IUCN Eastern Africa Programme

Somali Natural Resources Management Programme

An Ecological Assessment of the Coastal Plains of North Western Somalia (Somaliland)

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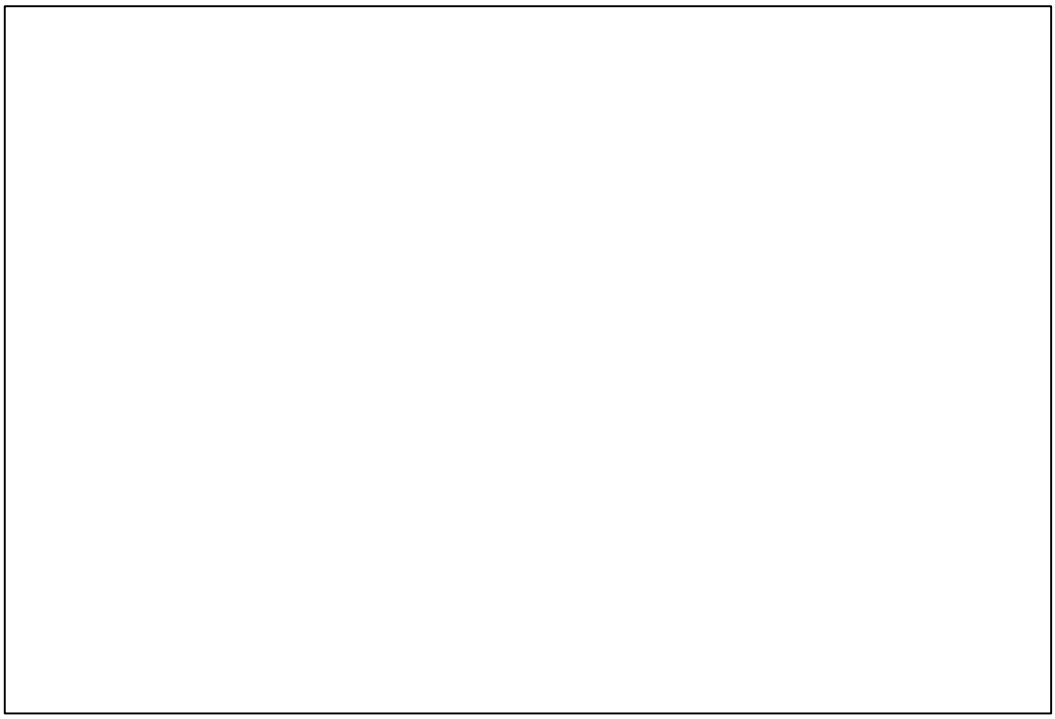

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IUCN Eastern Africa Programme

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By:

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IUCN CONSULTANTS

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SUMMARY

The objective of this study was to make an ecological assessment of the north western coastal plains of Somaliland which would provide some preliminary information on vegetation use and trends, wildlife and livestock numbers and the use of the area by herders and their livestock. The coastal plains are an important grazing area for a substantial number of livestock during the November/December rains and the area is thought to be an important refuge for wildlife. The study team surveyed approximately 10 000 km^2 of the coastal plains which included that area lying between Berbera in the east and Loyada in the west. Since very little time was available and the area is so large, rapid assessment techniques were used during the survey which nevertheless provided sufficient data to predict rangeland trends and give an estimate of wildlife and livestock numbers.

The coastal plains are characterised by low and erratic rainfall, sandy and well-drained soils, high daily temperatures and high evapo-transpiration rates. There are five major vegetation types occurring in the coastal plains of which *Panicum* grassland and *Balanites* bushland are the most widespread. Another important vegetation type is *Suaeda* shrubland growing on saline soils next to the sea as do small clumps of *Avicennia* mangroves located in estuaries and inlets. *Acacia* bushland is found along the base of the escarpment as well as on sandy soils with underlying ground water The vegetation of the coastal zone is well adapted to an arid climate and plants usually have small leathery leaves, are small, widely spaced and have a well developed root system. All plants show heavy use by livestock but some species more than others. Browsing is particularly severe of *Balanites* and *Boscia* trees as well as *Maerua* and *Salsola* shrubs, which are an important food item for camels and goats. In spite of the heavy browsing of tree and shrub species no correlation between browsing intensity and crown vigour could be shown, which shows that some trees and shrubs can withstand a heavy amount of browsing pressure before dying. Many of the *Salsola* and *Suaeda* had died but this due to the effects of a recent drought and not because of browsing. There was little evidence of fire, which does not seem to play a role in the ecology of the coastal plains because of a lack of combustible material. Ring-barking is not an issue but the lopping off of branches for fodder can be important, especially with *Boscia* trees which show a high degree of cutting near areas of permanent settlement. On the whole, the tree and shrub layers are considered to be in a reasonably good condition with satisfactory regeneration of trees and shrubs occurring throughout the survey area. The effect of high livestock numbers and grazing pressure is more noticeable on the grass layer and there is a prevalence of grass species characteristic of disturbed soils and which have increased because of overgrazing and habitat degradation. The overall picture is therefore one of heavy use with a change in species composition to those which are not so palatable and which cannot sustain such large numbers of livestock.

An aerial count of the coastal plains revealed that only 1032 head of game occurred in the coastal plains (density of 0.11 animals/km^2) and that the species counted were restricted to 12% of the area sampled. During the aerial count only Soemmering's gazelle, Pelzen's gazelle and ostrich were seen and counted and the total numbers was estimated at 563, 281 and 188 respectively. The total biomass was calculated to be 5.13 kg/km^2. Further ground counts revealed that there was more wildlife in the area than the aerial counts suggested including Speke's gazelle and a viable population of bustards. Wildlife movement is governed by rainfall distribution and pastures, with animals making the most of localised downpours which provide a flush of green grass. During the dry season, wildlife moves towards the coast as does much of the livestock and exists around shallow wells that have been dug by pastoralists for their livestock. According to earlier reports, wildlife populations have been in steady decline over the last 100 years and especially during the civil war in the 1980s when there was an influx of weapons, and soldiers and pastoralists alike shot animals in order to supplement their food rations. During the last few years, many species have become locally extinct, such as Beisa oryx and gerenuk, while others had been exterminated long ago (for example elephant, black rhino, zebra). The decline in wildlife numbers has not gone unnoticed by the local pastoralists and many of them are genuinely concerned about their extinction and wish to conserve the remaining populations. Although poaching is still prevalent (and wildlife products such as ostrich eggs and feathers are for sale in markets), it is said to be declining because pastoralists have built up good herds of livestock and there is no immediate need for game meat.

From the aerial count, livestock numbers were estimated at being in the region of 379 000 animals, giving a density of 40.41 animals/km^2 and a biomass of 1521.1 kg/km^2. Comparing these figures to other livestock numbers in similar areas, this is about 1.5 times more than the number one would expect for such an arid area. Livestock were widely distributed and seen in 65% of the units sampled. Of the total number of livestock, 16,785 (4.4%) were camels, 358,201 (94.5%) were sheep and goats and the remainder cattle and donkeys. While camels and small livestock were widely distributed according to pasture growth and flush, cattle were concentrated in only 10% of the area and occurred only along the coast and within a small radius of village

settlements and water. This shows that cattle are much more bound by water requirements than are camels, sheep and goats. Livestock numbers are augmented by herds moving down the escarpment and on to the coastal plains during the rainy season between November and February. During the dry season, many animals are taken to the coast where there are permanent sources of water and where *Suaeda* shrubland provides adequate browse. Issues related to livestock are the dearth of veterinary drugs available on the market and the lack of any veterinary extension network on the coastal plains. Mortality from disease is high and is increased even further by the predation of spotted hyaena which have increased in numbers and which have become a pest in many areas.

Detailed information was gathered on seasonal movements of the coastal plains pastoralists and the clans which move down from the highlands and onto the plains in search of grazing during their seasonal migrations. Movements are triggered off by the onset of rains and the availability of pastures. As interviews revealed, many of the coastal plains pastoralists are sedentary, staying along the coast (where there are permanent wells) during the dry season and moving out onto the plains when there is rain and pastures provide adequate grazing for their livestock. They only move out of the plains and onto the highlands in search of pastures in times of severe drought. In addition to this localised movement, there is a seasonal influx of pastoralists from the highlands and beyond who migrate down onto the plains for six month of the year and then return to the highlands for the rest of the year.

The study finishes off with several recommendations, which concern resource management: wildlife conservation, livestock production and the involvement of local pastoralists in any future development plans. In order to stop the decline in range conditions and improve the carrying capacity of the vegetation, it is proposed that the traditional system of management be recognised and improved, and that customarily-decided reserved areas be set aside, allowing areas to recuperate and plants to seed and re-colonise the pastures. Such grazing reserves would also have a beneficial effect on wildlife populations, which if protected effectively would recover quite quickly.

The creation of National Parks or other wildlife reserves is not recommended since it would antagonise the local pastoralists and the Government does not have the finance to maintain such protected areas. It must be understood that the management of grazing reserves as well as the conservation of wildlife can only be done through the involvement of the local communities and such institutions as village grazing committees and community scouts. This requires a substantial amount of resource planning, co-ordination and management and above all the long term input of a donor agency. Grazing reserves have to be chosen on the basis of agreed patterns of customary land use, sociological and ecological surveys, and a system of management with opportunistic rotation periods must be agreed upon with the local communities. When resources allow, local pastoralists should be trained in elementary data collection, and the surveillance of wildlife areas (a strategy successfully demonstrated in Zambia, Zimbabwe and Tanzania). Government authorities need to be involved and educated at every step of the project. Livestock numbers, which may presently be above the carrying capacity of the rangeland, may need to be reduced, but this can only happen with the co-operation of the local pastoralists. Such co-operation can only be forthcoming if financial incentives are provided for herders to sell their livestock, especially their female animals, and for them to provide adequate veterinary and marketing/sales services.

ACKNOWLEDGEMENTS

The consultants would like to thank the Ministry of Rural Development and Environment for supporting the study of the coastal plains and providing two field staff, Mr Ahmed Sugulle and Mr.Ahmed Elmi to the field survey. They were a great help as was Mr Mohamed Ighe Kille a well known conservationist and formerly Director of Wildlife in the Ministry of Rural Development. We thank the Ministry of Defence for allowing us to fly over at low altitudes the north-western part of Somaliland. While in Hargeisa, the consultants were well looked after by Miss Amina Abdalla head of the IUCN Somaliland office who made arrangements for the field trip, aerial census and organised meetings with local Ministry officials and NGOs. In Nairobi, Tony Potterton of the IUCN Somali field desk provided useful information of the area in the form of maps, research papers, field guides and previous ecological surveys of adjacent areas. Our thanks also go to Captain Mark Schwinge who piloted the Cessna Caravan while we conducted the first ever aerial census of the coastal plains.

Our special thanks go to the pastoralists, village elders and guides who we met in the field and who provided us with useful information about the land-use of the area, its vegetation and wildlife. They were at all times very hospitable and keen to share their knowledge with us which they did with great enthusiasm and insight. This makes us optimistic for ultimately the conservation and sustainable management of the land is in their hands.

The Somali Natural Resources Management Programme is funded under the EC Rehabilitation Programme for Northern Somalia. The terms of reference for the study were discussed with the EC Somalia Unit in Nairobi, who also provided support and advice and commented on the draft report.

1. INTRODUCTION

The consultancy was commissioned by the IUCN eastern Africa regional office in conjunction with the Somali Natural Resource Management Programme (SNRMP) which is part of the EC funded Rehabilitation Programme for Northern Somalia. The Rehabilitation Programme seeks to conserve and sustainable use natural resources by: a) assisting local communities in natural resource management, b) developing and managing the fisheries sector, c) implementing energy saving devices and forest conservation measures and d) promoting the wise development of water resources. During the last few years, the SNRMP under the auspices of IUCN has commissioned several surveys and studies dealing with such topics as artisanal marine fisheries (v.d.Elst, 1997), woodfuel management (ETC, 1997), socio-economic assessment of central Indian Ocean coastal plains (Laird and Potterton, 1997) and an ecological assessment of Saad ed Din Islands (McClanahan, 1997).

1.1 Objectives of Assessment

The objectives of the consultancy were to undertake a preliminary ecological survey of the north western coastal plains and to collect information on the current utilisation of the coastal plains by local pastoralists and their livestock. The north western coastal plains cover an area of approximately 10 000 km^2 stretching from Berbera in the east to Loyada in the west, and from the Gulf of Aden in the north to the foothills of the escarpment in the south. The area has for the most part an annual rainfall of 100 mm and because of high evapo-transpiration rates desert conditions prevail. The vegetation has adapted to these severe ecological conditions and consists mainly of xerophyllous species with a mosaic of grassland, bushland and shrubland vegetation types prevailing. In spite of these extreme conditions, the area in question is an important wet season grazing area for livestock which are moved down onto the coastal plains during the *Jilaal* season between November and February. The coastal plains also have some remnant wildlife populations, which have been heavily overexploited in the past and which up until now have been little documented and studied. Apart from some general vegetation and ornithological surveys of the northern region of Somalia, no detailed studies have been done of the north western coastal plains and very little is known of the general land-use patterns of the area, the pastoralists and their livestock husbandry and the trends in rangeland production. Because of the importance of the area in the pastoral system of Somaliland, IUCN together with the EC Somali Unit and the Ministry of Rural Development in Hargeisa decided to commission a survey of the coastal plains in order to identify priority issues and trends affecting its sustainable utilisation.

In order to clarify the existing conditions of the north-western coastal plains, the consultants were asked to provide information on the following subjects:

(1) Assess the environmental features of the north western coastal plains

(2) Establish rangeland condition and ecological trends

(3) Collect information on livestock/wildlife numbers and distribution

(4) Review past and current utilisation of the coastal plains by local pastoralists

(5) Identify priority issues and trends affecting the use of the coastal plains

(6) Suggest management measures to sustain pastoral and wildlife production systems

The consultants flew to Hargeisa on the 12th. November, 1999 and returned on the 25th November, 1999 in all a period of 14 days (Appendix 2). At the end of the field trip, a presentation of preliminary results was given to Ministry officials and representatives of NGOs working in the area.

1.2 A Review of Previous Studies

As far as the consultants can make out there have been no specific studies done on the ecology and pastoral socio-economics of the coastal plains of north western Somaliland. North western Somaliland has always been dealt with in a broader context, be it in Hemming's (1966) classic description of the vegetation of the northern region of the Somali Republic, or Janzen's (1988) work on migration and grazing patterns in Somalia. Nevertheless, much information has been gathered during the last 100 years on the geology, botany, ornithology and vegetation of Somalia and many of these reports and findings contain useful data relevant to the ecology of the north western coastal plains. The following is a brief summary of the ecological surveys done in Somalia all of which have documented the exceptional importance of Somalia's fauna and flora for biological conservation.

a) Biological Diversity

Because of its isolation and desert climate, the Horn of Africa has become, over many thousands of years, a centre of endemism for many species of fauna and flora adapted to arid and semi-arid conditions (Kingdom, 1990; Herlocker, Forbes and Douthwaite, 1997; East, 1998). Of approximately 250 mammal species, 30 (approximately 12%) such as beira (*Dorcatragus megalotis)*, Speke's gazelle (*Gazella spekei)* and dibatag (*Ammodorcas clarkei)* are endemic to the region. The flora of Somalia is equally varied and reflects influences from Africa, the Mediterranean and Arabia. Somalia is considered a centre of floral endemism (White, 1983) and of the 3,000 recorded species, 700 (16.7%) are endemic, something which is only surpassed by the South African floral region. In spite of this exceptionally high degree of endemism, Somalia has attracted little conservation efforts by the international community and what has occurred has been too little and too late with no long term planning and involvement. As a result of habitat degradation and uncontrolled hunting, 71 species are threatened (IUCN, 1992) of which 20 (28.8%) are mammals.

