



# I. INTRODUCTION

Eritrea has an area of approximately 124,000 km<sup>2</sup>. Its landscape is characterised by a chain of high mountains crossing the country from south to north. The altitude ranges from 110 m below sea level in the Danakil Depression, to 3038 on the Emba Soira Mountain. There are three main agro-ecological zones in the country; these are the central highlands and the eastern and western lowlands. However, there are several micro-ecological zones between the highlands and the lowlands, which provide habitat for different plants and animals, (NEMP-E, 1995).

Eritrea falls within the Africa a belt of Sahel, which is characterised by low rainfall, climatic unpredictability and during the last two decades by drought and massive destruction of natural resources.

Eritrea has six administrative regions: Zoba Maekel, Debub, Anseba, Gash-Barka, Semienawi Keih Bahri and Debubawi Keih Bahri. The population is at present estimated to be about 3.5 million people and the main ethnic groups are Tigrinya, Tigre, Saho, Afar, Bilen, Hidareb, Kunama, Nara and Rashaida.

Pastoral and agropastoral production system is the major land use system although mixed irrigation and rain fed farming occur along the highlands. Pastoral groups in Eritrea constitute people with distinct cultural and economic characteristics, and inhabiting places with seasonal variations in the amount

pastoralists. Yet the underlying (and usually under recognized) reality is that pastoralism is a conservation strategy to make best use of dry lands both in space (in terms of large land ranges) and time (to make best use of seasonal grazing) to help pastoralists secure their livelihoods in harsh and risk prone environments. This includes the importance of risk management and resilience enhancement. Even wildlife authorities tend to underestimate the importance of pastoralism as a conservation strategy, despite the fact that pastoralism is one of the few land use strategies that is compatible with wildlife conservation. If pastoralists livelihoods are going to be improved and the degradation of the dry lands reduced, then it is critical that pastoralism is respected and developed as a sustainable land use system. Pastoralism is based on natural resource management that respects the limitations imposed on such dry lands, the necessity for mobility, and which integrates the local knowledge and institutional systems of pastoralists.

In recent years, pastoral development in Africa has not received the emphasis and proper share of financial resources that it resumes in order to produce meaningful and tangible benefits for pastoral people. This is partly due to the lack of appropriate national policies, and discouragement of the pastoral mode of production. Pastoralism, as a potentially sustainable form of land use and conservation in harsh and arid climates, is poorly and often misunderstood at national planning and economic levels. It is poorly understood because research and studies that have been undertaken rarely find expression in a policy context and rarely influence dry land policy and planning.

Development activities in pastoral areas of Eritrea have been greatly constrained by the prolonged political struggle for independence. However, range/livestock development activities have been carried out in different areas of the country for the last ten years. These include surface water harvesting, over sowing, sporadic watering point development and an attempt to develop large grazing blocks and some herd restocking programmes.

## II. LIVESTOCK PRODUCTION SYSTEM

in transhumance the patterns of migration are more or less predetermined under normal circumstances. Nevertheless, predetermined migration does not in any way imply rigidity in traditional resource use by transhumants. These patterns are subject to substantial deviations in times of resource scarcity such as during drought. In general, the pattern of transhumance in East Africa is usually between highlands/plateaux and lowlands/flood plains. In Eritrea the **Saho Tigre**, and **Tigrinya** practise this between the Eastern coastal plains and the Eastern escarpments and the central highlands. The **Tigrinya**, **Saho** and **Tigre** are sometimes called opportunistic farmers, as often practised in the Sahel. They plant crops; usually sorghum and maize on their way east to wet season pastures and harvest them on their way back to the west during the dry season. The Beni-Amer migrate between dry season camp (**Demer Hagay**) and wet season camps (**Demer Kerem**) for search of forage and to avoid themselves and their livestock from biting flies. In between there are many different degrees of transhumance depending on the number and kind of livestock raised, type of crops planted and distance travelled. Each of these groups have distinct production systems and set of strategies that have evolved through generations and are well adapted to the vagaries of arid and semi-arid regions.

