1980-1985

Commiphora bushland on sandstone escarpment at eastern edge of Shabelle River valley. This escarpment is rich in species, especially dwarf shrubs and shrubs. Boswellia neglecta & C. stellatopubescens dominate.

Photo: Peter Kuchar.

Bettini, TM, Abdurahman Mohamed Abukar & Abdi Dubad Ismail 1980 ***Comportamento alimentare del dromedario somalo. Tentativo di inventario della vegetazione pabulare.*** Rivista Agr. Trop. 74(3-4): 151[184?]-203.

From Bowen & Bird 88: Recce survey of acacia bushland between Lafoole & Baydhabo; no. plants and cover per ha. Large variation in composition and density, and in some areas appears to be considerable range deterioration due to overstocking and uncontrolled felling. Four acacia species assessed on browse available to camel. Fresh wt of accessible leaves per plant ranged from 1.0 kg for A. asak to 0.4 kg for A. nilotica, with A. horrida and A. tortilis between (presumably).

Fagotto, Flavio 1980 ***The Caffer Buffalo and its habitat in Somalia***. Atti. Soc. Tosc. Sci. Nat., Mem., Serie B, 87: 161-179.

The buffalo is only along lower Jubba and lower Shebeli rivers, its spread greatly limited by the general aridity of Somali climate. Only SW from Merca (Marka) at Cortuale.

Much on climate. Field notes on the buffalo and other game. Common plant species indicated for several veg types, also the wild mammals.

Broken xerophilous open woodland. The most peripheral and arid sites, with scattered shrub 2-5 m and trees common but of secondary physiognomy. Acacia oerfota, A. horrida, Boscia somalensis, Cadaba farinosa, Maerua sessiflora, Grewia tenax, Salvadora persica, Sesamothamnus rivae, Lawsonia inermis, Dichrostachys cinerea, Cordia somalensis, C. sinensis (gharaf). Commonest succulents are Sansevieria powellii, Adenia ballyi, Euphorbia grandicornis, E. ruspoli, Cissus quadrangularis, Sarcostemma viminale. Emergent Acacia tortilis, Dobera glabra. S from Juba R the latter is replaced by Diospyros cornii, Terminalia bispinosa, Acacia zanzibarica (not seyal).

Xerophilous woodland has a richer tree canopy, discontinuous but dominant. Mostly Balanites aegyptiaca, Delonix elata, Acacia tortilis, A. nilotica, Albizia amara, Combretum hereroense, Terminalia orbicularis. Commonest grasses are Tetrapogon cenchriformis, Dactyloctenium scindicum, Cynodon dactylon; also Clitoria ternatea.

Savanna dominated by tall grasses, often with scattered trees or shrubs. Common are Digitaria somalensis, Sorghum virgatum, Tetrapogon cenchriformis, Dactyloctenium aegyptium, sporobolus robustus.

Riparian forest along the rivers; much wider along the Jubba, up to 1 km or more. Canopy 20-30 m with Acacia hockii (*not in Somalia; possibly robusta or rovumae*), Afzelia quanzensis, Ficus sycomorus, Garcinia ferrandii, Mimusops degan.

Perennial swamps: Phragmites mauritianus, Cyperus immensus, Saccharum spontaneum, Typha domingensis.

Commonly fed on by buffalo in S Somalia:

Digitaria somalensis, Dactyloctenium aegyptium, Dignathia hirtella, Tetrapogon cenchriformis, Saccharum spontaneum, Sorghum virgatum, Sporobolus robustus, Cynodon dactylon, Cyperus fenzelianus, C. immensus, and especially Typha domingensis and Phragmites mauritianus which form an important part of its intake. Also eats Clitoria ternatea, Zornia apiculata, Indigofera phillipsiae. In the dry season browse on evergreen species e.g. Salvadora persica, Boscia somalensis, Cadaba farinosa, even Dobera glabra, also Cissus quadrangularis.

Raimondo, Francesco Maria & Ahmed Mumin Warfà 1980 ***Preliminary phytosociological research on synanthropical vegetation in Southern Somalia.*** Not. Fitosoc. (Firenze) 51: 189-206.

Veg study, 95 surveys (relevés) per Z-M method, around Mogadishu and alluvial plains of Afgoi. Four CTs, each with a complete relevé table. A total of 180 plant species cited, a few with

lots of distribution/ecol data. Quite a detailed, amply documented study, too bad I didn't know about it when I knew Warfa. Why didn't he say something?

Community Types:

1.Sesbania sesban-Cullen(Psoralea) corylifolia CT. Alluvial clay, cultivation.

2.Euphorbia hirta-Alternanthera repens CT. Trampled soil, Mog-Jowhar.

3.Calotropis procera ruderal veg/CT. Mogadishu.

4. Aristolochia rigida sand dune CT. (Mogadishu area)

Anam, SA 1981 ***Forestry development plan for the Northern Rangeland Project: terminal report***. AG:UTF/SOM/022/SOM, FAO, Burao, Somalia, 26p.

Area of forest types in N Som: Acacia etbaica-A. bussei open woodland 84,000 km^2, Buxus-Cadia-Euphorbia forest 9500 km^2, Juniperus excelsa forest 1200 km^2, Conocarpus lancifolius forest 130 km^2. Severe and increasing grazing pressure is preventing regeneration of these forests.

Awaleh, MM 1981 ***Rangeland resources and their management and development in Somalia***. Somali Range Bul. no.12: 9-19.

Somali nomads and stock have acclimated themselves to the meagre available range resources. "Through out generations they have accumulated a wealth of experience on the availability of fodder for their livestock." However, conservation and management has not been part of their scheme of things, i.e. to provide continuous & sustained feed production year-round. Their attitude that grass is god's gift to be used as anyone feels still exists, and this attitude, together with low soil fertility and unpredictable erratic and scarce rainfall has led to desertification seen in nearly all parts of Somalia. (*A good appraisal, worth referring to.*)

The author lays the blame for desertification jointly on the nomads and "on the state planners for indiscriminate water provision and veterinary authorities for lack of care."

The extreme deterioration in the N recognized - great loss of good grazing
viz. *Chrysopogon* & *Cenchrus ciliaris* & *Themeda*, & loss of *Acacia bussei*.

Cassanelli 1982 (Rev by Lewis, Herbert S 1984 (bk rev) Africa 54(1): 97-99.

See review by Lewis, 1984.

HTS 1982 ***Bay Region Agricultural Development Project, Vol.3 – Resource and planning maps.*** Somali Democratic Republic Min. of Agr., Hunting Tech. Services Ltd., UK

The veg map is way too general, plus screwy nomenclature. It shows med density shrubbed bushland of acacias at E border and N area, below which med density grassed bushland with acacias.

Pignatti, S & AM Warfa 1982(3) ***The 'boscaglia' vegetation complex of southern Somalia***. Tuexenia, n.s. 3: 159-168.

(Around Mogadishu a system of sand dunes covered by open veg of acacias alternating with xerophilous pasture; known locally as 'boscaglia'. Recognize 3 CTs (associations): open thorny woodland, stretching 200 km along the coast (presumably southward): dominants are A. tortilis, A. bussei, A. senegal, A. reficiens, some A. nilotica, A. mellifera; pasture element with Tephrosia pumila dominant, and several other herbs, frequently Gisekia pharnaceoides; veg of shady place, in small dense patches in acacia shade, and dominated by Justicia flava and Asystasia gangetica.)