The conservation of Somalia's fauna and flora in a network of protected areas is in its infancy and numerous recommendations have not been implemented because the Government either lacked the finance, conservation awareness or political will to implement these recommendations. Sayer, Harcourt and Collins, (1992) list 22 existing and proposed conservation areas in Somalia covering 5,246 km ^{2} and 45,900 km ^{2} respectively. Most of these protected areas are on paper only and threatened by large herds of livestock, agricultural encroachment and armed poachers. Overgrazing, forest destruction and accelerated erosion are well known to anyone conversant with the ecological situation in Somalia.

b) Fauna

Early explorers, hunters and colonial officials travelling through the country at the turn of the century write of the astonishing wealth and abundance of wildlife to be seen and Somalia was considered one of the best wildlife areas in Africa (Swayne, 1895 and Pearce, 1898). Now only small remnant pockets of wildlife remain, many of which are near extinction. Elephant (*Loxodonta africana*), black rhino (*Diceros bicornis)*, lion *(Panthera leo)*, and Swayne's hartebeest *(Alcelaphus buselaphus swaynei),* have all been wiped out throughout their range in northern Somalia and the wild ass *(Equus asinus somalicus)* which occurred in their thousands, have been reduced to a few dozen. The status and distribution of Somalia's wildlife has been well documented by Simonetta (1988), Sale and Ighe (1990) and more recently by East (1998). Simonetta provides distribution maps for the antelopes of Somalia some of which still occur on the north western coastal plains (Soemmering's gazelle *Gazella soemmeringi*, Pelzen's gazelle *Gazella pelzelni*), while others such as Beisa oryx *(Oryx beisa)* have been extirpated from the study area. Simonetta (1988) and Sayer, Harcourt and Collins (1992) also mention the Zeila Wildlife Reserve which covers an area of approximately 4 000 km^2 and lies to the south of Zeila and adjacent to the Djibouti border. This reserve was established during the British colonial period but like many other wildlife reserves in Somalia has never been properly enforced and can now be considered defunct.

East (1998) provides an excellent and up to date picture of the wildlife situation in Somalia as well as providing data on wildlife numbers and densities for some of the more numerous species. East considers the population of Pelzen's gazelle (which he classifies as a sub-species of the Dorcas gazelle *Gazella dorcas*) as stable and in some areas locally common with population densities in the region of 0.2-0.02/km^2. Speke's gazelle *(Gazella spekei)* populations are considered to be declining but in some areas they are locally common with population densities varying between 2.0-0.2/km^2. Soemmering's gazelle are declining and populations have been heavily reduced through poaching and habitat destruction with densities anywhere between 0.3-0.03/km^2. Salt's dikdik (*Madoqua saltiana)* still occurs throughout most of its former range and the population is stable and in some areas locally common. Average densities are given as 2.0/km^2.

c) Flora

Large concentrations of livestock and the cutting down of trees for charcoal and firewood have had a profound effect on species composition, ground cover and structure of the vegetation. Grazing pressure and soil erosion are now a serious problem and together with periodic droughts have had a devastating effect on the vegetation and soils. There is evidence to show that the Horn of Africa is in a phase of climatic change with decreasing rainfall and desertification accelerating during the last 500 years (Parkinson,1932). The reduction of rainfall has been greatest in semi-arid regions and along the coast (Hemming, 1966). This desiccation process will only accelerate with the warming up process the world is experiencing. This in turn decreases rainfall reliability and great annual fluctuations are becoming a norm. The destruction of the climax vegetation by man has been going on for a long time in Somalia and there are very few areas left in the country which are still in a pristine state and which can provide baseline data with which to compare the present situation.

Botanical surveys and expeditions started around 150 years ago in Somalia with Hildebrandt making extensive collection between 1873-1875 and still continue to this day with new species being regularly discovered. Drake-Brockmann (1912) travelled through Somalia at the turn of the century and collected many plants. His photographs provide an interesting comparison to the present situation and it can be shown that even at the beginning of the century grazing pressure was manifest and that some unpalatable plant species were expanding at the expense of palatable ones (some *Aloe spp.* for example). This was followed by surveys and studies done by Gillett (1941), Edwards (1942) and Gilliland (1946) on the ecology of north- eastern Somaliland, western Somaliland and a survey of the grazing areas of British Somaliland. Glover (1947) continued the pioneering work of previous botanists and range ecologists and produced the first checklist of the flora of Somaliland while Cufodontis (1953) provided valuable additional information. In 1957 Pichi-Sermolli produced the first vegetation map of Somalia including the coastal plains of north-western Somaliland. In 1966 Hemming produced a detailed description of the vegetation, ecology (soils, climate, geology) and past history of the northern region of Somaliland which provided invaluable information for this study. In his publication he provides a short description of the vegetation of the coastal plains which he divides up into non-saline coastal plains and halophytic littoral communities with their characteristic tree, shrub and grass species. Between 1972 and 1973 Bally and Melville (1973) conducted a survey of the vegetation of the Somali Democratic Republic, which included a brief visit to Zeila on the north western coastal plains, when they suggested creating some Plant Resource Reserves on the coastal plains. The authors note the severe degradation of most vegetation types and give recommendations for its rehabilitation and the protection of Somalia's fauna and flora. In all, five areas in Somalia are recognised as being of particular botanical importance (none of which are located in the north western coastal plains) in terms of species richness and endemism (Herlocker, Forbes and Douthwaite,1997). They are:

- Bush/woodland associations on limestone in the Ogaden and Cal Madow of Somaliland
- Fixed dune vegetation in southern Somalia
- Coastal associations near Hobyo and the vegetation of the Nugaal valley
- Coastal associations of central Somalia
- Montane and riverine forests

1.3 Social Structures of the Somaliland Coastal Plains Pastoralists

Somali society consists of a myriad number of clans, sub-clans, and families (***rer***). According to Somali tradition all these clans are related through elaborate family trees, where descent is traced through male ancestors. Somalis are divided into six main clans: the ***Dir***, which is considered the oldest clan family; the ***Ishaaq*** and ***Hawiye*** which are related to the ***Dir***; the ***Darod***, which is related to the ***Dir*** through marriage; and the ***Digil*** and ***Rahanwein***, who are agro-pastoralists of the fertile riverine areas of southern Somalia.

The Republic of Somaliland is the home to three major Somali clans groups (see Appendix 1.1):

1. The majority **Isaaq** who dominate the central parts of the territory. They are composed of:
   (a) ***Habr Awal*** who live in the Western Hargeisa and Berbera areas and are divided into the slightly larger ***Sa'ad Musa*** and the ***Issa Musa***.
   (b) ***Habr Gerhajis*** who live in the central Burao area and are composed of the large ***Habr Yonis*** group of clans, and the ***Eidagalla***. A small pocket of ***Habr Yonis*** live in the eastern area of Erigavo, where the founder of the ***Isaaqs*** is buried.
   (c) ***Habr Je'elo*** who live to the east of Berbera and Burao.
   (d) The small ***Arap*** clan who live near Hargeisa.
2. The ***Dulbahante*****,** and ***Warsangeli*****,** who live in the extreme east are part of the large ***Herti*** clan family, which includes the ***Majertain*** who live in the north eastern part of Somalia, in what is now called Puntland. ***Herti*** are part of the **Darod** clan families, which includes the large ***Ogaden*** branch.
3. The ***Gadabursi*** and ***Issa*** who live in the extreme West. ***Gadabursi*** and ***Issa*** belong to the widely dispersed **Dir** clan family.

Nowhere do the coastal plains of Somaliland east of Berbera form a distinct economic, sociological or ethnic space. The plains are inhabited from quite ancient times by three distinct and large clans, whose grazing territory extends from the coastal plains, through the highland massifs, and across the common Somaliland - Ethiopian border into Ethiopia Somali National Regional State (popularly known as "Region 5"). In the east around Berbera are the grazing lands of the ***Habr Awal*** clan. The ***Issa Musa*** are the more coastal sub-clan of the ***Habr Awal***, and they live in the immediate environs of Berbera and extend southwards to Hargeisa. West of them but in proximity are the ***Sa'ad Musa***, who extend from a narrow strip on the coast near Bullaxaar and El Sheikh towards the towns of Gebile and Hargeisa which they dominate, and across into their grazing lands in the rich plateau area of the 'Haud' in Ethiopia. In the centre of the study area are the ***Gadabursi***, who extend from the coastal plains around Lughaye, through the Baki and Borama districts into the Ethiopian highlands west of Jijiga. In the west is the large ***Issa*** clan family, which extends from Zeila district into neighbouring Djibouti and into the Ethiopian highlands around Diredawa city (see Appendix 1.2).

1.4 Local Regulations Controlling Land Use and Natural Resources

Somaliland pastoralists recognise three geographical zones in their country:

1. The Guban – which is the coastal belt. 'Guban' literally means 'burnt' alluding to the heat and desiccation of much of the coast, where temperatures in the summer season go above 35 degrees centigrade.
2. The Ogo – which are the highlands intermediate to the coastal plains.
3. The Haud – which is the plateau extending across the Ethiopian border.

All the nomadic people of Somaliland adhere to the communal type grazing pattern of East African pastoralists, where the range is common property belonging equally to all members of the grazing group. The grazing groups are the family herding units, which are members of the sub-clans, which are themselves constituent parts of the clans, and so on. Although clan grazing areas can be designated from the common usage and the range of movements by its members, the borders of such grazing zones are never strict, and they overlap with neighbouring groups at various seasons or during different years. In many areas, a number of clans graze their livestock together sharing the same resource.

Clans are not stopped from using other clan's grazing resources, especially during droughts. According to officials at the District Commissioners office, Zeila, all clans from Somaliland have a right to graze the common land. In Somaliland livestock are grazed on the natural range. In response to the erratic and unreliable rainfall pattern, and to maximise their utilisation of the dry rangeland, production systems are characterised by mobility of whole herds and their owners. Before the turn of the century, Somaliland pastoralists would regularly move between the coast, the Ogo and the Haud, making use of the abundant pasture in the Haud during the rainy season, and then repairing to the permanent 'home wells' in the coastal strip. These traditional movements, especially between the Ogo and the Guban, still continue and are significant factors in Somaliland pastoralism.

Somali poetry has traditionally been full of praise for the lush grazing of the Haud zone, which is a scrub/bushland that is well suited to camels, but has no permanent flowing water. However, with the development over the last three decades of permanent water in the form of dams, berkads, and the construction of enclosures and the related adoption of farming practices, grazing patterns have shifted drastically.

During Siyaad Barre's regime pastoralists were considered a problem by the Government in Somalia. There was an official program to eradicate clans as the basis of social organisation among the Somalis, which was initiated by an officially orchestrated public demonstration where effigies representing the Somali clans were buried. All rangeland was considered the property of the state, the nomads were allowed only usufructory rights that were taken as a privilege granted by the state, while agricultural farms along the rivers and urban property was titled, privatised and individualised. Such traditional state claims to rangelands, and granting state instruments all powers over land rights, continue today in Somaliland.

Five Ministries are presently directly concerned with environmental issues and rangeland development in Somaliland, and these are the Ministries of fisheries; livestock; agriculture; rural development and environment; and water. The Ministry of Planning and the Ministry of Interior, may be seen as the outer tier. The lead agency in environmental issues is the Ministry of Rural Development and Environment, as empowered by various legislation of the Somaliland State. The basic policy of the Ministry is progressive, in that it acknowledges the relationship between rural poverty, population growth, competition for scarce resources and land degradation.

Among the major issues identified by the Ministry are:

- Man made environmental damage
- Forest/rangeland degradation due to improper land use practices or lack of policy
- Uncontrolled water run off, wind and soil erosion, soil wastage
- Livestock pressure on rangeland, and low level of livestock production

There is confirmation in the policy documents of the need for planned environmental action and the crucial role of participation in planning and implementation of rural development projects by local people. In the *Guddida Dastuurka Qaranka, Nuqulka Kowaaad* (1996) it says that:

a) Decision making process should be decentralised giving greater autonomy to the local level (from village upwards)

b) Delegation of more power to local level institutions not only in decision making but also in implementation of programmes, but with the supervision, monitoring remaining at the centre level

c) Collect quantitative data on a regular basis

d) Reassess periodically the overall effect of policies and other factors concerning the economy, natural resource and determine changes

To enable the participation of local people, the policy document proposes that all barriers to free association of rural people in organisation of their choice be granted, and that opportunity of rural people to participate at the local level will be promoted.

Presently, the Ministry of Rural Development and Environment is empowered by the Forestry Law no. 4/98, which became effective in May 1998. According to this law, thirty specified species of trees may only be felled with authorisation, while a further nine specified species may not be felled or made into charcoal. The law identifies eleven Natural Forest Reserves, and proposes town and village forest reserves which will provide charcoal for urban populations, all which will have clearly defined borders. The law further proposes that there will be seasonal grazing reserves that are to be opened at fixed times, drought reserves that may only be opened during serious droughts, and rotational pastoral reserves. The law proposes that water development be undertaken only with permission from the Ministry, to reduce the proliferation of water development in any one area. Livestock are envisaged as part of the management plan of the forest reserves, and it is proposed that permits be introduced to allow grazers entrance to reserves, and that these permits be given by the community. The Ministry will create a force that will investigate, guard and enforce the law to protect the land pastures, trees, wildlife, water and environment, and these shall be known as 'guardians of the environment.' Officers of the ministry, and police are authorised to take action on any contravention of the law, and a series of taxes for permits for fodder collection, use of water tanks, collection of gums, and grazing of livestock on reserve lands is proposed. The most far reaching proposal in the Law 4/98 of May 1998, is Article 9, (Demarcation and Protection of Land) which proposes that all grazing land be divided into grazing zones or 'Minimum Integrated Rural Development Areas'. This calls for each administrative district to be divided into a minimum number of grazing areas or blocks, which are 12x12 km in size where sustainable resource programmes are initiated and managed. The real challenge, therefore, is to find an approach that is suitably balanced between the different Government authorities and the communities concerned over resource management, land tenure and the planning and implementation of development projects.

A major problem is Somaliland is the growing trend of enclosing communal rangeland for private cultivation or fodder production. These enclosures disrupt nomadic grazing movement patterns, block stock routes to markets and water points. By taking out the small but vital grazing areas around seasonal streams, pastoral production is affected in large surrounding rangelands. The Ministry therefore proposes to divide the land into five zones as follows:

1. Rangeland
2. Reserved grazing lands
3. Forest reserves
4. Natural reserves
5. Agricultural land

During the colonial times, demarcation lines were created between the rangeland areas where enclosures and agriculture could be practised and the forest and rangeland areas. It is proposed that these lines be revived and extended to other rangeland areas where necessary. Several of these lines are listed. It is noteworthy that the line in Gebile district has been completed using local resources.

