the desert to Kufra, prices for camels and sheep soared as the demand from the Libyan consumers saw a steady growth over the last five years. In fact some of my informants claim that the Libyans are not only purchasing for immediate consumption but also are rebuilding their herds by such investments. This could be true because during some market days up to 400 heads of camels are purchased by Zaghawa and Libyan merchants to be exported to Libya.

But it is not only the demand from Libya that induces the pastoralists to supply livestock to the market. In fact one good camel can fetch up to L.s. 170,000 in Tine, L.s. 200,000 in El-Fasher and L.s. 500,000 in Egypt in 1994. A sheep fetched up to LS 20,000 in Tine in 1994. During 1995 prices for camels rose to L.s. 240,000 in Tine and sheep to L.s. 24,000. In the conventional wisdom it was claimed that a pastoralist sold less when prices are high but evidence from the field says the contrary. In fact they sold more. On the one hand, pastoralists are investing in town property such houses in Ndjemena and sending their children to schools. On the other hand the consumption habits of the pastoralists have undergone drastic changes. They purchase food materials originating in the Libyan markets such as Australian flour, pastries such as different types of spaghetti, sugar, tea, cooking oil, gasoline for lighting and clothes and shoes. They also invest in rugs and other prestige items such as tea thermoses (vacuum flasks), fire arms specially the two favorites: Kalashnikov (AK47) and Belgique (FN) and some even purchase Bazooka's and machine guns. They also need to purchase various types of ammunitions on regular basis. These items are not luxury items exclusive to the richest of the pastoralists, in fact each household which owns camels must have them for security purposes.

3.2.2 The Price Imperative

Prices in Libya are also good but as there are no banking facilities to transfer money, the merchants and the pastoralists convert their money into goods to be imported into Tine. Goats can fetch from 60 to 100 Libyan Dinars; sheep can fetch between 150 and 160 Libyan Dinars and camels can fetch between 700 and 1200 Libyan Dinars depending on their condition on arrival to Libya. In the old days they marched them on hoof to Libya; a march which took between 45 and 50 days which influenced the condition of the animals on arrival. Now the merchants and the pastoralists take advantage of the availability of moderns truck transport through the desert which makes it possible for livestock to reach destination in good condition.

Transport costs are as follows: a goat 15 Libyan Dinars, a sheep 20 and a camel 200 Libyan Dinars. A truck carries between 80 and 100 sheep depending upon their sizes, 160 goats and between 8 and 10 camels. The margin of profit is good given the low level of transport costs.

4. A CASE OF A HOUSEHOLD: A CAMP FROM MOTUR AREA

Motur area lies about 50 kilometers north-west of Tine market town. It is an open grass land area but with tree stands in the various *Khors* that traverse the area. However, there is evidence for the general regeneration of small trees because of the wetter spells of the last five years. If the apparent regeneration continues the area will in a matter of years, recover its tree cover. Older pastoralists claim that they have seen this happen before during the period between 1945 and 1956 when trees nearly disappeared.

This household consists of a 65 year old male head and his wives, his three male grown up children and their wives and children, and four hired herders from the Tama tribe of Waddai. The members of this household belong to the Kurra clan of the Biriye Zaghawa. Among the three brothers they have 22 children of whom 7 are females and 15 are males. Between them also they have 7 wives in addition to the two wives of their father and a newly acquired young wife for their father who will join the household residentially in a very short time. Age-wise the brothers are 39 and have four wives, and 32 and three

wives, and 28 and two wives. The eldest two brothers are in the Chadian army with the ranks of Lt. colonel for the 39 year old one and a captain for the 32 year old. None of them is literate. They are resident in Ndjemena, the capital, about 1100 kilometers away. However, each one of them have one wife resident in the Mutor livestock camps. Although these two brothers are not residents in the camp they visit the camp as frequently as possible driving their army land-cruisers the 1100 kilometers loaded with supplies (sugar, flour, ammunition etc.) for the rest of the household. All children in school-age are sent to schools in Ndjemena living with and supervised by the eldest of the brothers, i.e. the Colonel.

The household owns 110 camels, two hundred sheep and a small number of goats. About one third of the total animal property of the household is differentiated property in the sense that each animal in this group is owned by one or the other of the brothers. These are either animals that were paid as a *Suddag*, i.e. a religious requirement that a wife must own a specified piece of property at her marriage or those given to the children by their grandfather. The remaining two thirds are "commons" which is used on the need-to-use basis. Of such expenses, i.e. the need-to-use, are what is used during this year to acquire the third wife for the father, i.e. 15 camels, and the expenses of their father going to pilgrimage to Mecca. The two brothers who still did not fulfill their Islamic quote of four wives can use some animals from the "commons" for that purpose in that eventuality. The number which can be taken in such an occasion depends upon consultations between the father and the eldest of the brothers. Also current and recurrent expenses of hospitality, compensations of social nature such as for injury, homicide, adultery, etc., are met from the commons. For the four hired herders who attend the animals on daily basis a payment of 9 to 12 sheep is made on a yearly basis for each.

From a budgetary perspective a constant yearly expense of 48 sheep is incurred as a payment for the herders. Given the other recurrent or contingent expenses, the rate of natural increase must exceed those expenses if the household is to be viable as pastoral household. My observations and the information I got confirms that this is the case. Furthermore, the two brothers in the army make a great contribution by supplying food items from their rations which depresses the need to sell livestock. However, a sizable number of animals are sold each year and the cash is used for expenses in Ndjemena.

The operational responsibility of managing the herds stays fully with the youngest of the brother who is resident in the camp. The father helps in this responsibility. The two other brothers contribute by various means towards the welfare of the household herds and that of the managers in the field. Though they have access to alternative incomes from the army occasionally, either in form of salaries or other material goods, their ultimate economic and social security lies with the household herds. This is due to the fact that army salaries in Chad, like the moody and erratic rainfall of the drylands, are uncertain business although being in the army gives enormous power.

The camp is mobile and flexible and moves to wherever it rains. Last year (1994) in June, this household was camping at Jebel Merf'aeen about 110 kilometers from its present location; on July 1995. As the rainy season began in mid July, the camp was preparing to move further north. If the Juzu plants mushroom in the Teiga plateau this year, the distance to its 1994 dry season camp might become 200 - 300 kilometers. The two brothers in the army keep track of their herds through using army communications and through their physical mobility.

5. IMPLICATIONS FOR THE MANAGEMENT OF DRYLAND PASTORALISM

The system I have sketched above is clearly a non-equilibrium, event-driven system (Behnke, Scoones and Kerven, 1993). It is a system characterized by mobility and flexibility and opportunism as a management practice. Behnke Jr. and Scoones write:

Whether movement is regular and seasonal, contingent or a combination of contingency and regularity, the producer's strategy within non-equilibrium systems is to move livestock

sequentially across a series of environments each of which reaches peak carrying capacity in a different time period. Mobile herds can then move from zone to zone, region to region, avoiding resource scarce periods and exploiting optimal periods in each area they use. (Behnke Jr. and Scoones, 1993: 14-15).

Like Turkana pastoralism, that of the Zaghawa of Biriye described above also, "depends on flexibility, and anything which reduces their flexible response to resources limited in time and space threatens the viability of pastoralism" (Timberlake, 1991:75).

Flexibility reducing things could be political as was the case under the Habre regime wherein the Biriye range was made off-limits *de facto* since remaining pastoralists were politically persecuted, or could be the expansion of industrial agriculture as the Barabaig case in Tanzania or the Hadendawa case of the Gash scheme in the Sudan, or general competition with expanding mechanized schemes as the case of the Rufa'a al Hoi in Sudan (See Abdel Ghaffar M. Ahmed, 1976: 42-62).

Drylands are resource - scarce and pastoralism with its techniques provides excellent ways of managing scarcity. Such systems as described above could be improved but only through the involvement of the pastoralists themselves from the planning phase onwards. Blaming pastoralists for desertification by claims of overstocking, overgrazing and abusing resources do not stand eye to eye with facts. However as Harrison (1987) stated:

The consensus is now shifting. It is now widely accepted that the ranges are surprisingly resilient, and re-establish themselves quickly if they are left alone for a year with decent rain - as happens automatically when drought kills half the animals. (Harrison, 1987: 224-225).

It is my fear that given the relative stability which the Zaghawa area of Biriye is seeing, for the last 5 years, might contribute to the loss of that flexibility and mobility. The Biriye ranges were many times forcibly vacated by the pastoralists during difficult political times. That forcible evacuation was beneficial for the ranges since it gave them time to rest. Mine is only a fear.

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Resource Management in the Eritrean Drylands:

Case Studies From the Central Highlands and the Eastern Lowlands

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1. BACKGROUND

Eritrea is a semi-arid country with an area of about 12.5 million hectares. It has a coast line of about 1000 kms along the western side of the Red Sea. Out of the total land area, 3.2 million hectares (25.6%) are estimated to be suitable for farming of which only 12.5% is under cultivation. According to FAO (1994), 33% of the country, mainly along the coastal plain zone, lies at an elevation of 600m or less and has an annual rainfall of 200 mm or less and is regarded as desert or semi-desert. Some 52.5% of the country has altitudes of 500-1,500 m., two thirds of which receives rainfall between 200-400 mm. FAO (1994) classifies Eritrea into six agro-ecological zones (Fig. 1).

The population of Eritrea is estimated to be about 3 million, 70-80% of whom involved in rural production systems. The rest being urban dwellers or living abroad. The rural population may be classified into four major occupational groups (production systems). These are:

1. Agriculturists (sedentary farmers): These are mainly concentrated in the highlands and mid-altitude levels where the population density is quite high and land is heavily degraded. Though they mainly depend on crop production, livestock is an integral part of the farming system. Oxen are the main source of energy for agricultural operations and donkeys are the main pack animals. Farmers also own sheep, goat, poultry and cattle. There is an out migration of farmers to the less densely populated areas in the lowlands putting more pressure on the pastoral systems. Animal dung is the main source of fuel in this area.

2. Agro-pastoralists: These are mainly found in the eastern and western lowlands. They depend on a mixed crop livestock system of production. They live in permanent home-steads but seasonal movements in search of pastures is common (Woldemichael, 1992). Livestock owned include mainly, goats, sheep, cattle and fewer numbers of camels which are used as pack and draught animals.

3. Pastoralists: These are nomadic or semi-nomadic who rarely practice cultivation. They keep large herds of goats, sheep and camels depending on traditional tribal livestock ownership. The major pastoralist groups in Eritrea are Afar, Saho, Hadendawa or Hidareb, Rashaida and Tigre tribes (all speak the Tigre language). However, these pastoralists are gradually shifting to agro-pastoralism. Their population which was estimated at about 26% during the British Administration in 1994 has dwindled currently to 5% of the rural population (Woldemichael, 1992). The pastoralists live mainly in the Eastern and Western lowlands.

4. Fishermen: These are found in the Southern Eritrean Red Sea coast and in the Dahlak islands, mainly dependent on fishing in the Red Sea for their livelihood. The fishermen population have also dwindled from about 23,000 in the 1950's to a few hundreds at present (FAO, 1994).

The agriculturist, agro-pastoral and pastoral systems all interact and influence each other in a dynamic way toward resource management.

Eritrea had been severely affected by the 30 years of the liberation war and continuous drought. One of the most affected areas was the natural resource management in the Drylands which resulted in the loss of human life, displacement of about one million people, disruption of production systems, intensification of degradation by destruction of trees and bushes and little attention was given then to soil and water conservation in the country. This condition today results in bare condition of the land open for erosion.

However, some of the indirect and positive consequences of the war include the forging of a sense of solidarity and unity particularly among the rural population and the establishment of democratic structures during the war of liberation, called "*Baitos*" at village, district and region levels. These *Baitos* helped the sedentary agriculturists, agro-pastoralists and pastoralist to have a say in their own affairs and to participate in shaping their own future.

This paper is based on field surveys undertaken in South Western Hamassien which lies in the Central highlands and Gahtelay in the Coastal plain and they are taken as case studies for two different ecological zones. The main objective is to illustrate the main methods of adaptation among the various communities in the past and their responses and new mechanisms developed to cope with the changing circumstances brought about by drought, war and modern development.

2. CASE STUDIES

2.1 Gahtelay Region in the Eastern Lowlands

2.1.1 General Description of the Area

Gahtelay is one of the three districts forming the Ghinda Sub-province and constitutes part of the Coastal plain zone. The capital of the region Gahtelay town is situated about 70 kms from Asmara on the Asmara-Massawa road. The area is flat with small mountains and hills on the western part of the escarpment. There are some seasonal streams that flow from the western escarpment of the highlands to the area between June and September carrying rich alluvial soil. The run-off from these streams is used for spate-irrigation in the region. The elevation ranges from 320 to 450 meters, with an annual rainfall of less than 400 mm, mainly between November and February. The average temperature is estimated to be 35 C with a maximum of 45 C in May. The area has a saline soil type. There are five settled villages in the region. The main activities in the area are rain-fed farming, spate-irrigation and pastoralism.

The region had been a war front for a long time which has affected the natural vegetation of the area, specially woody species which was cut to be used for barracks and fuel wood. The war had also affected the population density and distribution and population trends indicate a systematic decrease since mid-1960's. Many took refuge in the neighboring countries and others were displaced internally. At present there is an increase in population as a result of the return of many refugees, from neighboring countries and towns within Eritrea, to their original places. The current population in the settled villages of the region is shown in Table 1 below.

Table 1: Number of Households and Individuals in Gahtelay

Village	No. of Households	No. of Individuals
Adshuma	496	1603
Gahtelay	262	863
Metkel Abet	175	532

Metkel Dukan 274 931

Shabah 254 1264

Total 1461 5193

Source: Ministry of Local Government, Gahtelay sub-district, 1992.

The Gahtelay population is mainly agro-pastoral and as the figure does not include the Tigre pastoralists who come mainly from North Eastern parts of the country to the region between November and May to graze their livestock, the Rashaida pastoralists who come to the region mainly from June to November. The Rashaida are able to exploit larger areas that were not previously open to pastoralists by using their Toyota cars. During the crop growing season, the pastoralists move to more marginal areas.

2.2 Resource Management

2.2.1 Land

Land is an important resource in the region. Although since the proclamation of the Italian colonial administration, land was regarded to be owned by government known as land "*Domeniale*" the villagers regard the land tenure system as village ownership. Each settled villager is entitled to land for farming. In the villages where spate-irrigation is developed, each family in the village is entitled to a piece of land that is allocated by the village council (*Baito*). The spate-irrigated areas are developed through joint efforts of the villagers. The Eritrean Popular Liberation Front (EPLF) introduced land reform measures in the early seventies to abolish the traditional dominance of the land lords and so an equitable distribution of land was introduced since then. The democratically elected "*Baitos*" look after the land. *Baitos* is a Village Assembly/Council which is composed of democratically elected committees that are responsible for the whole affairs of the village. The whole system runs smoothly and no administrative vacuum has been created by abolishing the traditional land lord leadership. The pastoralist groups in the region are more free to move their livestock to the area by December when the growing season is over. During the cropping season (September to December) they move to more marginal areas.

2.2.2 Water

As an arid region, water is a strategic resource and is treated likewise. The area benefits from the two systems (seasons) of water supply; first is the run-off from the highlands between June and September which is the highlands' rainy season, when run-off is used for irrigation, and the second is the rainy season in the area itself from November to February which is another source of water.

Spate irrigation was introduced in the Eastern lowlands of Wekiro area about 80-90 years ago. It is believed that it was introduced by Saudi and Yemeni farmers. It was gradually introduced to Sheib area and later to Shebah and Metkel Abiet. In the other villages of Gahtelay spate-irrigation is a new phenomenon that was recently introduced by the EPLF. The whole community effort concentrates on diverting floods, reinforcing the embankments, and irrigating the fields from April to September. As this period is excessively hot, women, children and livestock migrate to upland areas, while men remain behind working on shift basis to irrigate the fields. Crop growth later depends on the residual moisture conserved in the fields.

There are also other indigenous water conservation practices. After irrigating the land, it is furrowed by the help of traditional ox-drawn plough. It is again irrigated so that it accumulates more water in the furrows. The furrows are then covered by pulling wood over the furrow using oxen, thus water can be conserved for at least two months with the minimum evapo-transpiration.

Water sources for home and livestock consumption are mainly wells, reservoirs and streams. The water supply is not very adequate as most sources (wells and streams) dry up very soon after the rainy season (from April onwards).

2.2.3 Natural Vegetation

The dominant species in the area *Acacia* species. There are *Monoica* species near the coast. The *Monoica* species are particularly valued by the Rashaida pastoralists as camel feed. The Rashaida claim that these species are fast disappearing due to expansion of spate-irrigated fields. This encroachment on the traditional grazing areas is endangering camel pastoralism. Trees are not very much utilized for house construction. However, the houses are constructed by few tree branches and crop stalks (maize/sorghum) to make the houses well ventilated during the hot and dry environment of the region. Thus the use of trees for house construction is minimum.

The vegetation belongs to the community. There is no private rights or individual ownership of trees by farmers. Trees are cleared from spate-irrigated fields because they are believed to attract birds. In areas where spate-irrigation is not practiced, few trees are left purposely in the fields by farmers for animal browsing, shade and the improvement of fertility as a result of the fall on the ground of the decomposed leaves and pods.

The "*Baitos*", the local administrative body, also looks after the trees. People who illegally cut trees are punished either by paying fines or performing heavy work. The type of punishment depends on the type and stage of development of the trees that were cut.

2.2.4 Energy

Wood is utilized for fuel in some villages. The firewood situation is much better compared to the highlands. There is a plenty of fire wood because farmers do not utilize trees for house construction and the cooking habits do not require much wood is not used for fire (Azbeha et. al., 1995).

Cow dung is not collected and dried up for fuel like in the highlands. Cow dung is used as a fertilizer in the rain fed areas where soil fertility is believed to be low but not in the spate-irrigated fields where farmers are aware that the soil is sufficiently fertile. They also believe that the soil is saline and, due to the excessive heat, the cow dung burns the soil and so is not useful as a fertilizer. Kerosine is also used for lighting houses.

2.2.5 Crops and Cropping Systems

The major crops grown in the area are sorghum (*Sorghum vulgare*) and maize (*Zea mays*) for food, while cash crops grown include water melon and ground nuts. The yield level for sorghum and maize is generally low (Table 2).

Table 2: The Major Crops Grown and the Yield in qt/ha.

Crops	Yields qt/ha
Maize	28-32
Sorghum	04-12
Pepper	12-20
Ground nuts	06-80

Source: Azbeha et al., 1995.

The cropping strategies applied by farmers in order to increase yields include the following:

1. Through spate-irrigation the fertile "*gerii*" alluvial soil is introduced to the fields which increases the productivity of the soil. Thus organic manure is not applied.

2. Practicing crop rotation. The rotation cycle being sorghum-pepper, maize, tomato, water melon-sorghum.

3. Crop varieties: Different crop varieties are used including:

- **Sorghum:** The main variety being "*Hijeri*" which is believed to give higher yields under irrigation.

- **Maize:** The main varieties are "*Berih*" which is heat resistant and matures within 4-5 months, and "*Wedi lebab*" which is also an early maturing cultivar and dwarf, usually grown as an emergency crop whenever other varieties fail.

4. Row planting application in irrigated fields

5. Stone mulching is a very useful traditional method practiced by the farmers to stabilize the soil and control erosion. Big stones are removed whereas small stones are left on the field purposely to prevent top soil from being removed.

2.2.6 Livestock

The agro-pastoralists and pastoralists in the area own different types of animals such as goats, sheep, cattle, camels and poultry. The possession of different types of animals is in itself a form of risk aversion. Livestock is used for food, ploughing and source of case.

During the 1960's and 1970's cattle was the most dominant in terms of numbers raised. Currently the dominant ones are goats for all pastoralists groups including the Rashaida who used to raise only camels in the past. Due to the war, people were displaced and large numbers of livestock were killed as they were regarded as targets by the Ethiopian army. Many of the Tigre pastoralists in the eastern Lowlands (including the study area) have shifted to agro-pastoralism during the last hundred years. Table 3 below shows the number of livestock in the settled villages of the region.

The grazing areas of Gahtelay district are also open and freely accessible to other migrating pastoralist groups. At times of feed shortage, animals are taken to other regions including the highlands normally

from June to September. The Eastern lowlands (including the study area) attract large numbers of livestock from other parts of Eritrea between November and April when water is available in the area.

Table 3. The Number of Livestock in Settled

Villages of the Study Area

Type Number

Cattle (Oxen) 2110

Sheep and goats 3830

Equine 663

Camels 440

Poultry 272

Source: Ministry of Local Government,

Gahtelay sub district, 1992.

2.3 Interaction with the Highlands

There is a close interaction between the agro-pastoralists in the eastern lowlands and the farmers of the highlands. Cattle of the highland farmers graze in the lowlands. Many of the agro-pastoralists have small plots of land in the upland areas which they cultivate during the highlands' rainy season. They also migrate to the upland areas with their livestock when the lowlands are excessively hot. This mutual beneficial exchange is solidly built on economic rationale.

3.2 South Western Hamassein

3.2.1 General Description of the Area

South western Hamassien, south-west of Asmara, is a farming zone with a total area of 1155km². The temperature of the area ranges from a minimum of 5o c in December\January and a maximum of 30o c in the month of May.

The study area has an altitude that ranges from 1900-2300m. Its topography is rugged with plateaus, hills, valleys and very small flat plains. The soils are generally stony. The major types of the soil texture are sandy loam, loam and silty loam. The pH surface soil indicates that the soils are generally neutral to alkaline with low organic matter content and nitrogen. The area has two patterns of rainfall which are known as short and main rainy seasons. The short rainy season is from March to May and the main rainy season starts in June with the highest rainfall being in July and August with an average of 500mm per annum.

South Western Hamassien is semi-arid with low rainfall that has been settled as farmers who grow crops and raise animals for a long time. There is a high land degradation in the area and today the area is generally of low productivity.

The total population of the region is about 42,185 with a population density of 37 persons per km².

3.3 Natural Resource Utilization

Farmers use different resource management strategies to enable them to survive in this harsh environment (Adugna et al., 1995).

3.3.1 Land

The land tenure system is known as "*Diesa*" in which land is commonly owned by the villages. Land is redistributed every 7 years by the village "*Baito*". There are sub-committees for land distribution based on soil types (soil fertility). Every farmer gets piece of land from each soil type. The number of parcels depends on the area of arable land available in the village and the number of household per village. Each household on average owns about 5 "*tsmid*" (1 to 1.5 hectares) of land. There is a village owned land for grazing, afforestation, school etc.. At present the land tenure has been changed by government proclamation Article No. 58/1994. According to the new proclamation land belongs to the government where by every Eritrean above 18 years old has the right to use land for farming, pasture or other purposes.

In the study area there is an acute shortage of land due to population pressure and the suitability of most of its land for agriculture or animal grazing. They are highly degraded and infertile. To increase the land productivity farmers use animal manure, keep the land fallow for one or two seasons and practice soil and water conservation to minimize erosion or degradation of fertility.

Farming has been practiced in the area for centuries that has resulted in land degradation. Most of the areas are bare with very shallow soil that has poor water holding capacity and is barely suitable for crop production. Farmers believe that soil erosion by running water is the main form of erosion affecting the area.

To minimize erosion, terraces are constructed on hill sides to protect the soil and enhance infiltration rate which increases the water table. Earth and stone bands are constructed on cropped land to reduce soil erosion and conserve moisture in the soil. In areas where the soils is shallow, stone bands are constructed on hills, valleys and farm lands.

3.2.2 Natural Vegetation

It is believed that, the study area some 100 years back was covered by a dense forest that consisted of several tree species including *Olea africana*, *Acacia spp.*, *Euclea shiarper*, *Rhus natalensis*. However, after the advent of the Italians (late 18th century) the vegetation cover was decreased leaving behind scattered trees from original vegetation around few holy places. The main causes for this disappearance of trees are the war, drought, uses for construction, tool making, fuel wood and charcoal production and the clearance for agricultural expansion (See table 4).

Table 4: Farmers Responses to Trees Disappearance

Cause % respondents

Drought 25.00

Wood for fuel 22.00

Construction 22.00

War 21.00

Expansion of farm land 10.00

Source: Adugna et al. (1995).

Besides, the frequent famines that were caused by locust invasions also resulted in heavy clearance of vegetation by farmers to produce charcoal and sell it to buy food grains.

To restore the vegetation, now an afforestation programme is going on where trees are planted on the hill sides through the Food for Work Program (FWP). The most important tree planted is Eucalyptus. However, area closure (protection) was indicated by the farmers to be preferable than planting trees.

3.2.3 Energy

The area is devoid of vegetation due to the above mentioned causes, which indicates the extent of fuel shortage in the area at present. The major source of energy in the area is wood, animal dung kerosine and crop residues (Table 5).

As shown in the table fire wood is the major source of fuel. There are sophisticated management strategies to make use of the scarce vegetation resource in a balanced manner. Farmers are permitted to gather fire wood from the village owned vegetation twice a year for home consumption. Besides, whenever there are ceremonies and holidays they are permitted to take additional fire wood the volume of which is specified in definite donkey loads. Cattle dung is collected from animal barns and fields and dried to be used for fuel. In recent years, kerosine has been introduced by the government to reduce dependence on fuel wood. Farmers surveyed reported that there is a critical shortage of fuel in the area and that other alternative sources are critically needed.

Table 5: Percentage Distribution of Households

According to the Type of Energy Used

Source of energy % of respondents

Wood 38.0

Dung 32.0

Kerosine 22.0

Crop residue 8.0

Source: Adugna et al. (1995)

3.2.4 Water

Rain is the main source of water in the area and it is the only source for the small dams, ponds and recharge of wells. There are no permanent streams in the area. Each village has its own well and or ponds and some villages have small dams that are used for drinking water and growing vegetables in the down stream areas. The problem of water shortage is very severe in most of the villages and during the dry season and low rainfall years (drought), farmers and their animals have to travel 5 to 10 km every day to fetch water for human or livestock consumption.

3.2.5 Crops and Cropping Patterns

A wide range of crops are grown in the highlands. The major ones are shown in Table (6).

As indicated in the table the majority of the farmers grow barley because it is a quick maturing so that they can get harvest before the rains stop. They also believe that barley tolerates adverse climatic conditions and it provides fodder for livestock. Farmers also grow *grasspea* in case of drought because it is tolerant to rainfall shortage.