SOGREAH 1982 **North-West Region Agricultural Development Project.** Feasibility study and technical assistance tech. rep. no. 6, Range and livestock survey. Ministry of Agr., Somali Democratic Republic, Somalia and SOGREAH Consulting Engineers, Grenoble, France

(*No writeup*)

Wickens, GE 1982 ***The baobab - Africa's upside-down tree***. Kew Bul. 37: 173-209.

The baobab appears to have been eliminated from some of its traditional localities in S Somalia. "It has been fairly extensively reported by Italian botanists from the coastal plains of southern Somalia, although it is now disappearing from many of these localities;" trees may have been destroyed, with no natural regeneration. Somalia is the only country mentioned by Wickens - and several times, at that - where the range of baobab has clearly seemed to shrink.

Another indicator of poor knowledge of Somali flora: the distribution map of baobab (p.181) includes not just herbarium and flora records but photographic records, travel literature, and information from a special information survey undertaken by Kew. Nevertheless, the few dots in Somalia extend northward only to Baidoa, and the trees growing c75 km NE from Mogadishu are not represented - that would represent an eastward extension of c300 km.

Note baobab in Yemen, and uncertain if native or introduced by traders.

Elmi, AA 1983 ***Preliminary observation on browsing/grazing behaviour of camels***. SOMAC/SAREC-Camel Proj., Somali Nat. Univ., Mogadishu, 33p.

The lit/citations place heavy reliance on IFS Provisional Rep. No. 6, Khartoum, Sudan - looks like an invaluable reference on camel husbandry.

Somalia 637,000km^2, 90% best suited for livestock/range; 60% of Somalis totally dependent on livestock production, & principally so for another 20%; livestock has always been the mainstay

of the country's subsistence economy, & it generates c2/3 of foreign exchange (FAO 68, IBRD 75).

Somalia has >5M camels, = 44% of Africa's (Mukasa-Mugerwa 1981). Meat, milk, transportation. Despite their economic value, ability to survive in harsh environments & tolerate drought & water stress, little is known about the feeding & watering behavior of camels in Somalia.

Current work is the start of a detailed study of camel food habits. Observations from Lower Shabelle, CRDP, NW region & Toghdeer (also N).

Lit.rev. on feeding & drinkings p.3-6.

Statistics on livestock numbers by region (in 000's):

	CAMEL	CATTLE	GOAT	SHEEP
Hiiran	461	172	1,159	287
Galgadud	395	218	1,734	588
Mudug	751	340	2 ,744	1,136
Somalia	5,298	3,744	15,292	9,431

Usually camel-shoats or cattle-shoats, seldom camel & cattle raised together. Reasons for mixed-stock rearing:

1. Make best of available vegetation,

2. year-round milk prodution,

3. cash,

4. security vs drought,

5. settlement effect (tendency to minimize cattle pop. & increase cattle because nomad movement is restricted).

*A significant point: We should expect a trend toward more cattle & less camel, hence the need for more grass & less bush. Mgmt implications!...

Camel mgmt in Somalia is dictated by seasons: 2 wet & 2 dry.

1 GU (Apr-June). Rainy season; new family home located for camels to avoid ticks & tickborne diseases. Calving & breeding season. Exclosures (*xero*) built to minimize disturbance to milking camels and their calves at night. Camels stay late in the *xero* in the morning before being released for feeding.

(1) to wait for dew evaporations, "otherwise, camels will not graze but walk fast and far from home in search of dew free pastures, thus required late evening grazing";

(2) to keep them close to the camp areas;

(3) to milk late;

(4) to minimize day-long herding difficulties. Seldom watered in this season, & restricted movement.

2 XAGA (July-mid Sept). Hot on N coasts, humid & rainy in S coasts. Windy; shelter with thorn exclosures. Most efficient forage utilization is obtained by frequent watering

3. DAYR (mid Sept-Nov). Rainy season; mgmt as in gu.

4. JILAAL (Dec-March). Cold & dry in N, hot & dry in S. Camels remain in the same *xero* but dung is cleaned out 1-3 times a week. Every AM release & late-evening return: Camels spend more time in search of food. Longer interval between watering periods. Advantages to not dividing the herd, but if forage is scarce the milking herd plus smallstock remains near water while the dry herd ranges far from water, returning every 1-2 weeks. "Scarcity of forage around water wells" influences mgmt. With scarce forage & no suitable places, supplemental feed is provided to milking camels by lopping *Acacia* branches, collecting pods, or looking for certain types of plants such as *Loranthus* s.l.

Camels are provided with salt, salt soil, salt water, or fed on salty plants. Salt & salty soil are given at onset or shortly after the first rains when forage is expected to be abundant. Owners believe that salty water has medicinal properties and enhances efficient use of dry-period forage. In fact salt is required for thermal resistance & blood regulation.

Breeding & calves discussed p. 13-20. Gestation period c13 mo, calf production in wet season. Most 'black colostrum' is usually milked on the ground. Lots of details ...

Camel diet is a function of availability - they have a very broad range in diet. In rainy season camels are selective feeders but in dry seasons they eat whatever is available though concentrating on certain plants e.g. *Dobera*, *Salvadora*, *Boscia*, *Suaeda*. Many species are not usually used when forage is plentiful; some of these 'dry season plants' produce fls & fr & are nutritious in dry season. Camels can maintain very good condition on their dry-season diet.

4 lists of plants (sci. & vernac. name) representing species liked by camel in parts of Somalia.

Camels eat leaves, young twigs, fruit, flowers; no mentions of bark. "More preferred plant species are heavily browsed and become hedged." Trees such as *Dobera glabra* & *Boscia minimifolia* develop a browse line. Camels don't stay with a single plant; after several mouthfuls they move on to another plant.

MY COMMENTS:

p.l The position of camels in the livestock picture for Somalia would be clearer if statistics were also presented on other livestock, both as total numbers and stock units. I see some statistics on p.7, but the significance of camels would be clear when put on a weight (i.e. stock unit) basis.

p.3 I can't really believe that camels never overgraze the range. At sufficient density, any herbivore will degrade its habit. I suspect that the dense bushlands in Bulo Burti district, for example, are the result of years of heavy camel use. There's a lot of unpalatable species, and I suspect these have increased over the years as camels have concentrated on the palatable component.

I'm also skeptical of the view that camels disregard plant quality. Being ruminants, they must seek a diet of higher quality than the average presented in a lot of the vegetation they feed in. If they fed on a plant 'regardless of its quality' their system could very quickly grind to a halt due to the undigestibility of the material, i.e. exceedingly low protein & high cellulose.

p.3, 5th last line: All herbivores have some ability to digest crude fiber: the question is, is the ability of camels truly superior to that of other stock. And by now much?

p.4, 2nd part: I thought 2½-3 m was an accepted estimate of camel browsing height; they might reach 5 m if they stood on their hind legs but is that behavior documented? As for other livestock not reaching so high, I've heard that goats can climb, though not commonly I suppose.

p.4, 3rd para: Do camels 'thrive' on hard, dry thorny plants, or are they forced to eat these to increase their heat tolerance. Putting it another way, is thermal regulation a higher priority than weight gain (i.e. high-quality feed).

p.4-5 Is the high salt diet unusual, or is it typical of desert & arid-land herbivores? What's the physiology behind this, i.e. do they excrete a lot of salt, and if so, why.

p.5, 1st para: I don't think that all these genera are salt plants as perhaps implied - among the low-salt ones I'd put Acacia, Ziziphus, Indigofera, Tribulus, Opuntia, and maybe some of the Capparidaceae.

p.6, 1st para: It would be nice to sort out the individual components of water loss. When forage is scarce, for example, how much more water will the camel lose simply by being more active, searching for food? Does high-quality forage intensify water loss due to a greater need to excrete nitrogen?

p.9, near bottom: Why don't camels like dew? Their behavior seems just the opposite of certain arid-land ungulates such as oryx, which rely on dew for part of their water intake, & they graze at night to maximize this.