1.5 The Present Political Situation in Somaliland

On 18th May 1991, at a meeting in the town of Burao, after ten years of fighting against the military regime of Siyad Barre, the last President of the so called Democratic Republic of Somalia, the Somali National Movement, (SNM) declared self independence of the former northern regions. At a previous meeting in Berbera held from the 15th to the 27th of February 1991, and attended by elders and representatives from five regions of Somalia (Awdal, Northwest, Togdheer, Sool, Sanag) it was decided to establish the Republic of Somaliland which had existed from the 26th to the 30th June 1960, before the union joined the former Italian and British Somaliland (Ghalib, 1994).

This move meant, in effect, the repudiation of the so-called 'Greater Somalia dream' in a major independent part of the Somali territories. It was as well an endorsement of the Organisation of African Unity ruling that the Africa's colonial borders be adopted as the basis of states in Africa. It also heralded the greater role of local factors in national decision making. According to Lewis (1993):

" This pragmatic decision reflected the desire of many of the people of Somaliland to get on with rebuilding their country and ruined towns, after their devastation by Siyad's forces which had left hundreds of thousands of land mines to remind northerners of that barbaric regime."

In a subsequent meeting that ran from January to May 1993 which was held in Borama, the SNM folded away to give power to civilian politicians. According to Issa-Salwe (1994), the meeting made two main resolutions:

(1) the need for a country-wide security framework, and

(2) the establishment of a national organisational structure.

The Borama conference laid the foundations for a new constitutional order in Somaliland. A two-chamber parliament was formed. The 'upper house' called the Guurti was created and included elders, Sheikhs and Sultans. The Guurti is responsible for keeping the peace between the clans. It also passes legislation, and authorises decisions from the Lower House. The Guurti keeps the balance between the clans and is the repository of traditional power. The Lower House, composed of about 74 representatives of various Somaliland sub-clans passes legislation. It is significant that for now at least the membership of the house is based openly on clan affiliation, and not on a territorial 'constituency' system. Such a model is well suited to the clan based migratory pastoral people of Somalia. Both houses of parliament are independent of the Executive, and are selected by elders for a tenure period of five years. The Borama conference also elected an executive President. The President chooses his cabinet, which consists of technical Ministers who run ministries. All the Presidential appointments have to be approved by both houses of Parliament. The administrative divisions are regions called Gobol and districts called Degmo.

The new country of Somaliland is still young and under-funded, with its infrastructure in a state of disrepair after many years of civil war. It is, however, peaceful and this can be credited to the elders and the desire of the general population to rebuild their lives. Surprisingly, the elders operate on the Somali clan basis that is held responsible for the destruction of the state in southern Somalia.

According to Drysdale, (1994), the Somaliland population quickly reverted to a system of authority and governance which they understood and which was based on their own social system. It was possible to revert to this system in the north because the British, with their indirect colonial policies, used and encouraged local ways of governing local populations. In the south, however, the Italians ignored the local customs. As a result, the local population became used to being controlled by the state authorities, and the local elite had lost the respect and awareness of traditional ways of governance. The re-assertion of local traditional ways of doing things in Somaliland has the advantage of being widely accepted, well known, locally sustainable, and cost effective.

2. SURVEY METHODS

The following chapter details the survey methods used to collect data on vegetation types, wildlife and livestock numbers and the use of the coastal plains by local pastoralists. Since the study area was so large and the time at our disposal so short, a number of rapid assessment techniques were used which allow for a preliminary ecological analysis but which are not adequate for an in-depth analysis of the area concerned. Further fieldwork is necessary especially during other times of the year and in different seasons.

2.1. Vegetation Transects

The study area was divided up into four major vegetation types with each vegetation type being named after the dominant plant species and the physiognomy of the community (Fig 1). Bushland communities are vegetation types consisting of a mixture of trees and shrubs, continuous or open and with 2-3 vegetation layers. Shrubland communities are defined as a mixture of shrubs, continuous or open and consisting of 2 vegetation layers. Grasslands are areas dominated by grasses with the odd tree or bush/shrub and with 1-2 vegetation layers (Pratt and Gwynne, 1977). The plant communities consisted of the following vegetation types:

1. *Balanites orbicularis* bushland
2. *Acacia tortilis* bushland
3. *Suaeda monoica* shrubland
4. *Panicum turgidum* grassland

The Point-Centre Quarter (PCQ) method was used to sample the different vegetation types in the study area. The PCQ method is useful in sampling communities in which individual plants are widely spaced or in which the dominant plants are large shrubs and trees (Mueller-Dombois and Ellenberg, 1974). The procedure was as follows: In each vegetation type two transects were randomly located each 1 km long and placed in a north/south direction. The transects were at least 1-2 km away from any roads or tracks so as to minimise the effects of human or livestock disturbance. Along each transect, sampling points were located at predetermined intervals of 200 m. At every sampling point, a cross was placed on the ground which divided the ground area into four quarters (Fig.2) and the nearest tree, shrub and grass in each quarter was identified and the distance measured to the centre of the cross. By calculating the mean distance for every plant sampled and dividing it into 10 000 m^2, the density of the species per ha. in the vegetation type could be calculated (Mueller-Dombois and Ellenberg, 1974). At every sampling point, the tree, shrub and grass layer was sampled separately. A tree was defined as a woody plant at least 3m high and with a diameter at breast height (dbh) of 5 cm while a shrub was considered to be a multi-stemmed woody plant less than 3 m high and with a dbh of less than 5 cm. For each plant surveyed, the following variables where applicable were recorded with some variables divided into intensity of use (Appendix 3.1):

1. Vigour
2. Use (Browsing and Grazing)
3. Composition (Ecological Status of Grasses)
4. Fire
5. Debarking of Stem
6. Cutting of Branches
7. Dbh of Trees and Shrubs
8. Height of Trees and Shrubs
9. Crown Cover

Fig. 1 Vegetation Types

Fig. 2 The Point-Centre Quarter Method of Sampling Bushland and Shrubland

X Sampling Point

0 Trees

__ Measured Distance

---- Quarters of the Cross

2.2 Aerial Survey of Wildlife/Livestock Numbers and Environmental Variables

An aerial survey of the area was conducted using a high winged Cessna Caravan which was piloted by Captain Mark Schwinge. The survey method was described by Norton-Griffith (1978) as a systematic reconnaissance flight and the results were analysed using Jolly's (1969) equation for unequal length transects. Distributional data was analysed and mapped using the ARC INFO and ARC VIEW computer programmes.

The survey area was divided into ten, north-south transects 10 km apart (Fig.3), which were laid out on a navigation map with a scale of 1:500,000. The co-ordinates of the start and finish of each transects was recorded in a Garmin 95 GPS XL and helped the pilot and navigator verify flight paths. Each transect was subdivided into equal sized units and for each unit the number of wildlife and livestock were recorded as well as such environmental and land-use variables as vegetation type, pastures, fire, cultivation, poaching, erosion and water (Appendix 3.2). The Cessna was flown at an altitude of 300ft. and two backseat observers (Mr. Mohamed Ighe Kille and Mr.Ahmed Sugulle) counted all wildlife and livestock within a viewing width of 400m. The viewing width was defined by red bands on the struts of the aircraft as well as on the windows of the plane. The navigator (Dr. Malte Sommerlatte) recorded the environmental variables as well as keeping records of flight paths and location of the aircraft on the map. The aircraft had a radar altimeter installed so that the desired flying altitude could be kept at all times. The survey parameters are provided in Table 1:

Table 1 Aerial Survey Parameters

Survey Area	9377km^2
Transect Spacing	10km
Flying Height	300ft
Total Counting Width	800m
Total Number of Transects	10
Total Number of Units	51
Unit Length	9km
Total Transect Length	459km
Total Sample Area	367.2km^2
Sample Fraction	3.9%
Total Counting Time	3.45hrs
Total Flying Time	5hrs

2.3 Ground Survey of Wildlife and Livestock Numbers

While aerial counts provide an adequate estimate of wildlife/livestock numbers and give an idea of animal distribution over a large study area, they often underestimate wildlife numbers and miss out on the smaller and more cryptic species. It was therefore decided to augment the data from aerial counts by running ground transects during the course of the vegetation studies and when travelling from one camp to another in the course of the field trip.

In order to collect information on wildlife on the ground, belt transects of 50 x 1m dimension were run parallel to the vegetation transects and any animal tracks were identified and counted which passed through the transect. In all 9 transects were run in a north/south position from the Waheen river to Bullaxaar over a distance of 24 km. This method provided useful information on animal occurrence, distribution and habitat preference.

At the same time road counts were done when travelling from one camp to another from the Toyota Landcruiser by two observers seated (Mr Ahmed Elmi and Mr Mohamed Ighe Kille) in the back of the Toyota. In *Balanites* bushland the viewing width was set at 200m while in *Suaeda* shrubland and *Panicum* grassland which was much more open it was taken to be 300m. All animals were counted if they were initially sited within this distance (but not if they moved into it from outside the viewing width) and recorded by the navigator (Dr.Malte Sommerlatte) who was seated next to the driver. Road counts were done over a total distance of 162 km and covered an area of 92.4 km^2 (approximately 1% of the study area). The following areas were counted which are also shown in Fig 3 together with the location of the aerial transects:

1. From the Waheen river to Bullaxaar (24 km) in *Balanites* bushland
2. From Bullaxaar to Lughaye (67 km) in *Suaeda* shrubland and *Panicum* grassland
3. From Lughaye to Gargaara (33 km) in *Balanites/Acacia* bushland and tree grassland
4. From Lughaye to El Gaal (38 km) in *Suaeda* shrubland and *Panicum* grassland

Fig. 3 The Major Towns and Villages of North Western Somalia in Relation to the Aerial and Ground Transects Used During the Survey

2.4 Appraisal of Resource Users

The choice of methods was partly dictated by the short time available for the field study and the large area to be covered. Advantages were that the sociologist spoke Somali as his mother language, the communities were without exception very co-operative and organised and the Ministry counterparts who were assisting in the fieldwork interacted well and understood the objectives of the study.

The methods used were modified to suit local conditions and take advantage of the situation and persons who were interviewed. The following describes the main investigative tools used:

a) Formal Meetings

1) Discussions with representatives and heads of Ministries
2) Discussions with heads of administrative zones and field stations
3) Discussions with representatives of Non Government Organisations
4) Discussions with elders of administrative zones (the Degmo)
5) Discussions with elders of various villages, grazing areas and clans

Sites were chosen for the field work, which were spread among the major clan grazing areas along the coastal plains. In each of these areas, local field guides who were nomadic herders themselves were selected to accompany the study team.

b) Semi-Structured Field Meetings

1) Interviews with groups: Outlining of generalised grazing resources and seasonal movement patterns; group discussion of problems; ranking of problems; sorting priority problems requiring attention and local suggestions of solutions.
2) Individual interviews with nomadic families and herders. Individual family responses to seasonal resource availability patterns; marketing of stock; sources of household income.

c) In Depth Discussions/Interviews of Informants

1) Participant observations: In a number of sites, the study team was able to participate in significant social occasions and activities. These included: clan feast to celebrate and observe ancestor's day; wedding ceremony of a nomadic family; clan migration to coastal strip.
2) Video recordings: Of gatherings, interviews, general landscape and wildlife of the coastal plains.

3. RESULTS

3.1 Location and Size of Study Area

The study area lies between Berbera (45^0 East and 10^0 26'North) in the east and Loyada ($43^0$15' East and 11^0 27'North) in the west a distance of approximately 190 km and between the coastline in the north to the foothills of the escarpment in the south which varies from 84 km at its broadest to 18 km at its narrowest. The size of the study area is approximately 9 500 km^2 and incorporates most of the coastal plains west of Berbera (Fig. 3). Most of the major towns and villages of the region are situated in a broad band along the coast some of which (Zeila and Berbera) are 1000 years old and have been the centre of trade and commerce for the coastal region for centuries (Burton, 1894, Bradly Martin and Perry Martin, 1978 and Axelson , 1998).

3.2 Topography and Drainage Lines

The area is flat to undulating and the plains rise very gently from sea level in the north to 300 m (1000 ft). in the south over a distance of approximately 84 km and 18 km respectively (Fig. 4). There are two volcanic outcrops in the area which rise to 266m (Jebel Almis) and 328m in an otherwise featureless plain. The coastal plains are broken up by numerous seasonal wadis (Somali *Tug*) emanating from the broken hills and mountains which form the foothills of the plateau in the south. The wadis provide some features because of their characteristic vegetation, wide sandy courses and high embankments. They also form once they reach the sea small estuaries, pools and lagoons, which have developed characteristic vegetation associations. The wadis come down in flood after heavy rains have fallen inland and dry up after several days. During the field trip the Waheen river came down in flood after heavy downpours on the 12 th November. There is also some water seepage under the alluvial sands of the wadis, which surfaces near the coastline and is the source of water for many pastoralists and villagers living along the coast.

3.3 Geology and Soils

The coastal plains known locally as the *Guban* are a result of tectonic faulting which have occurred in an east-west direction along the Gulf of Aden and in a north-west to south-east direction along the Red Sea. These faults occurred during the Upper Eocene and Oligocene when the Gulf of Aden was formed and during the Miocene when the Red Sea was created. While the sea-bed of the Gulf of Aden dropped, the coastal area was formed and the inland plateau was uplifted to over 1000 m with the mountain massif rising to 2408 m at its highest point. Sometime during the Miocene and Pliocene there was an outbreak of volcanic activity and today these volcanic outcrops and mountains can be seen in the east, central (Mt. Almis) and western end of the study area (Fig. 5). From Mt. Almis the lava flowed south for about 70 km covering the Hegebo plateau.

Soils in arid or semi-arid areas are for the most part undifferentiated and poorly developed and reflect the underlying geological strata. A soil map of the coastal plains is therefore very much based on the geological formations of the area and the areas with lithosols correspond with volcanic activity and regosols with marine deposits mixed with sandy alluvium (Fig. 6). The coastal plains over a period of thousands of years have been covered by a mantle of sandy alluvium brought down from the mountains and plateau during pluvial periods (Pallister, 1963). These deposits have been mixed up with marine deposits, which form the underlying surface of the coastal plains. Along the coast from Berbera to Loyada the flat plains merge into the Gulf of Aden with hardly any dune formation and the coastline gives the impression of a salt-pan rather than a coastal beach. Soils of the coastal plane are generally shallow and immature and show their geological/marine origins. While soil development is clearly correlated to the amount of rainfall that an area receives, the coastal plains receive next to nothing and soils are poorly developed. Camping along the Waheen river, it was interesting to see the different textured deposits which had accumulated over time on the embankments which in some cases were 50-70 m deep (Fig. 7) These deposits varied from sandy to gravel which clearly was the effect of different erosion and deposit cycles.