Land preparation for most crops starts in January right after harvesting the crops in December. Land preparation is done 2-4 times for moisture conservation, good aeration and weed control. Farmers practice dry planting that starts in April for early crops and June in case of late of rainfall. This is done to get enough moisture for their crops.

Table 6: Major Crops Grown in the Study Area (a sample)

Crop	Scientific name	% of farmers
Barley	<i>Hordeum vulgare</i>	87
Wheat	<i>Triticum spp.</i>	53
Taf	<i>Eragrostis taf</i>	55
Faba bean	<i>Vicia faba</i>	18
Dagussa	<i>Vicia faba</i>	34
Maize	<i>Eleusine caracona</i>	60
Potato	<i>Solanum indicum</i>	20

Source: Adugna et al., 1995.

About 42% of the farmers in Souyh Western Hamassein area grow mixed crops and the common combinations are are "*hanfez*" (mixture of barley and wheat), sorghum and millet, "*wahrer*" maize and beans, sorghum and beans, sorghum and maize, faba bean and field pea.

The major reasons for mixed cropping are:-

1. to get higher yield per unit area
2. to minimize the risk associated with monocropping by providing insurance against drought, diseases and other hazards;
3. to obtain two types of crops from the same land: one crop acts as support for the other i.e. maximum efficiency in using the land.

Farmers also practice crop rotation in the area. According to farmers rotation helps to:

- a. maintain soil fertility
- b. minimize the incident of insects and diseases and
- c. improve the yield and increase the soil moisture reserves

The common crop rotations practiced in the area are:

- a. Barley> barley> barley> fallow or pulse
- b. Chickpea or grass pea> barley> taf or fallow
- c. Faba bean> barley> taf

3.2.6 Livestock

Livestock is an important component of the farming systems in the area. About 80% of the interviewed farmers reported that they own livestock. The major types of livestock in the area are cattle, sheep, goat and donkeys which is also a form of risk reduction.

The area was at one time well known for livestock production. The major reason for the decline of livestock population are continuous drought, lack of feed and diseases. Today the herd size per household is very small ranging from zero to one. Most of the farmers own only one ox and very few have 1 to 3 cows for milking.

Animal feed is a major constraint to livestock production and productivity in the study area. This is mainly due to drought, overgrazing and the acute shortage of grazing land which limits the livestock numbers.

In every village, enclosures of grazing areas "*hizaty*" are reserved mainly for oxen. The management of this scarce resource is so sophisticated that only injured animals or newly calved ones are allowed to graze and only for specific periods.

Oxen are allowed to graze daily whether they plough or not, whereas the other animals are excluded until the onset of the main rainy season in June. It becomes free for all types of animals between the end of June and early August after which it will be closed again for all animals other than oxen.

The study area with its relatively high population density and degraded land represents the situation in farming communities in the Central highlands. Farmers are migrating to the less densely populated lowlands which has been traditionally grazing areas for pastoralists. This puts more pressure on the pastoral areas.

4. CONCLUSION: THE FUTURE

Eritrean pastoralists, agro-pastoralists and farmers have developed resource management strategies to enable them to survive in the harsh environment of the dry lands.

The government pursues participatory policies in its development efforts that are targeted towards the rural population. Since liberation large number of schools, clinics, wells and feeder roads have been built in rural areas. There has been massive reconstruction efforts to rehabilitate the environment through popular participation. Elementary education is encouraged to be studied in the mother tongue. Radio programmes are broadcasted in local languages. These efforts are directed at improving the livelihood of the rural poor. It is clear that, in recognition of the limits set by natural conditions and as indicated by the services it provided, the government favors the settlement of pastoralists but this is done in close coordination with them. Pastoralists in Eritrea are not as marginalized as other pastoral groups in Africa (Omer, 1993).

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Survival Strategies in the Ethiopian Drylands:

The Case of the Afar Pastoralists of the

Awash Valley

Ali Said Yesuf

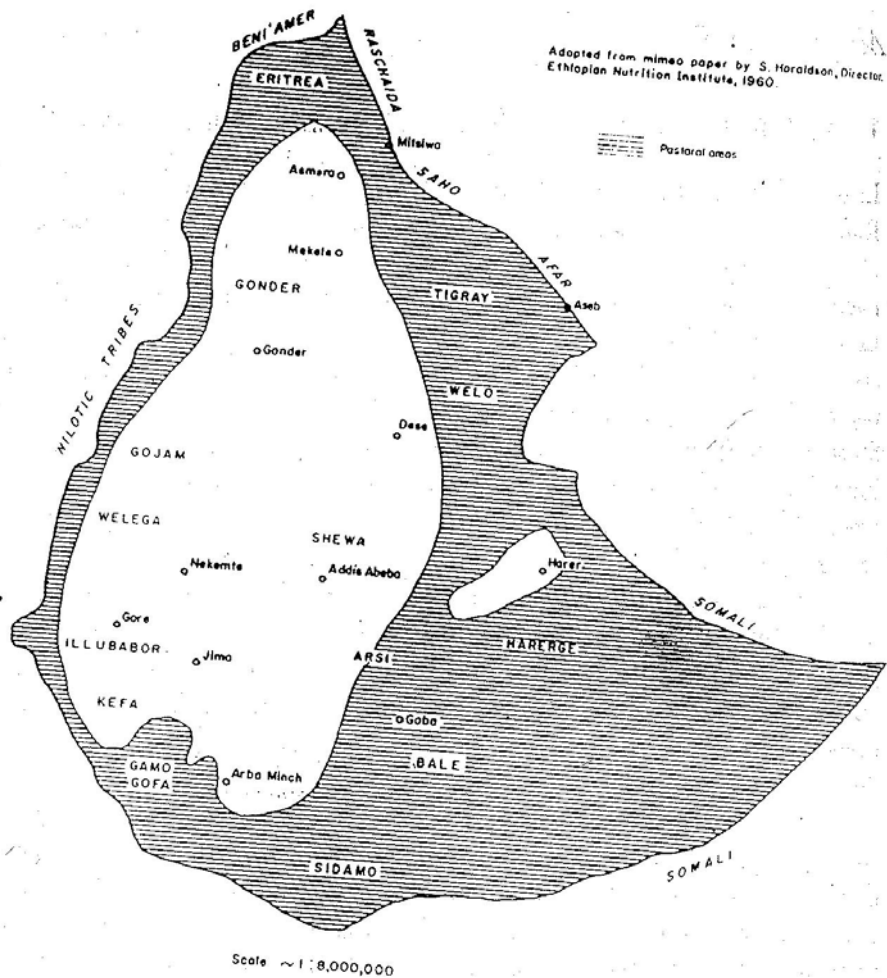
1. THE MAIN FEATURES OF THE ETHIOPIAN LOWLANDS

Lowlands constitute about 60 per cent of the total surface area in Ethiopia. Rain fall in these areas ranges from 300/400 mm in the lowland areas to 600/700 mm in the more higher land areas. Pastoralists and agro pastoralists are major inhabitants of the Ethiopian lowlands. There are more than 15 pastoral ethnic groups in Ethiopia (over 5 million) constituting roughly 10 per cent of the total population. The major pastoral groups are Somali, Boran and Afar living in the South East, Southern and North east rangelands respectively. Other smaller groups include: Hamar, Arbore and Dassanetch in the South-West; Neur in the west; Arsi, Kereyu and Bale Agro pastoralists in the central and south-eastern parts (Fig. 1).

Pastoral areas in Ethiopia are characterized by extreme variability and unreliability of rainfall both between different years and between different places in the same year, scarcity and seasonal variability of vegetation, and vulnerability to drought and erosion. Rainfed agriculture is hardly possible in most pastoral areas, but there are potentials for irrigation development and water harvesting.

Livestock rearing is the major economic activity among pastoralists in the Ethiopian lowlands. The pastoral nomadic sector raises about 40% of cattle, 75% of goats, 25% of sheep, 20% of equine and 100% of the Camels stock in the country (UNDP/RRC, 1984). Livestock and livestock products (live animals, hides and skins) are the second largest foreign exchange earner to the nation, next to coffee.

Fig. 1: Pastoral Areas in Ethiopia



The pastoral and agro-pastoral groups in Ethiopia are facing different problems both from internal and external sources, the major ones being; the contraction and depletion of the resource base mainly due to expansion of agriculture, low herd productivity and widespread animal disease, poor socio-economic services like infrastructure, health, education etc., prevalence of drought, population growth, and the break down of traditional institutions in addition to other socio-political constraints. Moreover, the pastoral sector, regardless of its present contribution to the national economy, its future potential has been overlooked in development planning in the past and hence the system has been rendered unsustainable.

1.1 The Awash Valley

Awash river is the longest in Ethiopia, creating a valley approximately 10% of the country's land area. About 70,000 sq. km. (58.3% of the valley area) is effectively drained by the river. About 60,000 ha of land has been put under irrigation in the Awash valley (large irrigation schemes) (Halcorow, 1990). The Awash river and its tributaries are the only sources of water for almost all Afar and Kereyu livestock and to the Issa herds during the dry season. The flood plains also used to be the main dry season grazing reserve for the Afar and Kereyu herds.

The soil in Awash valley is varying in nature and consist of alluvial black clays and alluvial brown soils in the irrigated schemes' area in addition to alluvial river levees, gravel fans, gravel out washed plains, acid lava and basalt types (MAS, 1991).

The natural vegetation is dominated by deciduous Acacia bushland, which is most developed along the flood plains of Awash river. Vegetation on dry sites varies from closed dry thicket to open shrublands, with occasional scattered trees, to grassy plains with no woody vegetation at all. Dominant grass species include *chrysopogen aucheri*, *Adropogen spp.* and *Aristida spp.*

The Afar pastorlists are the dominant inhabitants in the Awash valley occupying the middle and lower parts of the valley. The upper part is inhabited by highlanders, and towards the middle by Kereyu pastoralists. The Issa pastoral groups, a sub clan of Hashiya tribe in Somaliland, to the east of Afar region, are increasingly becoming inhabitant in the Middle Awash Valley often competing with Afar pastoralists, the original inhabitants.

1.2 The Afar

The Afar people inhabit the North-eastern rangelands of Ethiopia, Eritrea and Djibouti. In Ethiopia the Afar occupy the largest area of the Awash valley. There is hardly any data on Afar population to date. Estimates of Afar population in Ethiopia varied from 400,000 (Ayele, 1986) to 4.5 million (Alimirah, 1993). However, this later figure seems to be very much exaggerated, since the whole pastoral population is estimated at around 5 million. The Afar economy is based primarily on pastoralism and they raize cattle, camel, sheep and goats. Like any pastoral community, livestock are the back bone of the Afar economy as well as cultural value in their own right.

The marginal nature of the environment of the Afar region and some other external forces have imposed certain constraints on livestock production and human survival. The encroachment on their land by irrigation schemes, increase in human and livestock population and the severe and recurrent droughts have all brought the Afar pastoralism to a crises state.

The following sections of the paper will highlight some of the major adoptive strategies the Afar developed in order to withstand the harsh environment and there responses to the external pressures imposed up on them.

2. LIVESTOCK AND GRAZING RESOURCE MANAGEMENT

2.1 Herd Diversification

Afar animal stocks are diversified and include a combination of cattle, camel and small stocks. Herd diversification is one of the adaptive strategies among pastoral groups against risks of drought and disease. Diversification also helps in maintaining the balance between the fodder supply of the rangelands and the livestock feed requirements as different animals have different niche specialization. Another reason for diversification is the substitutability and complementarity of the different herd species in terms of products, growth rates and functions. Table 1 below illustrates the level of herd diversification among the Afar of the middle Awash valley.

Table 1: Average Household Livestock Holding Among the Middle Awash by Species Type (A Sample)

Species	Number	%
Cattle	15.8	38.5
Camel	3.8	9.2
Sheep and goats	21.2	51.6
Equine	0.3	0.7
Total		100.0

Source: Ali (1992).

As shown on the table the Afar keep all species of livestock so that the household's requirement for food and cash is met by the herd. Besides, the combination of browsers and gazers allow for a more efficient utilization of the range resources.

2.2 Herd Management

The herding unit among the Afar is based on patrilineal extended family which may be settled in several different camps. Heading tasks are divided between various members of the household. Cattle and camel are herded by older boys and younger men while goats, sheep and lactating cows are herded by women, young boys and girls. Dividing herds into different camps, splitting them and combining them according to labor and resource situation is used as a production strategy. The herd is split in three groups; dry cows, heifers and a few males are kept in distant pasture further away from camp sites, while milking cows are kept around the camp so that they can be fed cut grasses from river banks and irrigation canal banks, and unweaned calves are kept around the homestead away from their mothers during the day time. Camel are usually taken to a distant place for up to five weeks.

The head of the management unit, either father or older brother, takes most strategic management decisions which include decisions relating to the movement of camps, the deployment of household members in different camps, allocation of lactating animals to different wives, borrowing, lending or slaughter of animals. Some husbandry decisions, however, are made by wives, particularly those relating to milk production. Besides, while the selling of animals, especially cattle and camels, depends on the consent of the local community, the selling of small stocks is the sole decision of the owner.

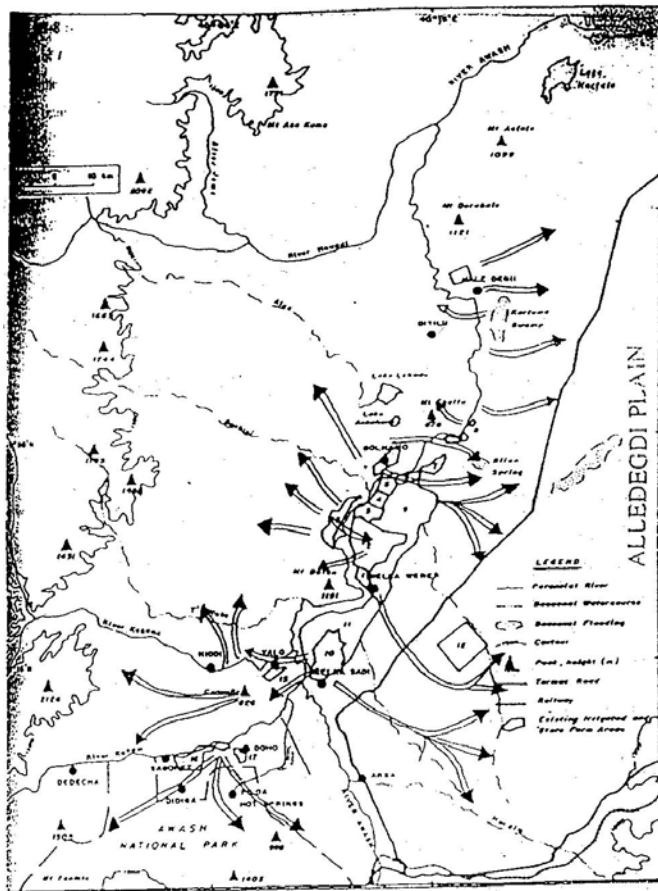
Herd growth among the Afar tend to be opportunistic instead of conservative by preferring to keep as many animals as possible. The Afar believe that the larger the herd size the better is the chance of getting animal surviving the frequent droughts. From interviews of 94 Afar households in the Middle Awash valley it was found that a household on average needs to keep 27 camels, 41 cattle and 80 small stocks to remain viable or to support the household's need for food and cash, and to be able to recover the herd after drought and other disasters (Ali, 1992).

2.3 Livestock Movement

Because of the variability of rainfall and therefore natural grazing, a degree of nomadism is enforced on the Afar pastoralists which, in fact, became a characteristic feature of their production strategy. The livestock movement and grazing pattern is governed by the availability of water and pasture in the rangelands which intern is a function of climate. The Afar traditional grazing pattern runs between the dry season sites and wet season sites, i.e. from the river bank through the flood plain to the hills and the

extensive wet season grazing land (Fig. 2). The Afar utilize the areas close to Awash river bank during the dry season (December to June) and move with their portable reed huts and cattle to the escarpments during the rainy season (July-October) to exploit fresh pasture growth of the wet season grazing.

Another reason for livestock and human movement, in addition to the search for forage and water, is also to avoid harmful insects such as ticks, mites, biting flies and mosquitos. In recent years, however, the grazing area available to Afar has seen reduced to such a degree that all seasons are mostly spent in the wet season grazing land mainly because of the dispossession of the Afar dry season retreats along the flood plains of the Awash river for large scale commercial farming.



→ Direction of livestock movement

Source: Adapted from Mac Donalds, 1987 and MAS, 1991.

2.4 Grazing Land Management

Although all land including pastoral land is declared a state property in Ethiopia, in practice traditional land tenure is what governs access to grazing areas among the Afar. Access to grazing is based upon clan control of grazing areas while control of wells was maintained by lineage and individuals in all parts of Afar land.

In the Lower Awash, Afar pastoralists had a political structure which organizes access to water, farm land and grazing areas through a centralized system of cattle and forest managers (*Malokti*, sin. *Malak*)

appointed by the Sultanate of Awssa (Gamaladin, 1987). Grazing land in the Middle Awash is a common property of all the clans inhabiting the area. Various clans cooperate among themselves in watering their stocks and in its protection against outside threat. Access to water and grazing in the Middle Awash, in fact, matters more than ownership.

Traditionally the Afar also had rules and regulations for the utilization of important trees like *Acacia tortilis* whose protein rich seed pods provide an important feed supplement to livestock in dry seasons. Cutting of such trees requires prior permission from the clan elder.

With the growth of human population and increasing encroachment on Afar land by cultivators and rival pastoral groups, such as the Issa, the customary laws of grazing and water resource management are under attack. As a result, there are occasional fighting among different Afar clans and between the Afar and other groups because of competition for grazing and water resources.

2.5 Mutual Aid and Stock Alliance Among the Afar

Another survival strategy which enables Afar pastoralists to survive in their environment is the traditional institutionalized mutual aid associations and stock alliances between different members of the group. The various mutual-aid mechanisms help new or destitute households establish their own herds or rebuild them after an unexpected disaster that decimates the stock. Ayele (1986) has identified a number of mutual-aid and stock-alliance mechanisms that represent a form of adaptation which enabled Afar survive in the hostile environment they inhabit and which are reinforced with the principles of the local community. These include:

1. *Hantilla*: lactating animals given as a free loan to a destitute household so that it consumes the milk;
2. *irbu*: those Afar who lost their animals due to epidemics or raids, do not consider themselves as beggars when they go asking for animals;
3. *gera hara*: an individual asks his local community to give him animals in order to buy fire arms;
4. *hula hara*: an individual asks his local community animal to slaughter when his wife gives birth.
5. *digibi hara*: small stock usually requested for slaughter during wedding.
6. *medili hara*: animals begged for a sick man consumption;
7. *rebey hara*: animals begged for slaughter at a burial ceremony; and
8. *zeka*: islamic alms payment to poor households.

There is also a stock alliance between different individuals. One may give animals to an ally to be reciprocated at another time. The quality and quantity to be reciprocated is not necessarily of the same type.

2.6 Reciprocal Arrangements with Cultivators

Traditionally the Afar used to have arrangements with cultivators, particularly lowland Oromo cultivators, that include:

1. Cultivators providing grazing rights on crop residues in return to fertilization of their field with dung and animal loans for ploughing or threshing of crop.
2. Afar renting of animals, specially oxen, to Oromo cultivators and trading with them.
3. lowland farmers grazing their animals on Afar rangelands.
4. Afar acting as herdsmen for cultivators in return for milk consumption and calf sharing.

However, recently those types of reciprocal arrangements between Afar and neighboring cultivators are being undermined because of the border conflicts that resulted from the encroachment of cultivation into Afar territory and the increasing livestock and human population that put more pressure on the available land.

3. DROUGHT AND COPPING MECHANISMS

Drought is a recurrent phenomenon in the Awash Valley. The Afar land has been hit by severe droughts five times within the last four decades; in 1958, 1964, 1966, 1973/74 and 1983/84 (Wood, 1977; Pankhurst, 1986). Evidence suggests that the famines of the 1970s and 1980s were not caused entirely by the failure of rains, but it was aggravated by dispossession of the dry and drought season grazing lands, dam construction and enclosure of vast area of land for National Park, devegetation and degradation of rangelands and direct trade and entitlement failures among Afar pastoralists (Kloos, 1982; Timberlake, 1985; Gamaladin, 1987).

The impact of the successive droughts had been the massive loss of human lives and livestock, change in the macro-ecology, aggravation of inter and intra-ethnic conflicts, destruction of the social structure, and change in the attitudes towards life, i.e. loss of confidence in pastoral way of life. Following a drought, rangelands deteriorate and annual grasses diminish and bushes encroach rangelands. Such phenomenon had forced Afar pastoralists to change their livestock composition from more grazers and less browsers in to more browsers and less grazers. (i.e. from more cattle & sheep to more camels and goats).

Other coping mechanisms during drought include: intensified gathering of wild plants, hunting, sale of animals and purchase of grain, raiding, migration, sale of firewood and charcoal, increased farm labor employment and sale of handicrafts and contraband trade. When there is a prolonged drought, calves are slaughtered to save the mothers and *Acacia nilotica* and *Acacia tortilis* trees are lopped and pods are fed to livestock. The mutual-aid and stock- alliance mechanisms also help to rebuild the herd of families who totally lost their animals during droughts.

Such strategies as changing herd composition, off-pastoral activities, migration and Acacia pod lopping etc., are survival strategy mechanisms that Afar pursue in order to cope the devastating effects of drought which frequently struck the region.

4. STATE POLICY AND AFAR RESPONSE

4.1 Establishment of State Farms in the Afar Region

The ill-conceived agricultural development policies pursued by the previous governments that aimed at the establishment of large scale commercial farms in the Awash Valley and the refusal to recognize the land rights of the Afar have had severe impact on the Afar and their production system. Vast area of dry season grazing land in the Awash Valley were granted to private and government enterprises without any compensation to the Afar since the 1960s.

A total of 70,000 ha of the dry season grazing land in the Awash Valley has been put under irrigation. In the Middle Awash alone some 23,000 ha of dry season grazing has been taken up by large scale state cotton farms and settlements while some 29,000 ha of wet season Afar grazing has been alienated for the National Park and Animal Holding Center in 1991. A recent study of the Middle Awash estimated that the dry and wet season Afar grazing lands lost to the State cotton farms, the National Park and Animal Holding Center would have supported 17,550 Tropical Livestock Units (TLUs) permanently under traditional Afar system of livestock production (Ali, 1994).

Loss of such large magnitude of critical grazing lands has had numerous detrimental effects on Afar life and their production system. The major effects being:

1. grazing land loss led to overstocking on the remaining rangeland and the eventual range degradation;
2. dislocation of people from their home places which disrupted the traditional social and resource utilization systems that evolved through centuries of adaptation to the ecosystem;
3. intensification of the inter and intra-ethnic conflicts resulting from competition for grazing and water resources and confrontations between Afar and state farm workers that created a feeling of bitterness among Afar towards the state;
4. clearing of the riverain forests along the river that led to ecological imbalance, rising soil salinity and sodicity due to faulty irrigation water management;
5. the negative impact on the health of Afar and their animals caused by chemicals used for the cotton farms; and
6. aggravation of the effects of drought.

Furthermore, the nationalization of rural land by the Dergue regime in 1975 exacerbated the Afar militancy which eventually led to the formation of Afar Liberation Front (ALF). Notwithstanding the geo-political and economic importance of their land, the Afar have been excluded from the mainstream Ethiopian development in the past. As result, the Afar representation in the socio-economic and political machinery of the state was limited. That constant marginalization of Afar pastoralists coupled with the internal and external problems like population growth, drought, etc. posed a real threat to the sustainability of Afar pastoral production system.

4.2 The Policy of Decentralization

Some change have taken place in Awash after the overthrow of the Dergue regime in 1991. The first drastic measure that has been taken by the Transitional Government of Ethiopia (TGE), in order to increase the role of the Afar in the politico-economic affair of the country, was to provide seats for the Afar representatives in the Council of Representatives - the highest political body governing the country. The Afar Liberation Front (ALF) and other political parties catering for the interest of Afar were also recognized and have established offices in Addis Ababa and the Afar Region.

Furthermore, the Afar land is delineated as "Afar Region" or "Region 2" with an autonomous federal status of self government with the objective of empowering the Afar and help them decide on matters concerning their region and their life.

In line with its policy of decentralization, the TGE has returned portion of the state run irrigation schemes to the Afar pastoralists. Some centrally run livestock development and irrigated pasture development projects were also returned to the local Afar government. Whether all these political changes and decentralization measures will bring about the desired improvement of the welfare of the destitute and

poverty stricken Afar pastoralists, depends on the efficacy with which all these measures are translated into action. Nevertheless, such measure represent a major step ahead towards the improvement of the Afar life.

However, care should be taken in implementing these policy measures so that they benefit the poor Afar. It has been observed that part of the returned farms were not cultivated and bushes were found to have invaded some farms, damaging the irrigation structures in the Middle Awash. Such a transfer of economic assets to new owner should be based on careful and meticulous assessment of the capacity of the new owner to run the units on sustainable basis. In addition, a way of distributing the benefit to all groups in an equitable manner should also be seriously considered.

Another recent development in the Awash valley is the increasing involvement of private investment in real estate development. Large scale commercial farm development is underway most of which focus on cotton production. In this regard, care should be taken not to repeat the mistakes that have been committed in the past, i.e. the developments shouldn't displace the poor Afar, the irrigation development should have in-built conservation measures to prevent land degradation and the benefits from such development should accrue to all Afar living in the area on equal bases. Besides, the Afar themselves should take part in all development activities in the region so that they acquire knowledge and skills.

5. CONCLUSION

The Afar pastoral group live in a harsh environment where drought is a common phenomenon. There are also other internal factors (e.g. human and livestock increase, disintegration of social structures, etc..) and external forces (e.g. dispossession of dry season grazing land, displacement of population and erroneous state policies) which undermined the sustainability of the Afar pastoral production system.

The traditional Afar pastoral production system has had various survival strategy mechanisms that were (and probably still are) adaptable to their environment. Herd diversification, livestock migration between dry and wet season grazing land, regulations on the utilization of rangeland, water points and forage trees, mutual aid and stock alliance and various kinds of reciprocal arrangements with cultivators were the main mechanisms that enabled the Afar survive in the marginal environment they occupy.