A lot of space could be saved, and it would also be preferable for comparative purposes, to put p.23-29 into into 1 table. Are these plants all rated about equally in palatability.

p.30 - If you mention how much time per day was spent observing feeding habits, then I suppose you could mention the total number of days this was done.

p.30, 3rd para: It seems a bit curious that camels will not stay long at any one plant, unlike some animals which, when they find a palatable plant, may devour all consumable portions. Does this camel behavior have a genetic component, i.e. do they naturally do this, or are they forced to because they are on the move? Is it perhaps an adaptation against poisoning? Or (and perhaps a bit far-fetched), have camels evolved to be natural conservators of vegetation?

This is a great start toward some really useful information on camel behavior and economics in terms of food intake. Documenting camel diet - details on plant preferences, nutrient content, regional and seasonal patterns, contrasts with other stock and perhaps game where known - will give us a deeper understanding why camels have been so tremendously successful in this part of the world, and will help in making management decisions for the rangelands.

HTS 1983 ***Bay Region Agricultural Development Project – mid-term review. Vol. 2, Annex 1 Crops, Annex 2 Livestock***. Min. Agr., Somali Democratic Republic and Hunting Tech. Services Ltd, UK, 94+71p.

(these vols not seen:)

Vol.1 Main report, 193p.

Vol.3, Annex 3 Roads, 54p.

Vol.3, Annex 4 Water supply, 82p.

Vol.2 Annex 1 Crops

The Juba and Shabelle are the only 2 rivers with perennial flows in Somalia.

In Bay Region, rainfall isohyets do not closely follow elevation diffs, except show declining rainfall with increasing[!] altitude on the limestone plateau.

Bimodal rainfall encourages double cropping by most farmers. But due to erratic nature of rains, “early land preparation and timely planting are of critical importance for maximum utilisation of rainfall. For example, the local sorghum, which is by far the most important arable crop, takes

between 115-125 days from planting to harvest, so that with such short duration rainy seasons, soil moisture holding capacity is of crucial importance in determining yields."

Here Gu is a much less unreliable cropping season than Dayr. Rainfall is generally higher, season is longer, and ET rate is significantly lower in 2nd half of Gu vs. Dayr. On the other hand, conditions late in Gu favor buildups of insect pests and crop fungal diseases. By far the most important arable crop in Bay Region. It occupies >95% of total cropped area.

Trials with sunflower (pot as cash crop), safflower, groundnuts, grain legumes esp cowpea and mungbean which are the most important of the Region's minor crops.

Vol.2 Annex 2 Livestock

Veg summarized from HTS 1982. Mainly semiarid wooded savanna. Almost 90% of area is used as rangeland and supports 5T/km^2. Five major ecol units based mainly on geology & soils:

1.Clay plains. Stock densities particularly high during harvest period. Range veg of rel low palatability.

2.Limestone plateau. Shallow stony soils with outcrops. Tetrapogon tenellus, lots browse.

3.Basement complex Open S/B, poor grass; erosion and compaction problems; heavy grazing pressure.

4.Basement/limestone interface.

5.Coastal deposits. Open bushland, good grass; no permanent water.

Estimated prod of 1.5T DM/ha, and 1T available to stock/yr.

"Standard range improvement techniques which might be practiced on the open range in Somalia, (e.g. increased water infiltration from bunding, chisel ploughing and reseeding) are unlikely to produce increases in range productivity comparable to those which could be achieved from the farm and which could be justified by the costs involved." (*Why should it be any different in other Somali rangelands!)*

Range reclamation techniques such as bush clearing, bunding, chisel plowing, reseeding etc. "are costly and necessarily confined to small areas, benefiting few people and of low reliability in regions of irregular rainfall." (*That fits the general view that range is not worth the cost of improving through active implementation, it is only cost-effective by managing the livestock*.)

The previous NRA program of range reserves has not, as NRA has acknowledged, resulted in increased range productivity. This will remain the case if sites are selected arbitrarily without supporting resource information, and without information on traditional users and their systems.

Madany, Michael H 1983 ***Common names of Somali plants***. Faculty of Agr., Dept Botany & Range Manage., (Mogadishu), 27p.

Alphabetic list of Somali plant names with corresponding scientific name, growth form, Somali region.

Naylor, James 1983 ***Range ecology of the Hobbio District***. Somali Range Bul. 14-15: 32-39.

Topo types: (1) gentle slope and low relief of coastal plain. (2) Narrow flat-topped plateau of Gawan Escarpment and deep canyons and gullies. (3) Large interior basin with salt lakes. (4) Limestone uplands in NW.

Coastal plain dominated by graminoids, also semi-woody spp. e.g. Indigofera sparteola (not intricata), Ocimum tomentosum, Pavonia, Grewia cerasifera, Jatropha obbiadensis. Cyperus sp (is this chordorrhizus?) common, not very palatable, and has increased to become dominant on disturbed or overused places. Aristida, esp. A. kelleri, an increaser due to overgrazing. Some palatable desirable grasses: Leptothrium senegalense, Cenchrus ciliaris, Digitaria spp, Sporobolus spp.