Fig. 4 Relief of North Western Somalia (adapted from Ministry of Defence UK, 1983)

Fig. 5 Geological Map of North Western Somalia (adapted from Merla et al, 1973 and Barnes, 1976)

Fig. 6 Soils of North Western Somalia (adapted from MOA, 1989)

3.4 Climate

The coastal plains lie between the 50 mm and 200 mm isohyet with rainfall slowly increasing with altitude (Fig. 8) as one travels up the escarpment to around 650 mm at an elevation of 2000m where *Juniperus* forest grow. The rainfall figure for Berbera which lies on the coastal plain just outside the study area receives a mean annual rainfall of 57 mm whereas Zeila which lies on the western edge of the study area receives 93 mm (Hemming, 1966). There is a great range in annual rainfall figures and it is very erratic with some years receiving half of the mean or double the mean. Herlocker, Forbes and Douthwaite (1997) provide a map for Somalia showing the reliability of annual rainfall and for the coastal plains the coefficient of variation (variability of annual rainfall) lies between 70 and 80%. The occurrence of rainfall is subject to the movement of the sun back and forth across the equator twice a year. The south-west monsoon which blows from May to September brings with it the long rains (known locally as *Gu*) and marks the beginning of the hot summer season whereas the north-east monsoon which blows from October to April marks the beginning of the short rains (known locally as *Dhair*) and the cool winter season. During the summer season and when it is not raining, a strong hot wind (known locally as *Kharif*) blows which desiccates the land and causes a considerable amount of sand erosion. Whereas in most other parts of Somalia there is a distinct bimodal distribution of rainfall, the coastal plains experience rain mainly during the winter month from November to May.

Fig. 7: Embankment of the Waheen River

Fig. 8 Mean Annual Rainfall (mm) of North Western Somalia (adapted from MOA, 1989)

The hot , dry season on the coastal plains occurs during June, July and August, with temperatures around a day time maximum of 42^0 C and a night time minimum of around 31^0 C. The cooler months are around November, December, January and February, with the day time maximum being around 29^0 C and the night time minimum 22^0 C. Temperatures rise at Berbera steadily from January to June and decline steadily from August to December. The average diurnal range for Berbera is not very high and is 8.5^0 C compared to $13\text{-}14^0$ C on the plateau.

On the basis of rainfall and temperature figures, the coastal plains can be classified as falling within Climatic Region 1, which is characterised by a single season of low and highly variable winter rainfall (up to 200 mm/yr) during November to May with high humidity (70-80%), high annual temperatures and with little variations in diurnal temperature.

The relationship between rainfall and evapo-transpiration has a direct effect on plant growth and development. On the north-western coastal plains, potential evapo-transpiration is well above the annual rainfall which means that plants face major ecological constraints in surviving in such an arid environment. The plants of the coastal region have adapted to these drought like conditions by developing small leathery leaves; deep roots; small size and by having a widely scattered distribution and a short growing season. Most plants are deciduous but some are evergreen (*Balanites and Suaeda*) and they protect themselves from water loss by having small "waxy" green leaves. The amount of rainfall also affects the life cycle of grasses in that perennials flourish during periods of wet years and annuals during times of drought and dry seasons. A succession of dry seasons may result in the disappearance of perennials and an increase of annuals.

3.5 Water Resources

The coastal plains do not have any surface water except sometimes during the rainy season, when it rains sufficiently on the plateau and the escarpment for the wadis to flood and for natural pans, waterholes and pools to fill up. Usually these floods are of short duration lasting only a few days. Since the coastal plains are covered by layers of sand and gravel, water quickly sinks into the sand unless clay pans or rocky pools retain some of the water.

A second source of water are shallow hand-dug wells and while flying along the coast between Lughaye and Sabawanaag numerous shallow wells were seen from the air. Shallow hand-dug wells are a traditional means by which pastoralists can obtain drinking water and water for their livestock. They vary from permanent rock lined structures to temporary holes dug in the sand or river-bed. In many cases when wells become brackish and are no longer fit for human and livestock consumption, pastoralists move on to another site or wait for the wells to become potable (usually during the rains). Wells can only be dug if there is ground water within a few metres of the surface. During the rainy seasons, wells become replenished with drinking water and during the dry season they might dry up or become so saline that it is impossible to drink. During the civil war, many wells along the coast became disused and fell into disrepair but many of them have now been rehabilitated. Shallow wells are usually surrounded by bush fences which keep out unattended livestock but which allow wildlife to drink (pers.com. Idiris Farah, 1999). In some cases where the wells are on the coastline, warthog *(Phacochoerus aethiopicus)* have become a pest and have increased in such numbers that they are soiling the wells with their dung.

A further source of water are boreholes which have either been drilled or dug and which require engine-driven pumps or hand-pumps to bring the water to the surface. Such boreholes usually occur in the vicinity of towns and large settlements where the human population is sedentary and where there is sufficient demand for such types of installations. These types of permanent water supplies can have far-reaching consequences such as sedentarisation of pastoralists, severe habitat degradation and conflicts over land-use. They can also be difficult to run and maintain if the community does not have the money, fuel and expertise to repair the water pump.

From a range management point of view, temporary water holding facilities are preferred to permanent ones so that when the watering point dries up, men and livestock have to move on. This minimises the risk of overgrazing and forces the pastoralist to seek other pastures. Unfortunately the tendency is to create deeper and bigger water storage facilities, a trend which is often supported by NGOs and other aid organisations to the detriment of rangeland conditions.

3.6 Vegetation Types and Ecological Trends

3.6.1 Classification of the North Western Coastal Plains Vegetation

The coastal plains have been classified by various authors, who have given them different names. However, they can be broadly divided into two main vegetation associations. That of the extensive, sand covered plains (perhaps 80% of the area) which spread from the bottom of the escarpment towards the sea and secondly that of the littoral zone, which borders the sea and consists of saline soils supporting halophytic communities. The communities of the coastal area have been identified and given various names according to different authors:

1. Coastal and sub-coastal semi-desert grassland and shrubland (White, 1983)
2. Coastal vegetation and grassy steppe with perennial herbs and low shrubs (Pichi-Sermolli, 1957)
3. Non-saline coastal plains and halophytic littoral communities (Hemming, 1966)
4. The sub-desert formation (Gillett, 1941)
5. The maritime formation (Gilliland, 1952)
6. The coastal and haloseral association and the *Balanites* and *Maerua* coastal shrub and *Acacia* grass desert scrub (Glover, 1947)

3.6.2 Species Composition and Structure of Vegetation Associations

On the basis of observations made during the aerial census and the ground surveys, a broad zoning of the major vegetation associations has been attempted (Fig.9) based on the dominant tree/shrub or grass species and the physiognomy of the vegetation (Pratt and Gwynne, 1977). A brief description of each vegetation association follows:

Fig. 9 *Balanites* Bushland

Balanites Bushland

Balanites bushland is situated in the central and eastern part of the study area and forms a loose association of trees and bushes with *Balanites orbicularis* the dominant species in the tree layer and *Balanites orbicularis* and *Boscia minimifolia* the dominant shrub species. The average height of the tree layer in *Balanites* bushland is 4.60 m and that of the shrub layer 1.75 m. Table 2 gives the species density, frequency and basal area for the tree and shrub layer. The dominance rank is an expression of basal area.

Table 2 Species Dominance in *Balanites orbicularis* Bushland

Tree Layer

Species	Density No/ha	Frequency %	Basal Area Cm^2 / ha	Dominance Rank
B. orbicularis	12	100	3916	1

Shrub Layer

Species	Density No/ha	Frequency %	Basal Area Cm^2 / ha	Dominance Rank
B. orbicularis	15	100	148	1
B. minimifolia	7	40	65	2
M. crassifolia	4	40	32	3

Balanites orbicularis is very much the dominant species in this vegetation association forming pure stands in the tree layer and also being dominant in the shrub layer. Towards the coast, the shrub layer becomes diffused with *Maerua spp. (Courbonia virgata),* which seems to thrive on loose sands.

Fig. 10 Vegetation Map of Study Area

Acacia Bushland

Acacia bushland grows mainly along the coast east of Bullaxaar where it has colonised sand dunes but it also grows on the stony foothills of the escarpment where it forms dense thickets due to overgrazing and habitat degradation. There is also a large area of *Acacia* bushland in the west of the study area, which is identical to an area of sandy sediments. *Acacia tortilis* is the dominant species in the tree layer and *Salsola forskalii* in the shrub layer. The average tree height of the tree layer is 5.30 m and that of the shrub layer 0.70 m. (Fig. 11). Table 3 gives the species dominance for *Acacia* bushland.

Fig.11 *Acacia* Bushland

Table 3 Species Dominance in *Acacia* Bushland

Tree Layer

Species	Density No/ha	Frequency %	Basal Area Cm^2 / ha	Dominance Rank
A. tortilis	52	100	6110	1
B. orbicularis	13	60	5841	2

Shrub Layer

Species	Density No/ha	Frequency	Basal Area Cm^2 / ha	Dominance Rank
Sal. forskalii	389	60	1506	1
A. horrida	56	20	884	2
Gr. Tembensis	222	60	289	3

Suaeda Shrubland

This vegetation occurs in a narrow strip all along the coast line from Loyada to Berbera on saline soils. *Suaeda* shrubland is dominated by *Suaeda monoica* and *Salsola forskalii*. There are no trees in this vegetation association (Fig. 12). The average height of the shrub layer is 1.32 m. Table 4 provides information on species density, frequency and basal area.

Fig. 12 *Suaeda* Shrubland

Table 4 Species Dominance in *Suaeda* Shrubland
Shrub Layer

Species	Density No/ha	Frequency %	Basal Area Cm^2 /ha	Dominance Rank
S. monoica	128	100	1037	1
Sal. forskalii	6	20	14	2

Panicum Grassland

Panicum grassland is by far the single most important vegetation association in the study area. The grassland is dominated by *Panicum turgidum* and at times it forms a tree savanna or grassland in association with *Balanites orbicularis*. *Panicum* grassland grows on loose wind blown sand which is slightly undulating with sandy ridges. The grassland has an average height of 0.09 m. although *Panicum turgidum* is much taller than the other grassland species with an average height of 0. 25 m. The *Panicum* grassland is sparse and the average distance between grass clumps is anywhere between 10 cm and 39 cm. Together with *Panicum turgidum* occur *Aristida adscensionis, Cenchrus ciliaris*, *Stipagrostis uniplumis* and *Chloris virgata*. Many of these are annuals. The crown cover of *Panicum turgidum* is 263 cm^2 for *Stipagrostis uniplumis* and *Cenchrus ciliaris* it is in the region of 6 cm^2 to 10 cm^2.

Wadi Vegetation

The coastal plains are bisected by numerous sand rivers or *Tugs* which can be characterised by either having steep embankments several metres high or no embankments at all where the wadi fans out onto shallow plains. They can be seen from the air and during the aerial census, they provided prominent landmarks in an otherwise featureless and flat plain. The wadis have a characteristic vegetation association which plays an important part in the ecology of the area and as a means of connecting one vegetation association with another. A prominent feature is the *Tamarix nilotica* trees growing on the banks together with *Leptadenia pyrotechnica* and *Calotropis procera*. While *Tamarix* grow along the larger watercourses, *Leptadenia* grow along smaller ones. In some wadis, *Prosopsis* has flourished, which is an alien species and a coloniser of sandy soils.

Mangrove Forests

The description of the vegetation would not be complete without mentioning mangrove forests, which occur in small areas along the coast between Loyada and Berbera. The mangroves consist of *Avicennia marina* which are heavily browsed by camels and used for poles for construction purposes (Hemming, 1966). On the edge of the mangrove forest, one finds growing on the sand *Tamarix nilotica* and *Suaeda* with a variety of grasses adapted to saline conditions.

3.6.3 Use of Rangelands by Livestock and Ecological Trends

Data collected on browsing intensity and crown vigour showed the following results: All 9 major species sampled have been either severely or heavily browsed with an average of 47.8% trees and shrubs falling into this category. Another 46.3% fall into the next category of being moderately to slightly browsed and the remaining 5.9% have not been browsed at all. Some shrub species such as *Suaeda, Tragus* and *Salsola* have been particularly severely browsed with 92%-100% of all plants sampled falling into this category. Of the tree species, *Boscia* is heavily browsed with just over 70% of all trees falling into this category. *Balanites* and *Acacia* are not that heavily browsed with less than 45% falling into this category (Fig. 13, with category 0 denoting severe browsing and category 4 no browsing).

Crown vigour was another variable that was measured and it was shown that of the 9 major species sampled, 13.8% of the trees and shrubs were dying or dead, 27.6% were in a moderate condition and 58.6% were healthy. The shrubs *Suaeda* and *Salsola* were particularly affected with between 40% and 55% of all individuals dying or dead. According to our guide this was due to drought which had affected many species. Trees on the whole were in a healthier condition with *Balanites, Boscia* and *Acacia* having 4%, 14% and 4% respectively dead or dying (Fig. 14, with category 0 denoting dead crowns and category 3 healthy crowns).

Other variables such as fire, ring-barking and cutting or lopping off of branches for fodder were also recorded while running the vegetation transects. Fire does not appear to be an issue in the study area as less than 2% of all trees and shrubs sampled had signs of heavy to severe burn marks. More than 87% of all trees and shrubs had no signs of fires. The only time that fire seemed to be of importance was on a transect which was run near an old livestock boma which had been burnt when the boma had been abandoned.

Ring-barking is also not a ecological issue and 99% of all trees and shrubs showed no signs of ring-barking whatsoever.

The cutting down of branches for fodder was noted in the transects but on the whole it was negligible with only 1.4% of all trees and shrubs cut heavily to severely and 84% with no signs of cut branches whatsoever. When looking at the data for trees only then can it be seen that cutting becomes more of an issue and that of the *Balanites, Boscia* and *Acacia* trees sampled 12%, 29% and 4% respectively fall into the heavily cut category.

Fig. 13 Number of trees in the various browsing categories

Fig. 14 Number of trees in the various vigour categories

Apart from such variables as browsing intensity and crown vigour which provide an indication of the use and trend in the vegetation another important variable is tree diameter and height which give an indication of regeneration and age classes in the tree and shrub layer. Fig. 15 and 16 show the distribution of height and dbh by tree and shrub species. It can be seen that *Balanites* and *Acacia* have an even spread in all dbh classes showing that there is sufficient regeneration for these species. *Boscia* on the other hand is only present in two dbh classes and there is a conspicuous lack of trees in any of the other dbh categories. This is most probably because of the severe browsing pressure exerted on the young plants that never manage to grow beyond this stage. In the literature, it is stated that *Boscia* trees grow to an average height of 4m, but in the study area it only has an average height of 2 m. The regeneration of shrub species such as *Suaeda, Salsola* and *Maerua* seems to be satisfactory, since they are well represented in the first two dbh classes and their height is what one might expect for such plants.

A general ecological characteristic (ecological and grazing value) of grass species is provided in Table 5. The ecological value is based on whether the species is a decreaser, increaser or invader. This classification is based on the reaction to grazing which is usually in two ways: the grass species either decreases or increases in abundance (Oudtshoorn, 1992). It is therefore a good indication of trends because if valuable forage species decrease in number and distribution and are taken over by species that do not have such a high forage value then obviously the trend is downward and the carrying capacity of the grassland is reduced. Also in Table 5 an indication is given of whether the grass is palatable or not (grazing value). The grazing value of most grass species is constant because they vary little genetically and are regional or habitat specific (Oudtshoorn, 1999). There appear to be a wide range of species represented in the study area varying from decreaser to increaser. Increaser II b are species which increase with moderate overgrazing while Increaser II c are species which appear with severe overgrazing. *Panicum turgidum* is one of the most important grass species in the area and increases with moderate grazing as does *Stipagrostis uniplumis* and *Cynodon dactylon*.