The recent political and policy changes are assumed to address some of the negative effects of previous state policies along with recognizing the right of the Afar people to autonomy and self-government. However, care should be taken in implementing the new policies so that they improve the life of the poor Afar who has suffered long periods of impoverishment and marginalization.

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State Policy and Pastoral Production Systems:

The Integrated Land Use Plan of

Rawashda Forest, Eastern Sudan¹

Salah El Shazali Ibrahim

INTRODUCTION

The conditions of pastoral nomads in Sudan seem to have become so wretched that the state authorities in Sudan have come to express interest in development of the pastoral sector. Of particular concern is the issue of securing the forage and fodder requirements of herds which touches on land use policies and environmental management. The purpose of this paper is to highlight and discuss some of the challenges that have to be lived up to in recognizing the rights of pastoral nomads to land (ownership and/or use). The paper focuses on the case of Rawashda Forest Reserve in eastern Sudan and seeks to corroborate the view that the major challenge is not simply a matter of drawing and strictly enforcing grazing lines and opening viable nomadic corridors in areas completely taken by mechanized rainfed farming. The formidable challenge for government is rather to adopt a form of integrated land use planning and natural resource (environmental) management that transcend, on the one hand, the limitations inherent in the departmentalized character of government policy and practice and, on the other, constraints imposed by the creation of small states within a federal Sudan.

In addition to this Introduction, the paper consists of five sections. Section One provides a background on the conditions of nomadic pastoral production systems in Gedarif State and the apparent interest expressed by the state in improving their conditions. The section refines the focus of the paper and underlines the main issues that will be discussed. Section Two gives an overview of Rawashda Forest Reserve and its integrated land use plan. Section Three assesses the experience of Rawashda project and highlights its implications for pastoralist. Section Four dwells into the limitations of the Rawashda project, how it not only undermines the interests of pastoralists but also fails to provide a viable model for sustainable environmental management.

THE CONDITIONS OF NOMADIC

PASTORALISM IN EASTERN SUDAN

In 1967 the Sudan Government imported sorghum from the USA to redress the partial crop failure which the then predominantly traditional agricultural sector experienced. The government was put to task for that "food gap", and mounting concern was expressed regarding the need for nation food security. In 1968 the government-owned Agricultural Bank of Sudan (backed by the International Finance Corporation of the World Bank Group) launched an extensive programme of credit to encourage prospective investors to enter the field of mechanized rainfed farming. The same year witnessed the establishment of the Mechanized Farming Corporation (MFC), which was entrusted with demarcating schemes (of 1000-1500 feddans each) for allotment as with supervision of compliance by scheme-operators to set regulations (a task that still remains to be carried out).

Well before the move by the government to actively promote mechanized farming, the suitability of the clay plains of eastern Sudan for mechanized rainfed farming was well known. The area was first opened for mechanized farming in 1944, over a decade before Independence. In the context of World War II, the colonial government sought to utilize the considerable potential of the area to produce food for the British troops in North and East Africa. But investment in the newly found sphere was not forthcoming during that

early period. Investment in cotton production in pump-schemes along the Blue, White and River Niles was evidently a more lucrative investment; entrepreneurs did not consider the apparently risky investment in rainfed farming.

By 1968, the prospects of investment in rainfed farming seemed different. The decline in profitability in cotton schemes had by then already led to massive indebtedness by pump-scheme owners. An obliging government launched an alleged Agricultural Reform Programme whereby the indebted pump-schemes were confiscated and generous compensations were paid to the owners. The prospects of high profit rates in mechanized farming thus started to draw more and more investors and a liberal credit policy provided the initial capital outlays required. The clay plains of eastern Sudan have since come to witness expansion in mechanized rainfed farming and Gedarif area gained popularity for its status as the "granary of Sudan".

The expansion in private rainfed mechanized schemes was parallel to an increased public investment in irrigated schemes in the region (New Halfa in the 1960s, Rahad in the 1970s). By the early 1980s, thus, vast areas of the clay plains were under crop: of the estimated area of seven million feddans in the clay plains, six million were already under crop.

The expansion in mechanized farming in the clay plains of Gedarif did not amount to colonization of uninhabited, vacant land. The plains brought under crop comprise the southern part of a wider Greater Butana, a region characterized by a number of rainfall zones and soil types, which through centuries remained one of the most important livestock production areas in the country¹. The southern part of the Butana usually receives the heaviest rains, reaching 900mm., while the northern most receives below 300mm.

The ecology of the Butana, as of Sudan's central rainlands in general, poses a number of serious constraints to the permanent settlement of pastoralists in any one part of the region. Basic among these constraints are the seasonal fluctuations in the supply of the essential inputs of pastoral production: water and forage which necessitate forms of pastoral movement, varying in distance and duration. In the southern clay plains, the ecological constraints are further exacerbated by adverse wet season conditions. During the rainy season the clayey soil turns into a sticky morass, and biting flies become a severe problem for animals: the area becomes simply uninhabitable for animals. Movement towards the bamy soil open space and insect-free region to the north is thus imperative. But during the hot dry season, starting around March, nomads make their southward trip to the rich pastures in the clay and the permanent water points.

Notwithstanding the limitations of large scale rainfed mechanized farming from social equity and environmental perspectives, the contribution of the sector to the Sudanese economy and food security remains important. Likewise it should not be assumed that every acre brought under crop constituted a cut in the grazing area of pastoral herd. Vast areas of the plains which lacked water sources are not accessible as pasture land, and the expansion of mechanized farming in such areas is not to be regarded as a cut in grazing areas of pastoralists and/or wildlife. The expansion within the grazing area, however, was considerable and catastrophic to nomadic pastoralists, particularly the poorer among them.

Elsewhere (Salah Shazali, 1988; 1992; 1993a; 1993b) I attempted to document aspects of the implications for pastoral production systems of the expansion in mechanized farming in the clay plains of South Kassala (now comprising Gedarif State of federal Sudan). I contended that the expansion did set in motion a slow but consistent process of marginalization of nomads by undermining centuries-old nomadic pastoral adaptations to a predominantly marginal region. The result is a situation in which pasture land is increasingly diminishing in area, nomadic corridors are disrupted; watering points becoming inaccessible; herds are forced to concentrate in small areas with consequent increased (forced) over-grazing and environmental degradation, and conflicts between farmers and pastoralist have continued to proliferate (to the detriment of the latter). I concluded that the marginalization of pastoral nomads in south Kassala, as in Sudan in general, was and continues to be, consequence and

manifestation of a particular configuration of governance (the relation between government and people) in which nomads could not effectively influence government to cater for their needs and interests¹

The Sudan Government used to make gestures which indicate some concern about the conditions of pastoralist but which almost always amounted to no more than lip-service. In January 1994, for example, eastern Sudan witnessed the establishment of the Pastoralist Union, and the President of Sudan addressed it. A Presidential Decree was issued ordering the re-opening of all known nomadic corridors throughout Sudan by January 1995. The Union, however, seems rootless within nomadic communities, and entering into the last quarter of 1995, only in the Blue Nile State (south-eastern Sudan) there seems to be degree of compliance with the Presidential Decree as a few corridors were opened under extreme pressure from the State Wali (Governor). In Gedarif State of eastern Sudan, opening corridors seems to be blocked by a powerful lobby of scheme-owners.

In May 1995, the Federal Ministry of Agriculture, Animal Wealth and Natural Resources, in what can be considered a shift in government relations to pastoralists, and in recognition of the worsening conditions of the country's pastoralists, is currently sponsoring intensive efforts to convene a National Conference on the Development of the Pastoral Sector in Sudan¹. One major outcome of the conference is expected to be recommendations for the promulgation of an act to delineate the grazing areas in the country, thereby simultaneously recognizing the legal rights of pastoralists to pasture lands and strengthening the institutional status of the Range and Pasture Administration (for a long time a marginalized government department). An atmosphere of optimism regarding prospects of improvements in the conditions of pastoral production systems seems to be building up. Task forces are currently engaged in reviewing aspects of the conditions of the "pastoral sector" and enthusiastically seeking to formulate recommendations for solutions and/or improvements to be adopted by the planned conference.

The reasons behind the apparent shift in government-pastoralists relations are a source of speculation if not controversy. It is obvious that the current status of the livestock sector as the leading foreign exchange earner in the Sudanese economy remains an important consideration. But whether the conference is being organized to achieve the empowerment of pastoral nomads, or is simply intended to ensure the continued increased livestock exports is not a question to be answered in this paper. No matter what the real motivations behind the conference idea are, one basic issue to be seriously considered concerns the rights of pastoral nomads to land ownership and use, Reversion to the traditional system of dar (homeland) consolidated by the British colonial government is not tenable given the vast areas brought under crop and which government cannot easily reclaim. Withdrawal of concessions to scheme-operators cannot realistically be expected to go further than what is needed to open viable nomadic corridors and ensure access to watering points. But hoping that corridors will be opened, a vexed question remains as to the destination of nomadic movement.

With reference to the experience of south Kassala, this paper seeks to highlight some of the complexities involved with improving the pasture conditions-complexities that draw attention to a level higher than department re-organization and strengthening: the need for comprehensive integrated landuse planning and sustainable environmental management in Sudan. The current practice of so-called integrated landuse planning, exemplified by its "model" of Rawashda-Wad Kabo Forests in Gedarif State, seems to be little more than a mockery of the concept.

THE RAWASHDA FOREST RESERVE

Before the expansion in mechanized farming in Gedarif State, the clay plains were a rich forest land. With the expansion, however, the area of forest-lands experienced considerable reduction (cf. Table 1).

Table 1: Change in Land Type/use in Gedarif State (1941 - 1991)

Land Type feddans feddans

1941 % 1991 %

Farm Lands 778,050 8.0 6,422,000 72.2

Forest-Woodland 6,977,750 78.5 1,654,900 18.6

Kerrib 321,100 3.6 321,100 3.6

Jebel, Khor, River 3,300 9.2 494,000 5.6

Total 8,892,000 8,892,000

Source: adapted from (M.G.A. Younis cited by Harris, 1994: 6).

The reduction in forest-woodland has adversely affected the local population: the sedentary agro-farmers, the gum tappers and, of course, the nomadic pastoralists. Two adjacent blocks of gazetted (reserve) forests with considerable significance to nomadic pastoralists have, however, escaped thorough clearance: Rawashda and Wad Kabo forests which have an area of around 125,000 feddans.

Rawashda/Wad Kabo forests form an intersection point with three livestock corridors originating from Butana and ending at the borders with Ethiopia in south east of the Gedarif State. With the progressive expansion of mechanized farming in the southern clay plains of the area, the forests represent the only refuge for pastoral nomads on the move between the wet (northern) and dry (southern) grazing areas. They are utilized for at least three months in the year during June-July and October-November.

Rawashda Forest was gazetted in 1960 (Harris, 1994: 6), well before the initial emergence on a large scale of mechanized rainfed farming. It has the status of a National Forest Reserve, and the primary objective in gazetting it was to "safeguard charcoal supplies to distant Khartoum" (FAO, 1989: xi). Besides its "national" (read "Khartoum") importance, however, the reserve has global significance due to its strategic location. According to Yahia El Dool (1994a: 2), the two forests:

still represent the original natural cover characteristic of the area and comprise the last existing forest area in the Dry Savannah left above the 14th degrees North latitude in the whole African Region...The (two) forests are therefore of prime importance from the environmental and genetic biodiversity point of view and hence should be managed and protected on a sustained yield basis.

Though Rawashda has been a success in supply of fuelwood, its management was very poor. No active measures towards conservation and development were carried out throughout the 1960s and 1970s. The Forest Department lacked resources, and contented itself with passive protection. It does not seem a coincidence, however, that concern over the management of Rawashda intensified with the growing concern over global warming. The Forest Department started to be an interesting partner to many donors, became one of the best equipped government units and, within a decade, its institutional status was promoted to a Forest National Administration and, as currently, a Forest National Corporation.

The first step in improving the management of Rawashda came about when the forest was selected in 1983 as a pilot area of the Fuelwood Development for Energy in Sudan Project. Wad Kabo Forest was subsequently incorporated in the project, but with a separate programme.

Forest management became an issue of paramount importance in Sudan as a whole in the aftermath of the drought and famine. With successive years of poor rainfall in the mid-1980s, the pastoral nomads all over central Sudan intensified their reliance on the forests. That process aroused concern at national and international levels regarding forest management. Integrated land use planning was identified as solution to the problems of forest management in the country and international donors came forward with funding for a pilot project. Owing to its significance, Rawashda Forest was selected for Sudan's "first effort at developing and implementing an integrated land use plan. The experience gained in managing this natural woodland savanna will prove invaluable in managing other forests in the Sudan and in the region" (FAO, op.cit.).

In 1987 an integrated forest management project was launched in Rawashda forest. According to FAO (Ibid, p. 11), the main objectives of the plan in its initial five-year phase (1987-1992) were set as follows:

- a) To protect and maintain environmental stability.
- b) To provide forest products mainly fuel-wood, poles and fodder, towards national, regional and local demand.

To reconcile the different local, regional and national demands on the reserve, five "working circles" were instituted in the forest:

1. National Fuelwood Working Circle, comprising 68% of forest area, in which management is geared towards fuelwood/charcoal production for regional/national use;
2. Village Working Circle (13%), intended to meet the demand of a adjacent villages;
3. Hashab (acacia) Working Circle (5%), devoted to gum production;
4. Fodder Working Circle (2%), to be managed for grazing and fodder production; and,
5. Protection Working Circle (12%), comprising all areas liable to gully erosion and in which the management is geared towards protection.

RAWASHADA FOREST PLAN AND THE PASTORAL NOMADS

Implementation of the Rawashda integrated plan seems to have encountered very serious problems due to "trespassing" by pastoralists. The situation is aptly described by Yahya El Dool (1994a):

Protection of the regenerated areas was very costly since guards should be 24 hours per day fully alert. This (is so) because the nomads and their animals enter the forest at any time of the day. Consequently thousands of feddans of regenerated areas were completely destroyed by grazing.

Throughout the five year span of the pilot integrated management plan, FNC staff continued to complain about the "fact" that livestock was entering into almost all parts of the forest and from all directions: "When closely evaluating the past experience it can be concluded that the forest is deteriorating due to overgrazing and illegal feelings and lopping by the nomads".

When the first phase of the pilot project ended in 1992, developments within the larger polity seem to have compromised opportunities for extension or renewal. Donor reluctance to provide funds in a context of undeclared boycott to the Islamic Sudan reduced drastically the infusion of resources to the FNC.

Hard times seem to have begun for FNC¹. Far from continuing its heavy top-down approach, it now shifted to slogans of community participation and management. For Rawashda, reduced funding implied inability to effect policing of the reserve, and over the last 3 years the presence of nomads has tended to intensify.

FNC is now engaged in the formulation of a revised working plan. The strategy of the revision will be based on multi-purpose management and is expected to incorporate grazing as an integral part of the management. According to the official assigned to undertake the revision:

Regeneration of woody species and range improvement will be given utmost priority which will encourage and promote villagers and herdsmen participation in the management of the forests. No restricted area, as in the past plan, will be allotted for a grazing working circle but most of the forest will be opened for grazing (Ibid).

The revised plan will also seek to improve the undergrowth plant species for grazing and rehabilitate the livestock corridors outside the forests with palatable annuals and perennials, which in the long run is expected to release the grazing pressure from the forest. The revision takes note of areas around the forests which are entirely rainfed agriculture and seeks to effectuate the stipulated afforestation of the 10% of agricultural schemes (Ibid). El Dool recapitulates that:

It is clear that R/W forests are deteriorating due to large scale grazing and damage to the newly regenerated areas, excessive browsing and tree lopping. These practices cannot be stopped completely due to the position of R/W forests and therefore have to be reconciled with forest management activities although more cost will be incurred. In fact fodder production and wood production cannot be considered as two mutually exclusive projects. Thus an integrated land use plan application as a sound approach in order to maximize sustained goods and services is vital.

The revision seems to be in line with a national trend towards commercialization within governmental units. Nomads are thus expected to pay grazing fees, and "Other sorts of fees can be paid in the form of land rent for nomads to grow fodder crops... as well as for provision of water through Hafir maintenance of allotting of camping sites" (Ibid). Assessment of the nature and implications of the seeming concessions envisaged by the revised plan to pastoralists need to be carefully undertaken upon actual implementation of the revised plan. However, many reservations (if not objections) to the direction taken in the revision may still be noted. The first reservation concerns the issue of entitlement of nomads to land; the second relates to the probable jeopardization of the mandate of FNC: the protection and development of forests. These two reservations may suffice to draw attention to aspects of (1) the complexities of developing the pastoral sector and; (2) the constraints of planning at departmental (sectoral) levels in relation to sustainable environmental management.

RESERVATIONS ON THE REVISED PLAN

It is recognized by all that the two forests constitute the only refuge for pastoral herds in an extensive surrounding area colonized by mechanized rainfed farming. The operators of the planned mechanized farms pay nominal rent to government; those investing in unplanned schemes (agricultural squatting) do not, although government seeks ways to make them pay to validate their use of the land. The harvested crops are charged dues (zakat and sale tax). The legitimacy of the entitlement of mechanized scheme farmers to land is never questioned.

The same is not true of pastoralists whose entitlement is always challenged and further undermined. The embryonic revised plan seems intent to dismiss, with a stroke of a pen, the remnants of the traditional rights of the inhabitants of the region to graze their herds in areas still amenable to grazing (outside the sacred boundaries of the schemes). Fees are contemplated for grazing, camp site and water. Such fees are apparently expected to be of a magnitude higher than the nominal fees paid by scheme owners to

validate use of very extensive areas (a minimum of 1,000 feddan per scheme). Indeed it has been explicitly stated that opening up the forest for pastoralists will result in increased costs in forest regeneration (Ibid). Payment of grazing fees was of course attempted before, but ended in failure as nomads refused and was terminated. Though FNC may not have the resources to recruit guards, one suspects a situation in which the corporation would resort to tactics already proven by the large schemes: soliciting the support of the regular forces. The revised plan thus seems to be heading towards an intensified confrontation, not a truce, with nomadic pastoralists. The confrontation then would be between, not a department, but a whole government apparatus and nomads. A puzzle that would then require explanation is the justification for the herd tax (which is charged for number of animals owned: sale tax is charged at markets when animals are brought for sale). The whole matter points once more to the issue of governance.

The limitations of a narrow sectoral focus need no elaboration. Even FNC admitted that and sought to adopt and "integrated" management plan. In so far as its planning is actually sectoral (and carried out by only one department-range authorities seem have different views on Rawashda which they regard as a grazing domain in the first place). FNC could not transcend the constraints imposed by its sheer establishment and mandate. When it had to look outside the forest, it could not go beyond the immediate boundaries comprising adjacent farms and its concentration remained on trees (enforcing the 10% afforestation). Given the timing of the presence of nomads in the area (June-August and October-November), which coincides with the agricultural season when no herds are allowed into the farmed area, the whole plan to lessen pressure turns to be red herring. The nomads would continue to fall back on the forest, rather than venture into the schemes before harvest and find themselves liable to high fines. Though the 10% afforestation is desirable, it will not relieve the forest during the agricultural season.

Tackling the problems of Rawashda requires action much further afield, in the Northern and Central Butana to the north. The considerable magnitude of water deficit and the deteriorated range conditions in these distant areas have combined to discourage pastoralists from staying for any length of period there. Nomads now tend to move late in summer to the Butana and return early in winter from it. They delay entry due to the water deficit, and have to be sure that the rains have fallen in quantity before they tread north. They return early, though water may be abundant, due to the deterioration in range. These changes in the timing of movement makes imperative presence around Rawashda, the only refuge, as that timing coincides with the agricultural season.

To mitigate pressure on Rawashda, then, requires a coordinated and synchronized effort to rehabilitate Northern and Central Butana. The donors concerned with Rawashda, however, seem to concentrate on the immediate government unit responsible of it. Pasture rehabilitation for "greens" seem to mean more livestock, more grazing and over-grazing. FNC itself does not have much of coordination with other units- not least the Range and Pasture Administration (which continues to replicate within government the marginalization of pastoralists in the wider polity and economy).

NOTES

1. This paper is based on the results of on-going research carried out under the African Dryland Research Programme, funded by the Norwegian National Committee for Development Research and Education (NUFU) and facilitated by the OSSREA.

2. For more details on the area, see Abu Sin (1995), Galal El-Din El-Tayeb (1985) and Salah Shazali (1993).

3. This apparent inability to influence government should not be taken to denote helplessness and/or passivity on the part of nomadic pastoralists. Pastoralists seem to be active at a number of levels: some are adapting to the system in a way to minimize losses, others are apparently defying the system altogether. For the other type of response, it may suffice to note that all the "hot spots" in the country, those ridden by civil war and/or banditry, are areas inhabited by pastoralists.

4. The conference is planned to be held in the third week of September 1995 at Kosti (capital of White Nile State). A Steering Committee, formed of representatives of various Federal Ministries and Departments, research institutions and NGOs (including the Pastoralist Union) meet weekly to consult on preparations of background papers. The meetings provide a forum for a fruitful dialogue on the predicament of pastoral production systems and the measures needed to rectify the situation.

5. A new Ministry for Environment and Tourism was established a few months ago, into which NFC (which was hoping to become a full-fledge ministry?) was added as one administration.

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The Importance of Forest Resource Management in Eastern Sudan:

The Case of El Rawashda and Wad Kabo

Forest Reserves

Sanaa Ibrahim Gadalla

INTRODUCTION

Wood and woody biomass constitute 80% of the total energy consumed in Sudan. Almost all of the wood used for generation of energy is obtained from forest and woodland of the dry land (Low Rainfall Savanna). As a result of population growth and increased energy consumption, forests and woodlands are being fast depleted. The UNDP/World Bank Forestry Sector Review of 1986 stated that the woodlands of Northern Sudan (dry lands) decreased from 103.6 million hectares to 33 million hectares within 40 years. The forests were depleted at an average rate of 1.57 million hectares/annum.

The removal of the vegetation cover at such a high rate has adversely affected the ecological equilibrium and has been one of the main factors in the magnification of the desertification process. The droughts of the 1970's and 1980's have also had a significant negative effect on the woody vegetation of arid lands. Being the only remaining renewable production system to survive the drought, the local population have turned to trees for an alternative source of income and as fodder for their livestock. Thus, the combination of increased population pressure, agricultural encroachment and overgrazing invariably leads to environmental degradation of arid and semi-arid lands.

The Rawashda and Wad Kabo forests reserves of eastern Sudan represent a living example of this degradation. The two forest reserves are situated about 40 kms north of Gedarif town between latitudes 13 44' and 14 25' N and longitudes 35 31' and 36 01'E. They are adjacent units with artificial boundaries comprising six cleared fire lines of about 115 kms in length. The forests have been reserved since 1960 by the Forest National Corporation, thus all rights become expropriated and extinguished, and only the sedentary local population are allowed to collect dead wood for fuel as well as to graze their livestock. However, this was only allowed in so much as it does not cause damage to the existing trees or upcoming seedlings.

Rawashda and Wad Kabo forests are bordered by seven villages on their southern and eastern boundaries in addition to the two large towns of Gedarif and El-Showak, and two refugee settlements further away to the northeast. Rain-fed agricultural schemes (both planned and unplanned) have taken up all the land surrounding these forests. This inevitably caused a disruption for the nomadic pastoralists mobility patterns by closing the transhumance routes and Hafirs (artificially dug water collection points) which originally existed along these lands.

Climatically the forests lie within the semi-arid sub-zone with summer rains of 480 mms and warm winters. The soil in the two forests is mainly dark cracking soil which are characterized by rapid infiltration rates when dry, but extremely slow rates when wet.

Rawashda and Wad Kabo are situated near the transition between two types of low rainfall woodland Savanna on clay, ie *Acacia melifra* thornland and *Acacia seyal-Balanites* woodland Savanna. The dominant woody species of the reserve is *Acacia seyal* (*Talh*) while the dominant grass species are *Justica flava* (*fakha*) and *Corchorous spp.* (*Mulukhia*).

The position of Rawashda and Wad Kabo forests is unique since it forms an intersection point with three livestock corridors originating from Butana and ending at the Eritrean border in south east of Gedarf State. This in addition to the closing of transhumance routes along agricultural lands have resulted in the forests becoming the focal grazing grounds for the different types of livestock. Also, the Hafirs made during the construction of the Gedarf-Kassala tarmac road retains some water which attracts large number of livestock.

Early and late during the rainy season ie, June-July and October-December, hundreds of nomadic herdsmen with their livestock of camels, cattle and sheep use the forest as a passage on their seasonal trekking between dry and wet season grazing. In different ways and in varying degrees, most of these people depend on these forests for forest products and livestock fodder.

Originally the low population pressure did not have severe effect on the forest resources, however, the advent of the drought, increase in population pressure and mechanized farming resulted in a change in the way of life of many of the rural populations. More and more people have become dependent on these forests for their livelihood and as such the forest resources are being utilized at a very fast rate.

Immediately after the rains, the floor of the forests become the staging ground of a large number of range species in addition to young tree seedlings. However, at present grazing soon diminishes this ground cover which in reality does not suffice the large number of livestock that passes through the forest, or are unpalatable to the livestock as is the case for the two dominant pasture species, Fakhia and Mulukhia. Consequently livestock turn to browsing of the available woody trees, and according to Gaiballa (1992) browsing percentage was found to be 68%, which indicate heavy browsing pressure.

Moderate grazing is not considered harmful to woodland plants, and is sometimes recommended because under normal conditions domestic livestock add manure and disperse the seeds. The real threat lies in overgrazing when the animal population exceeds the carrying capacity of the resources and cause severe damage to the woody vegetation, especially in its juvenile stage. In absence of edible ground cover, domestic herds up-root and consume the young tree seedlings. In browsing the animals eats up the leading shoots and tips of branches causing the tree to remain stunted and unable to develop vegetatively. Further damage is caused to the trees by lopping and shaking-off of the seeds and pods for animal feed. This lopping and felling of branches could, if carried to extreme, cause the death of the tree.

THE DOMINANT PLANT SPECIES OF THE FORESTS

The major woody trees found in Rawashda and Wad Kabo are *Acacia seyal* (Talh) found in sandy areas, *Acacia senegal* (Hashab) and *Acacia melifera* (Kitir), found scattered and *Balanites aegyptiaca* found in patches. The major range species consist of *Justica flava* (Fakhia) and *Corchorus spp.* (Mulukhia). In order to get a clear understanding of the extent of usefulness of these trees, a brief account of each is given below.