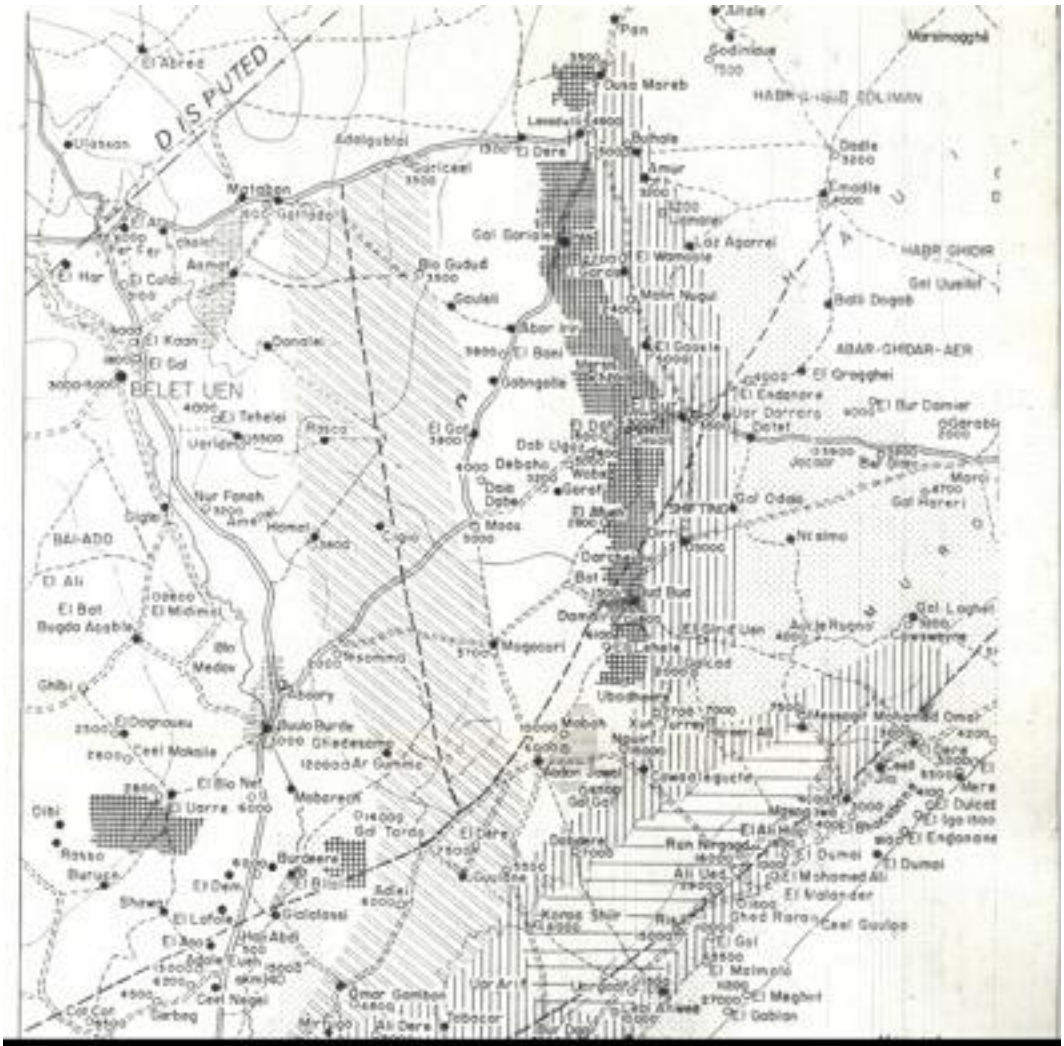
As land rises toward escarpment, Grewia cerasifera increases. A very low Commiphora (I guess C. murraywatsonii) evident. A low form of Acacia edgeworthii and a small low-growing Euphorbia cuneata are common.

Gawan Plateau: has lots of Terminalia of which much harvesting. The W-facing slope has a community dominated by Acacia nilotica. This CT occupies the area which has the most cultivation in Hobyo Dist. In canyons: Eulophia petersii, Ochna inermis, Buxus hildebrandtii, Negripteris scioana.

The interior basins incl gypsum basins have Salsola pycnophylla, Limonium distichum, Zygophyllum, Tamarix nilotica, Suaeda micromeris, Sporobolus ruspolianus, S. kentrophyllus, S. spicatus.

Limestone uplands: Balanites (prob rotundifolia) and Boscia minimifolia prominent. Also common: Euphorbia somalensis, E. cuneata, Acacia horrida, A. edgeworthii. Indigofera ruspolii is probably the most abundant species. Important forage grasses here: Leptothrium senegalense, Cenchrus ciliaris, Dactyloctenium scindicum, Enneapogon schimperianus. Aristida increasing due to overgrazing.

Pozzi, Renato, Giovanni Benvenuti, Cabdi Xaaji Mohamed & Cardi Iidle Shuurje 1983 ***Groundwater Resources in Central Somalia***. Memorie Di Scienze Geologiche, gia Memorie degli Instituti di Geologia e Mineralogia dell' Universita di Padova, 35: 397-409 (+2 foldout maps). Padova. (*Online in Central Rangelands of Somalia – published papers and reports, Dennis Herlocker*)



Note Yesomma sandstone area (equivalent to the Haud of Hiraan), the width is Mataban to Guriceel. Almost reaches Maxaas, just reaches Muqokoori, does not reach Aadan Yabal. Narrows slightly S of Jasoomman-Muqokoori.

Yusuf, Hassan Ismail, Abdulaziz Sharif Adan, Kassim Adan Egal, Abdurahman Haji Omar, Maryam Mohammed Ibrahim & Abdulahi Sheikh Elmi 1983 ***Traditional medical practices in some Somali communities***, p.171-183 *in*Thomas Labahn, ed., Studies in humanities and natural sciences, Vol. 4, Helmut Buske Verlag, Hamburg

(From summary) The traditional medical care system in Somalia coexists with the modern medical system forming sort of a plural health care system. Although the oldest and the most widespread, the former is the least understood by many of us. Therefore, within the framework of community health-based training of medical students, the study has been carried out with the following aims: (1) to train third-year medical students in conducting surveys in rural as well as in urban areas; (2) to demonstrate the extent to which people use traditional medical practices by: identifying the major groups of diseases that traditional healers take care of; examining the types of treatment that traditional healers give; assessing the knowledge, attitude and practice towards communicable diseases; and (3) to assess the attitudes towards a mutual interaction between modern medicine and traditional health care.

Capretti, Paolo & Renato Marai 1984 ***Fissazione e riforestazione delle dune mobili in Somalia***. Rivista Agr. Subtrop. Trop. 78: 163-180.

Research at dune of Shalambot in coastal S Somalia. The traditional method for fixing sand dunes was based on establishment of Opuntia plants with low fences. This system was both expensive and unproductive. A better system was found to be establishment of species such as Acacia holosericea [an Australian introduction] which is fast-growing, drought-resistant, and with a canopy suited for protection against wind erosion.

Friis, Ib & Michael G Gilbert 1984 ***Croton megalocarpoides*** **sp. nov. An arborescent Euphorbiaceae from semi-evergreen vegetation in S Somalia and E Kenya**. Nort. J. Bot. 4: 327-331.

The 'Bur' vegetation in S Somalia is that of large inselbergs. At the foot of the 'Bur' it is considerably less xerophilous than on the surrounding open plains. The runoff from the impermeable inselberg rocks creates a special environment at the foot, explaining the much moister semi-evergreen coastal-type vegetation in dry inland S Somalia.

George, RR 1984 ***Bay Region, some factual information***. Camel Forum (Somali Acad. Sci. Arts) Work. Pap. No. 7: 75-82.

Lists some of the common plant species, with Somali name.

Grasses: Tetrapogon tenellus is the dominant grass of Bay Region; also frequent is T. cenchriformis (JEEBIN). Others are Andropogon (Schizachyrium) kelleri (RARMO), Sporobolus helvolus (DUKA FIS), Paspalidium desertorum (DORAAR), Andropogon gayanus (FALAARAI), Dichanthium annulatum (DABA DUB), Chrysopogon plumulosus (DAREEMO), Dactyloctenium scindicum (DOFAR), Eragrostis perbella (HALFO), Dichanthium foveolatum (KOK SAAR), Cynodon dactylon.

Acacias: Ac brevispica GOR-GOR, Ac bussei GALOOL, Ac hamulosa NESAR JEBIS, Ac horrida SARMAAN, Ac mellifera BILCIL, Ac nilotica TUGAAR, Ac oerfota GUMER, Ac ogadensis FIIDO FIIDO, Ac reficiens (incl. misera) QANSAX, HANSA, Ac senegal CADAAD, Ac sieberiana BOKOL, DHAMBAL, Ac tortilis QORA, Ac zanzibarica FULAY.

Hjort, A & Gudrun Dahl 1984 ***Significance and prospects of camel pastoralism*.** Camel Forum (Somali Acad. Sci. Arts) Work. Pap. No. 7: 11-35.