Table 5 The Ecological Status and Grazing Values for Key Grass Species

Species	Grazing Value	Ecological Status	Comments
Aristida adscensionis	Very low	Increaser II c	Indicator of overgrazing, grazed when young but unpalatable when mature
Stipagrostis uniplumis	Average to high	Increaser II b	On undisturbed sandy soils and flood plains
Panicum turgidum	Average	Increaser II b	On loose sandy soils, unsettled and disturbed areas
Chloris virgata	Low to average	Increaser II c	On disturbed soils, colonises bare ground
Digitaria diagonalis	Low	Increaser II c	On seasonally wet grounds
Cenchrus ciliaris	High	Decreaser	High leaf production, good grazing and hay production
Cynodon dactylon	Average	Increaser II b	On moist sites, can withstand heavy grazing, unsettled ground
Anthephor pubescens	Very high	Decreaser	Indicates good pasture conditions, drought resistant
Tragus racemosus	Very low	Increaser II c	On dry sandy soils, of no importance for grazing
Leptothrum senegalense	Average to high	?	On eroded slopes and dry sandy areas, used to reseed denuded land

Fig. 15 Number of trees in the various height categories

Fig. 16 Number of trees in the various DBH (cm) categories

3.7 Wildlife Numbers, Distribution and Movement

Wildlife numbers, densities and biomass are given in Table 6 and the distribution for each species in Figs. 17-19. During the aerial count only three species were seen, these were Pelzen's gazelle, Soemmering's gazelle and ostrich *(Struthio camelus)*. The population estimate was 1032 giving a density of 0.11 animals/.km^2 and a biomass of 5.13 kg/km^2. Soemmering's gazelle were the most abundant species with a population estimate of 563 which was 46.8% of the biomass, then came ostrich with a population estimate of 188 and 44.4% of the biomass and then Pelzen's gazelle with a population estimate of 281 animals and 8.8% of the biomass.

Table 6 Wildlife Population Estimates from Aerial Counts

Species	Pop.Est.	Density (No/Km^2)	Biomass (Kg/Km^2)	Biomass as % of Total	S.E.	S.E. as % of Pop.Est.
Pelzen's	**281**	**0.03**	**0.45**	**8.8**	**200**	**71.2**
Soemmering's	**563**	**0.06**	**2.40**	**46.8**	**428**	**76.0**
Ostrich	**188**	**0.02**	**2.28**	**44.4**	**154**	**81.9**
Total	**1032**	**0.11**	**5.13**	**100**	**782**	**75.8**

The distribution of wildlife is extremely localised with Pelzen's gazelle and Soemmering's gazelle occurring only in 6% of the study area and ostrich in 4% of the study area. All game was seen either in the central or western part of the study area with no wildlife seen in the eastern part towards Berbera. According to local villagers, wildlife moves out onto the coastal plains during the rainy season (similar to livestock movements) when pastures are green and fresh and during the dry season it concentrates along the coastline where shallow wells, which are accessible to wildlife, provide sufficient water. Wildlife movements are therefore closely related to rainfall patterns in general, and localised showers in particular, which they can detect over great distances.

At this stage, it is of interest to compare the aerial counts with the results of the ground counts. On average, the ground counts give figures which are 5 to 7 times greater than the aerial counts (Table 7). The reasons for this can be many, one for example is that ground counts have not been placed at random intervals and by chance have been done in good wildlife areas.

Another reason might be that in aerial counts one misses many animals because of the high speed of the aircraft and the concealment of animals under cover. In both cases, aerial counts would give an underestimate of total numbers. Whatever the reason, ground counts did produce some interesting results. Three Speke's gazelle were sighted along the Waheeen river in *Acacia* bushland as were several Salt's dikdik and Phillip's dikdik (*Madoqua saltiana sps gubanensis)* in *Balanites* bushland. This is the first record of Speke's gazelle for this area. The ground count from Lughaye to El Gaal which for the most part goes through *Balanites* tree grassland produced a great number of Soemmering's gazelle (17) which is far above what had been counted previously by air. The sex ratios for Pelzen's gazelle was 1: 1.25 and for Soemmering's gazelle it was 1: 2.7 The Soemmering's gazelle had calves with them but there were no signs of calves in the herds of Pelzen's gazelles.

Fig. 17 Pelzen's Distribution in the Study Area

Fig. 18 Soemmering's Distribution in the Study Area

Fig. 19 Ostrich Distribution in the Study Area

Table 7 Wildlife Population Estimates from Ground Counts

Location	Vegetation Type	Species	Density (No/km^2)	Area (km^2)	Viewing Width (km)	Viewing Length (km)	Numbers
Waheen river to Bullaxaar	**Acacia bushland &Balanites bushland**	**Speke's**	**0.31**	**9.6**	**0.4**	**24**	**3**
		Pelzen's	**0.42**				**4**
		Salt's d.	**0.10**				**1**
		Phillip's d.	**0.52**				**5**
Lughaye to Gargaara	**Panicum grassland &Acacia bushland**	**Pelzen's**	**0.05**	**19.8**	**0.6**	**33**	**1**
		Soemm.	**0.10**				**2**
		Ostrich	**0.10**				**2**
		Phillip's d.	**0.05**				**1**
Lughaye to El Gaal	**Panicum grassland &Balanites grassland**	**Pelzen's**	**0.13**	**22.8**	**0.6**	**38**	**3**
		Soemm.	**0.75**				**17**

Of further interest, are the track counts that were made between the Waheen river and Bullaxaar which, although they do not provide population estimates, give a good indication of relative frequency and distribution. In all 10 species were recorded in the transects and a further 3 species near the transects:

Species	***Frequency***	***Numbers***
Common jackal	55.6%	Common
Spotted hyaena	22.2%	Infrequent
Striped hyaena	11.1%	Infrequent
Gazelle (most probably Pelzen's g.)	33.3%	Frequent
Dikdik (most probably Phillip's dikdik)	66.7%	Numerous
Medium sized bustard (probably white-bellied bustard)	55.6%	Frequent
Large sized bustard (perhaps Kori bustard.)	22.2%	Infrequent
Hare (most probably Cape hare, *Lepus capensis*)	44.4%	Infrequent
Squirrel (most probably pallid ground squirrel)	88.9%	Frequent
Ostrich (seen outside transects)	Seen outside transects	
Aardvark, *Orycteropus afer* (seen outside transects)	Seen outside transects	
• Porcupine *Hystrix sps* (seen outside transects)	Seen outside transects	

The most frequent species were Phillip's dikdik and the pallid ground squirrel (*Xerus rutilus)* which occurred in more than two thirds of the transects. Common jackal *(Canis aureus)* and medium sized bustards (most probably the white bellied bustard) were also fairly numerous. Gazelle occurred frequently around the Waheen river but gradually decreased in numbers towards Bullaxaar and the coast. The tracks of the spotted hyaena (*Crocuta crocuta)*and the striped hyaena *(Hyaena hyaena)* were infrequent.

Finally, the results of the bustard count are given in Table 8 which show a sizeable population of bustards for the study area. One area 5 km east of Lughaye was particularly interesting for 16 Kori bustards (*Ardeotis kori)* and Arabian bustards *(Ardeotis arabs)* were counted on an open grassland plain of approximately 1 km^2 at around 17.00 on the 17 th. November. In all 5 species of bustards were seen during the road counts, some of which like the Kori bustard and the white bellied bustard (*Eupodotis senegalensis)* are first ever sightings on the north western coastal plains (Ash and Miskell, 1998). The crested bustard (*Eupodotis ruficrista)* and the white-bellied bustard were seen inland whereas the Kori and Arabian bustards were seen along the coast. Bustards were seen mainly in *Balanites* bushland and *Panicum* grassland.

Table 8 Bustard Ground Counts

Location	Vegetation Type	Species	Density (No/km^2)	Area (Km^2)	Viewing Width (Km)	Viewing Length (Km)	Numbers
Waheen river to Bullaxaar	Acacia bushland& Balanites bushland	Heuglin's Crested Wt. bellied	0.10 0.10 0.10	9.6	0.4	24	1 1 1
Lughaye to Gargaara	Panicum grassland & Acacia bushland	Crested	0.10	19.8	0.6	33	2
Lughaye to El Gaal	Panicum grassland & Balanites tree grassl.	Wt.bellied Kori	0.09 0.04	22.8	0.6	38	2 1
Saba-wanaaag to Lughaye	Suaeda shrubland & Balanites tree grassl.	Kori Arabian	0.25 0.15	40.2	0.6	67	10 6

3.8 Livestock Numbers, Distribution and Movement

The total number of livestock for the study area was estimated as 378,925 which gives a density of 40.4 animals/km^2 and a biomass of 1521.1 kg/km^2 . This is nearly 300 times more than the wildlife biomass. Camels with a population of 16,785 contributed 53% of the total biomass and sheep and goats with a population of 358,201 contributed 40.2%. Cattle were only 3,376 and made up 6.6% of the biomass (Table 9).

Table 9 Livestock Population Estimates

Species	Pop. Est.	Density (No/km^2)	Biomass (Kg/km^2)	Biomass as % of Total	S.E.	S.E. as % of Pop.Est.
Camels	16,785	1.79	805.5	53.0	3693	22.0
Sheep & Goats	358,201	38.20	611.2	40.2	75603	21.1
Cattle	3,376	0.36	100.8	6.6	1461	43.3
Donkeys	563	0.06	3.6	0.24	199	35.3
Total	378,925	40.41	1521.1	100	80956	21.4

Figs. 20-22 show the distribution of livestock. Camels occurred mainly in small herds of 2-10 and were distributed primarily along the coastline from Loyada to Bullaxaar but also inland especially in the west. Sheep and goats occurred in mobs of a few hundred (150-300) primarily on the coastline and in the centre and western parts of the study area. Cattle were seen in groups of anywhere between 3-20 close to the coast line and inland where there was permanent water (e.g. El Gaal). The distribution of livestock, especially that of sheep and goats is closely related to the occurrence of water and pastures (Figs.23-24) and it can be seen that those areas which recently had good rains and where pastures were green or growing had the biggest concentrations of livestock (areas between El Gaal and the Djibouti border). Camels and sheep and goats were distributed throughout the coastal plains and occurred in 49% and 51% of the study area whereas cattle and donkeys had a limited distribution and occurred in only 10% of the area. Cattle are very much more tied to permanent sources of water and that explains their distribution along the coast line where there are bore holes near places like Lughaye and Sabawanaag. There were virtually no signs of livestock to the east of Bullaxaar because of a lack of rain and suitable pastures. These areas fill up as the rainy season commences and suitable grazing is produced. During the rainy season, livestock is spread throughout the coastal plains and during the dry season it is concentrated along the coastline especially around Bullaxaar, Lughaye and Zeila/Tokhoshi. In times of drought when even the wells along the coast dry up, livestock is moved up the escarpment as far as Hargeisa. Livestock movement is primarily governed by the presence or absence of water rather than the availability of food. The coastal plains are best grazed by small stock and camels. Families will have sheep, goats and camels. However, these are not grazed together. According to our informant, "*Weligood isku dag ma – Waa uun on layska kabeya".* (Not always do they have similar grazing requirements – they are only forced together). People from the coast do not like cattle. Cows drink too much water, and require too much grazing. It is said, that even if it rained last night, a cows needs water. If it doesn't drink sufficient water, the cow will not gain weight or have milk. Camels and sheep are grazed together. Sheep will graze grass in the coastal plains such as *Pennisetum* and *Chloris*. Camels will browse such species as *Balanites, Maerua, Salsola* and *Suaeda.* Camels that graze *Suaeda* have plenty of milk, which is also of good quality, and not watery. 'When the milk is used to make tea, you won't think any water has been used.' *Suaeda* grows two to three kilometres inland along the coast. It re-grows rapidly overnight, when it has been browsed, and it stays evergreen. It is grazed by sheep, goats and camels, although the sheep thrive on it more than goats and camels.

Fig. 20 Camel Distribution in the Study Area

Fig. 21 Goats and Sheep Distribution in the Study Area

Fig. 22 Cattle Distribution in the Study Area

Fig. 23 Water Distribution in the Study Area

Fig. 24 Pasture Distribution in the Study Area

3.9 Seasonal Movements by Pastoralists

Movement is a most important feature of Somali pastoralism. In the coastal plains of Somaliland, the following types of movement should be distinguished:

- The routine migrations, when families will move long distances to get to areas where it has rained, then contract to the areas where they have permanent water during the dry seasons.
- The smaller movements, within these, where livestock are moved within the dry season or wet season grazing areas to maximise one need or another, to get to relatives, to get away from relatives, to engage in social activities, to get to religious sites or other such social activities.
- The drought times, when rain fails completely in a major area and triggers off mass movement by large numbers of people and herds.

Routine movements in the coastal plains

There are three closely aligned grazing patterns on the coastal plains:

- The six-month in the hills, six months in the lowlands pattern followed by Guban nomads living east of Bullaxaar.
- The near permanent coastal zone settlements in the El Sheikh / Lughaye / Tokhoshi area.

The highland seasonal immigration into the coastal strip which include: (a) The long ranging nomads in the 'Galbeed' the west –who seasonally make use of the coastal plains in the Zeila /Tokhoshi/Casha Anood areas and (b) the near regular seasonal trek from the mountain areas of Hargeisa and Borama to the coastal strip (see Appendix 1.3).

Grazing patterns of the Guban zone east of Bullaxaar

The zone of the study area east of Bullaxaar are the grazing lands of the ***Issa Musa Galbeed*** (or the western ***Issa Musa)***. According to elders, they follow a clear pattern of 'six months and six months', whereby for six months of the year they are on the coastal plains (where they have permanent water), and the other six months they spend in the cooler hills surrounding the coastal plain (the Golis range):

Season	Deyr-Jilaal (dry period)	Gu-Xagaa (rainy period)
Grazing area preferred	Coastal Plains	Hills (Golis and beyond)

At the time of the interview, in November 1999, the families were in the Ceel Anood, Cusbale, Sheikh Abdal, Da'ar buruk, Sufi Hassan, Ilmaha areas of the highlands. It had rained recently in the hill area, otherwise they would have come to the coastal plains.

- Those from the coastal areas of Berbera move to the hills of Sheikh.
- Those from the coastal areas of Bullaxaar move to the hills of Sheikh Isaq (Banka Tunyo plains)
- Those from the Almis coastal plain move to Biyo shino, Agabar, Las Abarso, Damal and Caso dhoyo.

The nomadic movement takes five days (five Gedi) to get to the Haud just north of Hargeisa. When the camels are being trekked to go to the Haud, the families remain behind, and only male herders follow the stock. Many families combine their camels to create optimum sized herds for the move, and even families with only a few camels are able to get their stock to the Haud. In the same manner, when those pastoralist who usually reside in the Haud, send their camels to the coast, camels from many families are grouped. It is said that these herds are so large that their herdsmen cannot water the camels by themselves, and they have to ask for help from the coastal ***Issa Muse***.

Sa'ad Musa from the Haud areas migrate to the Sa'ad Musa coastal plains zones around the Almis range. However, most of the ***Sa'ad Musa*** do not go to the coastal plains areas. ***Sa'ad Musa*** have few sheep and many cattle. ***Sa'ad Musa*** are said to have camels with short mouths, full of hair, which are well adapted to the cold highland stony areas where the ***Sa'ad Musa*** live, but which would find it hard to cope with the coastal plain vegetation.