1. *Acacia seyal* (Talh)

This is a medium sized tree of up to 10 metres in height. Talh occurs in two races, either with a bright copper coloured bark (*Acacia seyal* sub.sp. *seyal*) or with a creamy white bark with occasional coppery patches (*Acacia seyal* sub.sp. *fistula*). There appears to be little difference in the ecological and silvicultural characteristics of the two races.

The Talh tree grows mostly on cracking clay soil and could be found in large almost pure stands under rainfall of 500-1000 mms and under lower rainfall on water catchment sites. It co-exists in a sort of cycle with grass land. In the thicket stage, trees which are more or less evenly aged gradually reach maturity and die. The death could often be caused by grass fires and the Talh woodland is succeeded by open grassland which persist for a number of years till that time when, for one reason or another climatic

conditions become unfavourable for grass growth. At such times, Talh promptly re-establishes itself and the cycle is once more continued. Natural regeneration may take place from seeds or from coppice of trees felled before reaching maturity. Disturbance of soil activates natural regeneration from seeds.

Talh is considerably resistant to fires and is capable of persisting in areas regularly swept by ground fires. Repeated fierce fires affecting the crowns will, however, kill the tree. Old trees are capable of surviving up to three months inundation, but young trees will fail to establish themselves if inundation lasts for more than one and a half months. Although living Talh trees do not seem to be greatly affected by pests and diseases, felled trees are liable to attack by a particular type of beetle.

The Talh tree produces good quality firewood, charcoal and building poles, but it cannot be stored for long periods as it is subject to attack by the Bostrychid beetle. The tree also produces gum which is of second grade to that of Hashab. The wood of Talh is used by Sudanese women for *Dukhan* (the smoke of burned wood used for shining the skin).

2. *Balanites aegyptiaca* (Heglig)

This tree is widely spread throughout the Sudan. It can occur in sandy soils under rainfall of 250 mms or in dark cracking soil with rainfall of 500 mms. The tree coppices moderately well, and regeneration whether natural or artificial is carried out by direct sowing of seeds either by humans or indirectly by animals.

Due to its thick bark, the Heglig tree is highly resistant to fires. The leaves are sometimes attacked by defoliator caterpillars and the seeds are subject to attack by borer beetles. The rate of growth of Heglig is more faster on sandy than on clay soils.

The Heglig is a highly valued multipurpose tree. It produces fuel wood of high calorific value, highly nutritive fodder and good quality carpentry timber. Being of high nutritive value, the leaves and branches of the tree are heavily felled by herdsmen to provide fodder for their animals. In addition, the fruit produced by this tree is also edible and is also used by the local population for herbal medicinal purposes.

3. *Acacia senegal* (Hashab)

This is a small tree with a yellowish or whitish grey rather rough bark. It is the most important gum producing tree in Sudan. Hashab could occur either on stabilized sand under rainfall of 280 mms and above, or on dark cracking clays under rainfall of 500 mms and above. On the dark cracking clays of central and eastern Sudan, it is never found as pure stands as in the case of sands. Its water requirement is intermediate between Kitir and Talah, and is usually found mixed with one of the two species, but more frequently with Talh. Coppicing is by far the most important method of natural regeneration, but regeneration from seeds is also of frequent occurrence.

Hashab is moderately fire resistant. Early fires before November are believed to do little harm. However, late fires if repeated for the three consecutive years will lead to the death of the tree and, even if they do not cause death of the trees, they will inevitably reduce the gum production to practically nil for the season.

Young seedlings and saplings grazed by animals are able to recover to some extent by coppicing, but repeated grazing may lead to the death of seedlings and saplings. Camels cause considerable damage to the Heglig tree by grazing the leaves and by eating the gum. The seedlings are also eaten by millipedes and damaged by web-spinning caterpillar. Also by defoliating the Hashab trees, the locust *Amacardium vernerella* greatly reduces gum yield.

Hashab grows faster on sandy soil and from coppice origin. Reasonably tended trees can attain a height of 1.2 metres in three to five years when tapping will be possible. Exudation of gum does not usually take place before the tree shed their leaves or when the weather is colder than average. The average yield of gum arabic is about 250 kgm per tree per annum. Hashab trees from seed origin can be tapped for gum production up to the age of 25 years, but yield will start to decrease after the age of 16. Gum exudation is retarded in cold weather. Tapping should not be heavy and should be confined to slashing the bark to avoid any adverse effect to the tree. Young trees of heights under 1.2 metres should not be tapped.

4. *Acacia melifera* (Kitir)

This is a small multi-stemmed tree with a more or less rounded crown. The best development of *Acacia melifera* is on the cracking clay soils. Under rainfall of 400-500 mms it forms extensive and almost pure stands, but could also occur along drainage lines under rainfall of as low as 250 mms. Under rainfall of 700 mms, Kitir is found alternating with or form an understorey to other *Acacias* and *Balanites aegyptiaca*.

The tree does not coppice well, so successful regeneration could only be attained by direct sowing of seeds. Usually in nature, thickets of Kitir alternate with grass land in the same way as Talh trees. In forests where human exploitation is high, natural regeneration is very scanty or completely non-existent.

The individual trees are relatively fire-resistant when young due to the fact that the dense crown at this stage reaches down to the ground level thereby protecting the usually numerous stems. The dense thickets are also fire resistant as they suppress the growth of any grass beneath them. Once the thickets become open due to natural death of old trees or due to upland felling, the remaining Kitir trees become liable to grass or bush fire. The rate of growth of Kitir is very slow. Kitir trees are a good source of firewood, charcoal and building material (*daggag*) for native huts.

The dominant grass species as mentioned above are *Justica flava* and *Chorchorus spp.* Both species are unpalatable and hence are indicators of range degradation on the forest floor. According to Gaiballa, the average cover percent in Rawashda forest in 1985-1991 was about 55% which is regarded as an indication of poor range in an area subjected to heavy grazing and dominated by low quality range plants. Carrying capacity was assessed during 1985-1991 by determining the total range production in the forest. By comparing the carrying capacity with the number of livestock in the forest, it was found that the forest was overstocked during five years out of seven (Gaiballa, 1992).

LOCAL POPULATION AND THEIR INTERACTION WITH THE FORESTS

From the information so far revealed it is clear that the above indigenous species of the forest are capable of providing the basic needs of the local population. However, the question which arises is to what extent are these forests capable of supporting the ever increasing population pressure of both humans and animals.

According to the 1993 census, the sedentary population of Gedarif, El Showak and the neighboring seven villages have increased by 34.87% since 1983, whilst the estimated percentage increase in the numbers of Camels, Cattle and Sheep which uses the Rawashda and Wad Kabo forests between 1985 and 1991 was 59.52%, 82.7% and 94.33% respectively (Gaiballa, 1992).

This heavy dependence of the locals on Rawashda and Wad Kabo forests for their various needs have resulted in the severe degradation of both the forest trees and range plants. The tree cover is becoming thinner year by year, and in some areas natural regeneration is non-existent or if they appear are relentlessly devoured by livestock after the first few months of their lives. Consequently, only mature trees which will eventually die or be felled are found to dominate the landscape.

From the interviews conducted with the villagers living around the forest, six types of forest users were evidently present:

1. Nomadic livestock owners
2. Sedentary livestock owners
3. Bildat traditional farmers
4. Mechanized scheme farmers
5. Non-agricultural workers
6. Wood and charcoal producers (illegal).

The nomads are almost wholly dependent on these forests and it would be a difficult task to keep them out. Closing of grazing routes by the setting up of mechanized agricultural schemes have further increased their dependence on these forests. Livestock owners are now forced to graze their animals in these forests during their northward and southward trek. On their northward trek to the Butana land (late July to early August) they usually spend no more than three weeks. The forest soon becomes muddy and invaded by flies and so they are forced to leave and head northwards. During this trek they do not face any problem with the farmers who have still not started cropping. However, on coming back (ie on their south-ward trek) they encounter the growing crops which have by now reached a reasonable size. Since there are no defined grazing routes, the nomads are forced to pass across these crops which will inevitably cause the nomads to enter into conflicts with the crop owners which may result in payment of fines. On reaching the forest, they usually spend up to four months within the forest, the duration depending on the harvesting of agricultural crops on the southern parts of Butana. As soon as harvesting takes place, the nomads leave the forest and spread over the southern area whereby their livestock can feed on the crop residues.

The nomads are aware that overgrazing and lopping of trees (in addition to illegal felling) may lead to stunting and gradual disappearance of these forests within the coming few years, but since there are no alternative grazing grounds they are forced to use these forests. According to livestock owners, the forest does not provide sufficient ground cover for their ever increasing livestock, and as such, the pressure on the available woody trees will continue. According to the nomads, this pressure on the forest will never decrease as long as there are no alternative grazing grounds. The remedy to this problem lies in either the establishment of range lands north of Rawashda forest, the allocation of these lands to the nomads whereby they could grow crops and later graze their animals on their residues, or the reopening of grazing routes.

However the real threat to the forest is caused by the illegal charcoal production. Villagers chop down whole trees (mainly Talh) for the production of charcoal. This have resulted in many bare areas within the forest. This is especially evident in the south western sector of Wadkabo forest where the villagers have completely cut down all Talh trees extending over an area of 5 kms.

Removal of tree cover have resulted in the destruction of soil in various parts of the forest. Land cleared of trees become susceptible to scorching by the sun and subsequently erosion. Even when rainfall is adequate, it is of little value if there are no trees to hold the soil particles together and reduce run-off. Hence, the need for conservation and sound management systems that can repair the depleted resources is imperative. Since the forest is reserved, this responsibility falls on the Forest National Corporation.

THE ROLE OF THE FOREST NATIONAL CORPORATION

Before 1983, the main activities carried out by the then Forestry Department in Rawasda and Wad Kobo forests were the protection effected by forest guards who tour the forest on foot and the large scale Taungya (growing of agricultural crops in lands which are essentially dedicated for forests) under which thousands feddans of Acacia Senegal (Hashab) were sown together with Dura.

Taungya involves the drawing of a contract between the forest Department and the local individual. The contract involves an agreement between both parties whereby the forest department provides the individual with a cleared plot of land on which he is to grow his agricultural crops in addition to the forest trees. This process was believed ensure the planting and protection of forest trees at a minimum cost.

However, this practice did not succeed because the local people who were given the plots were rich merchants with their own lands and, as such, were in no need to fulfill their part of the agreement and bother themselves with the costly process of planting trees.

In 1983, the Forest Department devised a new form of Taungya and was given the name Department Taungya. Here the Department itself carried out the planting of trees with agricultural crops such as dura and sesame. Again, this achieved no results and the practice was terminated in 1987.

In 1987, a five year Integrated Forest Management Plan (1987-1992) was drawn up for Rawashda Forest by the Fuelwood Development for Energy in Sudan Project (FDES). The main objectives of the plan were to protect and maintain environmental stability, and to provide forest products, mainly fuelwood, poles and fodder.

To achieve these objectives, the Forest was divided into five working circles, namely,

1. Protection Working Circle, comprising areas subject to erosion (12% of the forest).
2. National Fuelwood Working Circle, covers the area available to produce fuelwood and charcoal for Regional and National consumption (68% of the forest).
3. Village Working Circle, covers the area adjacent to the villages whereby the demands of the locals are given priority (13% of the forest)
4. Hashab Working Circle, comprises the Hashab plantations of 1973-76 and Hashab mixed stands (5% of the forest).
5. Fodder Working Circle for the benefit of livestock owners (2% of the forest).

By the inclusion of a Protection Working Circle in erosion affected areas, protection can take place by restoring a dense, protective ground cover to compensate for trees cleared or destroyed by fire.

The National Fuelwood Working Circle consisted of a 20 year felling/regeneration cycle. As Talh is the dominant species of the forest and produces high quality charcoal (irrespective of its age), the primary management objective was to grow Talh for fuelwood and charcoal. Thus, exploitation by clear-felling of large compartments followed by regeneration is the most feasible option at present.

The Village Working Circle involved local participation and was based on developing awareness amongst villagers about the forests functions and involving them in forestry related activities. It also included the involvement of landless villagers in Taungya practices.

Hashab Working Circle was designed to be managed for gum arabic production. This required thinning of dense stands, removal of dead trees and regrowth of other species which do not obstruct good Hashab growth.

The aim of the Fodder Working Circle was to provide fodder so as to relief grazing pressure on the other parts of the forest.

This attempt of Working Circles did not produce any significant results because the success of such plan lies on the reduction and control of Biotic malpractices from the part of the increasing human and animal population. However, it has become evident that control over these factors is impossible since large numbers of livestock enter these forests from all directions and at all times of day and night. This subsequently disrupts the effective regeneration of the forest.

According to El-Dool, the revision of the above Working Circles plan is to take place soon but the objectives will remain the same as the original ones. The revised strategy should be based on multi-purpose management involving grazing as an integral part of the management plan since grazing pressure can not be ignored. Regeneration of woody species and range improvement will be given utmost priority. The revised management plan will also take into consideration the areas around the forests which are entirely rainfed agriculture (El-Dool, 1994). According to the Forest Law 1989 a minimum of 10% of the area under rainfed agriculture should be allocated to trees whether conserved or newly planted. This law should be enforced as firmly as possible if a buffer zone for the forest is to be created so that grazing pressure on the forests will be reduced.

CONCLUSION

It is clear that the people have become aware of the gradual disappearance of forest resources, and as such means of conservation of these natural resources have begun to gain wider acceptance as a means of sustaining forest resources.

Although the importance of trees to the environment is widely recognized, strategies and institutions able to approach forestry within the broad multi-use concepts are still in their infancy (Casey and Muir, undated). In many areas in Sudan fuelwood for household purposes is still gathered rather than produced or purchased. Where wood is no longer available, people tend to resort to dung and/or crop residues depriving agriculture from manure. Few rural families consider planting trees as a solution to fuel crisis, and few social forestry programmes have been established in close consultation with the population they are designed to serve.

Problems of environmental degradation, fodder production and fuelwood supply cannot be solved by reforestation alone. What is required is an integrated land-use approach which involves agriculture, livestock, land settlement, forestry and the socio-economic set-up.

Forest planting projects should thus be related to the needs and priorities of the people living in the area. Success of tree planting projects should not be measured by the numerical targets achieved. Increasing the number of trees in an area may have little beneficial effect unless it is closely related to the needs and priorities of the people living there.

The management and utilization of existing tree resources should be a major component in any social forestry development programme. Appropriate scientific management of woodlands with local participation not only could supply valuable yields of fuelwood and poles to neighboring communities, but could also provide many other useful woodland products while fulfilling an equally important conservation function.

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Land Tenure and Pastoral Planning in the Red Sea Hills

Leif Manger

INTRODUCTION

This paper deals with the problem of land degradation and land tenure in the Red Sea Hills. First I shall discuss to what extent evidence of environmental degradation can be attributed to the workings of the pastoral system in the area, and thereby comment upon the widely held view that traditional pastoral systems are detrimental to the environment. Secondly, I shall discuss to what extent local land tenure and tenure institutions function to protect local resources and thus can be made use of in pastoral planning to protect the same resources.

The arguments presented are not original. My aim is to present empirical material that may help us reflect upon these issues and thereby try to go beyond simplistic understandings of pastoral systems as a major developmental problem, or on the other side romanticizes pastoral practices. My discussion will show that both viewpoints constitute problems to a sound understanding of African pastoralism.

The ethnographic material I shall present was collected by members of a research programme called The Red Sea Area Programme (RESAP). Most of the work within RESAP has been focused on the Hadendawa people, and on the Sinkat district up in the Red Sea Hills. RESAP has been a collaborative research effort between the Universities of Khartoum and Bergen, aimed at academic competence building and research related infrastructural assistance to the University of Khartoum. Through the formulation of research issues the programme aimed at producing information relevant for the social and ecological rehabilitation of the Beja communities so hard hit by the droughts in the 1980s. An integral part of this type of work has of course been also to reflect on the future development of pastoralism in the Red Sea Hills as well as how issues relating to the continuation of this type of adaptation should be handled, thus relating to basic planning dilemmas within this type of region. It is from this latter part of our experience I shall draw in the present paper. For a broader discussion on other aspects of the pastoral system and various planning issues I refer the reader to Manger et al. (eds.) 1996. Before I start on my specific discussion, I shall give an overview of the pastoral system on which we focus.

PREAMBLE: A CONVENTIONAL OVERVIEW

The Red Sea Province covers an area of about 220 000 square kilometers of Eastern Sudan. Its main landscape features are 1) a narrow coastal plain, 20-40 km wide (including a salt marsh strip and a semi-desert strip), 2) a line of hills, parallel to the coast and up to 10 km wide from east to west, rising in altitude to 1500 m above sea level, and to the west 3) a plateau about 1000 m above sea level, with scattered isolated hills and cut by shallow *wadis* and a *khors* drainage system flowing west toward the Nile, 200-400 km away. The province is divided into two main surface drainage systems by the Red Sea Hills: a Nile catchment to the west of the hills and a Red Sea catchment to the east.

The climate varies according to location, with three main types which change along an east-west axis. In the Red Sea coastal plain there is winter rain, but only in limited quantities. The Red Sea Hills receive winter rain but in more abundant quantities than along the coast. Finally, the vast plains west of the mountains have a drier climate and receive rain in the summer.

It is estimated that 98 % of the province receives less than 200 mm of rain annually. As a result, apart from the Tokar and Gash rivers, the main surface drainage of the province is provided by seasonal *khors*, some of which form extensive networks that carry large quantities of run-off water for short periods towards the Nile and the Red Sea.

The basement complex and volcanic rocks of the province do not normally provide good aquifers, so there is relatively little groundwater and it is of low quality. Groundwater recharge probably only takes place every few years when there is especially heavy rainfall and then through a substantial *khors* system, which are cultivated with the help of water harvesting techniques to divert the *khors* flow.

The vegetation of the province is typical of such an arid area and consists of drought-resistant species. Three major vegetation types can be distinguished:

1. Open *acacia* communities in hill-valleys, *khors* and catchment areas of inland and coastal plains with bushes and trees of *Acacia tortilis*, *A. radiana*, *A. etbaica*, *Salavadora persica*, and *Maerua crassifolia*. Annuals and ephemerals include *Cenchrus spp*, *panicum*, *Euphorbia spp*, *aristida*, etc..

2. Salt-marsh vegetation on the Red Sea coast (partly fringed by mangrove forest) consisting of succulent halophytes arranged in a zonal pattern according to a gradient of salinity. Some dominant species are *sueda* and *halopeplis*.

3. Hill vegetation with a unique type of open woodland formation, controlled by relatively cool and moist conditions due to the altitude and off-sea wind. Major species are *Euclea schimperi*, *Euphorbia abyssinica*, *Solanum spp*, *Acacia spp* and annual and ephemeral herbs and grasses.

The name *Beja* denotes a confederation of population groups which control different parts of the region. In the north, towards the Egyptian border, live the Bishariyyin. The Amara are found around Port Sudan whereas the Hadendawa are dominant in the south, from Sinkat to the Gash Delta. In the southeast of the Red Sea area and into Eritrea we find the Beni Amer. In addition we find the Rashaida, an Arab pastoral group that immigrated from Saudi Arabia during the last century and which is not linked to the Beja confederation. In the towns there are several groups from other areas of the Sudan, from the Nile Valley, the West and to some extent the South.

Economic adaptations vary throughout the region. The basic activities are animal husbandry and cultivation. The cultivation is rain-irrigated and is only possible by a combination of rainfall and run-off in the seasonal rivers. Goats dominate in numbers among livestock, but camels are also kept and play a significant role in Beja culture. Animals roam around settlements or are herded to various types of range. But the Beja are also heavily dependent on extra income generated outside the agro-pastoral system. In the northern mountains there are mines that employ a certain number of local Bishariyyin. The Amara and Beni Amer have a history of labor migration to Port Sudan, and have found work mainly in the harbor. The Hadendawa are also involved in this but they are also moving to the two major scheme areas in the region, Gash and Tokar. A source of income that is increasing in importance is the sale of charcoal. During the drought years of the 80s the cutting of trees increased and today probably constitutes the most important threat to the natural environment and to the survival of the Beja itself. The basic impression obtained from such a quick look at the Beja adaptation is that it is based on a complex of activities and various types of income. The viability of the Beja can thus not be assessed by focusing on one or two of these in isolation, but must be based on the totality of sources of income and their availability to the Beja. The social organization within which such activities take place is based on the segmentary lineage organization. The different levels of social and territorial organization among the various Beja groups are *adat/qabila* (maximal lineage), *duwab* (or *hissa* as used in the Sinkat area) (sub-lineages), and *dua* (camp cluster). The basic productive unit is the family and it is within such family units that the basic management of resources takes place. The wider levels provide personnel for cooperation, provide a tenure system that gives access to productive resources, as well as a tribal organization with leaders (*sheikh*, *omda*, *nazir*), courts (*majlis*) and a corpus of traditional law (*urf*) and Islamic law (*shari'a*) that allow regulation of access and can deal with conflicts.

One of the most important asset is animals. Young people, both boys and girls, are given livestock by their father on various occasions in their lives; birth, baptism, circumcision and the wedding itself. After marriage such animals are taken from the father's herd to form a new herd under the management of the

new husband. As time goes, such a herd may grow, and there may be a shortage of labor for herding and watering. The obvious people with whom to cooperate are found within the sibling group, especially brothers, and livestock belonging to brothers may thus be herded together by the brothers themselves or by their children, creating what is generally known as herding partnerships.

Livestock are not only important in economic life, but also on ritual occasions such as weddings. Some of the animals that a man needs to get married are given to him by his father, but there are also institutional mechanisms through which a Hadendawa can go to his friends and relatives to get animals (*halagen*). Furthermore, there are mechanisms of sharing in the society through which people can obtain animals if they do not have any, or to have someone else look after animals if there are too many. The first of these is known as *dangit*, which takes place when a man borrows animals. He can use only the milk, and must return the animal later, when the crisis is over. Secondly, there is *tait*, which is a transfer of the animal itself to a new owner, and this creates long-lasting relationships between the persons involved.

The point here is that the members of the productive unit live in a context that makes it possible for them to establish themselves, and maintain themselves in the traditional production system. They are dependent on the economic status of their fathers, from whom they get animals through life, and whom they are going to inherit. They are also dependent on a wider context of social relationships in which sharing of animals is an important part, which helps people to maintain economic viability. In addition there are factors inherent to the units themselves like the number of children, their age and sex, which will affect the unit's ability to manage the resource it controls.

Land is the second important productive asset for the Hadendawa. The young boys will cultivate together with their fathers and when they marry they will get their own fields. But some may decide to leave to find other occupations. Cultivation is a more individualized activity than herding and the family is more dependent on its own labor power, although there is a work party institution also among the Hadendawa (*koben*).

What we said above is true for the men of the family in as much as they are the ones responsible for looking after the animals, i.e. herding and watering, and for the major part of cultivation, as well as going on wage labor and producing charcoal. The Hadendawa woman is looked upon as a subordinate to the man; a person who does the household things of child caring and making food, braiding mats and also the important task of putting up the house itself when the family moves. However, Hadendawa women also contribute directly to family incomes, through the production of milk products for sale, selling coffee (*jebana*) and selling the mats they make. With the increasing degree of male labor migration women often also find themselves as sole providers in the family, i.e. female-headed households.

It is evident that the Red Sea Hills area presents us with several problems that are typical for the Sahel belt in Africa, i.e. a very arid environment with low and unreliable rainfall and human adaptations based on animal husbandry and cultivation. The herding of animals in search of pasture and water, and cultivation in the rainy season, constitute the basics of a traditional adaptation. Located at the border of other influential cultures the Beja early became involved in general caravan trade with Egypt as well as Arabia across the Red Sea. Combining local and external resources, a flexible adaptation emerged that made it possible for the Beja to survive for millennia within a marginal environment. Sound local land-use practices together with high rates of mortality and out-migration were the major checks maintaining this balance.

However, certain developments, primarily related to this century, tend to create new types of imbalances in this system. Population increase through better health services and reduced warfare is one such factor. Others are the trends towards more sedentary forms of life, and the constant and rapid growth of towns in the area, particularly Port Sudan. Secondly, the external system provides new opportunities through urban employment in towns as well as schemes like Gash and Tokar. Such factors tend to create new pressures on systems such as the one in the Red Sea Hills. One overall effect is that these new opportunities do not relieve pressure on the traditional adaptation and pastures by absorbing people into

non-pastoral activities; rather people maintain a stake in several resources, thereby, also building up pressure within the pastoral adaptation.

It is to one particular type of problem we shall now turn, i.e. the environmental problem. This means that we shall conceptualize the problem as an ecological one, in which we focus on the state of the natural environment, which also constitutes the range on which Hadendawa animals depend. In this perspective issues of overgrazing, deforestation etc. arise.

PASTORALISM, ANIMAL NUMBERS AND THE PROBLEM OF ENVIRONMENTAL DEGRADATION

A basic parameter in the working of a pastoral system is the relation between carrying capacity for the area and demographic processes, i.e. the growth rate of man and animals. Important concepts in this discussion were said to be carrying capacity and reproduction rates. We have also suggested that what might be termed the "conventional wisdom" that exists on pastoral systems in arid East Africa relates to this type of problem, arguing that 1) there is an inherent dynamic in such pastoral systems to overstock - i.e. inherent mismanagement and thereby 2) that one gets general overgrazing, general desertification and general disaster triggered by famine. Such assumptions have led important aid agencies like USAID to abandon the pastoral sectors in arid East Africa. Similarly, ILCA has shifted focus from working on such pastoral systems into more agro-pastoral ones where "something can be done".

The recent research referred to above as "non-equilibrium" has challenged this conventional wisdom. One case is the one of Northern Kenya as presented by Ellis (1988) (see also Ellis 1988) with examples from dry areas in Kenya (the IPAL project, within UNESCO's Man and Biosphere (MAB) program, and the Southern Turkana Ecosystem Study partly financed by NORAD). Both these projects showed that the above propositions must be qualified. Relating to the problem of general overstocking it was found that only 15 - 20% of the IPAL areas were considered overstocked. 80 - 85% were understocked or not populated at all. In Turkana the stocking rate was estimated to be at 12 - 15% of carrying capacity. The facts do not support a hypothesis that these areas are generally overstocked. About overgrazing, it found that in both Marsabit (IPAL) and in Turkana serious overgrazing occurred only around settlements and water points; it was not a general picture. Desertification was rare. Even around settlements where overgrazing was evident, areas within trial plots where grazing pressure had been removed showed a rapid regeneration of vegetation. Again, there is no support for the contention that these areas are facing a long term degradation due to desertification. And, finally, drought periods surely bring about famine, but mainly among poor pastoralists and settled pastoralists.