## 2.4 AGROPASTORALISM

Agro-pastoralism is another important type of pastoralism accounting, in many cases, for the bulk of total livestock populations. It is perhaps the most highly diverse form of pastoralism, with agriculture as the main subsistence activity, but where animal husbandry is an integral part of the household economy. The availability in agro-pastoral systems is essentially due to the recurrent drought and markets for crop and livestock, which are characterised by huge fluctuations in price and volume. These risks are reduced through the diversification of activities, mutual aid and cooperation, at least at the level of extended family. By choosing to engage in both animal husbandry and crop production, agropastoralists minimize the risk of falling below a certain threshold of disaster, and thus, maximize the probabilities of survival (Upton, 1987). The **Tigrinya**, **Kunama** and **Nara** in the Southwestern lowlands mainly practise agropastoralism.

Agropastoralists can send their livestock on transhumance in the dry season or graze them all year round close to the village, returning at night or camping on the periphery of the village

There exist apparent similarities in animal husbandry between pastoral and agropastoral societies that often tend to obscure the important differences between these two systems of production. Animal husbandry in pastoral societies is geared towards the growth of the herd over time to maintain the physical and social since subsistence of the household unit. There is no pastoral society, which, subsists exclusively on pastoral products, the specialised pastoralists have to produce animal surpluses, which can be exchanged for goods produced outside the pastoral economy. Consequently, the existence of societies producing an agricultural surplus is a necessary condition for pastoral specialization. Apart from being exclusively important as the basis for subsistence, herd in pastoral societies contribute basic forms of wealth and play a vital role in creating and

maintaining social relations and reproducing the social system as a whole. Heavy animal losses through disease or drought are compensated for by support from kinsmen and through institutionalised forms of livestock loans or gifts (Brandstrom et al, 1979).

Because of the dominant role of agriculture in agropastoral economies, practices and strategies of animal husbandry as well as the social organization set-ups differ in a number of ways from those of pastoral societies. The requirement for cultivation forces agropastoralists to subsist in less arid regions than pastoralists, which may limit their mobility in time and space. This does not preclude long distance migrations.



supported the aristocratic groups enabling them to strengthen their hold on power among the communities.

During the 1940s a major rebellion by the serf classes seriously undermined the authority of the aristocracy and ultimately weakened its power. Since the beginning of the liberation struggle in 1962 the authority of the aristocracy was further undermined by the disruption of the cattle economy due to drought and war. The disruption of the pastoral economy led to the pauperisation of the aristocratic groups along with the serf classes. Both groups joined the liberation struggle and this ultimately led to radical changes, which have undermined and abolished the Beni-Amer aristocracy together.

The Tigrinya is the dominant group whose traditional territory is the central highlands of Eritrea. Due to overpopulation and over-exploitation of natural resources in the highlands some of the communities, which border the western lowlands, decided to migrate permanently in search of better agricultural and grazing opportunities to the western lowlands. According to current information such settlements began in the early 1950s and the number of highland settlers in the lowlands has increased since that time. The Tigrinya speaking population has now become a sizeable group within the western lowlands.

The Tigrinyans are settled agriculturalists and are organised in village communities, which are each composed of varying numbers of extended families. Most of these families are the original occupants and, therefore, owners of the land. They are known as Restenya, while the families, which immigrated later and are their tenants are the Maekelay aliet Both classes of families enjoy the same rights of user of the land, but only the restenya have a right to a voice in the management of the village.

The highland system was administered by if in institutionally had by headed village chiefs, 'Shumamntij and a committee of elders, 'Shmagele man or Chiqa who by tradition is invariably appointed from a particular family restenya.

When the highlanders migrated to the western lowlands they maintained a cohesive social structure and organisation.

The highlanders were traditionally mixed farmers who combined livestock and crops. Having found better grazing and better land they were able to revive their traditional skills in livestock management and now are able to run and integrate a productive farming system in their new area.

In the highlands they have traditionally a different land tenure system, wherein arable land was equally distributed to all households in a village. Under this system land was distributed approximately every seven years and was strictly divided among the villagers. The other system, Risti, comprised of land that was privately owned but lacked the equitable distribution system of Diesa. The Diesa system allowed farmers to own their known land in more than one village and this had often resulted in long court battles over the establishment of inheritance rights.