A good general paper. Note map showing main camel-husbandry regions of Afr & SWAsia.

The whole series, which has proc. of a workshop in Baydhabo[S-C Somalia], is worth having.

Hjort, Anders & Mohamed Ali Hussein 1984 ***Camels and Somalia: The Camel Research Project***, p.87-114 *in*Thomas Labahn, ed., Proc. 2nd Int. Congress of Somali studies. III: Aspects of development, Helmut Buske Verlag, Hamburg, 330p.

Human and livestock numbers in 1975 census in Central Somalia (in '000s)

Region	Humans	Camels	Cattle	Sheep	Goats
Mudug	215	751	340	1136	2744
Galguduud	182	395	218	588	1734
Hiran	147	461	170	287	1159
COUNTRY	3501	5298	3744	9431	15292

Milk forms the subsistence basis for camel pastoralists. They can go weeks or months without any food, and since the lactation period covers a whole year the supply is reliable. One can milk a camel 5-8 times a day.

Iannelli, Pierino 1984 ***The principles of pasture improvement and range management and their application in Somalia.*** FAO Pasture Fodder Crop. Stud., No.9, 213p. (translated from the Italian, and parts organized by J.J.Norris)

As remote from the definitive work on Somalia range management as can be possible; a great opportunity lost, considering the large format and ambitious title. This document seems to have been hastily cobbled together, using old simple maps of the country and most range examples and experience from elsewhere (sometime very remote). At least half the book goes through general diagnostics and principles of range, using examples from elsewhere. This varies from the annoying to the quite misleading; for example, after a short discussion of acacias in Somali rangeland, the author leads directly into Robinia pseudacacia, which I doubt has ever touched Somali soil (native to U.S.). After noting that many acacias can form either a bush or tree form, he notes that the main strata are trees, bushes and herbs - and in some cases mosses as a fourth

stratum, which is an utter absurdity for Somali rangeland! This lack of 'field' awareness, of the realities of Somali rangelands, make this a particularly frustrating tract.

It makes totally unsupported statements, e.g. that Acacia horrida would spread dangerously in Somalia were it not for camel. And where's the data showing that this acacia's reproduction is suppressed by camel? As if that were even true! My strong suspicion is that this acacia has greatly benefited by camel husbandry, seeming to be more abundant where range is more severely impacted. And so it goes. An alarming book with an official imprimatur.

Lewis, Herbert S 1984 ***Bk Rev***. Africa: J. Int. African Institute 54: 97-99.

Rev of **Lee V Cassanelli** 1982 ***The shaping of Somali Society: reconstructing the history of a pastoral people, 1600-1900***. Univ. Pennsylvania Press, Philadelphia, 1982, 328p.

A useful corrective to IM Lewis whose work was primarily in the north. Cassanelli discovered the south, different from the N, with lots of agr and different social and production systems. An important bk.

The Shaping of Somali Society consists of a series of essays on the history of Somalia and its people, with particular reference to southern Somalia. Making use of oral traditions, as well as of archival materials and a wide range of published sources, Lee Cassanelli has written about Somali pastoral adaptive strategies, the pursuit and acquisition of political power and control, the roles and styles of Muslim religious leaders, trade and the development of commercial agriculture in precolonial southern Somalia, and the rebellions against the Italians in the early phase of colonization. Each chapter represents a separate study, but these essays are related to one another, and taken as a whole they expand, complement, or modify the emphases and perspectives on the Somali which we have received from Enrico Cerulli and I. M. Lewis.

Cassanelli's book offers an interesting combination of concern for specific individuals and events in the past and the search for more general patterns and processes. His is a work of social and cultural as well as political and economic history. If the data he uses are sometimes thin (especially in the case of his reconstruction of the Ajuraan dynasty), his explanations are plausible both in terms of Somali culture and in the light of some current thinking in anthropology about decisions, motivations and political and economic processes.

Much of our detailed knowledge of the Somali people and Somalia has to come to us through the writings of I. M. Lewis over the past three decades. Lewis's work was undertaken primarily in the north, in the former British Somaliland, and it is therefore natural that our view is coloured by his findings among the nomadic pastoralists of that area. But, as Lewis has also told us, there is a large southern region that is different from the north, above all because it lies in a better watered area between two great rivers. A considerable amount of agriculture goes on in the southern region, and the nomadic ecology, economy, ethos and polity which we know from the north is modified in the south. Cassanelli's book gives us the first attempt at a synthesis of the social, political and economic history of this region.

In chapter 2 the author argues that the appropriate unit for the analysis of Somali history is the regional resource system, as defined by Somali use of and adaptation to the environment. In attempting to establish his case, he offers an illuminating discussion of pastoral Somali adaptive strategies in the face of a harsh, uncertain and drought-prone environment. He emphasizes the need for flexibility and for the Somali to disperse their families and hedge their bets through the activation of a variety of social and economic strategies. One of these tactics has been to send the weak and the dependent away from the home ranges, temporarily, in cases of drought, in order to reduce the pressure on the herds. This may mean sending women, children and the old to towns, or to work as agricultural labourers, or to live with kinsmen. When the crisis ends these families expect to be reunited again. This may have implications today when drought and the Ogaden war have forced so many Somalis to take refuge in camps, towns, and with relatives in rural areas. The maintenance of ties with kinsmen in towns and abroad in the 'Somali diaspora' is undoubtedly just as important now.

Cassanelli then pursues the phenomenon of 'pastoral power', the rise to influence and control by ambitious men and groups in the face of the uncertain, poor environment and the strong egalitarian ethos of Somali society. While Lewis stressed the democratic side of Somali life (he invokes Burton's description: 'A fierce and turbulent race of Republicans'), he also alluded to the existence of sultanates in Somaliland without telling us how they could co-exist with the feuding egalitarian herders. Cassanelli attempts to do this, on the basis of oral traditions, supplemented by some written documents and comparative material from studies of wealth and power differences in other nomadic societies. His reconstruction of the Ajuraan dynasty, said to have ruled in the inter-river area in the seventeenth century, contains a good deal of speculation but offers an interesting interpretation of political power and the role of Islam, as well as a sophisticated discussion of Somali political ideology and oral traditions. In this chapter and elsewhere the author shows how, despite the 'turbulent republicanism' of Somali life, there were and continue to be differences in fortune, inequalities, and the rise to wealth and power, even if only temporarily, of leaders and rulers. Cassanelli discusses cases of success and failure and suggests the routes to power as well as the limits of pre-colonial political control.

Chapter 4 focuses on the roles, activities, and styles of different types of Muslim religious figures among the Somali. It ends with an extended discussion of a nineteenth-centur yjihad and its failure. Following this, we learn of the development of trade and commercial agriculture in the inter-river region and along the Benaadir coast. The extent of this Somali-controlled caravan trade is impressive, but more of a surprise to me was the evidence of the development of commercial agriculture, much of it utilizing slave labour, in the Lower Shabeelle River Valley in the nineteenth century.

In the last substantive section, Cassanelli gives us a detailed account of a series of local Somali responses to the Italian occupation of the Benaadir region between 1870 and 1900. Here he convincingly demonstrates, using recent and full oral traditions and a relatively rich written record, the range and mixture of attitudes, motives and perspectives which different Somali groups and individuals had to the occupation. He discusses the political, economic, religious and personal interests involved, in the context of the economic and political circumstances of that region at that time. Above all he stresses the variety of motives and interests explaining the varying reactions.