The overall conclusion is then that the crisis in the pastoral sectors is related to specific causes external to the pastoral system. They are not inherent in the system itself.

No reliable quantification of such parameters have been made by any development agency in the Red Sea Hill-region, or by RESAP. Gunnar Håland (1990) has presented the basic steps in such an analysis, using available data from various reports, applying them to the situation in Derubeb. He concludes that the actual animal numbers in the Red Sea Hills fluctuate under a threshold of what may be termed a theoretical carrying capacity. This lack of correspondence between land degradation and animal numbers is no surprise in an area like the Red Sea Hills, as the region makes up an example of the non-equilibrium system that has been analyzed in recent years, for instance by Ellis and Swift (1988) and Breman (1988). The highly unpredictable rainfall pattern on which primary production relates, results in highly variable carrying capacities that can hardly be matched by natural increase in animal populations. Secondly, the animal and human population numbers are cut back by density-independent factors such as climate (drought), disease and raiding. Animal numbers are therefore kept below any theoretical carrying capacity (Helland, 1992).

Botanical work within RESAP provides material that is consistent with this type of conclusion. There is a reduction of tree cover and of certain tree species such as *Acacia etabica*, *Acacia tortilis*, *Dracena umbet*, *Olea chrysophylla*. This development is not related to pastoralism but much more to the demand for fuelwood, charcoal and other commercial commodities in Port Sudan and other urban centers in the region.

A second point is the existence of weeds, e.g. *Agremone mexicana*. Although being taken as a sign of overgrazing it is interesting to note that this particular weed frequently colonizes areas which have been cleared for *dhura* cultivation during the intermittent years of no cultivation. It is also very common around settlements. One may therefore raise the question that this spread is a result of the spread of agriculture in the area. This is an interesting conclusion as most of the agencies operating in the area in the 1980s assumed that agriculture would be one way out for the pastoral Hadendawa.

Remote sensing studies showed an agreement with the conclusions outlined above in that land degradation in the Sinkat area is due to changes in land use practices, rather than reflecting any climatic shift, although the effects are aggravated by periods with less rainfall. A second conclusion is that the deterioration of perennial resources is spreading from nuclei rather than along fronts, which indicate that the degradation is initiated by processes from within the system rather than imposed from outside. But the process is fueled by urban needs for energy, not the pastoralists' need for pasture.

The overall conclusion is twofold. The environmental problems of the Red Sea Hills are not natural disasters, i.e. the results of drought. They are clearly related to changes in land use practices, and hence includes Man as a major cause. However, the pastoral sector as such is not to blame. There is no clear relationship between pastoral activities and overall evidence of degradation. The cutting down of trees is related to the demand for charcoal and fuelwood for the urban Port Sudan market as well as smaller market towns and truck stops in the region. However, in isolated areas like Erkowit, there seems to be density dependent factors at work. The grazing and browsing pressure in areas like Erkowit is an effect of such areas being safety areas in periods of drought, with people moving in to find fodder. It is thus not related to any internal dynamic of growth within the individual pastoral herd. But as an example of what is happening in areas that constitute key resources, this development is indeed worrying.

DEFORESTATION AND LAND TENURE

The major environmental threat in the Red Sea Hills is that of deforestation. And the major forces behind this deforestation are the ones of general population increase and urbanization. The problem is not the Hadendawa pursuing their traditional adaptations, rather it seems to be urban populations pursuing various forms of "modern" life.

But even though urban populations may constitute groups of demand for energy, it is also clear from our studies that the Hadendawa themselves make up the group of producers. Local pastoralists may know their environment inside out, they may manage their herds of animals in ways that are environmentally sound, but, still, they cut down the trees on which the long term survival of their environment depends. Apart from dealing with the demand side, a big planning problem is to deal with the supply side also. This raises the issue of resource management.

The question we want to raise at this point is whether there are indigenous systems and groups that operate in ways that secure the control of access to productive resources and whether such organizations can be made useful for long term resource management. The answer to this question is important and will depend on the perspective we have on the working of local Hadendawa institutions involved in land tenure issues.

HADENDAWA LAND TENURE

The Hadendawa tenure system, briefly summarized, is embedded in the segmentary descent organization of the tribe. That descent system is based on agnatic descent, referring back to a common ancestor, *Barakwin*. The Hadendawa is a major sub-division following from that apical ancestor. The Hadendawa are furthermore divided internally in several sub-divisions and the whole system is roughly made up of four levels;

1. the *dua* or the camp cluster,
2. the *duwab* (in Sinkat the term *hissa* is also used) which contains several camp clusters and forms a minimal lineage,
3. the *qabila* or maximal lineage and
4. all Hadendawa qabilas.

Various types of segments control territory, from the Hadendawa level downwards. Of particular interest is the minimal lineage, *duwab*, which is a unit with collective rights to land, vegetation and water within a certain area.

Furthermore tenure rights are codified by a combination of traditional law (*urf*) and Islamic law (*shari'a*). The Hadendawa differentiate between two types of rights. First there is the original rights to the first comers in a territory. Those who settled first are the original owners of an area, and this is a right that all members of that particular tribe or *duwab* have in common and should defend. Secondly, the original owners can give members of other tribes right to settle and make use of the territory. Such arrangements involve the payment of small tribute from the "renters" to the owners called *gwadab*. The original rights are termed *asl*, the secondary, usufruct rights are called *amara*.

This system provides people with access to productive resources. Such rights vary according to the type of productive resources. For *pasture*, land is normally open for all nomads passing through. People from different tribes can graze and browse their animals, and the same goes for the different *duwabs*. They can normally also make use of the wells in the area they are passing through. But they are not allowed to cut down trees or make wells in the areas other than their home territory. If someone wants to build a house, dig a well or to cultivate in another tribe's area they have to get permission from the owners. Such a permission can be given and is traditionally formalized through the incomer's giving a token gift (*gwadab*) to the owners. The *gwadab* does not constitute a rent, and is of small economic value. It represents a symbolic way of accepting that land does not belong to the user. But generally, pasture areas have a clear element of communal usage.

Land for cultivation is found along seasonal rivers and has a different ownership structure. This land has been divided among different members of the tribes a long time ago, and land is being transferred through inheritance. The river valleys, for purposes of rainfed cultivation, are thus divided according to sections and individual users. Inheritance of agricultural land is codified through Islamic *shari'a* law; men inheriting one part, women one half of men's part. Normally women do not get plots allocated to them, but do their cultivation on the husband's land. If men move away, brothers may cultivate plots of their absentee relatives. Thus there is a lot of local and individual variation in the pattern of formal ownership rights and actual cultivation on specific plots. The same pattern holds for irrigated plots.

Water is open to anyone to use, but wells can only be dug by people from the landowning tribe and section. Water from the wells can be taken for human as well as animal consumption. This common usage can be changed in the cases of irrigated plots. In such cases only plots within reasonable distance

from a well can be made use of. In such cases we also find a fence to protect the wells from the use of others.

INCREASING PRESSURE ON KEY RESOURCES

As we have seen above there might be evidence to suggest that such tenure arrangements allow people to regulate access to resources. The many stands of trees in the area, in spite of recurrent droughts, may indicate that they have been effective. But we also see today that tree-cutting is taking place and that there is pressure on certain areas. This indicates that the tenure arrangements are not in themselves sufficient to control the use of resources under conditions of increasing pressure.

The economic rationality behind engaging in charcoal production is clear. We may ask, however, whether the Hadendawa have organizational solutions in order to avoid this disastrous development. Are there sanctions that can check the spread of tree cutting? This relates particularly to what was termed key resources to the Hadendawa. Thus it seems that particular areas, with abundant resources, like Erkowit, the flood plains such as Odrus, the salt marsh and the coastal plain in general (*gunob*), as well as larger areas like Tokar and Gash, tend to be more communal, and hence they come under greater pressure than other areas. Such areas stand out as meeting places for a number of Hadendawa groups (sub-tribes, lineages) that gather there at certain seasons. Odrus is an area where several groups engage in agriculture. *Gonub* receives people from many groups during the winter, and this also constitutes a time for collective festivals, like the religious *howlia* (El Siddig, M.O., 1992). Erkowit and the large scheme areas, Tokar and Gash, provide crucial dry season grazing, and also experience an accumulation of people and herds during drought years.

These facts are important for an understanding of why the traditional tenure rules can not keep people from cutting down trees in their own territories. It also provides an interesting opening for discussing the differential effects in various areas. Distance to the market is a key factor, but we should also include the dynamic provided by the particular tenure system in the area. This can be seen by looking at the difference between individual *khors* and larger plains. In the narrow *khors* good stands of vegetation seem to be maintained, and people seem to accept the traditional sanctions relating to tree cutting. However, in the larger areas, where many Hadendawa lineages and sections have equal rights to the territory, and where resources seem to be more abundant than elsewhere, sanctions seem to be less effective.

This leads to interesting interlinkages between the natural environment, the land tenure system and the Hadendawa coping mechanisms. The particular natural environment in the Red Sea Hills provide certain areas that have more vegetation resources than others, areas that are of great importance to the long term survival of the ecosystem itself, and which also provides a basis for human life in the area. Seen from the perspective of the Hadendawa, such resources are critical in their survival. They represent key resources to which they turn when drought has made other areas inhospitable, i.e. they represent corner stones for effective coping mechanisms. As such these areas make up the real "Commons" areas, that are more open to all Hadendawa than more localized *khors* and *wadis*. It seems that a major share of tree cutting, and hence of deforestation, happen in precisely such areas.

The continuation of such tree cutting does not mean that tenure rules around access to trees are changing in any "legal" sense, but that in certain areas such rules, and hence various sanctions that might be applied are not effective in the contemporary situation of increasing pressure on this type of resources. This further strengthens the argument that tree cutting is a localized activity, rather than one appearing along broad zones. The combined effects of distance to the centers of demand for energy, of the need for the Hadendawa to survive, and the availability of communal resources as outlined, might provide an understanding for how certain areas seems to be deforested before others. It does not mean that other areas can not be deforested, but that the tenure system at the present moment is operating and able to protect such areas. The fact that the key areas as we have described them also make up key elements to the environmental stability and resilience, does not detract from the drama of the situation. Tree cutting

does appear as an activity that in the longer run might render the Red Sea Hills uninhabitable. However, the short term economic benefits show why it is being pursued.

THE ROLE OF LOCAL INSTITUTIONS

This raises yet another crucial issue. To what extent can we rely on local pastoral institutions to solve the problems of local environmental degradation. There is a general policy framework in the area, forbidding tree cutting and there are active efforts by the authorities to control illegal trade in charcoal. Yet this does not work because of the role played by powerful groups in this. A similar situation can be seen among the Hadendawa themselves. They have a tenure system, and they have institutions to deal with the mismanagement of the environment. We have in the preceding section provided a general argument for why it does not work. Here we want to explore the possibilities of various institutions involved in land tenure management, to evaluate the likelihood for such institutions to develop into efficient management bodies.

A basic problem in this respect is that land tenure institutions also relate to several other aspects of Hadendawa life, and that the working of such institutions must be seen in this totality, and not be reduced to the single case of being a tool for resource management. Let us proceed with a discussion that might substantiate this position.

Each Hadendawa maximal lineage is large, highly segmented with a genealogical span of sometimes as many as 16 named generations to the founding ancestor. It is difficult to define the number of *duwabs* in the different maximal lineage; the number varies within the range of five up to thirty three. Furthermore the *qabila* varies greatly in its population size. All Hadendawa will identify themselves as a member of a specific sub-unit and local community. The answer to a question about what is your *qabila* will contain the name of the *qabila*, the *duwab* and also the *dua*.

As families develop over generations and lineages expand, not all their segments grow at the same rate. Some families and groups multiply more rapidly than others, and some lose many of their members through disease and famine, and previously also through warfare. The Hadendawa segments are therefore not a balanced set but show a variety in size and depth.

Throughout history the tribes have spread in different areas of the Hadendawa territory, due to their political strength (based on animal wealth). One pattern in this distribution is that people belonging to the same tribe have territories in different parts of the Hadendawa area. Thus one sees a tribe in Sinkat for instance, also having land in the Gash area. This pattern reflects a division between rich, high potential areas like the Gash, and the poorer, more arid northern areas in the Red Sea Hills.

Secondly the tribes are distributed locally, being neighbors to each others. The tribal territories are further divided into smaller areas, each occupied by a *duwab (hissa)*. This is the smallest territorial unit in the Hadendawa segmentary system to which members have collective rights and claims in a particular territory. There is also a process of segmentation going on, in which people may leave their own areas for some reasons and join or get permission to settle within another *duwab's* territory. This might then be the beginning of a new *duwab* under formation.

Such processes of fission are basic to our understanding of Hadendawa tribal dynamics. Certain people may break away from their *duwab* due to conflicts over land, women etc. and establish themselves as an independent *duwab*. They may also link themselves to a different *qabila* in order to succeed. This will be shown by the *duwab* adding a different camel brand on their animals to signify this dual status. Over time such a strategy may result in a shift of *qabila* membership, and may also result in a *duwab* becoming a *qabila* in its own right (e.g. the Kenjar, Ausenda, 1987:255).

Secondly, descent and kinship among the Hadendawa relates to a number of other features of Hadendawa society. First of all, Beja are part of the Middle East cultural area. They are Muslims and have strong notions of honor and shame which are important notions in that region. Such honor and shame is tied to individual Beja and their ability to defend what is important. A conflict some years ago between the Hadendawa and the Rashaida tribe is a case in point. The conflict was over a claim from the Rashaida to have a *nazir*, a claim to which the Government was sympathetic given their long history of residence in the region. The Hadendawa mobilized strongly however, and the issue was of course that such an appointment also signified the fact that the Rashaida had legitimate claims to territory in the area. Such conflicts also appear on lower levels of organization (*duwab*), and also at the family level. At stake is a group or a person's ability to defend material and symbolic resources. This is the issue of honor. Honor is obtained through a continuous process of defending the heritage of being Hadendawa, based on blood relationships and kinship as well as the defense of territory, which is the material symbol of the historical achievements of the Hadendawa.

In addition to a general level of protecting the Hadendawa honor there is also a process in which Hadendawa compete for honor, i.e. to gain influence and authority in the society is in basic ways tied to this honor-game. The manifestation of honor for a person also leads to this person being one to consult (*omkir*). This ideal is represented in the concept "The responsible man" and is tied to identity (Dahl and Hjort af Ornäs, 1990). The building up of such a position takes a lot of skills and may end up in a "Big Man"- like position. But like the Melanesian Big Man the position can be challenged by other persons, and one man's position may be superseded by others. But for all participants a basic premise is participation in the pastoral game. It is with reference to management of land, animals, local resources etc. that this honor can be built.

This basic system also gives shape to many of the conflicts that appear as a result of the ecological degradation. The mobility with which groups respond to pressure is a case in point. With increasing marginalization more people will move around, and the changes will lead to less inclinations to follow traditional rules. We have said earlier how important it is that people who do not have *as/* rights should not dig the soil, cut trees etc. When this happens, at an increasing rate, the result is an increasing amount of conflict. But because of the cultural codification of land tenure such conflicts manifest themselves to people not as a battle over resources as such, but as a struggle about honor.

The above sketch shows that it is not likely that such a fluid structure, with relevance for so many of Hadendawa concerns, is a viable basis for defining groups on the ground which can handle resource management. One aspect of this organization is definitely relating to such resource management. But it also deals with honor and with basic competition for prestige in the community. Thus in addition to the fluidity, this multifaceted aspect of social organization adds further to our skepticism.

The lessons from the period of Native Administration are instructive in this respect. During that time the Hadendawa (and Beja) system was incorporated into the government system, and leadership positions were imbued with judicial powers as well as tax collecting functions. Such leadership positions were defined on the basis of traditional social organization, with a *nazir* representing all Hadendawa, and the *omda* being a leader of a maximal lineage. The lack of correspondence between such units and actual units on the ground resulted in an inefficient system, and it was changed into one based on territoriality. The new type of leader and tax collector, *sheikh khatt* was supposed to deal with all people within his administration region (*khatt*) disregarding lineage membership. The dynamics within a *duwab* hinted to above may prove to represent similar types of problems. Attempts to fix such groups for certain purposes may well prove to bring similar types of results.

IMPLICATIONS TO PASTORAL PLANNING

Let me finish this paper with a few reflections about what consequences the type of perspective presented here might have on pastoral planning. In recent years the issue of pastoral planning has come back on the agenda of African development. The discussion is now directed to finding new perspectives,

and finding new avenues through which we can approach this problem field. Assumptions and arguments built on traditional range ecology and range management are being questioned; not least within the biological sciences themselves. Concepts that were earlier taken for granted, like "climax vegetation at equilibrium", "carrying capacity" and "degradation" are assessed in the light of new material, particularly from arid areas such as the Red Sea Hills.

Our concentration in the paper has been on what we term environmental problems. This means that we conceptualize the problem as an ecological one, in which we focus on the state of the natural environment, which also constitutes the range on which Hadendawa animals depend. In this perspective issues of overgrazing, deforestation etc. arise. My discussion showed clearly that such problems were indeed there, and that it was related to the ways Man utilized resources. But at the same time it was not possible to relate this to the workings of the pastoral system, rather, it related to tree-cutting for making charcoal, the prime incentive being urban needs for energy. But we have also seen that land is a basic resource, not only for material survival, but also for cultural survival. What appears as an environmental problem to a planner thus entails a number of issues that reach far beyond the actual natural resources that make up this particular environment . (For other planning problems in the area, such as the one of productivity, and that of equity. (See Manger et al. 1996).

What we have shown then, is that local codes and institutions are diverse, ambiguous and constantly evolving. They vary with types of natural resources, and they vary with forms of social organizations. Furthermore, they cover a multitude of usages and users. This situation may provide problems of classification, but also in effect provide obstacles to local management of resources. The awareness of this must be our starting point when we want to deal with pastoral planning. It suggests that blueprint planning will not succeed, and that we need some sort of adaptive, incremental, learning type of planning. But this type of planning must also be based on realistic assumptions about the real workings of pastoral adaptations, and not yield to "pastoral romanticism".

It is indeed difficult to assume that a single model of public planning can accommodate policies for this complexity. As rightly pointed out by Jeremy Swift (1995), the formal system, i.e. Government, should provide an enabling environment for pastoral activities, meaning that the complexities of pastoral adaptations are recognized (see also e.g. Monod, 1975; Håland, 1977; Horowitz, 1979; Helland, 1980 and Sandford, 1983) for similar types of arguments). Swift further advocates a process of decentralization of power and responsibility to the lowest institutional level that allows for the provision of services and which can maintain accountability. In reality this means strengthening the local level in pastoral administration. It also means that mechanisms of conflict resolution must be built, that customary law must be acknowledged within formal law, and that the general process of institution building is more crucial than technical support.

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Range Management in the Sudan:

An Overview of the Role of the State

Abdel Rahman Abbakar Ibrahim

INTRODUCTION

The contribution of agriculture to the Sudanese national economy ranges between 35% to 45% in the Gross Domestic Product (GDP). Agriculture provides over 90% of exports making the Sudan among a relatively small number of countries which are nearly completely dependent upon agriculture as a source of foreign exchange. The importance of agriculture to the Sudan economy can be highlighted by many other indicators. While over 60 percent of the population relies for living on agriculture, the other sectors of the economy are equally nearly totally dependent on agriculture as a base. Industry, transport, commerce and most of the service sector are dependent upon agriculture for raw materials, for jobs and for finance (Ibrahim, 1994). While some efforts have been made to develop the agricultural sector, e.g. irrigation schemes, mechanized farming there are other agricultural potential remain to be developed. Out of 600 million feddans, which is the total area of the Sudan, an estimated 140 million feddans are suitable for crop farming i.e. 23% of the total area of the country. Out of this 66 million feddans can be cropped under rainfed systems, while the remaining area needs some form of artificial irrigation (Ali, 1995).

Range lands or areas suitable for animal husbandry extend beyond crop farming lands to cover an estimated area of 372 million feddans. In other words over 62% of the total area of the Sudan is potentially Range land (Ibid). Thus according to Ali only 38% of the surface of the Sudan is currently not suitable for crop farming or animal husbandry (Ibid). Perhaps after some efforts and investments in land rehabilitation, the parts of the land covered by sand dunes, mountains, swamps and other forms of unsuitable lands for agriculture can also be brought under cultivation or animal husbandry.

LIVESTOCK STATISTICS

The size of the livestock population in the Sudan and the actual number of people engaged in the pastoral economy can only be roughly estimated. Figures widely circulated give the number of livestock in the Sudan at the range of 65 million heads (El-Inghaz El Watani newspaper, August 1995). According to this and other sources, there are currently 22.6 million heads of cattle, 22.7 million sheep, 15.8 million goats, 2.8 million camels, 750 thousand donkeys and 100 thousand horses (Ibid). The Department of Animal Wealth of the Ministry of Agriculture had recently suggested that the actual number of livestock in the country is 103 million heads (Department of Animal Wealth, 1995). Many experts in the field have challenged this official figure suggesting that it may have been motivated by the desire to satisfy the targeted requirements of the Comprehensive National Strategy to be discussed below. Wherever the truth lies, all indicators support the significance of pastoralism to the national economy of the Sudan. Given the importance of this sector, public policy questions relating to its development and especially management issues, deserve greater attention and investigation by academics and researchers. This paper is part of an ongoing research by the author on the role of the Department of Range and Pasture administration in developing the pasture sector in Eastern Sudan.

While the pastoral economy spreads across the whole country, not all the regions are equally endowed with livestock. While most have relatively large animal population, they vary in their range resources and size and types of livestock. Some regions have more cattle (e.g., Darfur and Bahr El Ghazal), others have greater number of sheep (Central and Kordofan) and yet others have larger herds of goats (Darfur and Central) (Ibid).

Overall, it can evidently be said that the Western regions, i.e. Darfur and Kordofan appear to have the highest concentration of livestock. Hence many of the issues to be raised below with regard to the pastoral economy in the Eastern region are equally relevant to Darfur and Kordofan. However as will be seen later the Eastern region which is taken as a case study has its unique and special problems.

For the purpose of this study, the Eastern region as an administrative and political unit, covers the former provinces of Kassala and the Red Sea. In terms of ecology and geography the Eastern region overlaps with parts of the central region. Area south of Gedaref and East of the Blue Nile are important range lands where pastoralists from the Eastern and Central regions meet, interact and form an integrated pastoral society. It should be noted that the administrative and political units in the Sudan have been subjected to many changes in recent years. In order to make things easier for the reader we shall remain to refer to regional and administrative structures under the 1981 Regional Government Act.

THE DEVELOPMENT OF THE PASTORAL SECTOR

The role of the pastoral sector in the national economy of the Sudan has been indicated above. Recent research by (Ibrahim, 1994) and many articles in newspapers (Ali, 1995) have demonstrated the growing importance of the sector. Ali, for example, has suggested that if only 10% of Sudanese livestock can be exported annually, the Sudan can earn an estimated 1.5 billion dollars at current prices. The significance of this figure can be examined against the current value of Sudan exports which is below \$ 500 million per annum. In view of the economic significance of this sector, the questions about the nature of historical influences which led to the neglect of livestock by development planners and policy makers has been raised (Ibrahim, 1994).

Recently, however the pastoral sector started to attract greater attention. The present government in the Sudan, perhaps more than any other government seems to have appreciated the role of the pastoral sector at least in terms of its policy statements.

Many conferences and workshops were held with the objective of highlighting various aspects related to the pastoral economy. The Comprehensive National Strategy (CNS), the official blue print and plan of action which outlined state development policy has embodied state objectives, programmes and specific targets related to this sector during a period of ten years (1990/91 - 2000). In what follows the paper will first abstract the main targets and programmes of the CNS with regard to the sector and then raise questions about the mechanisms, institutions and means by which these programmes were to be realized. These questions will further be elaborated by examining the implementation of policies and the institutional factor in this process with reference to the role of the Department of Range Management.

THE COMPREHENSIVE NATIONAL STRATEGY

Volume one of the C .N.S outlined the main objective to be realized in each of the major sector of the economy. With regard to the livestock sector the document contained the following broad objectives:

1. To triple existing livestock herds during the period of ten years.
2. To improve techniques of animal husbandry and rehabilitate pastoralists and livestock owners.
3. To double livestock exports 20 times, during the period of ten years covered by the strategy.
4. To eradicate chronic and epidemic animal diseases.
5. To reach self-sufficiency in vaccines and other basic animal drugs.

6. To improve the level of veterinary research and enhance the status of veterinary professions.

Other indirectly related objectives include the following:

a. To increase area under irrigated agriculture from 2.8 million to 9 million feddans.

b. To horizontally expand rainfed agriculture to cover by the end of the strategy 51.7 million feddans, 30 million feddan of which were to be covered by mechanized farming and 21.7 million feddans by traditional agriculture. (CNS., Vol. I: 206-208).

In order to achieve the first three objectives listed above, it becomes, imperative to improve the performance of the Range system and increase its productivity, at least, by three folds. Under existing realities the natural range lands produce an approximate amount of 62 million tons of dry matter (Zarroug, 1994). Thus, by the year 2000, in order to meet the objective of the CNS of tripling the size of the National herd, an estimated 186 million tons of dry matter must be availed. Unfortunately, however, the document seemed to have missed a very important aspect since it made no direct or explicit reference to the Department of Range and Pasture Administration or the range system in general. The implementation of programmes related to these set of objectives are assumed to be carried out by existing institutions. In the remaining parts of this paper we shall discuss how the Department of Range and Pasture Administration had responded to the requirements of the CNS at the national level and then to proceed on to show the specific problems of Eastern Sudan.