The new settlers in the western lowlands occupied lands, which were traditionally *Terre Dominate*, which means state owned lands, and they had user rights on such land, which they occupied through peaceful expansion in what was forest, and probably dry season land for nomads.

Italians introduced uniformity by putting chiefs in charge of all sub-districts and appointing their own nominees, who were not always chosen from the traditional leading families. Similarly they appointed their own nominees to village headman ships, often ignoring the rights of the families from which the appointments were traditionally made.

The southern stretch of the coastal plain and the people who are nomadic pastoralists vast desert lying abutting it in Ethiopia and Djibouti are thinly inhabited by *Afar*. The *Afar* are organised as small clans or families, which now come under the loose control of a number of petty Sheikhs, some of whom have at various times assumed the title of Sultan (*Derder*), exercising a territorial jurisdiction from the few semi permanent centres, which have developed in this inhospitable area.

between the *Afar* and *Tigrinya*, on the eastern edge of the plateau and scattered along the escarpment and plain below, are the *Saho*. The majority are pastoral nomads or semi-nomadic pastoralists. The *Saho* are organised as clans, which have become federated into five tribes. Before Italian colonialism they had no chiefs, their affairs being managed in a haphazard fashion by councils of elders. This did not suit the Italians' need for close control and accordingly they appointed chiefs in charge of each tribe: a measure, which has become a

earlier clan and family organization, which persists in their present village communities. In the Kunamavillages there are no comparable family organisations. Information on the evolution and social organization of both Nara & kunama communities is scanty. Traditionally the affairs of the Nara and Kunama were managed by occasional meeting of elders and, though leaders sometimes emerged, nothing approximating to chieftainship was known until the Egyptians appointed a prominent Nara named Totil to collect taxes and execute their orders. The Italians improved the Egyptian practice by converting the position held by Totil into hereditary chieftainship extending to the Kunama as well as to the Nara.

The powers of the feudal aristocracy among all the groups has diminished greatly over the past forty years and decision-making in the village rotates around the council of Elders (Mahber) and the Baito, which were created and inspired by the liberation movement, the EPLF.

By the end of the liberation war in 1991 more new grass-roots based structures had emerged. On one side there is a traditional village council structure, which consists of community leaders and sheiks and on the other the peoples' assembly or Baito emerged as a political structure organised by the Eritrean Peoples Liberation Front (EPLF).

Baito functions among all the ethnic groups similarly as described above.

As indicated earlier the role of the Baito has changed in post independence Eritrea from being political-agitational to developmental. The Baito now serves as an important link between the communities and the local administration. They are still involved in the following activities.

- 9 Organizing food/cash for work
- 9 Identifying vulnerable groups for input distribution,
- 9 Collecting land tax for the local administration,
- 9 Protecting forested reverine areas,
- 9 Leasing with the administration in all aspects of community development work

The role of elders can be stated as being responsible to:-

- 9 Reconcile families, who may be in conflict,
- 9 Mediate on inter-village conflicts,
- 9 Settle a variety of disputes,
- 9 Mobilize assistance for needy families (Organise loaning of grain to poor families during difficult years, Encourage the well-off members of society to assist the poor by lend lactating animals to poor female-headed households, donating seeds,

Mutual self-help groups of an informal structure exist in all the pastoral communities. The basic unwritten rule among the communities is that people must help each other as their forefathers did. The communities cooperate in a variety of production work, which varies according to the particular production system they have. This includes:

- 9 Communal agricultural work (sewing, weeding, harvesting, etc.)
- 9 Building of huts and local wealth,
- 9 Communal herding
- 9 Marketing,
- 9 Women's savings groups (**Ekoub**)
- 9 **Mahber**(Saints groups),

The communal work in Tigrinya is mewed **Wofera** or **Kewa** in Tigre as the most established village institution. This is a well-established institution among all the groups. **Kewa** or **Wofera** initially means "group work" and comprises a small or large number of people working together manually or using oxen to mitigate labour shortages. People believe that group work is convenient and faster. People also have the opportunity to socialise whilst they work. Aspects of non-agricultural work where collaboration is evident are building huts, constructing wells and so forth.