This is an important contribution to Somali studies and to the historiography of pastoral peoples. Building on the corpus of knowledge given to us by Enrico Cerulli and I. M. Lewis, among others, Cassanelli has produced a sophisticated and suggestive work which increases our awareness of the richness and complexity of Somali history and society. He brings this seemingly remote pastoral people into closer connection with developments elsewhere in terms of religion, trade, and politics.

Naylor, James N & Abdi Adan Jama 1984 ***Ecological survey and initial management plans, Hobbio District, Somalia.*** CRDP Tech. Rep. 2, 60p.

c10 pp in Herlocker 1989 summarize it. I have changed Indigofera intricata to I. sparteola. Supersedes Naylor 1983 which was purely descriptive.

Hobyo Dist has 7 range sites. These mapped, tabulated, briefly described in text, and a table each for woody and herbaceous spp, on a 3-pt abundance scale for spp for each of the sites. (At least RS3 named after the probable dominant climax spp)

1. Limonium cylindrifolium/Ipomoea donaldsonii/Sporobolus ruspolianus-Cenchrus ciliaris dSG.
2. Indigofera ruspolii-Ipomoea donaldsonii/Sporobolus ruspolianus-Leptothrium senegalense dSG.
3. Balanites orbicularis-Boscia minimifolia/Leptothrium senegalense-Cenchrus ciliaris SG.
4. Acacia nilotica-Anisotes velutinus/Brachiaria somalensis-Leptothrium senegalense S.
5. Terminalia spinosa/Indigofera ruspolii/Cenchrus ciliaris-Heteropogon contortus B.
6. Indigofera sparteola-Grewia cerasiformis/Leptothrium senegalense-Cenchrus ciliaris dSG.
7. Leptothrium senegalense-Indigofera sparteola-Cenchrus ciliaris G.

RS1 Limonium cylindrifolium/Ipomoea donaldsonii/Sporobolus ruspolianus-Cenchrus ciliaris dSG. Frequent RS in W half of Hobyo Dist, including some larger units in W-SW. On the lowest part of the catena, recurring throughout the interior basin, and supports a distinct plant community with an abundance of salt bushes such as Halothamnus (Salsola), Lagenantha, Tetraena (Zygophyllum) and Suaeda. Soils are deep (3-4 m), grey calcareous silts and silty fine sands that are highly saline and gypsic. Filled basin bottoms often support only grasses possibly because periodic standing water inhibits woody growth. The lowest-lying areas are often salt lakes without vegetation. Woody canopy cover all <1 m, c18%, basal herb cover c8%. But there seems to be confusion here, or at any rate the suggestion that a taller woody layer is there, with dominant being Commiphora spp with Acacia edgeworthii and Euphorbia matabelensis, and herb layer with Sporobolus ruspolianus, Cenchrus ciliaris and Sporobolus spicatus. The tall shrubs are not in the RS name possibly because the salt bushes best characterize the RS. Special-purpose habitat for stock brought periodically for salt-bearing forage.

RS2 Indigofera ruspolii-Ipomoea donaldsonii/Sporobolus ruspolianus-Leptothrium senegalense dSG. Frequent RS but mostly in small units in W half of Hobyo Dist, esp centrally. It is on limestone ridges and the soil has relatively high gypsum content. Woody canopy c20%, basal herb cover c10% and with woody plants <1 m high. The major woody dominants are Acacia

edgeworthii and Euphorbia matabelensis, Indigofera ruspolii among dwarf shrubs, and Leptothrium senegalense and Sporobolus ruspolianus among grasses. Ipomoea donaldsonii is in the RS name because a more valuable forage species.

RS3 Balanites orbicularis-Boscia minimifolia/Leptothrium senegalense-Cenchrus ciliaris BG[SG]. The largest RS, covering much of the W half of the district. On fine orange sands with a considerable gypsum component and up to 1 m deep. Has the most valuable forage species viz. the (named) evergreen shrubs, which would probably dominate the RS but are so heavily browsed that acacias including Acacia edgeworthii are increasing at their expense. The RS averages 20% woody cover at c3.5 m, and c9% basal herb cover. Dominant shrubs are Acacia horrida, A. reficiens and Ipomoea donaldsonii; dwarf shrub Indigofera ruspolii; grasses Aristida kelleri, Leptothrium senegalense and Dactyloctenium scindicum. In order of decreasing importance, Leptothrium senegalense and Cenchrus ciliaris, the potential dominants, and Chrysopogon plumulosus are the most valuable forage grasses, but their cover has been reduced by grazing in favor of Aristida kelleri, of rel low palatability, and the grazing-resistant low stoloniferous Dactyloctenium scindicum.

RS4 Acacia nilotica-Anisotes velutinus/Brachiaria somalensis-Leptothrium senegalense B[S]. Occupies W slope of Gawaan Ridge in S Hobyo Dist. This is a gently to moderately sloping RS with light orange, non-gypsic soils 1.5-2 m deep. The soil is highly erodible and numerous deep gullies are being cut. Woody canopy cover averages 47%, mature shrub height 4 m, basal herb cover 13%. This RS is the highest forage producer in the district, and particularly of shrub forage.

RS5 Terminalia spinosa/Indigofera ruspolii/Cenchrus ciliaris-Heteropogon contortus W[B]. On top and eastern slopes of Gawaan Ridge in E Hobyo Dist. In the S has steep slopes with long deep canyons but gentler slopes in the N. Soils are shallow, pale orange sands over limestone. No gypsum. Woody canopy cover averages 36%, with trees (Terminalia) to 7 m at maturity. Acacia edgeworthii is another dominant but not in the RS name because not a climax dominant. Grasses are important forage producers, particularly as the trees are being decimated. The most important woody forage producers are Indigofera ruspolii and I. ogadensis.

RS6 Indigofera sparteola-Grewia cerasiformis/Leptothrium senegalense-Cenchrus ciliaris dSG. On a gentle footslope at E base of Gawaan Escarpment in E Hobyo Dist, extending in a long narrow strip between interior bushland and the coastal plain. Soils shallow, orange, slightly silty sands, non-gypsic. Woody spp low, often stunted, and besides the named climax dominants include Maytenus obbiadensis and Acacia edgeworthii. Woody plant height seldom >0.3 m.

RS7 Leptothrium senegalense-Indigofera sparteola-Cenchrus ciliaris G. Occupies the coastal plain of Hobyo Dist. Soils are white to very pale orange, medium coarse sands c1 m deep, with underlying limestone that may reach the surface. The named spp are climax dominants.

Rabeh, Omar Osman 1984 ***The Somali nomad***, p.57-69 *in* Thomas Labahn, ed., Proc. 2nd Int. Congress of Somali studies. III: Aspects of development, Helmut Buske Verlag, Hamburg, 330p.

Somalian society is basically nomad, both in origin and composition to 80%. This paper analyzes the psychology and outlook of the Somali. The nomad obtains his subsistence from his animals, and for this reason has no notion of productivity.

Hendy, CRC, ed. 1985 ***Land use in testse-affected areas of southern Somalia*.** Somali Democratic Republic National Tsetse and Trypanosomiasis Control Project land use survey, ODI and Ministry of Livestock, Forestry & Range, LRDC [Land Resources Devel. Centre] Rep. P-148, Muqdisho, 293p.