THE DEPARTMENT OF RANGE MANAGEMENT

The CNS has treated the issue of range lands within a wider framework of natural resources when it emphasized the need for environmental balance and protection. In order to achieve this objective it called for the need of reserving an estimated 25% from the total area of the country for forests and range lands. In addition to this basic objective the CNS outlined the following:

1. The rehabilitation of range lands in all regions of the Sudan.

2. To maintain a reasonable balance between the carrying capacity of the range lands and the number of animals.

3. The development of Range resources.

4. Protection and management of pastures and pastoral resources (CNS, 1991).

These are very general objectives which need to be translated into specific projects. Nowhere in the CNS document, was the Department of Range and Pasture Administration directly mentioned. This could have been intended on the ground that responsibility for range lands is a joint responsibility, shared by many government departments responsible for the management of natural resources e.g. Forestry, Soil Conservation, Rural Water and the Range and Pasture Department. Or otherwise this could also be attributed to the general trend in all development plans which ignored the institutional factor in development. However, from interviews with the staff in the Department of Range and Pasture Management, in Khartoum, it became clear that the Department took the task seriously. It has responded by producing the following set of programmes by which it hoped to meet the main objectives of the CNS This include:

1. Collection of data on the current state of the range lands and conducting surveys for all available pastoral resources.

2. Improvement of pastures and prevention of crop farming in all marginal lands.

3. Protection of pasture from arbitrary fires.
4. Rehabilitation and protection of nomads trekking and nomads migratory routes.
5. Planning for commercial ranches.
6. Establishment of fodder banks in order to increase the storage capacity of animal feeds to guard against drought years.
7. Protection of pasture around permanent settlements..
8. Modernizing and regulating tenure rights in traditional range lands.
9. Strengthening the Department of Range and Pasture Administration at the central and regional levels through staffing, training and equipping technical personnel in the field of range administration.

In developing its programmes of action the Department stressed the significance of range and pasture as one of the main natural resources in the country. The commercial value of dry fodder, from the natural range, has been calculated at 31 Billion Sudanese pounds. This figure is reached, on the assumption that, the annual average productivity of fodder, in the dry lands, is equal to 62 million tons of dry matter and one Ton of dry matter is priced at L.S 500 (Zarroug, 1994). The logical conclusion from these estimates is that any investment in the development and improvement of range productivity worth the penny. The following section will discuss the performance of the Department of Range and Pasture Administration during the first three years of the Comprehensive National Strategy and show whether the broad targets of the plan in the pastoral sector are feasible.

IMPLEMENTATION OF PROGRAMMES

Having responded to the main objectives set by the strategy for the sector, various concerned departments responded with their programmes of action and detailed specific projects. The Department of Range and Pasture Administration like other governmental agencies, produced its projects which included the following programmes:

1. Range protection
2. Improvement of range lands and pastures.
3. Establishment of seed banks to help in implementing the programme.
4. Institutional development and capacity building.
5. Pilot projects, such as Kheiran and El Odeia in Kordofan (Department of Range Management, 1995).

Each of the above programmes included a number of specific projects distributed throughout the country. In implementing its programmes the Department of Range and Pasture Administration relied on its field units, which under the current policy of decentralization, were expected to play even a greater role.

However, in this section, and for reasons of data availability, we shall be interested in examining broader aspects of implementation using the Central Government development budget of the Department of Range and Pasture Administration as the main indicator for programme implementation. The development budget will be examined at the level of proposed funds, approved funds and actually spent funds.

Within the context of the objectives set by the strategy it has been estimated that the total cost of Range and Pasture Management programmes, during the period of three years, which covers the first phase of the plan and the two years preceding them was L.S. 464 Million at current prices. Out of this proposed development budget only 76 million were approved by the Ministry of Finance. The Department was able to draw out of this L.S. 61 million which it has actually spent. In other words the percentage of approved development funds as a ratio of proposed was only 16% and that of expenditure as a ratio from approved was 82%. (See table 1).

Table 1: Development Budgets of the Department of Range Management (1989/90-1993/94)

Year Approved Released	
1989/90	9,289,000 8,451,000
1990/91	6,171,000 3,108,000
1991/92	16,604,000 13,943,000
1992/93	33,331,000 25,555,000
1993/94	10,967,000 10,670,000
Total	76,000,000 61,000,000

Source: Department of Range and Pasture Administration,
Khartoum, August 1995.

With regard to the specific projects and the rate of implementation in these projects, the conclusion seems rather obvious. There is no proportional relationship between planned targets and implementation. The gap will be even greater if factors of inflation were taken into account. The original proposed figure of L.s. 464 million which reflected the estimated cost of projects in 1990 would have been highly inflated in 1994 thus making the gap between estimated and real funds even greater. Table 2 and 3 below reinforce this trend.

Table 2: Rates of Implementation in Certain Key Projects (1992/3-1994/5)

Project Achievement Proposed Level of

Target Execution %

Protection of Range 33,200 Kms 30,660 Kms 93.0%

Improvement of Range 286,600 90,200 31.0%

Reservation 17,850 5,950 33.8%

Note: 1. Source: Dept. of Range and Pasture, Khartoum, Aug. 1995.

2. By protection projects it is mainly meant the preparation

of fire brakes.

3. improvement of range involves aerial spraying of seeds-collection and

preservation of genetic qualities of local plants ..etc.

While the above table indicates the quantitative rates of implantation whereby the Department nearly succeeded in fulfilling its target of protection, this achievement, however, must be put within its proper perspectives. For a long period the routine duty of this department was centered around the protection of range lands against arbitrary fires. Hence the real performance of the Department in the plan must be judged against its performance in the other fields. The following table below shows the performance and rate of implementation of other projects, in financial terms.

Table 3: Implementation of Other Project in Financial Terms 1992-1995

Project Proposed Budget (L.S) Approved Budget(L.S)

Seed Stores 4,705,356 Zero

Improvement of

Range lands 23,200,000 Zero

Processing of Crop

Residues for Animal Feed 48,700,000 Zero

Concentrated Animal Feed 20,949,000 Zero

Source: Department of Range and Pasture Administration,

Khartoum, August 1995.

This table indicates that, other activities which were to be performed by the Department within the limits of the plan were completely ignored. Pastoral resources were not improved, seeds were not stored to be sprayed in areas which have deteriorated and crop residues were not processed and stored to be transported to areas of deficit as it was originally planned.

The assessment and evaluation of the role of the Department within the perspective of targets set by the CNS can further be shown by reference to other indicators. In its submission of its projects, the institutional factor had been stressed. In order to produce real changes in the pastoral economy, particularly in the improvement of pastures, it has been recognized from the beginning that strong and capable institutions are needed. Implied in this is the recruitment and training of staff, provision of equipments, and the allocation of the necessary funds. As we have given some attention to questions

related to financial allocations and levels of implementation of projects, few words related to human and technical resources are necessary.

From interviews with leading figures in the department including the Head of the Department, it was revealed that during the first year of the plan (1991\92), the total number of trained staff in the field of range sciences employed in the Department were 90. Of these 4 were Ph.D. holders, 21 were M.Sc. holders, 4 with post-graduate diplomas, 11 with B.Sc. certificates and 41 had completed secondary school in addition to 9 technicians with diploma qualifications. Most of this staff were posted in the field, in the main regional and provincial head quarters where they performed all technical activities related to range management. As may be required and within the limits of budgets, an unspecified number of permanent and seasonal labor (non classified) staff were recruited, to assist the trained and qualified technical staff in the field.

With the initiation of the plan a capable and qualified range scientist, a Ph.D. holder with international experiences had been appointed to lead the Department. He took his job very seriously and expected similar commitments from the Ministry of Agriculture. In order to strengthen the technical and institutional capacities of the Department he proposed to the Minister the approval and introduction of the following measures in order to reform, enable and strengthen the Department at the central and provincial levels. These reforms includes the following:

1. Designating a permanent building to function as central head quarters for the Department.
2. Recruiting and training more staff.
3. Equipping the Department with tools, vehicles, tractors, labs and other logistics. Since the main work of the Range Management staff is mainly in the field, the need for strong four wheel vehicle has been stressed.
4. Specifying in a clear manner the duties, responsibilities and areas of jurisdiction where the boundaries between the Range, Forestry and Agriculture departments are demarcated.
5. The establishment of a framework for coordination between all departments and organizations operating in the field of natural resources (Zarroug, 1994).

Instead of meeting and satisfying these requirements, which were vital necessities, the staff felt that they have been ignored. Frustration and lack of motivation, replaced the original feeling of high expectations. As a result many of the staff started to leave. At the time interviews for this paper were conducted (August 1995) the Department had already lost 40 out of its original 90 staff. Among those who have decided to leave were 4 Ph.D. holders, 6 M.Sc. holders, 12 B.Sc. and 3 secondary school. 60% of all staff in the central headquarters (Khartoum), were either on leave without pay or otherwise have permanently quitted their job in the Department and many field provincial units are currently empty.

CONCLUSION

Our data is not yet complete and the field work that will cover the Eastern States is yet to be conducted. However from the brief review already made a number of issues and questions in relation to the role of the Department of Range Management in pastoral development are raised and some generalizations can be made.

These issues and questions relate first to the nature of state priorities and state commitments towards the pastoral sector at large. Secondly, while these priorities were clearly very low and below expectations, and they do not reflect the importance of the pastoral sector, at the level of implementation, these priorities were further scaled down. This gives support not only to the point of marginalization of the

pastoral sector by the state, but also sheds light on the credibility of declared policies. Questions about public policy apart, other issues relate to methodology and perception of planners can be raised:

1. The Comprehensive National Strategy is a typical example for a top down approach in development planning. In the design of the plan and in its implementation there seems to be very little attention to pastoralists who as a segment of the population and as a social strata have never been consulted either by the planners or the executing agency.

2. While the Department of Range and Pasture Management have been given big responsibilities in the sense of realizing the sector targets and objectives set in the plan, many important issues of great consequence have been left unsettled. For example the question of land tenure and entitlement to land use and the impact of all this on the pastoral sector were not raised. It is well known that there are contradiction between the interests of commercial mechanized farming and the pastoralists, particularly in the Eastern Region (Zarroug, 1994). By calling for the horizontal expansion of mechanized rainfed agriculture and irrigation schemes and reserved forests (Comprehensive National Strategy, *op.cit*) the plan has prepared the grounds for the intensification of these contradictions.

3. At the time when the state is officially embracing and advocating notions of market liberalization, accepting and implementing strict structural adjustment programmes (SAPs) it formulates comprehensive national strategy programmes which are a version of central planning. In other words the state is simultaneously enforcing a command economy while at the same time introducing a market oriented system without realizing or reducing the contradictory factors that can be brought into play. For example from the data discussed above, we can see that development planning requires higher levels of investment which may call for deficit expenditure if necessary while structural adjustment demands cuts in budgets and refreshment of staff. The results are crippling not only for the Department of Range Management but also for the plan as a whole.

4. Practically, and as a result of the above, the institutional framework for plan implementation had been seriously shaken if not completely broken down. The decentralization model currently in progress throughout the country at all levels and tier of government brought new realities, not in favor of a regular and smooth functioning of government institutions. This experiment of decentralization had brought substantial changes in the budgetary process and the corresponding institutional structures. For example the central Ministry of Planning had been dissolved and thus it is not yet clear how the state can have any role in development.

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What If the Pastoralists Chose Not to be Pastoralists?

The Pursuit of Education and Settled Life by the Hadendawa of the Red Sea Hills, Sudan

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INTRODUCTION

Recent studies have clearly indicated the desperate situation of pastoralist societies in the Horn of Africa. Their plight cannot be completely related in a direct way to natural causes (e.g. drought) nor to the pastoralists' own misuse or mismanagement of resources. Leif Manger has aptly explained how the dilemma of the Hadendawa pastoralists of the Sudan cannot be said to have been caused by long periods of droughts in the area or the Hadendawa's handling of land and animals, their two major sources of livelihood (Manger, 1994). Land degradation, for instance, in the Hadendawa area can be related to factors such as the increasing rate at which nearby urban centres are growing and the consequent demand for energy in the form of wood fuel; and not to over-grazing. The pastoralists' problem in this case, it is suggested, emanates from their increasing incorporation in the national economic and political programmes. Other factors, like policies and actions of NGOs, also come into play (Abdel Ati, 1993). The overall effect of national policies and programmes and the generated processes may be beneficial to the country as a whole but to the detriment of the Beja. Manger is perhaps right in refusing to reduce the complex pastoralists' situation to one that can be tackled through simple models based on "popular participation". He is perhaps also right in agreeing with Hogg (1992) in that "Ultimately, the plight of Africa's pastoral population can only be addressed by the joint actions of governments, international donors, NGOs and pastoralists alike". This, Hogg goes on, can only be achieved if all those parties agree that "pastoralism is an economically viable, sustainable and worthwhile way of life" (quoted in Manger, 1994: 23).

This paper intends to contribute to the enrichment of the above argument by concentrating on the pastoralists' side. Without minimizing the importance of the other factors, pastoralists no doubt constitute the corner stone in the discussion. Despite the fact that many researchers acknowledge this fact, very few indeed deal with responses and reactions of the pastoralists to their worsening conditions. Even fewer still take into consideration non-economic and non-technical aspects of such responses. Current approaches mostly view the situation from the perspective of the options pastoralists take under environmental, political and economic constraints concerning the resources available to them - usually land, vegetation, water and animals- and their management. What is lacking here is the need to explore the conceptions and processes which inform the choice of options and the actions that follow; these need not be purely economic, nor solely arising out of pastoral social organization set-ups.

For many of the Hadendawa, a major propelling factor in the way they perceive and face the present situation is education. Many groups and community leaders among them see education as the solution to the problems they are experiencing. There is however no single and unanimously agreed upon educational model; instead, a number of competing models are offered. Community leaders agree, though, that their low level of education is largely responsible for their poor management of the situation at the local level. But, more importantly, they think, their limited education has incapacitated them, as they do not possess effective leverage over policies affecting their livelihood at the national level. Hence, many attempts have been made in the field of education (El Hassan, 1994).

The purpose of this article is to account for some of the ways the Hadandawa have followed to achieve the goal of raising the level of education. To simplify my task I will review these trials as models. One has to caution here against any implicit assumption of regarding these models as discrete entities, or viewing them structurally. They constitute part of an on going process, and as such open to all sorts of influences with which they mutually interact. Also, the education option is to be seen as complementary to other processes underway at present and not as the primary mover for purposes of analysis. Therefore, it is not in any way implied here that other perspectives emphasizing the role of environmental, administrative and technical constraints are not useful. Again, one cannot depend completely on the earlier anthropological works that put more stress on the importance of internal forms of social organization (e.g. segmentation for the functionalist) and values and norms at the cultural level for the objective analysis of pastoral societies. However, a new look is needed to grapple with the intricacies of pastoralism. So, it is not the intention here to discuss any of the aspects related to the social organization, though their significance is well acknowledged. The paper merely argues that a more close inspection of the element of education may give us much insight as to how the Hadandawa interpret their problems and envisage possible solutions.

HISTORICAL BACKGROUND

Literacy and institutions of learning are by no means new introductions in the Horn of Africa. Old Nubia and Abyssinia knew many such institutions which could be described as prototypes of present day *khalawi* (sin. *Khalwa* i.e. Quranic schools) widespread in eastern Sudan. They were organically related to the religious systems of the time and they were community supported. They were, however, confined to the settled areas and we know little about the conditions in the pastoral section of the society. As no evidence exists that the pastoralists of the region were ever completely isolated, one would assume that some sort of relations existed between them and the settled population. Much later developments (mid 19th century) pointed to the impact of urban centers, like Suakin, on the Hadandawa pastoralists through smaller settlements such as Sinkat. Education was still anchored to the religious institutions; though by then it was shaped by Islam (El Hassan, 1994).

The second important historical landmark is the colonial period (1898-1956). The British educational policies had been molded by two factors: suppressing Islamic spirit; and satisfying the clerical needs of the newly established administration. Also, later on in the twenties, and due to political developments, ordinances that purported to organize 'native administration' were issued with regard to northern Sudan in particular. Those were in essence tribal policies geared towards giving tribal structures and chiefs more weight in the administration in both settled and 'nomadic' areas. These political and administrative policies led to two lines of action in relation to education. First, establishment of a 'dual' system of 'secular' (modern) and 'religious' (traditional) educational institutions, and, secondly, giving special attention to the education of the sons of tribal chiefs, notables and dignitaries with the view of preparing them for leadership in the future (Ahmed, 1990: 70).

Eastern Sudan was considered then, and still is, a 'backward' region in terms of education. Its number of 'modern' schools is one of the lowest in the country. Most people were, and still are, very much dependent on the *khalwa* for educating both males and females. During the 1920s when the British were pursuing their 'native administration' policy, they found in the *khalwa* a useful tool to supply the tribal chiefs with 'literate' functionaries; but it was also necessary to put some controls over it because of its potential anti-government religious feeling. They achieved this by creating the system of assisted *khalawi* in which non-religious subjects were introduced (e.g. arithmetic); and the whole system was put under the supervision and inspection of the Department of Education. The *fakis* and *sheikhs* (masters) of those *khalawi* were given monthly salaries. This arrangement did not prove to be quite suitable for the intended goals, and education has since then remained substantially linked to the *khalwa* in eastern Sudan (particularly in rural areas) independently of central authorities. The *khalwa* education depend mainly on individual, family, group or community initiatives and assistance for their sustenance.

SCHOOL AND KHALWA

Though a few elementary and primary schools were open in the first half of this century in eastern Sudan in Port Sudan, Kassala, Suakin and Sinkat towns, they suffered from extremely low rates of enrollment and very high drop-out rates. It was the urban families who were relatively economically capable of affording to send their sons to school, while the pastoralists, primarily for ideological and economic reasons, were unable to do so. For them, modern schools had been brought by the *kafir* (non-believers) and were meant to spoil their faith. On the other hand because of their poverty those families were not only practically unable to bear education expenses, but also could not release their school-age children of their herding obligations¹.

In this regard the *khalwa* had an advantage over the school. Learning Quran is a blessing not for the student himself but also for his family and community at large, and a salvation in this and the other world. It lifts the burden of supporting children, especially in difficult times, as it usually provides full boarding and sometimes clothing for non-resident students free of charge. Moreover, its flexible system and schedule of instruction of allowing students to enroll at any age, or withdraw at any point of time without penalty means parents can adjust their children's *khalwa* education to suit their own pastoral needs.

Even at present, and with the worsening of economic conditions, drop-out rates at the elementary level are more and more on the rise. Though most of the drop-outs engage in petty activities (with the loss of animals), some of them still join the flourishing *khalwa* institution. This trend has been documented for the 1980s drought period. The increase and spread of *khalawi* (supported also by the current Islamic ideology of the state) has indirectly resulted in a *khalwa* school dual system whereby school students attend the *khalwa* lessons as well and make use of its boarding facilities at the same time. Other students, both males and females, may also join the *khalwa* to deepen their religious knowledge. There is still no central authority's discretion over this arrangement up to now.

MODELS OF EDUCATIONAL INSTITUTIONS

A number of educational models among the Hadandawa can be discussed here according to their relevance to pastoral life. There is no definite date as to the time of the establishment of the early *khalawi* in eastern Sudan. Nonetheless, it may be safe to give the mid-nineteenth century as a mark for the establishment of many traditional educational institutions in Suakin under the auspices of Islamic "missionary" figures like al-Mirghani and al-Majdhub. Yet, mosques had existed there before that, and it is quite probable that some of them had been functioning as centers of learning. Whether mosques or *khalawi*, those institutions were basically urban in nature and meant to serve the multi-ethnic and multi-national population of the until-then flourishing trade port (Hamadai, n.d.: 3; 13). Escaping the oppressive heat and humidity of Suakin during the summer months, the wealthy citizens of the city used to move to the more mild climate of Sinkat, about thirty kilometers to the south west of it. They transported their "institutions" with them to cater for their educational religious needs while staying at Sinkat. Sinkat is a small town which has been serving as a link between the settled and urban centers, on the one hand, and the pastoral population, on the other; being a resort place for the former and a market-place for the latter. It is here that pastoralists and semi-pastoralists came into contact with such learning centers. Evidence is lacking concerning the actual nature and mechanisms of that interaction. For example, no information is available on the numbers or background of the attendants of those centers, nor the results of that kind of education. During the 1980s, however, two major events coincided: the declaration of the Islamic laws at the beginning of the decade, followed by the declaration of the "Sharia'a state" at its end (after a military coup); the second, the mid- 1980s severe drought in the whole sahelian belt. Relief and aid distribution receiving points became in many cases synonymous with the *khalwa* place. Hard hit by the drought, many pastoralists took refuge in the *khalwas* awaiting food and other forms of assistance (El Hassan, 1991). Drought is usually explained by the Hadandawa as a manifestation of God's anger for the bad deeds people have done. Resorting to religion is considered important for explaining of natural and social misfortunes quite often (cf. Hjort and Dahl, 1991: 152-62).

In this Suakin/Sinkat model the educational institutions are controlled by sedentary elite (e.g. the Ashraf) with the main purpose of teaching Quran and very little *fiqh* (jurisprudence) and *hadith* (Prophet's sayings and deeds) and *frayid* (laws of inheritance). Their influence over the pastoralists could only be indirect through their religious personal charisma and ties with the administrative and tribal heads locally and at the national level. The pastoralists on the other side looked for blessing (*baraka*) of those religious figures. In other words, as far as education is concerned it was confined to narrow limits geographically and socially. Also, for reasons that could not be dwelt on here, this model was more successful with women than with men.

The second model is to be found among pastoralists in rural areas around famous points of their meeting places. The religious educational centers in those places are usually associated with sub-clans (*dewab*) like the Samarandewab (at Sallum and Wgig, for example), the Hashindewab (e.g. on the River Atbara, Um Gurdal). Other religious families include the Shabindewab, Kanjar, and Ibshar and places such as Asut, Tulaq, Tumala, Raira and Khashm el-Girba, for instance (Ahmed, 1990: 45). Some of these learning places have become very famous, and attracted many of the children of the pastoralists to accommodate them in boarding houses. They have mainly been concentrating on learning Quran by rote. In these *khalwas* important social occasions take place e.g. marriage and death ceremonies, public meetings, religious festivals, etc. The *sheikh* (master) of the *khalwa* receives high respect from the community and is regarded as a model personality. He is, furthermore, consulted on all important family and personal matters; though his decisions are by no means binding. He might also be requested to mediate between conflicting parties, he would intervene only when he makes sure that he is accepted by both parties. In such cases - which are usually of homicide and land disputes- his role is restricted to calming the disputants until a *galad* (truce) is reached.

Despite the fame of these pastoral *khalwas* and their attraction for many students of varied ethnic background, they nevertheless do not exhibit high scholarship that surpasses the regional boundaries. Nor does the education offered prepare its students for more than being *khalwa sheikhs* themselves. That is, it does not satisfy the requirements of what is now called basic education- "instruction at the first or foundation level, on which subsequent learning can be based ... education for children, as well as education in literacy, general knowledge and life skills for youth and adults" (Ahmed, 1991: 23). Thus, the graduate of this model will not be equipped to face the kind of problems and situations posed during the 1980s and after.

The third model presented here is taken from Ali Bitai's Hamoshkoraib². Ali Bitai was an illiterate person who had been born to a pastoral family around Hamoshkoraib area, to the north of Kassala along the Eritrean borders. He claimed to have seen Prophet Mohammed at the age of six and continued to do so until his death in 1978. At the age of 17 he entered a state of *ghaybuba* (unconsciousness) when he professed future events. Three years later Prophet Mohammed, he claimed, appeared to him in a vision and instructed him to build a mosque and start a "*da'wa*" (call) to the Beja and beyond inviting them to repent and return to the right path; he was ordered to spread the message. Moreover, he had to tell them to give up their earlier way of life, shave their long hair, settle down, study the Quran, learn Arabic, abide by the rules of cleanliness, drop their arms, carry instead writing wooden boards of Quran and perform all the five daily prayers communally. Also, that their gainful pursuits had to be *halal* (religiously lawful), and that they should be self-dependent. In that vision he was told that he would be opposed by the tribal chiefs and other 'important' people, and that he would be followed by the "poor".

When Ali Bitai started his call in 1951 by establishing his first *khalwa* for men, to be followed in 1954 by a women's *khalwa*, and went around preaching his message, and even crossed the borders to the *Beni Amir* of Eritrea, he was summoned by the *Nazir* (chief -highest tribal authority in the Native Administration) on instructions from the British colonial authorities. He was advised to give up his activities, stop preaching, and, interestingly, disband his followers and let them revert to their earlier nomadic mode of livelihood. He was subsequently imprisoned from 1954-1960 on the account of not obeying the authorities. This led, paradoxically, to increased popularity for Betai, and by time many people of the Beja saw in him a spiritual leader with miraculous and prophetic qualities (having *karamat* and *baraka*) even as *wali* (holy man).

After 1960, Ali Betai had been active consolidating his activities among various Beja tribes, enlarging his settlement educational facilities at Hamoshkoraib for both men and women, opening new branches in other areas of the Beja land and beyond. He built mosques at New Halfa, Gadarif, Omdurman and as far as Nyala, al-Obeid and al-Fashir in western Sudan. The Quran students at Hamoshkoraib, called *muhajirin* (religious migrants), who, in addition to the Hadandawa, Bisharyyin, Beni Amir, Amarar, Artaiga and Kamilab tribes of Eastern Sudan, come from as far as Mali, Nigeria, Eritrea, Somalia and Yemen. There are said to be over thirty dialects and languages reflecting the scope of ethnic diversity. Among the Hadandawa themselves it was estimated that around 12.5% of the population are disciples and loyalists of Ali Betai in 1985 (Ausenda, 1987: 450). Most of the Hamoshkoraib *khalwa* attendants are nuclear families, but also many unmarried men and women reside there. Families live together in separate homes - but two locations, separated on gender basis, are used for teaching and religious purposes.

Some of the basic principles around which Ali Betai's teachings revolve include; pledge of sincere repentance, group performance of the daily prayers, learning and reciting of Quran, amicable and peaceful co-existence, abandoning all sorts of discrimination be them ethnic, economic, social or otherwise, settlement of nomads, self-reliance and pursuance of lawful economic activities, preferably cultivation and trade. All of these teachings, whether in their theoretical, religious, spiritual or pragmatic sides, are considered integrally related and one in nature. Ideally, daily activities should be actual manifestations of the principles stated above. Hamoshkoraib constitutes a community of believers who earnestly follow the principles, and by living them, attempt to provide a model everywhere they go. In the settlement, their daily activities are divided between communal prayers, recital and study of Quran at prescribed times of the day and engaging themselves in agricultural and commercial work, when need arises. The community runs its own affairs and has daily sessions after prayers to discuss religious and social matters of importance.