Among the **Beni-Amer** and **Hedareb** group work is manifested through communal herding, where small numbers of stock held by families are combined together to form a large herd **Murah**, which is then herded by one or two members of the clan, who will be remunerated in cash or in kind which is raised by the various households. Communal herding is widely practised among the semi-sedentary groups both around their homesteads and migrant herds belonging to different families.

Strong collaboration is also seen among the semi-sedentary groups during marketing. Households select the animals for sale and agree to round them up together assigning two, three or more able-bodied men to drive the animals to important markets. Among the **Hedareb** and **Beni-Amers** such persons are known as "**gallelenab'** (livestock drovers) and they are supposed to be the bridge between the local pastoralist producer and their kinsmen in the main markets.

Among the Tigrinya group there are also other forms of organisations such as the "**Mahber**" which is named after a saint obeying precisely defined regulations and having typical obligations. "**Mahber**" has a secular meaning and refers to a group of people or an association working towards a common objective. According to Eva-Maria Bruchhaus, et.al (1994) the groups are either composed of men only or men with their wives. Be it in one way or the other the leaders are always men and the women do not have a say in most of the groups.

The same author also gives an interesting description of the "**Ekoub'** which is a popular group form especially among the Tigrinya and it seems to attract particularly women. The emphasis of the "**Ekoub'** group is on savings. Some such groups function in a classical way as in many African countries.





## 4.2 Climatic and Agro-Ecological Zoning climatic

### 4.2.1 Introduction

The climatic conditions in Eritrea are diverse and closely associated with the altitudinal and latitudinal gradients. They are characterised by a rainfall regime ranging from below 150mm year in the eastern lowlands to above 1000mm in Filfil in the eastern escarpments of the central highlands, and 400mm in some parts of the western lowlands. Precipitation decreases from south to north. It is around 200mm in the northern border with Sudan and rises to over 700mm in the southern border with Ethiopia. Over the highlands and the western lowlands, rains usually fall from May/June to September, but more intensely in July and August. On the coastal zone, rain falls during the period November to March. The heaviest rainfall during the winter falls on the eastern escarpment with high concentration around Filfil and Mirara, in Semienawi Bahri, where bi-modal rain pattern is well developed. The first peak occurs in December and January and the second one in July and August. The bi-modal rainfall distribution is a characteristic of a transitional position between two climatic regimes one under sub-tropical climate, influenced from south to southwest and the other from temperate climate influenced from the east to the northeast. At Mirara the high rainfall increases the vegetation growth period, and productivity is the highest in the country.

### 4.2.2 Agro-ecological Zones

Although there are three major agro-ecological zones in Eritrea, i.e. the highlands, the eastern and western lowlands, many agro-climatic zones at the micro level are found, determined by the topography. Six main agro-ecological zones are often cited as relevant in the country on the basis of the prevailing climatic conditions, landforms, dominant soil types and land use (FAO, 1994).

The central highland zone is characterised by altitudes ranging from 1500m to over 2000m with annual rainfall that varies from less than 400 mm in the north to over 700 mm in the southern part, and a mostly warm to cool climate. This zone comprises at least three sub-zones according to altitude. On higher altitudes of this zone, *Juniperus procera* and *Olea African* dominate the natural forests. Population pressure is high in this zone as is also deforestation. Major soil types are cambisols, lithosols and fluvisols of medium and low fertility.

The western escarpment zone rises from about 600 m to 1500 m and has warm to hot, semi-arid climate. The physiography and geology of the central highlands determine its soils and relief. The woody vegetation in this zone is very mixed, including acacia species and other trees and shrubs. Population pressure is moderate.

The southwestern lowland zone has an altitude of 600 m to 750 m and has a hot semi-arid climate, and rainfall in excess of 400 mm. Soils include large areas of vertisols, and are characterised by two types of woody vegetation, large tracts of woodlands, dominated by

acacia species, and riverine forests near the Gash and the Barka Rivers. Important economic trees are found which, include e.g. *Acacia Senegal*, *Acacia seyal*, *Hyphaene thebaica* and *Boswellia papyrifera*. Population density is low, but this may change soon as the area is booming due to new economic activities and settlement.