Drought movements

The ***Eidagalla*** send their camels to the coast to get salt. During the drought in the Haud areas, Eidagalla camels may be sent to the coastal plains. Haud camels are not allowed to drink the salt water of the coastal plains for the first 40 to 60 days. They eat the salt bush, which gradually acclimatises the camels to the salt. After the 40 or so days of salt grazing, the animal can drink from the salty wells of the coastal plains. Animals that start drinking from coastal wells immediately bloat and become sick.

Grazing patterns in the Guban zone around Lughaye

A distinctive feature of the Lughaye area is the large populations that are settled throughout the year along the coastal strip. All along the coast from El Sheikh to Casha Anood, pastoral hamlets are built next to one another along the coast. Camels are grazed on the *Suaeda* within short distances of the sea. Many of the settled families have never moved away from the coastal plains, and their movements do not take them more than twenty kilometres from their hamlet. In Lughaye, for example, even during the drought of 1998 to 1999, when it did not rain at all for two years, most of the families did not move away from Lughaye.

The presence of a large population at the coastal plains of Lughaye excludes other pastoralist coming down to graze here during the dry season. However, near Lughaye inland is the Kalawla borehole, the Garissa and Gargar areas which have permanent water and good grazing. These are the areas to which those from the highlands might seasonally migrate.

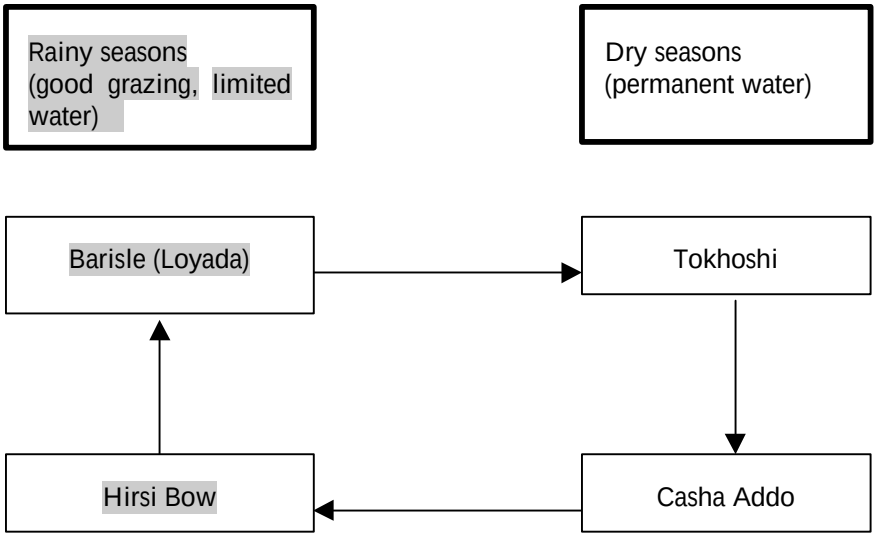
Grazing patterns of the Zeila district

The coastal plains are widest at the western parts near Djibouti border. There are two groups of users:

1. The Guban residents – who like the Lughaye livestock herders do not move away from the coastal strip throughout the year. They stay near and around the water points of Barisley, Tokhoshi, Hirsi Bow, Casha Addo. Their movements are also rotating around these water points. Only during severe droughts do they move into the higher lands of the ***Issa*** clan in Ethiopia, and even then milk herds and camels are left behind with the families. Many of the elders of ***Casha Addo*** and ***Tokhoshi***, have lived all their lives within this area, and have married in the same area. In his lifetime, one of the elders we were talking to has been to Ethiopia only four times in his lifetime, all in times of extreme drought. (See Fig.25.)

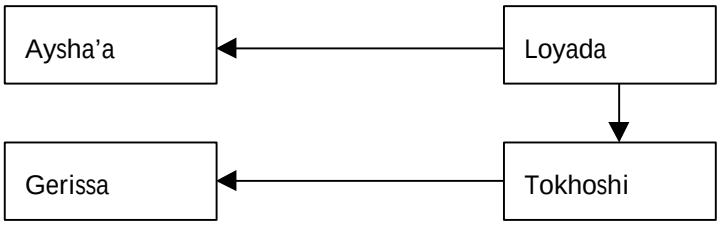
2. The 'Galbeed' pastoralists, who come from the Ethiopian border and beyond, will regularly move to Aysha'a in Ethiopia, to Gerissa in the Somaliland. These movements to the higher ground are in the rainy season of Gu' and Hagaa (Spring and Summer). Unlike the more settled pastoralists, they have large flocks of cattle that need to move to good grazing, and good water sources. On the other hand, Aysha'a and the areas west of Tokhoshi are grassland favouring cattle keeping. The coastal areas receive the 'Hais' rains of November/December, during the period when the coast is cool. Qatow-Qatow pour down into the coastal plains during the Jilal and Deyr seasons, spreading from Loyada to Almis hills in the east. They also have large flocks of camels, sheep and goats, and migrate seasonally over long distances like the typical Somali nomads of anthropological literature, typically spending six months in the mountains and six months on the coastal plains. They are also the least affected by the market, and the large towns, and retain much of their traditional "Issa" customary systems Both groups have existed long enough for them to make jokes about one another. The Guban residents are known as 'Jilba Lab,' (those with the folded knees), because they are not moving around. Those nomads who come in seasonally are known as 'Qatow-Qatow' (those who dart from place to place haphazardly).

Fig. 25 Typical movements around the Zeila grazing areas.



Drought period migrations

During droughts, even the Jilba-lab may be forced to move some of their stock. The farthest movement reported was to the 'Ell Harawa, and Adigalla grazing areas, within the Issa territory in Ethiopia. Only dry herds would be moved here, and it takes about fifteen days of constant movement to migrate to this grazing zone.



Both the Jilba lab and Qatow-Qatow groups are ***Issa***. However, the majority of the Guban residents fall into three sub clans of the ***Issa***. The permanent residents are increasing in number as more Qatow-Qatow decide to settle, or marry into the settled families and adopt their ways. However, many of the Qatow-Qatow keep large herds of cattle, which need to move to areas of plenty water. They are taken to Aysha'a, Adigalla in Ethiopia, and along the Somaliland Ethiopia border.

3.10 Pastoral Economy

According to Lewis (1993), "It cannot be emphasised too strongly that the pastoral nomadism constitutes the economic base of the vast bulk of the Somali population, and manifestations of the nomadic lifestyle and traditions pervade almost all aspects of Somali life. Somali nomads are not cut off from the life of the urban centres, or culturally or socially separated from the majority of urban residents". That the Somaliland urban economy revolves around the production and marketing of livestock became abundantly clear during the 1998 Saudi Arabian embargo on imports of Somali stock ostensibly due to the outbreak of Rift Valley Fever in East Africa. All economic activity took a down turn, and newspapers in Hargeisa starting printing diatribes against Arabia and Arabs. The Somaliland Ministry of National Planning and Co-ordination estimates that the Berbera port, which is the main Somali port exporting livestock to the external markets, sent out 2,480,090 animals, including 2,372,656 sheep and goats, 64,606 cattle and 42,828 camels in 1996, realising about one hundred and fifty five million dollars (Ahrens, 1998). According to "The Republican" newspaper (a Hargeisa weekly): "Somaliland's total livestock turnover for the year 1996 was 3.6 million heads and in 1997 more than 2.7

million heads were exported to Saudi Arabia and the United Arab Emirates. Somaliland's annual earnings from livestock is estimated over US$ 200,000,000 every year."

In view of the absence of regular census figures for the population of the study area, it is problematic to make judgements about the population. It will be very important for planning purposes to have a working estimate of the population. Sources that could be used include the present census, rapid assessments using participatory methods, calculations based on density in different ecological areas.

The herd size possessed by families differs considerably between families. In the East, a wealthy family was reported to own up to one thousand sheep and goats, and one hundred and forty camels. The average family will own up to two hundred sheep and goats, and about twenty to thirty camels. In the west, the wealthy herd owner will have four hundred camels, and seven hundred sheep and goats, while the average will have fifty camels, and three hundred sheep and goats. Although the above figures are generous, and show a situation that would be rosy, it should be noted that the Guban zone has survived without external food aid for close to a decade now. It was also obvious that the population of the study area is not undergoing food-related stress. However, pastoralists reported 'average holding' and did not include the large number of families that do not have any stock at all. If these are accounted for then the average will go down considerably.

Without the sale of increasing numbers of livestock, the populace of the study area would not be able to meet its basic food needs. Within the study period, it was not possible to estimate off-take rates to markets, both internal and external. However, it was clear that the sale of small stock was a primary and important ingredient to the food security of the population of the study zone. Among the major problems reported by pastoralists was the fluctuation in price between the cereals purchased and the small stock offered by the pastoralists.

According to Lewis (1993), "It is important to stress that nomads have been for centuries part of a vast, monetarised, trading network connecting Ethiopia and the Arabian Peninsula. Commercial attitudes are consequently strongly developed. They have sold livestock and livestock products - hides, skins, and clarified butterfat – for centuries." The study area, although next to the coastal belt from where the livestock are exported to external markets, does not have firm linkages with the markets. The marketing system and chains is more rudimentary in the western part of the study area. Two outlets are available for export. Livestock are sold for both the domestic slaughter market in Djibouti and Hargeisa and the export market to Arabia. Within the study area, the prices of smallstock have stabilised at an exchange rate for one sack of rice, commonly known as 'kabdat.' The main markets are at Hargeisa and along the Hargeisa- Berbera road, where traders buy small stock for sale to the Arabian countries. Pastoralists from the eastern part of the study area use these markets, where they take their stock for sale. Pastoralists at the western end of the study area use the markets at Casha Addo, and they offer stock for the domestic Djibouti market, where the prices are lower than along the Hargeisa – Berbera road.

An important income for Somaliland pastoralists is remittances from relatives. A large number of families of the study area receive some subsidies from relatives working in Djibouti, Hargeisa, Diredawa or abroad in the Arabian Gulf or elsewhere. On the other hand, a number of residents of the urban area of Hargeisa, Djibouti are subsidised by nomadic relatives living in the Guban.

At the eastern and western ends of the study area are the two large port towns: Berbera with more than fifty thousand people, and Djibouti with more than three hundred thousand people. On the southern edge are the towns of Hargeisa, with over four hundred thousand people, and Borama with over two hundred thousand. According to data, the former Republic of Somalia had one of the highest urbanisation rates in Africa, with about 40% of the population living in the cities. Some pastoralists find work in the mines at Tokhoshi, which has abundant extractable salt resources. More than three hundred families were working the mines at its peak performance in the1980's. However, problems of marketing the salt have limited the working and the populations living on the mines. The poor conditions of the roads and their breaking down in the wet seasons, and the refusal of Ethiopia, the main market, to allow import of salt straight through the nearest border point make sales difficult. The Ethiopians insist that the Somaliland population uses the Harti Sheikh border point, near Hargeisa as the only entry point into Ethiopia, forcing the Tokhoshi salt to travel more than two hundreds kilometres on non existing roads into the Hargeisa mountains. During the wet season, salt extraction stops completely, as roads break down, and markets for the salt become inaccessible.

However, for the foreseeable future, residents in the study area will depend on pastoralism, and it is therefore important for them and those concerned with their welfare to care for the environmental resources that they need.

4. DISCUSSION AND RECOMMENDATIONS

At the end of November, 1999, the coastal plains were supporting a livestock biomass of 1521.1 kg/km^2 composed mainly of sheep, goats and camels. Camels being browsers feed on trees and shrubs in the 1-5 m height category, whereas goats browse on shrubs up to a height of 1.3 m. (when standing). Sheep graze on grasses and herbs. The browsing pressure of trees and shrubs is high with 50% of all trees and shrubs having more than ¾ of their crown browsed. In some cases, such trees as *Boscia* resemble more a shrub than a tree because of the severe browsing pressure from camels and goats. In spite of the heavy browsing pressure, there was no significant statistical correlation between browsing pressure and plant vigour. This shows the tremendous recuperative powers of the plant species concerned and in spite of heavy browsing they manage to survive and even to remain healthy. The effect of droughts and other environmental catastrophes seem to affect the survival rate of trees and shrubs much more than browsing pressure and during the last drought, many *Suaeda* shrubs were killed. At this stage, it is difficult to say if browsing pressure accentuates the influence of droughts and further field work has to be done to answer this question. In areas where *Acacia tortilis* grows there is a problem of bush encroachment and according to Mohamed Ighe (pers.com.,1999) many of the areas which were fairly open 20-30 years ago are now covered by an impenetrable growth of *Acacia tortilis* (for example around Gargaara).

The effects of grazing is more subtle and if one looks at the grass species occurring in the area, most of them are Increasers b and c which means that they are species which increase with moderate to severe overgrazing. Over time the species composition will change with Increasers dominating over Decreasers and therefore the carrying capacity of the range will decline. Many of the grass species sampled are indicators of overgrazing such as *Aristida adscensionis* or such species as *Panicum turgidum* which grow on disturbed areas. Other environmental factors such as fires do not seem to play an important role in the ecology of the area, mainly because of a lack of combustible material which does not accumulate sufficiently to provide the basis for an intensive fire. The use of trees and shrubs for charcoal, firewood, fodder and bark is not serious at the moment. Many of the transects sampled had an abundance of dead branch litter which had not been removed for firewood and their were no signs of cutting down of trees for charcoal. However, this situation changes when one nears a village or a town like Berbera where many trees have been cut down for charcoal and where there is no branch litter. The cutting down of tree branches for fodder during times of drought is not an important issue and only 1.5% of all trees sampled had ¾ of their branches cut for fodder. Ring-barking is not important either and only 1% of all trees and shrubs had their trunks ¾ ring-barked. An attempt was made during the aerial count to assess erosion rates and Fig. 27 gives some indication of the state of erosion in the study area. Much of the erosion has been classified as medium to light, with most of the medium erosion areas occurring at the base of the jebels which occur on the edge of the survey area and in areas to the north of Lughaye. Since the coastal plains are flat and sandy, erosion rates are not severe with over-browsing and over-grazing having more of an impact on the ecology of the area than erosion.

The results of the aerial survey, showed that there is very little wildlife left in the area although subsequent ground counts and track counts showed that there is most probably more wildlife in the area than the aerial counts suggest. Wildlife numbers totalled 1032, giving a density of 0.11 animals/km^2 and a biomass of 5.13 kg/km^2. It is interesting to compare this figure with game counts done by Sommerlatte and Hopcraft (1992) on a 8,000 ha ranch on the Athi–Kapiti plains which has a wildlife biomass of 2759 kg/km^2 and a wildlife population of 27.3 animals/km^2. The livestock biomass is 6035 kg/km^2. The ranch in question has an annual rainfall figure of 510 mm and lies in *Balanites* and *Acacia* tree savanna. On the whole, however the density figures for Pelzen's gazelle (0.03/km^2), Soemmering's gazelle (0.06/km^2) and Speke's gazelle (0.21/km^2) compare favourably with the ones given by East (1998) who gives an average density of 0.2-0.02/km^2 for Pelzen's gazelle, 0.3-0.03/km^2 for Soemmering's gazelle and 2.0-0.2/km^2 for Speke's gazelle. Wildlife populations have been particularly decimated during the the Ethiopean war (1977-1978) when there was an influx of firearms and during the civil war (1988-1991) in Somalia as many soldiers and civilians lived off the land and hunted game to survive.