Ali Betai's movement is now renowned for its active propagation in the eastern region and other parts of the Sudan. Thus, places like Gebeit and Sinkat, which have not been in direct contact with Hamoshkoraib, are deeply influenced by its "reformative" inclinations and even tried to emulate it particularly in transformation of women. Many of those who have received their education and training there are now spread in rain-fed and irrigated agricultural areas in the Gash and Tokar deltas as cultivators, and in Aroma, Kassala and Port Sudan as petty traders. Wherever they are, they have been very successful, and people admire their honesty, spirit of hardworking and the polite and co-operative manner in which they conduct their transactions (Nautrup, 1995: 10).

The impact of Ali Betai's model among his sizeable Hadandawa adherents is very immense in a variety of ways. Heeding to his call, many of them, and of other tribes, have abandoned their nomadic pastoral life and started to lead a settled one. That is, they have accepted the notion that pastoralism is incompatible with devout religious life and "progress", which will only be attainable through religious education and "purity" and settled life. In this view, pastoralism and parochial tribalism are synonymous with conflicts, anarchy (for lack of religiosity) and subsequently, "backwardness". Accordingly, and on his directions, people of Hamoshkoraib and similar sites have begun to adopt all signs and symbols of the settled, and renounced traditions of pastoralism. All men now wear their hair short (instead of fuzzy styles), and put on white clothes with turbans to go with. The compound is lighted by electricity supplied by a generator. Inhabitants always made appeals for introduction or consolidation of existing health, veterinary and piped water services, and building dams for collecting water for agricultural purposes.

The movement has achieved many successes towards meeting its goals. This is particularly so in the case of women, who are traditionally known for being extremely conservative. By sheer numbers, their presence is very impressive; as they were estimated to number five thousand "students" enrolling in women's *khalawi* at Homoshkoraib. Inter-ethnic marriages have become by now a common practice; with women having a say in deciding whom they want to marry. Both men and women were urged by Ali Betai to learn Arabic and use it as the main medium of instruction and lingua-franca. This must have opened a lot of opportunities for both sexes. With the new state's ideology and religious policies, it is possible now for the male graduates of Hamoshkoraib (and females at least theoretically) to join higher institutions at the national level e.g. the Quran University in Omdurman.

CONCLUSION

The usefulness of the concepts of "carrying capacity", "environmental degradation", "resource management", "de- and re-stocking" etc.. should not preclude us from exploring other factors which may have some significance in shaping pastoral life. The concepts just mentioned concentrate on the assessment and measurement of the "technical" sides of pastoralism. Other current concepts deal mainly with aspects of social organization and/or socio-economic constraints under which pastoralists are obliged to make options in order to survive. Accepting all that, we need to know how the pastoralists perceive their problems and the steps they take towards their solutions at the level of knowledge. In this respect, many scholars have pointed to the importance of taking "indigenous knowledge" into account when considering development issues. Little or no mention at all, however, is made to what constitutes that knowledge, or the mechanisms used to impart or test it against empirical situations to find out how it works, and its limits in real life contexts.

In this paper three models of indigenous forms of knowledge were discussed to indicate their relevance to pastoral mode of living. All three derive from Islamic tradition of religious education, a long standing tradition in society. The first, being urban-based, had little effect, if any, on its pastoralist hinterland. The second, though in the heart of pastoral areas, has no direct relevance to basic necessities of pastoralism. Nor does it equip its recipients to advance in learning to promote their positions socially, economically or politically. The third one rejects pastoralism and calls for permanent settlement and establishment of a new life based on cultivation and commerce. Its basic tenets comply with inter-facing with national economic and educational programmes. But its success will ultimately be contingent on the disappearance of pastoral way of life. This poses a dilemma. For many years back many anthropologists have been defending pastoralists against adamant planners and policy makers who argued for their settlement so that services could be provided to them. Now, what if, like our case above, the pastoralists themselves think that pastoralism is not worthwhile to pursue as a way of life ?!

NOTES

1. Interview with Haj Mahmoud Jailani, 80 years old at Sinkat, November 24th, 1993.
2. Most of the information relating to Ali Betai and Hamashkoraib is to be found in Ahmed, 1990; Eid, 1985; Ausenda, 1987; Nautrup, 1995; and El Hassan, 1995.

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Property and Social Relations in Turkana, Kenya

Frode Storås

Once when I was about to leave Turkana, I asked my good friend and host, Locha, to give me a bull as he had promised. As I understood the Turkana way of life, this was an approach to underline our good relationship. Locha answered that he very much wanted to give me a bull, but that the time was not right and he gave many good explanations why. His excuses, I had learned, was the Turkana way of handling such requests. Some days later I again challenged Locha with the same demand. He showed me a fine calf and said it would be mine when it was weaned. He then went into the *kraal*, got a big billy-goat, gave it to me and said he would only give me this "small animal" now, since I had to wait for the bull. It was not a small animal. The billy-goat was huge and very beautiful. And it was Locha's youngest son Lorem's dancing animal, a he-goat his father had given him a year earlier when Lorem was reckoned big enough to dance. Lorem cried and fought for his billy-goat. He did not at all agree with his father giving away the animal. His mother, Nakadio, supported him. I felt terrible and tried to refuse the gift. But Locha took his son aside and told him something. Lorem wiped off his tears and I went off with the animal.

Whose animal did I go off with? In his book "The Family Herds: a study of two pastoral tribes in East Africa, the Jie and Turkana" Phillip H. Gulliver wrote:

...a man inherits his own herds of animals through his 'house' [i.e. mother and children] after his father's death... He assumes the sole use of them both for narrow economic and wider social purposes, and they are recognized by all people as 'his stock'. Through him, wives and children share this ownership and use and, together, the group is distinguished from all similar groups, however nearly related, as the owner of certain herds (Gulliver, 1955: 126).

The case above indicated modifications on a man's sole use of his animals and, furthermore, revealed disagreements within the group on how its members looked upon the sharedness of the ownership. Furthermore, Locha had by his promise given me, a person outside this "share holding" group, a vague right in one of his animals. I want to point to the disagreements that came to the surface in this case, and thereby account for, and analyze the implications of, this part of reality.

Locha had on different occasions publicly announced his promise to me. This way he had defined our relationship in a particular way (and thereby his legitimacy to claim more of my chewing tobacco!). Our neighbors who knew about the promise, had again and again pushed me to ask for the bull. Maybe they wanted to see Locha's reaction since they probably thought it was a bad judgement to give away a bull to a person who was on his way out of the area. Locha knew I was leaving and he probably had the same considerations as I believe his neighbors had. By giving me the biggest billy-goat they had and renewing his old promise, he chose a middle way, but still demonstrating that he did not run away from his promise. He went for a big he-goat and he might have given a thought to the good relationship between his son Lorem and me when he chose that particular billy-goat. Lorem and I were good friends and Lorem was quickly appeased when he understood what was actually going on. First he had thought his father was going to slaughter his billy-goat. That made him very upset and he protested. He did not obey his father as he "ought to". Instead he claimed compensation for his billy-goat. His mother supported her son on this issue. And I have very good reason to believe that Locha said something about a young bull when he took his son aside and succeeded in calming him down.

I do, of course, not know for sure what was going on in Locha's mind. The list would be very long if I were to speculate on all possible considerations. We, as observers, can never get any definite picture of what is influencing people's action in a situation, neither can they as participants. But my guesses are not arbitrary.

Locha and Nakadio live in a district which has been classified as one of the most arid in eastern Africa (Pratt and Gwynne, 1977). In this harsh but beautiful landscape of the Rift Valley the subsistence of the majority of the people is primarily based on animal husbandry. Cattle, camels, sheep, goats and donkeys are kept and moved around in the area.

Control over livestock is an essential aspect of what it means to be a Turkana, this control, however, is not straightforward. Raiders from neighboring people, diseases and periods of droughts, are disasters which can deplete or eliminate a herd. But control over livestock is a question which has to be dealt with all the time. As the case above showed, the interests of different people are brought to the surface when a person takes action in relation to an animal. "Rights" in property are ambiguous and this opens up for interpretations and manipulations and negotiations. Thus the term right used in the way that right is something a person has or does not have, does not account well for the relationship between people and livestock in Turkana. In order to account for the dynamic aspects of property relations, I will therefore use the term claim, or to claim, instead of right. The term claim accounts for the positioned relationship between a particular person and other people in relation to livestock. In the case referred to above, the term claim would account for the interests each family member has in the billy-goat as well as my interest in it. A person may have common interests with other persons and act together with them as a group in some situations, but that does not exclude the possibilities of conflicting interests within the group itself.

I will argue that the interests of many persons are attached to every domesticated animal in Turkana and this inevitably involves persons from different groups. The multiplicity of claims individuals maintain in animals make it difficult to determine how livestock are distributed on individuals and households within a population. In Turkana there is no legal system, nor pensions or social services, which guarantee property or economic security. The impending threat of losing one's means of livelihood is always present, one's animals can die or be taken away by one means or another. There is but one form of security for a Turkana nomad: the ability to mobilize support, which implies relationships with others where one has outstanding claims in their livestock and acknowledges that they have claims in his or her own flock. Surviving as a nomad in Turkana demands the ability to mobilize support from a wide range of people. Thus complex networks of social and economic ties link individuals across the region. These are networks of individuals, and men and women establish and maintain relations with individuals of both genders. Supporters are recruited by, among other things, giving and asking for animals, money, clothing and food. One gives and receives, or, promises to give and receives promises from others. Everyone, thus, builds up a network of outstanding claims. Some of the persons comprising one's network are kin, some are affines and some are friends. Kinship and affinity are neither necessary nor sufficient conditions for such a relationship.

The individual Turkana establishes and maintains relationships with many persons who, in turn, are related to still many others. Overlapping networks spreading in all directions are the result. But one is, therefore, also constantly confronted by conflicting interests and one must deal continually with many claims and counter-claims. When brought to the surface, a claim will always provoke counter-claims. The outcome of such a conflict of interest will depend upon the support the disputants are able to mobilize. The physical power of the disputants can ultimately resolve a conflict. But in nearly all cases the matter is verbally settled. Rhetorical skill can be critical for establishing the validity of one's claims. However, any claim holder is better off if he or she has supporters, and preferably rhetorical skilled ones, at hand during any dispute.

Each person needs to maintain knowledge about what is happening and how his or her partners are dealing with their claims and counter-claims. It is essential to know who is making what moves. The transfer of animals, and promises of such, is continuous. Without adequate information one can be cut out or deceived and is thus ill prepared for engaging in verbal confrontations. One must constantly update one's knowledge, be it concrete, factual kind of knowledge or rumors and other less reliable types of information and co-ordinate this new information with impressions from the past in order to adopt a strategy for action. Knowledge is tantamount to power and therefore a critical factor.

People in Turkana relate to information as "cards in a game". Out of regard for the complex set of factors present in any given situation of interaction, they selectively pass on only certain fragments of information they have. And their concern is not only what they want to tell the anthropologist (or anyone else who asks a question), but also what should be said openly and thereby shared by all those present, for instance, when an interview takes place. Every event is a situation where people collect and give information which can be used in the constantly ongoing negotiation for support. Suspicion is a necessity and people weigh their words carefully. A player interprets what others tell him or her, compares this with what he or she has otherwise observed or heard and then acts in response to this full range of impressions. Control over livestock is therefore depending on active participation in what is going on among people. This all requires that, at least ideally speaking, each Turkana nomad be continually present so that he or she can follow up control over his or her own interests by making timely claims and by appropriately demonstrating support of others. If an individual is passive or withdraws from the arena, his or her relationships with others will weaken and lose their value. The success of a Turkana nomad is utterly dependent upon active participation in the negotiations which revolve around relationships, gifts and promises.

Individuals will, as members of overlapping networks, again and again face situations where they have to choose whom to support and thereby risk a setback in one or more relationships. Furthermore, for the individual there is always the conflict between avoiding claims and simultaneously demonstrate generosity and be worthy support. 'Good explanations and vague promises' provide the necessary latitude for action when one is facing a claim. According to the bridegroom, Kongo, in the film 'Wedding Camels' (Judith McDougall and David McDougall, 1974) this is what life is all about among the Turkana. And it is promises rather than livestock which are actually circulating between partners in Turkana.

The character of the "the game" implies that a person cannot lean on solid facts. Facts without support are of little value. The meanings people confer on events and thereby the experience they are harvesting, therefore deal with how to be a person who it is worthwhile supporting. Negotiating morality thus becomes an important aspect of the "game". But ideal norms of behavior is only one of many references.

There is not some static 'thing' that the self just is or ought to be, which determines what moral agent ought to do. Rather, one's identity as a moral agent (i.e. one's moral personality) changes and is shaped by one's way of deliberating about and pursuing one's ends and purposes (Johnson, 1993:133).

What is acceptable behavior and what is not, will depend on the definition of the situation and the possible support. The very same secret undertaking can be winked at in one situation and even be admired, but openly condemned and used against a person in another situation.

Children engage very early in life in strategies to create a good reputation and to build their own network of relations. For example, a herd boy can slaughter an animal and arrange a "grill party", *akiriket*, for his friends. In this way a herd boy gains prestige and a reputation for being generous, *epatana*. But this generosity will never be approved by the people at home and the boy therefore has to come up with a story that the animal was taken by hyenas or whatever. Thus he must weigh the attainment of a good reputation among his friends against the risk of losing his reputation as a good herder. Such secret undertakings are not uncommon. Young men, for instance, can establish their own flock through raids if they place the raided stock with friends thereby holding it separate from the family herd. While one risks losing family support, the young man can build a network independent of his kin.

Controlling livestock depends on controlling people for support. since viability is directly related to the ability to mobilize supporters whenever needed. But the cross-cutting networks of relationships imply paradoxes. People are tied up by mutual claims in these networks, still in order to maintain the relationships a person has to act independently. When a man gives away an animal to a friend, he has already ignored the claims from many people. Even though he tries to reduce the risk of losing support, he can not please everybody, Therefore, in the process of negotiating support a person has to handle multiple, simultaneous concerns (cf. Wikan, 1990) and very often conflicting concerns. The ambivalence a

person feels between what he ought to do, i.e. what he thinks is expected, and what he finds most practical, is a daily stress. Through the experiences people harvest, they learn ways of handling this stress.

CONCLUSION

I have pointed to aspects of property relations, aspects that I believe have decisive implication for everyday life, and thus explain a lot of what we can observe going on among people in Turkana. As no over-arching institutions sanction property rights, individuals are 'left alone' and have to protect their own interests. A wide network of support where one has outstanding claims will be of great importance as help to rebuild a herd after being hit by a disaster or to get animals for a bridewealth. Good friends can be decisive as supporters when one's interests are challenged one way or the other. But due to the web of crossing interests within these networks, no one can sit back and trust that all of his or her friends will be there to support him or her. As support is of vital importance in controlling livestock and thus for surviving as nomadic pastoralist, everyone has to work on maintaining their position versus each other. The fact that every person is 'left alone', thus impel people to relate to each other and socialize.

Everyday life in Turkana has to do with maintaining social influence in a political field that is characterized by continual flux. The result is a society continuously in the making. This opens for a flexibility that has proved to be very adaptive to nature and other people in this part of Africa. The short history of the people now called the Turkana, shows how people expanded from the highlands west of Rift Valley down the escarpment to the plains towards Lake Turkana, organizing their military forces according to the resistance they met. They came to more arid land than they were used to, but they learned from people they conquered, pushed on or assimilated, and some, for instance, took up camel herding as a new technology, others combined small stock herding and fishing in the lake. Today the variation in the use of technology and the way people organize is to such an extent that it is difficult to describe the Turkana as one kind of society different from its neighbors. Northwest in the district, for instance, the Turkana have much more common features with their neighboring Karimojong than they have with Turkana people further south.

Few, if any, development projects that aimed at improving the situation for nomadic pastoralists, seems to succeed. The former chief economist at the International Livestock Center for Africa gave the explanation that development of water supplies, veterinary services, grazing schemes, ranch creations, associational formation, marketing schemes, (including stratificational production designs) and technical livestock improvement programmes, all activities that have been pursued in pastoral projects, are managed so relatively by the pastoralists themselves that there has been little room for improvements (Jahnke, 1982, cited in Aronson, 1984). This does not mean that these societies today are as they have always been. People respond positively or negatively to the opportunities they see. For instance, they go to a Somali trader, or a Turkana trader passing with his donkey, and sell a goat or two when they need a new blanket and more tobacco. Or, in order to save the animal, some wash gold for a week to get the money for the blanket.

The social, political, economical and ecological surroundings change and so do people and the way they relate to all this. The flexibility and flux entangled in their way of life make them adapt to changes without losing identity as pastoralist. Even the many who have moved away from Turkana and taken other work, relate to their background and maintain identity as Turkana, i.e. as pastoralist. And all Turkana have claims in livestock. Regardless of how poor they are or whether they have settled in town or on a development project, they can lay claim to animals there where they have kin and friends. But not all succeed in mobilizing adequate support for substantiating their claims. Those who have not nourished their relationships and thereby maintained their social position, face difficulties in mobilizing support for their claims.

Many of those who leave do so because they lose in the pastoral "game", they are not able to maintain their social position and lose support. These losers can be family groups that are unable to rebuild their

herds after being hit by a disaster, but more often the loser is an individual that of some reason or another lose support and thereby control over livestock. Individual losers come from all over, some from rich groups, some from poor groups. As I have tried to show above, individuals alone are responsible for their career as nomadic pastoralists. The threat of ending in a position where one is forced out of the adaptation, make people socialize. Thus the sanction implied in the risk of losing support, support which is decisive for surviving as a nomad, make the individualistic nomads cooperate and create and recreate communities.

Even though reports show that districts as Turkana can supply more people and livestock than today (Ecosystems Ltd., 1984; Ellis and Swift, 1988), projects that aim at reducing the sloughing off rate may undermine the sanction implied in the risk of losing. The problems they face those who have been restocked with the help of a foreign agency, shows how the nomads react to this kind of meddling with their business (Burke, 1989). Furthermore, the sloughing-off (sic!) rate also relates to nature and the carrying capacity of pastures.

Projects that aim at helping these kind of societies, should first of all be aware of any possible, unintended, negative implications. More safe are projects that aim at the "losers", not agricultural schemes on the best pastureland, but rather training centers, educational institutions and industries in the towns.

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**"Do Give Us Children":
The Problem of Fertility Among
the Pastoral Barbayiig of Tanzania**

Astrid Blystad

INTRODUCTION

In this article I wish to shed light on female procreation in general and on abortion and infant death in particular. I will particularly use data from the Barbayiig of northern Tanzania, but parts of my argument seem to be valid beyond the confines of this particular pastoral group.¹

Brainard (1986: 525) states that:

The most significant world-wide demographic trend in recent decades has been the rapid and dramatic decline in mortality characterizing the populations of nearly every developing nation. This trend in mortality has contributed substantially to the present very high rates of population growth in these nations. The nations of sub-Saharan Africa are now among the fastest growing populations in the world...(However) Many nomadic pastoral populations still exhibit relatively low rates of growth, and this has been attributed, in part, to what are suspected to be continuing high rates of infant mortality.

With an estimated infant mortality rate (IMR) of 200/1000 (Borgerhoff Mulder, 1990; Lane, 1991), the IMR for the Barbayiig pastoralists is much higher than the Tanzanian average of cator for describing mortality conditions, health improvement and, indeed, the overall social and economic well-being of a society, i.e. a prime indicator or index of development and modernization (UN, 1988: 3; Farren, 1984: 5; Stoeckel and Choudhury, 1973: 20). Studies of IMR were initially focused on measurement of mortality, but there has been a gradual shift to studies that address the explanatory aspects and the development policy implications of high mortality (Farren, 1984: 5).

Epidemiological studies have identified a myriad of causes for mortality differentials and infant survival chances and frameworks of increasing sophistication have been proposed (cf. Pool, 1982; Venkatacharya, 1985; Moshley, 1980, 1985a, 1985b; Mosley and Chen, 1984). Problems in the analysis of empirical data have nonetheless persisted to be many and have been partially linked up with the recognition that indicators of mortality differentials are highly correlated with each other.

It seems that the methodology and analytical approach of anthropology in general and medical anthropology in particular offer tools which may be useful in this context. Despite efforts to develop multifactorial frameworks, like contemporary approaches, these have tended to overlook the manner in which people experience interconnections between different aspects of life, and how reproduction of a given form of social life demands continuities in discourse in order to permit a shared and sensible frame for the interpretation of daily and ritual practice.

Quite a few of the studies focusing on fertility has been carried out among pastoralist groups (cf. Blystad, 1992; Bosrup, 1995; Cronk, 1991; Dahl, 1979; Hill, 1985; Leslie et.al., 1988; Michael, 1989; Traore, 1985; Van Den Eerenbeemt, 1985). These can be grouped into one of two categories. Quantitative epidemiologically and demographically based studies which, with some good exceptions, have suffered from the lack of sufficient social and cultural insights which are so vital in the assessment of the figures. The other body of literature has a qualitative fundament and are often based on thorough anthropological

research, but lack medical data which can give the reader some sense of the types and dimensions of the problem discussed.

In this article, I shall try to show the importance of an approach which allows for the consideration of the complex web of links between environmental, historical, political, economic, social, cultural, and behavioral factors that influence an infant's survival chances. I intend to review briefly the historic development of the Barbayiig, and will try to show how the high infant death rates among the Barbayiig need to be seen in the light of changing environmental, political and economic contexts. I shall also try to demonstrate that we can grasp only parts of the issue at stake if we do not seek to unravel the cultural discourses and practices which are linked up with the reproductive process within the pastoral community itself.

The procreative powers of women will in Barbayiig thought ultimately depend upon on the blessings of Aseeta, the Datooga God, as well as upon Udameesegwa, a female fertility spirit and the song below is sung by women on anum.

"Do give us babies..."

Udameesegwa, hayayahee Udameesegwa, hayoyahee.

Udameegeena The one who doesn't marry

meegeena ghwasaan? Why does she not marry?

Ghaheawa ghawooda Her powers of blessing does not allow it

Ghawooda haw The great blessing

Gheamata galanda The mother who keeps watch

Ghooghoomnyeanda at the precarious time (of labour)

Utteeba mawalla The one who supports without requesting

a return

Mawalla iiseaghwa The one who never betrays us

Gheamata weeteasa Mother who gives us strength help us

Aba ghooghoomnyeanda at the precarious time

Uda miing'waanjeeda You, the one who know no resentment

Goonahameakaasa Do give us children

Ea hamarooyeeka and the leather slings in which to

carry them

Every Barbayiig woman and man intensely desire children. Without a child married men and women will never be fully considered adults and will not become officially buried. A childless person is properly called

soonooda gatmooda/ siida (barren woman/ infertile man), but in heated arguments the term *nyalooda/ nyaleyda* (sterile) may be thrown at a childless person, an expression communicating utter disrespect. Indeed the expression when voiced publicly is considered the most appalling offense against a fellow Barbeand (sing. for Barbayiig).

The Barbayiig live in a semi-arid environment where life is precarious and hard pressed, and the sound of song praising a newborn child alternates with the sound of wailing after the loss of a child. The Barbayiig experience close interconnections between life and death cycles of people, cattle and land. An additional rainfall, a cattle epidemic, the birth of a calf, or the loss of a few acres of fertile grazing land, all have consequences for human health, and in the last instance may be the factor which determines life or death of a newly born infant. This vulnerability and the close interdependency between the human population, the cattle population and the land seem to create a foundation for an immense cultural preoccupation with life and the power to reproduce.

In the central *ghadweed* ritual, which is regarded as indispensable for Barbayiig fertility and survival, women pray with grass in their hands for the fertility of people, plants, animals, and the community itself i.e. the Barbayiig lineages and clans. Treatment for barrenness in bovine and human populations is carried out simultaneously, and a cow's placenta is hung over a woman's bed in order to enhance her procreative powers. Barbayiig funerals are grand displays of fertility in which the corpse is placed in a foetus-like position wrapped in a cow's hide inside a tomb which is placed in the heart of the cattle corral. Grass and branches are planted on the mound, while it grows in height and width for nine months, at which point the "birth of the spirit" and a simultaneous renewal of Barbayiig society takes place. The term "to give birth" (*jeata*) is for a Barbeand used to describe a whole range of dramatic life events such as the time a young boy is circumcised, when a young man kills a lion with spear, when a woman has gone through the final wedding ritual, when a man is initiated in the world of men who can drink the sacred honey mead, as well as after a childbirth. At the time a woman is in labour, the Barbayiig will articulate that the woman "is dying" and that "she is close to the dead". Not until after the navel cord is cut has "she given birth".

In innumerable ways the interconnections between the life and death cycles of people, land and cattle are elaborated upon and highlighted. Before we enter further the realm of human procreation, we shall remove ourselves from the close empirical setting and take a look at some of the dynamics outside Barbayiig society which have impact on the population's health and ill health.

THE HISTORICAL-POLITICAL CONTEXT

The "Dadoog" language has, according to Ehret (1980), been spoken in what is today Tanzania for a thousand years and, for several centuries, "Dadoog" headers dominated the grazing land of central northern Tanzania. Their enchanting historic past has however changed dramatically and their lives are today characterized not by grand political leadership and fame, but by marginality, migration and acculturation. Barbayiig society is indeed threatened by final dislocation.

The most prominent changes have taken place within the last 25 years. Several of the more dramatic transformations that have occurred have more or less directly received justification from the Tanzanian government. This may partly be explained by lack of knowledge of the consequences of official policy, but also partly by the fact that the population has been regarded as unruly and ungovernable since the colonial times. Forced settlement, which most likely has been perceived as tougher punishment for semi-nomadic cattle herders than for farmers, collective punishment through confiscation of large number of cattle and random imprisonment of young men without trial are all examples of policy carried out by the independent Government of Tanzania.

Official policy has moreover long favoured an agricultural adaptation over a pastoral one, with the consequence that neighbouring agriculturalists have on large scale moved into formerly Barbayiig dominated land. Without sufficient documentation to prove that the land is theirs, and with minimal

support from local politicians and bureaucrats, the outcome of a land dispute has commonly been obvious already at the onset of the case.