The north western lowland zone has an altitude ranging from 400 m to 1500 m and has a hot arid climate, with about 300 mm of rainfall. In the extreme north western part, rainfall

**Western Lowlands:** Most areas in the south-western portion of the Western lowland zone does not appear to have been damaged due to the migratory use by pastoralists. The south-western part of the western lowlands appears to be less damaged, except in those areas adjacent to population centres where bare soil with extensive gully erosion is



## 4.5 PLANTS AND WATER

Pastoral knowledge of natural resources is

## V. LIVESTOCK TYPES AND POPULATION OF ERITREA

### 5.1 Livestock

Reliable statistics are lacking on current livestock populations as demonstrated by cattle vaccination figures, which are more often double the registered population. No livestock census has been carried out since 1978, and the current livestock figures are based on estimates. At present there are 1.9 million cattle, 2.1 million sheep, 4.7 million goats, 318,914 camels, 518,459 equine and 1.1 million poultry.

#### Cattle:

The known zebu cattle breeds or types of Eritrea are:

#### Begait (Barka):

Barka is dominant in the Gash-Barka Region. They rank first in population size as compared to the other types. Milk and meat are the main products of this breed. The Barka is a long legged black and white breed originating in the Barka region. It has been spread to many areas on account of its milking qualities: daily yields of 6 to 8 litres are reported as normal. They are relatively resistant to diseases and are also known for their high feed conversion rate making them good meat producers. Mature body weight ranges from 267 to 316 Kgs.

#### Arado:

The central highlands of the country are home for this typed breed and they are second to Begait/Barka in population. The main purpose of rearing is for meat and draft power; their milking potential is about 1 to 2 litres per day. Their mature body weight ranges from 205 to 300 Kgs.

#### Arebo:

The coastal plains of Northern Red Sea are home for this breed of cattle, although numerically less important than the other breeds, it reportedly has a similar milking capacity and crossing potential as the Begait/Barka. Their mature body weight does not exceed 250 Kgs.

#### Afar:

The coastal plains of Southern Red Sea are home for this breed of cattle. This breed has compact body size and are few in number compared to the Barka and Arado. Their milking potential is almost similar to that of Arado. Their mature body weight ranges from 220 to 250 Kgs.

## Goats:

Most of the Eritrean goats are unidentified and several types and strains are seen in the country.

### Rora goat:

The most notable is the Rora goat; it is similar in appearance to the Nubian with drooping ears and a milking capacity of more than one litre per day. Average live body weight ranges from 24 to 31 Kgs.

### The Barka

The Barka is the preferred breed in the Gash-Barka region. Average milk production is estimated at 1 to 1.5 litres per day.

### The Shukria

The Shukria are mainly found in the western lowlands. This strain reportedly produces 1.5 to 2.5 litres per day and their milking potential warrants their trial introduction to other areas.

### The Hassani

The Hassani is well known for its milk production: it was introduced from the Sudan and is characterised by long hairs. Average body weight ranges from 30 to 34 Kgs.

### The Maria

The Maria is found in Anseba region and has short, round ears. Average milk yield is 1 to 1.5 litres per day. Average body weight ranges from 27 to 30 Kgs.

### The Lange

The Lange is a milk producer found in Gash- Barka region. It is similar in body weight as the Hassani.

### The Beledi

The Beledi is a cross breed of Lange and Hassani.  
There are also unidentified mountain type goats in the central highlands.

### The Afar:

The Afar is mainly found in the South Eastern Coastal plains. Average live body weight ranges from 24 to 31 Kgs. Average milk production is estimated at 0.5 litres per day.

#### Sheep:

All breeds are hairy types. Although all the breeds are primarily for meat production, they are also often milked for subsistence consumption.

#### The Shimezana

The Shimezana type of the southern highland breed is fat-tailed and small. The body weight ranges from 21 to 24 Kgs.

#### The Rashaida

The Rashaida type of Northern Red Sea is short thin-tailed and small. The body weight ranges from 30 to 32 Kg.