The study area covers most of southern Somalia with an extension N in the Shabelle River valley to Jiiqley (N of Buulobarde). The Land Use Survey Team comprised CRC Hendy (livestock), JD Hanks (livestock), IM Daniels (economist), MJ Makin (soils, agr), EC Trump (ecologist), R Rose-Innes (range botanist). Somali professional staff also provided support.

Land regions (LR) and their underlying geological formations were characterized through airphoto interpretation and groundwork. Preexisting soil surveys were mostly by FAO/Lockwood 1967, HTS 1977 and HTS 1983. Details are given in Ch.10-14. Range and vegetation studies involved airphoto interpretation and ground truthing which also aimed to describe vegetation types and species composition and assess range condition and trend in the major rangelands.

The 3 LRs for the portion of Hiiraan that was included are:

LR 9a, essentially N of Buulobarde, is Northern Sedimentary Uplands – Upper Shabelle Valley, i.e. it includes the valley together with the hills and scarps adjoining the valley. Low escarpments of limestone, sandstone and calcareous marls with Acacia-Commiphora bushland. Population density not given.

LR 5, essentially S of Buulobarde on the W side of the valley, is Shabelle Saline and Related Deposits. Soils mostly high in gypsum and variable amounts of calcium carbonate. Much of the region is underlain by shallow limestone. Soils often capped by a saline crust. Mostly bushland with some bushed grassland + grassland, and Suaeda micromeris and Urochondra setulosa both saline indicators. Acacia seyal [more likely zanzibarica] often dominant. Locally Commiphora or Anisotes parvifolius may displace acacia. Associated are Terminalia spinosa and Balanites aegyptiaca, A. tortilis locally dominant. Dobera glabra usually very infrequent. Nomadic population density 2.4/km2, total density 5.9/km2.

LR 1c, essentially S of Buulobarde on the E side of the valley, is Coastal and Interior Dunelands – Interior Sands. Interior Sands are continuous with the Main Coastal Dunes but extend northward up the east side of the Shabelle River to near Buulobarde. They seldom exceed 25 km in width and may lie as far as 30 km from the river. Virtually all is bushland. Nomadic population density 7.3/km2, total density 28.9/km2.

The characteristic vegetation of S Somalia is low deciduous bushland and shrubland. Some riparian forest remains along the major rivers, and woodland and thicket on swamp fringes and in seasonally flooded old river channels. Swamp vegetation and swamp fringe grasslands occur in

the lower Shabelle valley. In trans-Jubba SW of the Caanoole drainage, higher rainfall supports bushland and woodland with numerous evergreen species.

The main rangelands in the inter-riverine area and trans-Jubba have <5% land in the cultivation cycle. Range condition measures by the RMR Southern Rangelands Survey found that some rangelands are in poor and deteriorating condition, with low ground and aerial cover, particularly near intensively settled and farmed areas. Bush encroachment was noted in some heavily used wet-season rangelands. Range in higher-rainfall areas, and riverine rangeland used only in the dry season, appear to be in good condition.

The Shabelle floodplain mostly comprises deep seasonally poorly drained, medium to heavy textured calcareous alluvial entisols, cambisols and vertisols. Chromic vertisols predominate in the Shabelle valley, with increasing salinity and alkalinity downstream to the 'Marine Plain' (S-SW of Hiiraan Region). Annual rainfall averages 328 mm at Buulobarde and 277 mm at Beledweyne. Mean annual flow at Beledweyne is 2154 mcm and is lowest in Jan-Mar, highest in May, Sep and Oct.

The interriverine plains have bushland and shrubland and communities have a relatively small number of dominant species. Typical species include Acacia bussei, A. seyal, A. reficiens, A. nilotica, A. oerfota, A. mellifera, A. tortilis, A. senegal, Dobera glabra, Gardenia fiorii, Cordia sinensis, Grewia tenax, G. villosa, Combretum spp, Commiphora spp, Euphorbia spp, Thespesia danis and Dichrostachys spp. Notable minor evergreen components include Boscia spp, Cadaba glandulosa and Maerua spp. Terminalia orbicularis is very frequent on heavier soils. Phyllanthus somalensis fringes seasonal water pans and watercourses. When fire opens up the bushland, resultant productive perennial grasslands typically include Chrysopogon plumulosus, Sporobolus helvolus, Cenchrus ciliaris, Andropogon keller and Eragrostis spp.

Coastal dune bushland is frequently dominated by Acacia tortilis and A. senegal, and other common species are Cordia somalensis and Terminalia spinosa; also T. prunioides, Balanites, Salvadora persica, Grewia villosa, G. fallax, Combretum exalatum, Uvaria denhardtiana, Mundulea sericea, Euphorbia cuneata, E. scheffleri, Commiphora spp, Sterculia, Gardenia fiorii, Dobera glabra, Croton. Beaches have Ipomoea pescaprae, Scaevola plumieri, Atriplex farinosa and Sporobolus spicatus. The sedge Cyperus chordorrhizus dominates large areas immediately above the beach and provides important grazing, apparently heavily grazed. Also, Halopyrum mucronatum, Urochondra setulosa, Sporobolus virginicus, S. spicatus, Panicum pinifolium. Open areas within the dune bushland support excellent grass cover and Cenchrus ciliaris grows vigorously. The coastal sands between Muqdisho, Afgooye and Balcad are extensively enclosed for grazing and forage cutting for sale in Muqdisho, mainly for dairy cattle.

Trans-Jubba evergreen bushlands are very similar to the Boni vegetation of the Kenya coast hinterland. Typical woody plants include Diospyros cornii, Manilkara spp, Carissa edulis, Uvaria spp, Premna resinosa, Polysphaera multiflora, Euclea spp, Heinsia, Strychnos spp, Tanarix, tarenna graveolens, Gnidia latifolia and Croton spp. The bushlands include well-grassed open areas with Hyparrhenia, Panicum, Digitaria, Chloris, Brachiaria, Echinochloa and Tetrapogon.

Saline soils in the rangelands support a halophytic flora with Suaeda spp, Salsola and Limonium, with the frequent halophytic grasses Urochondra setulosa and Sporobolus spicatus, the former dominating extensive grasslands.

All forests are groundwater riparian types along the rivers. Very little remains of the Shabelle forests, rather more of the Jubba forests but clearing is ongoing. The forest is a dense gallery type with trees to 30 m high. Species include Parkia filicoidea, Mimusops degan, newtonia erlangeri, Ficus spp, Afzelia quanzensis, Diospyros cornii, Trichilia jubensis, Tamarindus indica, Teclea alexandrae, Garcinia ferrandii and Hypseloderma jubensis.

Freshwater swamps have developed in poorly drained areas of both the Shabelle and Jubba valleys. Water margins support Nymphaea lotus, Nymphoides, Pistia stratiotes, the grasses Vossia cuspidata and Echinochloa stagnina, and communities of Typha latifolia and less of Phragmites karka. Tidal estuaries have mangrove swamp dominated by Avicennia marina and Rhizophora mucronata.

The lower Shabelle alluvial plain has seen marked changes of the vegetation within the last 40 years, from G and BG to denser shrub and bushland. In other areas the spread of cultivation and fuelwood cutting reduced the vegetation to regenerating bushland and ephemeral weeds. Overgrazing depleted grass fuel leading to a reduction in seasonal fires which had previously kept woody invaders at bay. Uncontrolled elephant hunting at the same time would have hastened the changeover from grassland to bushland, because “A thriving elephant population tends to maintain grassland at the expense of bushland.” Veg structure varies from open to dense shrubland or bushland, even thicket, generally 2-6 m high.