What perhaps more than anything else has influenced newer Barbayiig history has been the onset of the Tanzania Canada Wheat Project (TCWP) in 1970. More than 100,000 acres of the most fertile Barbayiig grazing land was alienated for the cultivation of wheat supported by Canadian development aid. Economic, ecological and not the least human consequences of the project have been tragic. The project indeed effected what has been referred to as a Barbayiig diaspora; the population has been spread over vast areas of Tanzania, and the ones who have been too weak to leave the area are today left marginalized and impoverished.

In the female sung prayer "*dumda siheeta ng'yeang'yiid*" (The song which awakens the earth), the Barbayiig reveal their anxiety in connection with the way life is changing. The fundamental concern with the loss of land and the interdependence they experience between having land and having children.

Ak ghaaw gweasta sina gheereega: Let our coupling lead to ***gheereeg2***

Ak adifursi fii meatikweeda: Do not look away from us when

we are here

Geewaschi banangsu muy giirear: We are orphans who are now

badly fed

Bissiina hooni maseawjaan: Do give us your help

Eara ijjea hooni maseawjaan: And if you do give us help

Gideelneasa ng'eanyiideanya: Return to us our land

Sissiina gadeemga harmarooyeeka: And give our women leather

slings to carry their children in

Ginung oorjooga gwareangsa haweega: Let our sons court our girls

Ghoamwaara haweega daegechaenda: and let the girls anoint the

young men with white butter

Siimbaleeleati day diiweasa: Our lives have turned badly like

cows lying in awkward positions

Gheeda muunda gheereegaasa: We are the houses that were born on

your skin

Gissisamnyi gheawungaagu: And as we honour your name

Gisamnyeasa meayda haghweanda: Love us like we all adore a female calf

Gagurneey gheeda gheereegaasu: The people of the houses that you

have given birth to call you

Gheeda lagweenda bea heeyda: We, the houses of sheep and oxen.

"They are not Human Beings", The Local Political Context

At this point we will make a move from the level of national politics to the local political scene. Barbayiig inter-ethnic relations are characterized by strong antagonisms. The neighbouring peoples, except for the Iraqw, have as far back as history can recall, been their enemies. Cattle theft and murders have taken place on both sides, and among themselves they refer to 'the other' as "non human". In recent years it does, however, seem quite obvious that it is the Barbayiig who have been on the losing side and the stigmatization and discrimination of the Barbayiig today appears to be the rule rather than the exception. Let us take a brief look at some of the background for this state since the quality of the inter ethnic relations in more and less direct ways influences Barbayiig health condition, and in particular their reproductive success.

The Barbayiig have been feared and, to some extent still are, by the outside for their tradition of carrying out "ritual murders". People from "unfriendly tribes" were in earlier times included as prey together with lions and elephants and other large wild mammals in hunts which gave reward in the forms of cattle and prestige at home. Lion claws, elephant teeth, or human fingers or limbs were carried home as proof of the kill, making the acts appear quite barbaric to outsiders. The hunts continue today, but although murders are no longer rewarded, the neighbouring Iramba and Isanzu tribesmen will still try to avoid passing through Barbayiig inhabited areas. The image of the Barbayiig as man slaughterers still remains strong in people's consciousness not only among their neighbours but indeed up to the level of state bureaucracy.

The Barbayiig physical appearance certainly does not conform with a "developed" image. Married women carry a skirt which is sewn into a fan shape from hundreds of small pieces of calf, goat and antelope skin, and they wear eye-catching brass decorations. Men wear a simple sheet worn in toga fashion, and they commonly carry spear and sometimes bows and arrows while on a journey. Unmarried girls wear short leather capes and the heavy bead waist decorations, and their faces are often heavily scarified in circles around the eyes.

The Barbayiig are the victims of considerable negative attention, and this must be considered at least partly in the context of Tanzanians being fuelled with political messages about the importance of leaving their "primitive" past and of entering the era of change and development. Through education they have been introduced to knowledge, norms and rules which imply that dress, diet, hygiene, sanitation, housing, as well as moral, values, belief-systems that are all closely linked to adaptation, identity and way of life, are no longer voluntary and free for the 120 Tanzanian ethnic groups to choose themselves.

Comaroff (1993) writes in an article dealing with the relationship of medicine and imperialism on the South African frontier, about "the shaping of an imperial vision in the late eighteenth-century discourses of the afflicted continent" (Comaroff, 1993: 306).

(In contrast to) the sense of health and social and bodily order the frontiers of "civilization" represented.... the savage natives were the very embodiment of dirt and disorder, their moral affliction all of a piece with their physical degradation and their 'pestiferous' surroundings (Ibid :308).

What Comaroff wrote about in her historical account about white's people's attitudes towards the blacks in Southern Africa, can very well be applied to the processes taking place between the Barbayiig and their Tanzanian neighbours today.

In line with alterations of lifestyle in a manner which conform with the modern state ideals, the discourses which continuously create stereotypes of the other are modified, and the representations of the Barbayiig gradually change. The earlier image of a greatly feared but also, to some extent, respected and admired enemy has gradually been substituted with an image of a primitive and barbaric neighbour.

The Barbayiig are today haunted by negative cultural stereotypes (Lane 1991, Ndagala 1991). The neighbouring populations will frequently react with disgust at the sight of a Barbeand; they may hold their noses when Barbayiig enter a bus, and they continuously comment upon their limited dress which they link up with free sexuality, bestiality and life in the bush. More seriously however, is the fact that innumerable cases are known of Barbayiig being cheated at auctions or markets, in courts, in elections, in the meeting with tax collectors, with health workers, politicians and bureaucrats - in short - with the non-Barbayiig world. The aggregate result is a pastoral society, stripped of rights and of dignity. The Barbayiig are in short bereaved of the local support they so desperately need. The consequence of this state is felt by every Barbeand, and the ultimate losers are the weakest of them all; the tiny newborn child.

At this point we return to the local Barbayiig community in order to try to gain some insights of the reproductive processes and try to reveal some local concepts and practices that influences a child's survival chances. The changes taking place in the female body during a pregnancy that ends in a miscarriage (*meewaneeda*) or a death of an infant (*miyeeda ghameeyenda*) creates a concern which is culturally elaborated upon and has considerable social consequences both for the foetus, the newborn child, the pregnant woman or mother involved, but also for her other children, her co-wives and the surrounding Barbayiig community.

THE AFFLICTION OF THE "CLOSED" WOMAN

As in many other cultures a pregnant Barbayiig woman is referred to as a "closed" woman (*bungaroocheanda*). To be "closed" refers to her physical body being closed in the sense that it no longer menstruates. The blood is kept inside her for the foetus to nurse until the time of childbirth when she "opens up" and lets the child and left-over blood out.

In a social sense we can possibly talk about a pregnant woman as being closed. The pregnant Barbayiig woman is a lonely woman. Her apprehension and thoughts related to her pregnant state are commonly not shared with anyone but the life maturing in her womb. She experiences herself as exposed and vulnerable to surroundings pervaded by human beings, substances and states that can cause harm to both herself and her unborn child. The optimal strategy for a woman in her condition is to keep her fears to herself and to lead a limited social life³. In order to protect herself and her hidden progeny she will live with a web of restrictions on the way she walks and will talk, eat, and look at the habitat around her. Outside impressions and stimuli she allows to affect her are substantially reduced, she talks with her voice lowered and will choose her words carefully. Her eyes frequently focus on the ground and takes great care not to kill even the tiniest little insect when she walks. But, for a pregnant Barbayiig woman enemies exist not only in her surroundings. Her body is invaded by an internal enemy growing in her womb, a foe that can make her ill or even cause her death. The foetus, perceived as a watery parasite nursing on its mothers blood, itself so vulnerable and dependant, is also demanding and perilous, and the woman will take any action to keep it satisfied.

The growing foetus will after birth be a child who embody its mothers blood and flesh, but its father's (i.e.genitor's) bones. The pregnant woman will thus choose her diet carefully, since "her blood becomes what she eats", and she will take care not to drink much milk and eat much butter so that the child in her womb does not become fat and lazy, and will have difficulties getting out. Her leather skirt (*hanangwenda*), which she has worn from the day she got married, is tied tightly around her stomach in a

manner which pushes her growing belly downwards. In this way the unruly foetus is prevented from engaging in unproductive wild play in her womb. Simultaneously she will be able to prevent her pregnant state from becoming known until the later stages of the pregnancy.

HAVING A "WHOLE" BODY

The image of the "parasitic" foetus is extended after birth when the "sweet" blood which nourishes the unborn child, is substituted with "sweet" mother's milk nursing the infant baby. The suckling baby and its mother are perceived as two halves of a whole. A woman will while she nurses her infant lose weight while her child rapidly grows and gains weight. A breach in the correct reproductive cycle from conception through pregnancy, birth, and nursing to weaning is thus perceived as threatening since the woman is no longer considered to have a "whole body".

Having a "whole body" is the symbol par excellence of life and life giving in Barbayiig culture. People will fear a person who loses a limb to the extent that he/she will not be able to socialize with any other Barbeand until he/she has undergone considerable cleansing activity. An individual lacking even a finger or a toe will never become buried. Only the unimpaired and unblemished human body is found worthy of the burial which culminates with the birth of a spirit guardian as well as a rebirth of the entire Barbayiig community i.e. every Barbeand is given renewed life by the medium of what is perceived as an exemplary and highly fertile body. There is as such created an equation between the condition of the body and the society. This parallel between the human body and the societal body is hardly unique. Quoting Shepherd-Hughes (1987: 20):

Of particular relevance to medical anthropology are the frequent encountered symbolic equations between conceptions of the healthy body and the healthy society, as well as the diseased body and the malfunctioning society. Janzen (1981) has noted that every society possesses a utopian conception of health that can be applied metaphorically from society to body and vice versa.

Susan Whyte (1994: 62) talks about bodily deviances being provoking and alarming for thought, and refers to Riceur and Mary Douglas who write about rottenness, and physical incompleteness in contrast to a biological wholeness which is considered holy.

Related to the concept of the "imperfect" body which is found to lack the potential of renewing fertility of society, and the fear of individuals who e.g. lack a limb, a woman is not only considered partial by the loss of her foetus or still suckling child, but is experienced as threatening to the rest of Barbayiig society. Since the woman and foetus or the woman and suckling child are perceived as two parts of a whole, the one without the other is consequently no longer complete. Notions of being incomplete, deficient, imperfect as well as being impure and contaminated are linked up with the bereaved state of the woman after an abortion, stillbirth or infant death. She is in a state of pollution (*ghawiid*), and the unproductive milk still dripping from her breasts is held to be life threatening to her surroundings, and appears as a metonym for her wounded and polluting body.

Indeed, the woman is perceived to be contaminated to the extent that she is socially isolated until she again becomes pregnant. A separate hut encircled by a thorn fence will be her home for many months. She will not eat nor socialize with others, except for her children if she has any, and she will regularly go through ritual action which seeks to remove her state of impurity. Water and firewood will be collected for her but is left at the entrance of the fence which surrounds her house. Her husband is also contaminated by the tragic event which has taken place in his household, but the extent to which he will be affected by the state will depend upon to what degree he decides to reside with his wife.

The house of Gidamuidaghat was in a serious state of pollution after a twin stillbirth". The woman and her earlier born children had already been placed behind a special thorn fence enclosure where a low round grass hut had been constructed at the time I arrived. The men's house was filled with male relatives from the householder's clan, as well as with important elders from the neighbourhood. Several hours were

spent sharing meals of meat and milk, drinking honey mead and carrying out the sung prayers. Lengthy oral prayers dwelt on the harmful event that had occurred. In the early afternoon three elders were chosen to carry out the "blowing of the honey mead". Everyone went outside and watched the group as they entered the special enclosure and open grass hut and got seated around the hearth. The woman looked pathetic when she sat down on a large bed inside the hut. While prayers were continuously proclaimed, the woman's wedding necklace was removed, and another was smeared with butter and placed around her neck. The words "do not do it again", "do not repeat the act", were repeated while honey mead was blown from the mouth of one of the elders onto the woman's face and head. The blessing was repeated over and over again until the woman, who was sitting calmly on her bed, became completely soaked with the mead. After further prayer, the woman and her children were left behind in the enclosure while the elders joined the others for more song, prayer and honey mead lasting far into the night. The woman and her children remained in a seclusion for a period of about seven months. At this point the woman had again become pregnant.

Women who either have several abortions or loose several children while they are still nursing may spend large parts of their adult life in thorn fenced enclosures suffering not only the loss of their child, but also lack the company of women who under other circumstances with their mere presence would provide comfort at a time of pain and distress. The individual woman will have to overcome her grief by herself, or possibly together with her husband and children. Women in seclusion often display a heroic demeanour which conceal their suffering. They may however express that they have been 'emptied', and that they are extremely lonely in their 'uninhabited' state. The children who die are never mentioned again, and so it has to be since human beings who die before they have given birth should never again be brought to the mind of people, and their names should be forgotten. The women would moreover express feelings of having been abandoned and of being radically dependant.

The custom of isolating women, after abortion and infant death, within the cultural concepts of "whole body", the "breach of the procreative cycle" and the fear of the "unproductive milk" etc.. seems to be related to the institution of levirate (a man inheriting his deceased brother's wife) as well as the ambition of men to hold on to a woman who looses her child, thus adding a functional aspect to the custom. A married Barbayiig woman would under other circumstances, particularly after several miscarriages, be prone to run away from him and try her luck in another marriage.

Some regularities at this point seem to emerge in the way the Barbayiig perceive and act in connection with the death of the unborn or recently born child and the contours of relations of gender as relations of power gradually appear.

Throughout a pregnancy a woman is told by men and women alike that she must keep on working lest the tiny baby will become tired and lazy and not fight his/her way out at the time of birth. Pregnant women thus continue the strenuous task of fetching water in large calabashes often several miles away from their homestead. They continue to carry large loads of firewood and grind maize flour on stones several hours every day. Men on the other hand maintain their roles as local politicians and keep on with their extensive meeting activity, hardly influenced by the new state of their wife or wives. Indeed, they can even punish their wives if they do not conform to their wishes.

However, in this context it is important to note that it is acknowledged by both sexes that women, both individually and collectively, hold certain rights, the encroachment of which may lead to immediate action from women in the neighbourhood. Women's rights are embodied in certain basic concepts and postulates which are primarily concerned with the sanctity of the female body and with domestic harmony during the critical period of pregnancy and birth. Women who discover that beating of a pregnant woman is taking place, may with the law in their hands sue the offender, and may rightfully extract an exemplary bull from his herd for their own consumption.

Also at the traditions of gathering of praying women, the gathering after the birth of a child, as well as the song traditions *dumda jeepta* (the song of the child) and *shatooda* (the contest) women may through harsh and critical texts voice highly political messages related to violence of rights during pregnancy, birth

or convalescence. The texts are feared since they may be brought far and near, and may thus harm a man's reputation. We thus see that women are not without means of politically enforcing their rights, particularly when they are carrying a baby in their womb. We are talking body politics in the most literal and physical sense of the term.

The power embodied through the medium of pregnancy and birth is not solely a potency for political influence on Barbayiig gender relation, but it also represents and demonstrates female fearlessness, courage, honour and pride of their procreative capability. The moment however a foetus or infant child is no longer there the power situation is radically altered. As we saw, the woman at that point becomes completely reliant on others and is perceived as impaired and contaminated. Handwerker (1990: 1) sums it up in the following quote:

The birth of child is a political event. So is its absence, for any of all of the events that comprise human reproduction may be a part of a strategy to acquire or extend power, may create new ties of independence or may provide a means to break ties of dependence.

That is why the death of a child is not only a loss and an individually tragic event of utmost significance for mother. It is also a loss of esteem and power for her husband, for the clan to which the child belongs, and is indeed perceived as posing a threat to the Barbayiig society as a whole.

We have in the above section seen that cultural customs in which elaborate pollution beliefs, avoidance and isolation practices, dietary restrictions, lack of restrictions on daily activities during pregnancies, etc. are all rooted in a meaningful cultural framework. We have however also seen that these traditions have the potential of influencing a woman's procreative ability and ultimately the child's survival chances. They are moreover part of a power play where women's procreative powers appear as a scarce and valued good.

A HARSH CONFRONTATION WITH LIFE: A CHILD IS BORN

Let us at this point enter the world of the mother and her newborn child. It is a vulnerable time for the two, and the mother will go to great lengths in order to protect her child from all potential evil or threatening factors and forces. Again, due to the scope and limitations of the paper I have to focus mainly on thought and practice which appear to have negative consequences for the new born child's health, starting with the concepts and handling of the vital mother's milk.

A Barbayiig mother will generally let her child suckle whenever it cries. Milk has been noted to function as a metonym for the intimate connection between mother and child, and may be used metaphorically in relationships outside the mother-milk-child constellation. The milk may thus carry qualities of dependency, of intimacy, solidarity, purity, and is the sign of successful procreation par excellence (cf. Haaland, 1990; Rekdal, 1992).

But the connotations of mother's milk may not be entirely unambiguous in Barbayiig thought. Water is substituted for colostrum the first days of an infants life, mother's milk is fed in combination with cow's milk whenever possible, it should not be "mixed" with semen, and is greatly feared after an infant death. Indeed as we have seen, the "unproductive" milk of a woman's still dripping breasts is regarded as polluting to the extent that the woman is isolated for several months. The understanding of these practices, which imply manipulation of the major source of infant nutrition, require substantial attention since they most likely affect the baby in dramatic ways.

The custom of replacing colostrum with water during the first days of a Barbayiig infant's life unfortunately deprives the baby of a vital source of antibody⁴ and nourishment, thus reducing the child's resistance to disease. The feeding of often contaminated water also causes instant diarrhoea for a number of children and is probably a major cause of numerous neo-natal deaths. The fear of the first colostrum has been

documented among different societies around the world (cf. Griffiths, 1990: 160; Maclean, 1982: 170; McGilvray, 1982: 61), and is often thought to be hazardous to the child. Barbayiig beliefs suggest that the background for the Barbayiig custom may be quite complex and the understanding of this complexity seems to be vital to any intervention in the area.

The choice of water as a substitute for milk may not be arbitrary. Water is not surprisingly noted to have special significance in societies where people's livelihood is entirely dependent upon the periodical rainfall (Palsson, 1990; Dahl and Megerssa, 1990). Water is a substance which has been particularly associated with impregnation and life-giving fertility. In some pastoral societies indeed, the whole stream of social life has been noted to be analogous to the circulation of water, through the soils, wells, milk and bodies of cattle and humans. For the Boran pastoralists of Kenya, water is a key symbol which organizes a series of very different discourses about gender, fertility, territory, kinship and power (Dahl and Megerssa, 1990: 21-39). The Barbayiig call rain water "the spit of God" and a cherished form of greeting is to spit each other on the hands and forehead.

In some cultures the human foetus is said to feed on the "water" inside the maternal womb, whereas the human placenta solely supply the foetus with blood. It seems very likely that there is a connection between the rain water, the "water" which makes up the "liquid" environment in the womb and the water the Barbayiig feed their new born infant instead of colostrum. The Barbayiig will argue that the pure water is health bringing through the cleaning up of the infant body.

When a mother starts to breast feed a child she will simultaneously initiate the strenuous task of feeding the baby cows milk from cupped hands. Mother's milk and cows milk are thus mixed and ideally provide the sole nourishment for the child during his first year. Milk and milk products have also been noted to be of particular significance in pastoral societies and carry deep cultural significance in addition to its subsistence value (cf. Talle, 1988; 1990; Årheim, 1987; Klima, 1970). Talle, for example notes that the cultural universe of the Maasai pastoralists is very much a "milky way" and that in the production, handling and consumption of milk, the Maasai convey important messages about themselves (Talle, 1988; 1990). The Barbayiig, through feeding their babies cows milk, do in quite a similar manner socialize their babies into a "milky way" and thus impart pastoral knowledge to their children already from infancy. The rich nutritious milk diet fed to Barbayiig children seems to prevent malnutrition like kwashiorkor⁵ and marasmus, but one might expect that cow's milk to be a potential carrier of disease like brucellosis and tuberculosis.

Both water and cows milk fed to infant babies are served un-boiled. Fire is a medium which facilitates transformation through boiling, heating, and burning. In Barbayiig culture the content of a certain item may be dramatically transformed through the agency of flames and fire e.g. grass, cooking pots, honey, meat.. etc. (Blystad, 1992). Indeed, during birth itself, fire seems to be used as a catalyst in order "to heat up the mothers blood and thus speed up the delivery". A woman in labour is placed in a hanging position close to the hearth which is continuously tended. The reluctance of the Barbayiig to boil cows milk must thus be understood in the light of these processes which, through boiling, transforms this most cherished product into something that is no longer milk.

THE PROXIMITY OF HUMAN BEINGS AND DOMESTIC ANIMALS

The close bonds the Barbayiig experience between human beings and the cattle population are highlighted throughout the reproductive cycle. Both conception and a human birth must take place on a large bulls hide and the baby is born in a heap of cow dung. The placenta is buried in the cattle enclosure and the umbilical cord, which is cut against the hide, is tied onto the leg of a heifer. Among the Barbayiig, one single room is used for giving birth, cooking, eating, storage and stall for new born calves and small stock, and the houses are constructed by cow dung and water. Feeding of the child cow's milk seems to

express the bond between people and cattle which starts at birth and is continuously stressed and developed throughout the individual's life.

Living in the proximity of cattle to the extent indicated above most likely exposes infants to numerous diseases. An estimated 900 000 babies in the world die each year from neonatal tetanus (WHO, 1978: 361; Good, 1987: 34). This is especially noted to be a problem in East Africa, India, and other parts of the world where people and their cattle live in close proximity. Serious diseases like anthrax, relapsing fever, brucellosis and tuberculosis are also prevalent under such living conditions.

Although adults also live in close contact with animals, it is the newborn infant who is generally the most vulnerable member of the household and it is particularly in this group that the closeness in bonds between bovine and human population becomes fatal.

The last point brings us back to water again. The Barbayiig commonly live long distances from water sources, but particularly young men and women and often also older men manage to keep a fairly high hygienic standard. Married women, however, seem to have greater difficulties in keeping themselves clean compared to others. This is partly related to the fact that a mother's hygiene commonly gets last priority in the fierce competition for water, but it also has to do with the restrictions on women to bathe outside the confines of the homestead, and not the least the absolute prohibition on removing their leather skirt which is infused with most potent fertility connotations. The reluctance to bathing infants furthermore seem to be linked up with perceptions about hot and cold (McGilvray, 1982: 30; Broch-Due, 1990) and fear of cooling down human beings in such vulnerable or liminal states.

Such concepts and practices which prevent an infant from getting colostrum, which substitute mothers milk with unboiled cows milk and water and the sharing of living quarters with domestic animals and failing to bathe infants, obviously, add to the risky environment into which a Barbayiig baby is born.

CONCLUDING REMARKS

I have in this article tried to reveal aspects which may broaden our understanding of the problem of high death rates among the tiniest and most fragile human life in a pastoral society in Africa.

I have moreover argued that an understanding of the political processes within Barbayiig society, as well as the dynamics between the local Barbayiig community and their neighbouring populations, politicians, bureaucrats, and donors is today a prerequisite for an understanding of pastoral society and in this context, a pastoral child's survival chances. To paraphrase Shepher Huges (1987 :23):

We have seen that "the relationship between the individual and the social bodies... concern more...than metaphors and collective representations of the natural and cultural. The relationships are also about power and control.

I have also tried to show how the Barbayiig population establish close interconnections between highly diverse aspects of life in a manner which has profound consequences on their health and their reproductive success. The reproduction of a particular form of social and cultural life demands for every one an understanding of certain continuities in discourse in order to make sense of the world.

In the analyzes of the diverse cultural concepts and practices related to the reproductive process all highly embedded in a pastoral cosmology, we have encountered various aspects which appear vital in connection with the estimated high infant mortality rates in this pastoral population. The elaborate pollution beliefs, the avoidances, the isolation, the dietary restrictions, the infant feeding practices, the arrangements which allows for people and animals to reside under the same roof are all factors that more or less directly influence the Barbayiig infant death statistics.

The main contribution of anthropological holistic approaches therefore, seems to be the provision of information on seemingly as diverse aspects of life as processes of reproduction, cosmology, religion, history, economics and politics which reveal the manner in which people experience interdependency between aspects of life that other researchers may choose to single out as distinct variables. Through this approach we can hopefully in a better way grasp the content of figures that hide so much suffering, anguish and pain.

Eaniyeen googatgachi diibisu Datoogasa: Please, lift up these children

Ayeena geemaschi Datoogasa : Say that all the Datooga agree

Ak iibalaksa diibiga miyeeda : The children are getting worse

Akkeka haa ndeara ea mama jeepta: Last year our small child also died

Eshine iya: Tell them mother

Oomiinni ginneeda jeepta

ghaheanya datoogasa: Make clean the breast of our child

Ea mii deanyu deateang'wa datoogasa : They are not my children,

they are our children Datooga

Abatbassiina ng'ushsheega ghuusugeagwa

jeepteanya datoogaasa : Gather the spit in your

mouths for our children

Ajoora geeyooda datoogasa: Let us win over illness

Ayeena geemaschi datoogasa: Say that all the Datooga agree

NOTES

1. Barbayiig is the largest sub-section of the ethnic category Datooga, a Southern Nilotic speaking population numbering some 100 000 people. I have carried out fieldwork among the Barbayiig during three successive periods; the first from October 1989 to December 1990, the second from October 1993 till October 1994, and the third during June and July 1995.

2. The state a woman is in after giving birth, i.e. let us have children.

3. During my last fieldwork among the Barbayiig I was pregnant and gave birth after half a year in the field. I was struck by the silence that surrounded my pregnant state. No one commented on that, and people would react awkwardly if I at all touched upon my pregnant condition. A neighbor with serious mental problems was the only one who would loudly tell that I was expecting a child promptly creating a situation of great uneasiness among those present. Only when I myself brought the theme up in intimate conversation with other pregnant women would I get some response. This in great contrast to the almost excessive sociability, from my point of view, some weeks after the birth of our child.

4. Colostrum has been found to contain measurable antibody titers against enterotoxigenic E.coli and rotaviruses, two of the most frequent enteric pathogens in the area (Nations 1986:117).

5. According to Olsen (1990), Kwashiorkor, a protein deficiency disease, is noted to be quite frequent among the neighboring Iramba, but is close to non-existent among the pastoral Barbayiig (personal communication).

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