#### The Barka

The Barka type is the most commonly known type of sheep in the Western lowlands of Eritrea. It is long thin-tailed, whose body weight ranges from 42 to 47 Kgs.

#### The Hamale

The Hamale is similar to the Sudan Desert sheep and is widespread in the Western Lowlands. The body weight ranges from 37 to 40 Kgs.

#### Donkeys:

#### Camels: Eritrea5

of their livestock. This defines, to a large extent the patterns of use of natural resources with respect to timing and length of pastur

If present, the status of the terrestrial wildlife has been assessed and, surprisingly, large mammal wildlife species continue to survive, but in very small numbers, in most of the sub-regions. Some of the existing animals are hyena, jackal, baboon, fox, greater kudu, klipspringer, gazelle, ostrich and warthog. Globally endangered species that still persist in Eritrea are the wild ass and Nubian Ibex. The elephant is also a highly endangered species at the national level for they are not more than 40-50 in number.

Most of the central highlands of Eritrea are devoid of wildlife with the exception of baboons and hares, otherwise the bulk of the wildlife species inhabit the eastern coastal and the western lowlands where there is obviously heavy concentration of livestock, which increase competition, for a grazing (Hagos, 1997).

It should be noted that pastoralists have refined knowledge and very positive attitude towards wildlife. They never threaten wild animals with extinction as each species of animal or bird represents something unique and valued in an interlinking cosmology of the natural and spiritual world. Killing an animal for no apparent reason, without exaggeration, is to violate all which is sacred. They essentially turn a benign attitude towards most wildlife species and accept the right of animals other than livestock to share the rangelands and water resources. In normal times, pastoralists do not kill wildlife, except lately when circumstances have forced them to do some hunting.

In order to enhance the protection of the wildlife in Eritrea, potential protected areas have been identified and their implementation has been proposed which is awaiting legislation. Eritrea cannot afford to set aside extensive protected areas, but a few and small strict nature reserves are proposed within a wider biodiversity conservation area. The intention of such a choice is to minimise potential conflict that may arise with pastoralists in relation to the appropriation of land.

### 5.3 SUPPORT SERVICES FOR LIVESTOCK PRODUCTION

In its sectoral policy framework and strategy, the Government of Eritrea has placed major emphasis on the achievement of food security. This main objective is to be achieved through an enhanced productivity of crops and livestock; the creation of a modern, technologically advanced and competitive agricultural sector; and emphasis on the development of irrigated agriculture and high value commodities.

The sub-sectoral objectives regarding animal resources are formulated in order to increased supply of animal origin proteins and nutrients; promote livestock ownership and production; stimulate processing of livestock products and by products; increase supply of animal drought power. The result that should lead to achieve these sub-sectoral objectives are in the field of animal health, production, nutrition and livestock marketing and strengthening of livestock input supply and support institutions.

The sub-sectoral policy and strategy's view is to increase national livestock production through improved individual animal productivity and development of the traditional pastoral system in the lowlands through efficient sustainable

nutrition, high mortality and morbidity from diseases and limited essential support services. Taking these in to consideration, in the last fifteen years after independence the government has undertaken the following development activities:



## VI. IMPACT OF PASTORALISM ON NATURAL RESOURCES AND THE ENVIRONMENT

Pastoralists seem not to have a range conservation programme for the sake of conservation since they can always move to a new area, when the area under use is depleted. Conservation, as we understand it today, may not be the imminent goal of pastoralism. Nevertheless, since pastoral practices are aimed towards the protection and conservation of natural resources for future productive use, then pastoralists make one of the most important and dynamic conservationists' group that have ever existed. There are several traditional range management systems that seem to promote and sustain conservation of plant resources. These include: mobility, management of species (unique and protected habitats and range reserves) and conservation of economically important trees and shrubs.