Fig. 27 Erosion Rates in the Study Area

Nowadays, nomads hunt wildlife in times of drought when their livestock is dying and in order to supplement their meat rations. Wildlife is considered a free resource to be used at will and especially in times of hardship when people are starving. One village elder, estimated that approximately 60-80 Soemmering's gazelle and 30-40 ostrich were hunted on the coastal plains per year. This is an annual off-take of 10-15% for Soemmering's and 16-21% for ostrich, which is not sustainable. Gazelle are hunted for their meat and ostrich for their meat and ghee. At most village centres (for example El Gaal), shops had ostrich feathers and eggs for sale which are bought by passing truck drivers. Ostrich meat is highly prized and sold in large towns where there is a thriving market. Leopards *(Panthera pardus)* still exist in the foothills but are poached for their skins, which are taken to Djibouti for sale. There soldiers of the French Foreign Legion take them out of the country (pers.com E. Bradley Martin, 1999). Lion were last seen on the coastal plains some 20 years ago but cheetah *(Acinonyx jubatus)* apparently still exist although none were seen during the survey. Warthog, spotted hyaenas and the common jackal are perhaps the only wildlife species which have proliferated. Warthog have become something of a pest along the coast line where they find refuge in thick clumps of *Prosopis* bushes and because nobody hunts them (some years ago French hunting parties from Djibouti used to come over to hunt warthog). Hyaenas and the common jackal have increased in numbers because of the human mortality during the civil war when many corpses littered the coastal plains. In spite of all this, many nomads interviewed have a strong interest in wildlife and its conservation and assured us that poaching was declining and wildlife populations were again increasing. This sentiment is best borne out by the public outcries against organised hunting. Although poaching, droughts and military style hunting trips have all combined to decimate wildlife populations, there are still some small and scattered wildlife populations left which if effectively protected could provide the nucleus for future conservation projects.

Livestock biomass is approximately 1.5 times higher than is normal for such an arid area (Deshmukh, 1990 as cited in Herlocker, Forbes and Douthwaite, 1997) and will increase as more pastoralists move into the area with the onset of the rains and green pastures. According to the nomads interviewed, livestock numbers have built up since the reduction in numbers during the civil war. This trend will increase pressures on the existing vegetation, especially the grass layer with its palatable species that will decline and eventually disappear. The decrease in forage production lowers the capacity of the rangelands and fewer livestock numbers will be able to cope through crises periods like drought or increasing desiccation. The present dramatic increase livestock numbers dramatically (as herds are re-built after the civil war) will cease, as growing populations of livestock exert pressure on available labour, management, water and range resources. This situation creates diminishing returns on any investment which seeks only to increase herd sizes. In other words a livestock population will be reached beyond which only marginal changes will be possible. As human population grows, this means that families will either become impoverished, or future generations will need to find jobs and a livelihood elsewhere in neighbouring towns and villages. Already, some of the nomads interviewed have described such a situation and therefore want the Government to create jobs in order to absorb the surplus number of people.

4.1 Livestock Management and Conservation of Rangelands

The vegetation of the coastal plains is under pressure from over 350 000 head of livestock and there is an urgent need to reduce the number to within the capacity of the range. What the carrying capacity of the Somali coastal rangeland is no one knows, but initial studies of the vegetation show that the quality and quantity of grazing is decreasing. If this trend continues, then a crash in livestock numbers is inevitable as soon as stress conditions apply: dramatic movements of stock into region from other regions, droughts, collapse in marketing structures. The result would be a decline in living standards for the pastoralists. The objective of a rangeland management programme would be to provide coping mechanisms against certain seasons of hardship, through guaranteed access to adequate grazing for a sustainable number of livestock, which livestock numbers would depend on the economic and technical levels attained by the society. Such a system would require two lines of action:

A. Restoration of the Vegetation and an Improvement in the Carrying Capacity of the Rangeland

Even the most overgrazed areas can regenerate vigorously after a few years of rest. Such 'rest' can be achieved by establishing grazing reserves and controlling the time and number of livestock permitted to graze on them. Although the setting up of grazing reserves have been the preferred method of choice by national governments, the experience has been that in the very dry arid areas, these reserves have been difficult if not impossible to establish and maintain. Local populations have resisted the often arbitrarily and poorly designed schemes, and the states have lacked the financial and political strength to force pastoralists into rotation and grazing schemes which pastoral herders see as socially and technically impossible to adopt. Nevertheless, all pastoralist recognise the value of resting rangeland, and where it is economically and technically possible do not resist the idea in itself. In many societies there existed customary methods of ensuring rotational grazing patterns. In the Republic of Somaliland, traditional laws are recognised through the two chamber parliamentary arrangement, which has specifically set up the '*Guurti*' as a house of elders. Clan representation is no longer considered the antithesis of a modern state, and it should be possible to institute a regime of natural resource tenure that works *with,* instead of *against,* the pastoralist traditional knowledge and skills. Such knowledge constitutes part of the customary Islamic and African tenure systems, and could be the basis for new legislation that would incorporate the first truly pro-pastoralist legislation in Africa, including unique pastoralist innovations like:

- the sharing of common pool resources,
- the recognition of interest in resources along temporal and spatial lines, (where resources in one region are owned for certain seasons with other clans from other areas),
- where resources owned by some in one season are owned by others in other seasons,
- where there are reciprocal arrangements concerning resources with other groups sharing similar resources

With the help of modern scientific knowledge, local elders who form the district administrative council could be assisted to choose reserve grazing areas according to ecological zones and in areas of high plant diversity and fodder production. Various systems can be used, depending on the condition of the rangeland, varying from exclusion for a number of years, and then a phased introduction of grazing, to some kind of partial use, where livestock is only permitted during some specific time of the year, for example after the rains and when grasses have seeded.

Whatever the system of rangeland improvement, or method of rural development is chosen, it is essential that the local communities (maybe at district level) and their customary traditions (the '*Heer*') be the final decision makers in the planing and establishment of any grazing reserves. Such grazing reserves can be managed and controlled by village range associations which would decide on what to do with anyone who infringed such grazing laws. However, with the acceptance of people in the 'driving seat,' it is easy for government to institute a system of fines to ensure the maintenance of such reserves. Such grazing reserves would also have a positive effect on existing wildlife populations which would benefit from improved food availability and reduced disturbance.

Although many of the ideas of the Ministry of Rural Development and Environment are pro-pastoralist, they will need to make the fundamental break with the colonial paternalistic attitude of state appropriation of rangeland to ensure against desertification and overgrazing. Using the structures that the Somaliland people have set up to ensure clan co-operation and peace, like the *Guurti* and the district councils of elders to establish local common ownership of property will be a first step to deciding on a Somaliland wide natural resource range management system. The crucial role of the state will then be to protect the weak against the strong as the value of land is increased by the commercialisation of Somaliland pastoral economy. The state will also have to find ways of incorporating women fully into the district councils and *Guurti* to ensure justice and to curb the modern trend of taking away from orphans and widows.

B. Control of Livestock and Reduction to Manageable Numbers

Any attempt to reduce livestock numbers would be unpopular and meet with stiff resistance, but it could be encouraged through the sale of livestock with the introduction of incentives. Bally and Melville (1973) suggested that a quota should be introduced to control the proportion of females to be slaughtered or exported. The more females that are sold and slaughtered the sooner the population will decline. Another way would be to provide a monetary incentive for slaughtering female animals or establishing a grazing tax that would encourage the keeping of male animals. District councils could introduce a license system for individual herders or villagers for a definite number of stock in a given area which would depend on the grazing capacity of the area.

In the long run, it may be possible to sustain even larger numbers of livestock in the Somaliland if technical support for fodder production in the dry seasons and the drought periods are found. Already, in the Haud region, lorries are used to transport bulk hay to animals, and water tankers are used to carry water to livestock in remote grazing areas. This represents a welcome investment by domestic capital in the rural sector production, which should be encouraged. Pastoralists buy the water, and the hay, and a marketing system has arisen to supply hay and water to remote communities during the dry seasons. During the 1994/5 drought in the Haud, and eastern Somaliland, sheep and goats were being ferried by lorries to the study area where it had rained. Although it appears that every possible natural resource niche is being exploited, it may be that inventive people shall find even more niches to extend the supply line to feed the growing livestock populations. However, given the lack of an over-arching land-use plan for the Somaliland rangeland, and the lack of co-ordination among the competing investors, such investments could undermine the very development they seek to encourage. Care must be taken to ensure natural justice in the allocation of resources to avoid promoting instability and conflict. Government, with the assistance of NGOs, needs to establish a veterinary extension network that will provide adequate veterinary services and drugs to pastoralists as a means of improving the quality and health of their livestock. Improvements in the marketing systems, and the quality of the shipping system would increase the returns to pastoralists from livestock sold, and may reduce the need to sell large numbers of stock. While 90% of all livestock exports go to Saudi Arabia, it is important to expand this market to other countries in the Middle East so that the local beef industry is not solely dependent on one country for its export market.

4.2 Wildlife Conservation and Management

The coastal plains still have a small but viable population of Soemmering's gazelle, Pelzen's gazelle and ostrich not to mention good populations of Phillip's dikdik and several species of bustards. Most populations are on the razor's edge and require careful protection if they are not about to slide into extinction. Elsewhere, it has been shown (Mutton in Dixon and Jones, 1988) that wildlife declines primarily because of over-hunting rather than livestock competition and that if wildlife populations are conserved they stabilise and recover within a few years. The attitude of the local pastoralists is positive to wildlife conservation, and if conservation projects are linked to job creation and community development (health and education for example) and the devolution of responsibility to local villagers and nomads, then a low key conservation programme could be initiated with some chance of success. In future, further field surveys need to be done to determine the biology of key species, the limiting factors which control population growth and areas that should be set aside for intensive conservation. Also a group of local pastoralists need to be selected and employed as community scouts to patrol wildlife areas and to collect information about wildlife numbers, movement and population trends. Community scouts should be trained in various aspects of wildlife management such as wildlife and vegetation surveys, collection of biological data, wildlife laws, report writing, patrols, wildlife values and public relations. The establishment of wildlife reserves or National Parks is not recommended as this would only antagonise the pastoralists who would loose valuable grazing areas. The active patrolling of wildlife areas and the collection of biological data needs to be coupled with a campaign to educate the local herdsmen and Government officials on the values of wildlife and the need to conserve it. Useful information can be gathered from the experience gained from the reintroduction of Arabian oryx *(Oryx leucoryx)* in Oman, Saudi Arabia and Jordan (Dixon and Jones, 1988). If such a conservation project is a success then wildlife species can be reintroduced which have been extirpated from the coastal plains such as Beisa oryx and gerenuk, which were last seen some 10 years ago.

Although tourism is not a priority at this stage, the coastal plains do have potential for some low key tourism in the form of horse and camel safaris. The area concerned is of great scenic beauty and there are many places of historic interest along the coast. The coastal nomads still lead a traditional life and they have a deep knowledge and understanding of the wildlife and ecology of the area. The offshore islands provide unsurpassed snorkelling opportunities and deep sea fishing while the mudflats and estuaries along the coast provide interesting bird

watching opportunities for palearctic migrants. If tourism is coupled with community involvement and development then it could become an interesting force for wildlife conservation in the area.

In many villages and settlements of the coastal plains, hyaena have become a nuisance killing livestock and attacking people. Hyaena's occur in large pacts of up to 20 animals and at times livestock predation can become severe. In one case, one man lost 2 camels out of 9 in one year and in another case a herder lost 10 camels out of a herd of 14 also in one year. Even bomas are not a solution, as hyaena's have been known to stampede the livestock within the bomas and then pick off the animals when they flee into the night. There have also been several cases of rabies in jackals and children have died because of jackal bites. Villagers want to poison the hyaena's, an action which will of course effect other species as well such as jackal and birds of prey who also feed off the poisoned carcass. Instead, it would be much better if some of the community wildlife scouts are trained to shoot the hyaenas. For this they require the appropriate rifles (with telescopic sights), ammunition and a bounty system which encourages them to shoot hyaenas.

Community conservation projects do not necessarily require a great deal of funding per se but what they do need is a long term involvement from donors.

4.3 Participation of Pastoralists and Village Communities in the Planning and Implementation of Development Projects and Range Resources

According to Government documents and policies, the Government recognises the need to involve local people in the planning and implementation of rural development projects. If one takes this statement to its logical conclusion, then the devolution of power should be taken ultimately to the village level where a group of elders or village committee would be responsible for the management and conservation of such resources as: rangeland, forests, fisheries, and wildlife. This would require close co-ordination and co-operation with the appropriate Ministries and their extension workers who have the required expertise to recommend management, marketing and sales procedures. The end result would be a land use plan for the coastal plains which would emphasise, sustainable rangeland use, production of healthy and marketable livestock, soil conservation and reclamation projects, wildlife conservation and where appropriate the establishment of farming and agro-forestry enterprises. The need for involving the society in land use planning, and getting wide understanding of the underlying themes of sustainable and equitable management of resources can not be underestimated. All the populations in Somaliland's urban sector, as well as the large Somaliland Diaspora, keenly follow events and conflicts within the clan grazing lands, and they are prepared to participate in, or help finance the avenging of the smallest slight felt against the clan and its perceived interests. By reducing to writing within a land use plan, there may emerge the perception of losers and winners in the vexed context of traditional clan land. With the accelerating trend of enclosures, pressure for access to grazing land will increase, and a pattern of 'spill over' to the coastal dryland by displaced highland pastoralists may begin to clearly emerge. The only way to solve this looming conflict between coastal pastoralists and incoming migratory nomads displaced from the highland zone is through a system of land use zones based on customary range resource tenure.