Legesse (1994) indicated that environmental degradation in pastoral areas has been brought about by development programs rather than by pastoralism. He identified two types of degradation. The first is a natural and dynamic process caused by the use of resources by pastoralists. Thus pastoral communities build-up herd size in good years as a buffer against uncertain environmental catastrophes. Such degradation does eventually occur due to natural checks and balances of the resources. The second type of degradation is primarily a result of the various and numerous development interventions introduced in pastoral areas. The digging of boreholes provided permanent water sources, an essential factor in restricting mobility; the building of dispensaries and schools, the various forms of involuntary sedentarisation projects and the introduction of other forms of poorly planned development programs, both attracted non-pastoral communities to pastoral areas and encouraged pastoral settlements, with the resultant high concentration of humans and animals in pastoral land.

Recent studies in Eritrea have shown that the riverine areas in general are important dry season havens for livestock producers. Movement to such areas are carefully planned and coincide with the season of scarcity in the home territories of the different groups during the long dry season. It is unclear what regulations are used to manage the riverine vegetation but as a general rule all livestock owners are not supposed to cut down trees but either lop or shake trees for pods.

The riverine vegetation area in rangelands is a vital forage resource for pastoral herds, particularly during the dry season. For this reason, riverine vegetation strips are greatly valued and their protection are ensured through traditional regulatory and conservation procedures. Conservation of plant resources in unique habitats ensures adequate feed resources from trees such as *Acacia*, *Salvadora*, *Hyphaene*, *Cordia* and others. The protection of the plant resources in the riverine sites prevents over exploitation of plant resources when their potential for regeneration is at its lowest.



Utilization of woody vegetation is often governed by formal and informal rules that protect plants against overuse. They rarely cut valuable trees or shrubs; they instead collect dry and dead wood for fuel and cut less useful trees and shrubs for constructing fences and to reduce bush encroachment. Th

## VII. RANGE RESOURCE MANAGEMENT AMONG PASTORAL COMMUNITIES TRADITIONAL ADAPTIVE STRATEGIES

Traditionally, risk-reducing adaptive strategies are, herd size, herd diversification and herd dispersion.

### 7.1 HERD SIZE

Technical people equate livestock production with beef production and want fewer livestock numbers of uniform structures. That is why the pastoralist has been constantly accused of being environmentally destructive because overstocking and, overgrazing that seem to be inherent of his life style. These allegations may have been misplaced because they ignore the essence of pastoralism.

The pastoralists derive more than 50% of their total food energy intake from livestock in the form of meat and milk. This resource extraction is largely a subsistence dairy operation because milk is the most important animal product in pastoral societies and is needed every day. Most cows conceive usually once every two to three years and provide little milk during the dry season. Females comprising more than 75% of the livestock number always dominate the herd size. This reflects the pertinence of milk as the major end product of pastoral production systems. In addition, the herd facilitates the formation and the reproduction of the domestic family unit to which it is attached, and enables the

Freehold ranchers adjust livestock numbers to their land base when faced with large and unpredictable fluctuations in resource productivity, whereas pastoralists seek access to natural resources needed to sustain their livestock elsewhere rather than reduce herd size. This is very much in line with the certain knowledge that they must live and operate within a rigidity delimited and finite land base. Opportunistic stocking and herd mobility are a logical and tactical complement to non-exclusive tenure (Sanford, 1983; Behnke & Scoones, 1993). Further, herd size and the size of its associated family are interdependent

Complementarities provided by a diversified herd sustain income requirements and the total quantity of food energy available for human consumption and reduces its seasonal variability. Camels normally provide milk throughout the year; have the highest resistance to drought and the highest market price in addition to being used as beasts of burden. Cattle provide milk which can be processed into ghee (butter) for home consumption or sale, have a good market value if sold for meat and are slaughtered, on, special social occasions. Small stock produce milk that can also be made into ghee and provide a small cash return when sold. They are slaughtered at small gatherings and to provide hospitality to guests (Al-Najim, 1991). Due to their high reproduction rate, small stocks are also important in herd rebuilding following a devastating drought. The exploitation of different species thus constitutes a rational strategy for balancing the objectives of subsistence needs, drought security and cash income.

In Eritrea, as in most developing countries, small ruminants have been raised for generations and are viewed as a symbol of wealth and prestige, and security against uncertainties and natural disaster.

Any change in species composition can therefore have a significant impact on both rangeland ecosystems and pastoral production strategies.