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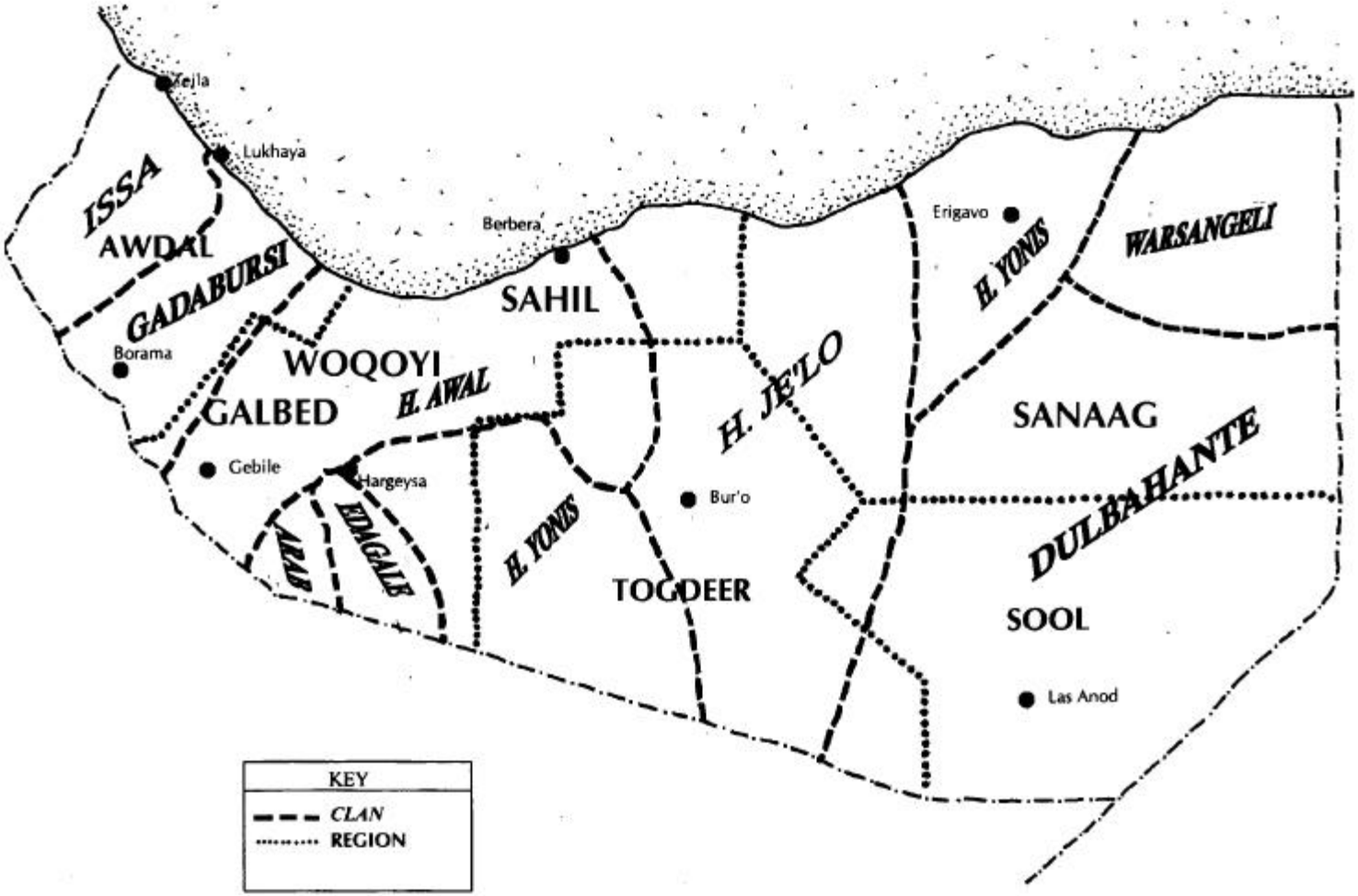
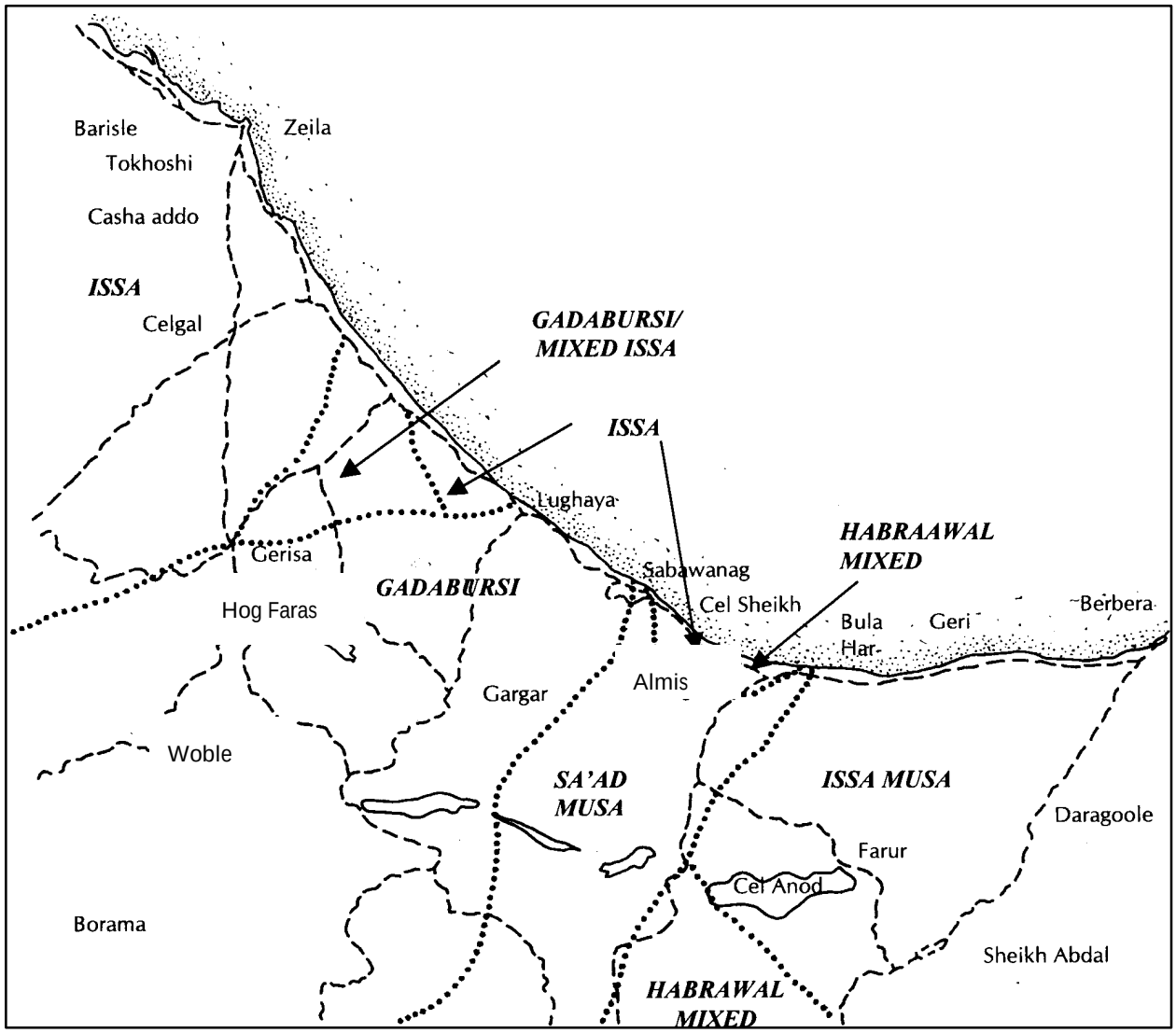
6. APPENDICES

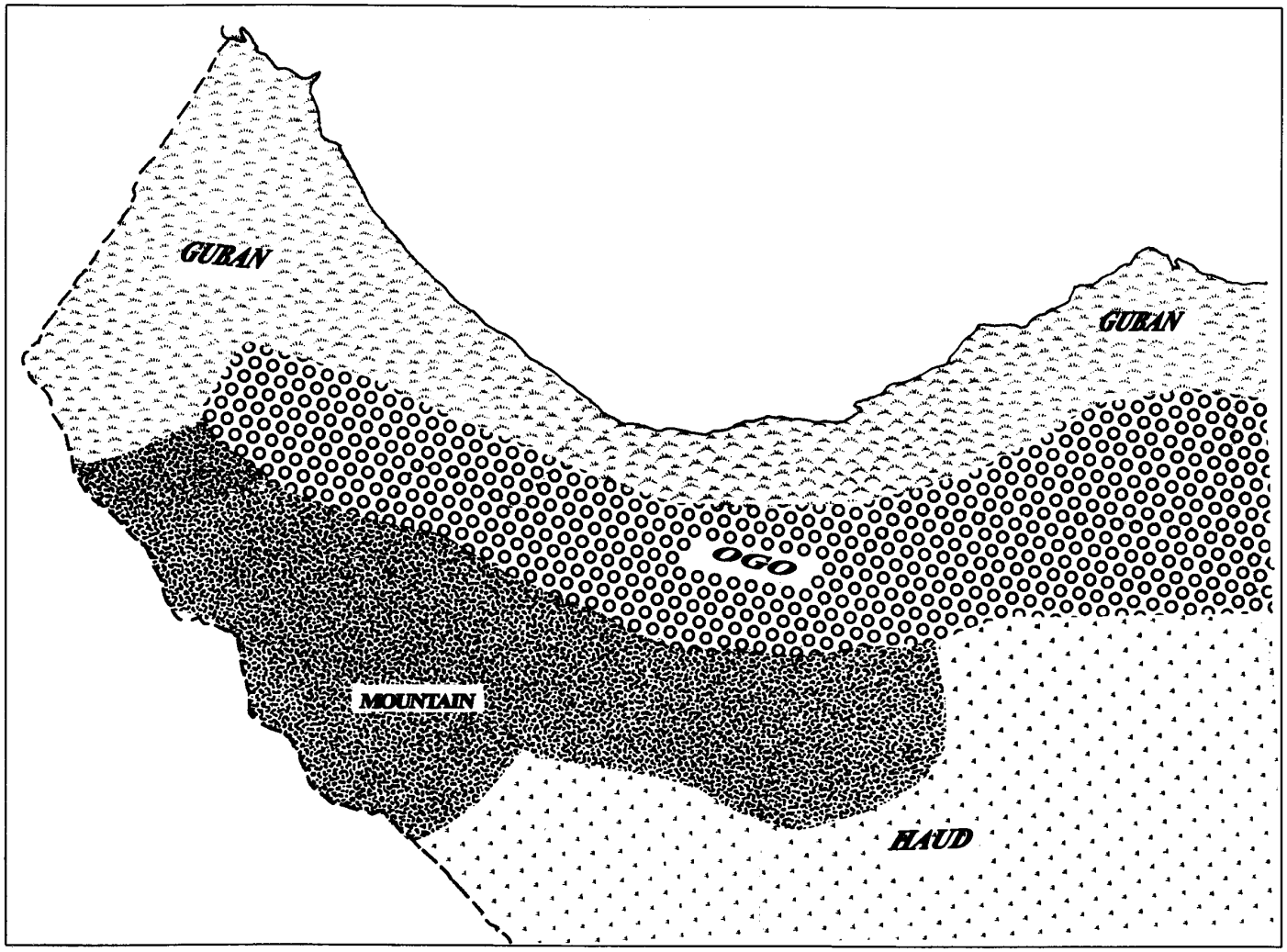
Appendix 1.1 Maior Clans in Somaliland



Appendix 1.2 Major Clans of the Coastal Plains



Appendix 1.3 Zones in the Coastal Plains



Appendix 1.4 Movements of Pastoralists in the Coastal Plains

Appendix 2 Itinerary of Field Trip

The consultancy was scheduled for 25 days of which 14 days were spent in Hargeisa and in the field and the remainder in Nairobi preparing the survey (3 days) and writing up the results (8 days).

November 9 th. Literature review, preparation of field forms for aerial and ground surveys,

November 10 th Meeting with NGOs active in Somaliland, collection of area maps.

November 11 th. Computerisation of co-ordinates in ARC INFO programme

November 12 th. Departure to Hargeisa. Meeting with IUCN Hargeisa representative and discussion of field itinerary, camping logistics, aerial survey and scheduled meetings with Ministry officials.

November 13 th. Meet local counterparts from the Ministry of Rural Development and discuss itinerary and TORs. Visit the Ministry of Rural Development and explain objectives of the survey and introduce members of the team. Prepare maps, co-ordinates and logistics for the aerial survey.

November 14 th. Meet the pilot of the UNHCR plane and discuss procedures of the aerial survey, download the geographical co-ordinates into the GPS and organise refuelling requirements and flight plans. Load camping equipment and food for the field trip and organise staff and vehicles. Depart for Faruur (107 km) and camp on the Waheen river (which was in flood).

November 15 th. Organise 2 local guides to accompany survey teams. Establishment of two survey teams dealing with vegetation and wildlife and with livestock and pastoralists. Start of survey and establishment of field procedures. Conduct road count and vegetation transect in Balanites bushland. Field work centred around Faruur and the Waheen river. Return to the Waheen river camp.

November 16 th. Drive to Bullaxaar (24 km) and conduct surveys around Bullaxaar and the coast. Do a road count and a vegetation transect in Balanites bushland. Interview pastoralists around Bullaxaar. Return to the Waheen river camp.

November 17 th. Break camp and drive to Lughaye 107 km away. Conduct road count and vegetation transect in Suaeda shrubland on the way. Arrive in Lughaye and meet village officials and mayor. Discuss survey and introduce survey team. Organise two field guides to accompany the two teams. Camp at Lughaye.

November 18 th. Wildlife team drives to Gargaara (33 km). On the way conducts road count and vegetation transect in Acacia bushland. Pastoralist team works around Lughaye and the coastal dunes. Return to Lughaye camp.

November 19 th. Break camp and drive to Zeila and Tokhoshi (120 km) via El Sheikh and Sabawanang. From Lughaye to El Gaal conduct road count. Arrive in Tokhoshi and meet with the village elders to discuss survey aims and introduce members of the survey team. Organise field guide for pastoralist team. Camp at Tokhoshi.

November 20 th. Drive to El Gaal and do vegetation transects in Panicum grassland and Suaeda shrubland. Meet village elders at El Gaal and pastoralists encamped on the way. Pastoralist team conducts surveys around Tokhoshi and El Gaal. Return to the Tokhoshi camp.

November 21 st. Break camp and return to Hargeisa via El Gaal, Gerisa and Boorama. Conduct a vegetation transect in Panicum grassland and interviews of pastoralists at Gerisa. Arrive in Hargeisa after a 14 hr. drive. Meet Tony Potterton Nairobi IUCN desk officer in Hargeisa and discuss results of field work and proposed aerial count.

November 22 nd. Conduct aerial count over the north western coastal plains. Evaluate results and prepare for presentation of preliminary findings. Meet representative of VETAID.

November 23 rd. Present preliminary findings to members of the Ministry of Rural Development, local NGO's and aid workers. Debrief local counterparts and discuss final inputs of the survey.

November 24 th. Return to Nairobi aborted because of overbooking of plane. Review of IUCN library and documents and photocopying of relevant articles and publications.

November 25 th. Return to Nairobi.

January Presentation of field work to IUCN and EU representatives

January 17 th. Submission of draft report

January 24 th. Submission of final report

Appendix 3.1 Classification of Plant Variablesm

Appendix 3.2 Classification of Environmental Variables

Appendix 4 List of Species with Somali and Scientific Names

Somali Name	Scientific Name
Agar	Chloris virgata, Erichloa nubica
Biniin	Rhigozum somalense
Damas	Conocarpus lancifolius
Darif	Pennisetum dichotomum
Dheen	Berchemia discolor
Dunqaare	Panicum turgidum
Duqaw	Courbonia virgata (Maerua sp.)
Etinle	Juncellus laevigatus
Gagabood	Iphiona rotundifolia
Garanwaa	Prosopis cenerario
Gargaro	Echinochloa colona
Geel-dabar	Convolvulus hystrix
Gob	Sizyphus spina-christi
Gulan	Salsola crassa, Salsola foetida
Hajiin	Indigofera spinosa
Hudhuun	Suaeda fruticosa
Kidi	Balanites glabra
Hadig-hadig	Ipomea hardwickii, Ipomea argyrophylia
Hamudh	Sizyphus hamud
Harig-harig	Eleusine compressa
Jaleefan	Acacia senegal
Jilab	Indigofera sparteola
Kulan	Balanites latifolia (Balanites orbicularis)
Madh-weyn	Eragrostis aethiopica
Maraa	Acacia nilotica
Meygaag	Boscia minimifolia
Moroh	Leptadenia pyrotechnica
Nagaadh	Tragus racemosus
Qalan-baruur	Maerua somalensis
Qudhac	Acacia tortilis
Quud	Balanites aegyptiaca
Raq, Aday	Salvadora persica
Saleell	Croton gillettii
Sareen	Aristida papposa
Sarmaan	Acacia benadirensis
Sogsog	Acacia etbaica