### 7.3 HERD DISPERSION

Herd dispersion is a third risk-reducing strategy, which is frequently practised in traditional systems. Stockowners separate their herds and have them herded in areas sometimes up to several hundred kilometres apart; this is primarily a measure against forage shortages and raiding. If the family is large enough, its members manage the different herding units, and family reunions and rearrangements of the different stock sections take place either during the rainy season or during certain ritual occasions.

A related form of dispersion, although of a different significance is the formation of stock alliances and stock patronage that is independent of family size and social status. Individual animals or groups of animals are given out to other stockowners, who are either needy (practical between the Tigrinya and Saho pastoralist) or in some way entitled to compensatory claims. Often the original owner never recovers the animals, but in times of hardship the son or even grandson might reclaim some or even all of the loaned stock from the recipient's heirs. This risk reducing strategy is common among all pastoralists, whose social organisation is based on clan and age set structures and should be regarded as a system of social security rather than an actual management tool.

When herders are forced to disperse livestock to several places, the labour demand for herding becomes highly disaggregated. Problems associated with labour shortages are usually solved through arrangement made between individual pastoral households. Two

or more households (usually relatives or close friends) bring their herds together under a single herder, who rotates them on a seasonal basis. Territorial alliances between the pastoral groups (Tigre and Hidareb, Tigrinya and Saho) are another form of community strategy, which helps reduce conflicts of over re

For the agro-pastoralist in area, Northern Red Sea coastal area of Sheab movements are upward and downward along the escarpment on a seasonal basis, while for the nomadic population in Kerkebet, movement is horizontal involving long distances.







cannot advocate that the big rivers be reserved for the pastoralists alone. There is a need to exploit these areas by commercial farming, but the pastoralists should be among the main beneficiaries, or be provided with a viable alternative.

Interventions by government and development agencies in natural resource conservation, while well meaning to provide essential serv

Therefore, if pastoralism is to continue in Eritrea the following points need to be put in place:

- 9 Ensure the flexibility and mobility of pastoral herds, which is critical to “opportunistic range management” and the success of this system,
  
- 9 Develop an extension system in the pastoral communities, a more adaptive, process oriented approach to planning is required that builds from an understanding of existing pastoral management strategies and local knowledge of environment and resources,
  
- 9 Selective range management interventions

## REFERENCES

Al-Najim, M.N. 1991. Changes in species composition of pastoral herds in Bay region. Somalia. Pastoral Development Network Paper 31b.

AMRF, 1999. The assessment and management of riverine forests project. Management plan for the riverine forests of the western lowlands of Eritrea. MOA/SOS, Asmara, Eritrea.

Ba, A.S. 1982. L'art vétérinaire des pasteurs Sahéliens. INDA, Serie Etudes et Recherches No. 73-83, Dakar.

Behnke, R.H. and I. Scoones, 1993. Rethinking range ecology: implications for rangeland management in Africa. In Behnke et.al. eds.

Behnke, R.H. 1994. Natural resource management in pastoral Africa. Overseas

Fratkin 1989

Fre, Z. and A. Musa. 1993. Research on pastoralists and Agro-pastoralists in North western Eritrea. The case of Forto Phase 1 Study. PENHA, MoA, CAFOD report.

Gall, C. 1981. Goat production, Academic Press, New York.

Ohta, I. 1987. Livestock identification among the Turkana: the animal classification and naming in the pastoral livestock management. *Afr. Studies Monographs* 8: 1-69.

Sanford, S. 1983. Management of pastoral development in the third world. John Wiley and Sons, Chichester.

Tewolde, W. 2001. Prospective on Pastoralism in Eritrea. *Journal of Eritrean Studies*. Vol. 3, No 3, May 2004.

Trevaskis, G.K. 1960. Eritrea a colony in transition: 1941-52. Oxford university Press, Amen House, London.

Upton, M. 1987. *African Farm Management* Cambridge Univ. Press. Cambridge.

Webb, P. 1989

White, C. 1984. Herd reconstitution. The role of credit among WodeaBe herders in central Niger. Pastoral Network Paper No. 18d. ODI, London.

Yohannes, Y. 1994