The most important invaders are probably Combretum hereroense and species of acacia including A. nilotica, A. seyal, A. Zanzibarica, A. oerfota, and A. bussei and A. mellifera also occur. Widely scattered trees of Slavadora persica, dobera glabra, Balanites, Albizia anthelmintica, Sesamothamnus busseanus, and Euphorbia robecchii mostly in discrete groups. Thespesia danis and Dichrostachys cinerea tend to multiply in distured conditions and often on moister sites. Phyllanthus fringes seasonally flooded depressions and drainage lines. Common lower shrubs include Feretia apodanthera, Gardenia fiorii, Opilia campestris, Grewia spp, Cordia spp, Commiphora spp, Maerua oblongifolia. Sansevieria powellii is very widespread. Common grasses include Sporobolus helvolus, Centhrus ciliaris, Echinochloa haploclada, Enteropogon macrostachyus, Leptothrium senegalense, Aristida adscensionis, Tetrapogon tenellus, Schoenefeldia transiens.

Percentage of vegetation types in the Upper Shabelle rangeland in 1960 vs. 1983-4: grassland 6/0, shrubbed or bushed grassland 18/2, open shrubland or bushland 3/0, thicket <1/0, and shrubland or bushland 73/98. (That is, in the intervening time almost all of the vegetation gravitated toward shrubland/bushland, and grassland cover, in particular, fell from 6% to zero, viz. overgrazing). This was not a change unique to the Upper Shabelle valley in Hiraan, everywhere in the rangelands of S Somalia grassland cover fell sharply and most vegetation tended toward shrubland/bushland.

As of 1984, Beledweyne District was sparsely populated with 5-10 persons/km2, while Buulobarde and Jalalaqsi had <5 persons/km2. Most of southern Somalia is equally sparsely populated except coastally and subcoastally and in Baydoa District. As of 1983/84 the nomadic proportion of the Hiraan population was 47% (dropping from 62% in 1975), rural 34% and urban 19%.

Wildlife comprises an insignificant (1.5-5%) proportion of total herbivore biomass therefore wild herbivores do not compete with stock in southern Somalia. However, there are crop-damaging wild animals.

Livestock numbers relied heavily on the RMR Southern Rangelands Survey of Nov-Dec 1983 and March 1984. Data on seasonal movements were also gathered by interviews and other such methods. Livestock populations (in thousands) for southern Somalia in 1984 are 2509 camels, 3291 cattle, 4405 goats, 1346 sheep, 30 donkeys. In Hiiraan the % of total stock biomass contributed by cattle has risen from 10% in 1952 to 22% in 1984. Camels still constitute >70% of stock biomass in Hiraan.

Variable opinions in reports on stocking densities in the 60s and 70s. Some said that stocking was generally about the level of the carrying capacity while others concluded that densities (especially in the late 1970s) were 2-3 times higher than the long-term carrying capacity. One study calculated stocking densities in southern Somalia in 1983/84 at c64% of carrying capacity, based on all forage production, both herbage and browse to 2 m height. In some regions a trend toward more cattle, especially in areas with agriculture; crop residues and fallow grazing may be more suitable for cattle and sheep. Countering this is bush encroachment, reducing suitability for cattle and sheep compared to camel and goat. Irrigation development, with its potential for much higher DM yields, is recommended especially in riverine grasslands. The only pump irrigation in the upper Shabelle Valley amounts to 100 ha (1984).

The gradual increase of land under cultivation or fallow has reduced available rangelands by c30-50% in different LRs in the last 23 years and the trend is continuing. Land clearing and wood cutting has opened bushland near settlements, leading to problems of degradation and wind erosion in some areas. Even undeveloped rangelands show a deteriorating trend due to heavy wet season use particularly near settled mixed farming areas. In some areas a virtual elimination of perennial grasses, and the lack of fuel has reduced the incidence and severity of bush fires with gradual increase in bush density.

Based on 1983-84 data, in the Gu season Hiraan has 398 km2 in the cultivation cycle and 291 km2 cropped. Cropped area by district is 35 for Beledweyne, 130 for Buulobarde, 119 for Jalalaqsi. Total acreage of crops is maize 173 km2, sorghum 43, sesame 37, legumes 26, other crops 12. Fallow is 27% of occupied land. In the Dayr season, the cultivation cycle has 414 km2 of occupied land with rainfed/irrigated acreages 95/78 km2. Maize 32 km2, sorghum 93, sesame 14, legumes 23, other crops 11.

Analysis of a Jalalaqsi soil:

Depth (cm)	0-15	55-70

Sand	67	20
Silt	30	37
Clay	15	43
pH	8.7	7.8
EC mmhos/cm	0.2	2.1
CaCO3 %	12	19
Gypsum %		3.9
CEC	10.3	21.7

Exchangeable cations, meq/100g:

Na	0.2	0.3
K	1.6	2.1
Ng	2.9	4.7
Ca	>50	>50

Wieland, Ronald G & MJA Werger 1985 ***Land types and vegetation in the Luuq district of south-western Somalia.*** J. Trop. Ecol. 1: 65-87.

Did 52 releves using "traditional phytosociological methods", also DECORANA and TWINSPAN. Mean size of releve (i.e. plot) per 'community' ranged between 0.14-0.36 ha.

The jumble is in the presentation: a series of synoptic tables of species, apparently not with Z-M(B-B) cover-abundance values but (as the table says) the number of stands per veg type in which the species occurred, indexed to certain edaphic and physiographic forms, followed by an attempt to characterize (some of?) the veg types. No standard releve tables as such, the tables are mixed with descriptions of species preferences and assemblages.

It's almost like the old-school mix of text and lists of species. It's particularly troublesome trying to understand community structure and dominance. I feel it's going to be a daunting task to pull out species info from this – but I will try to ease it by just listing species and see where it goes from there.

Having said this, the study is notable in being the only quantitative research to come out of southern Somalia on bushlands which are the dominant landscape form.

The study area is 2000 km sq, centered on Luuq. Open thorny bushland of *Commiphora* and *Acacia* (as per White 1983), mostly 1-4 m tall. Little herb cover except in depressions and drainageways. Total woody cover averages 34%. Limestone uplands are the most species-rich, averaging 49 per ¼ ha and max 66 spp (note that this includes grasses and herbs). Gypsum and basalt average c40 spp.

Lifeforms: herbs, dS's & low S 0.2-1.5 m, (overlapping with) med & tall 1-4 m, tall >4 m.

Tab.2: soil EC (mmohs/cm), color, CaCO3(%), CEC (meq/100g), Ca, pH.

Mostly limestone and gypsum cover and a basalt ridge SE of Luuq; scattered inselbergs and river-basin alluvium. Main land types are gypsum inter-plain 27%, limestone hills & rolling uplands 18%, basalt 6%, alluvial plain 21%, alluvial river basin 13%, & the rest mostly more limestone & gypsum-limestone. Note absence of sandy soils especially deep sands.

In summary:

Basalt parent material	1B	basaltic	C.boranensis
Limestone upland	2L	limestone tableland	C.corrugata
	3L	limestone hills & rolling uplands	"
Gypsum interplain	4G	gypsum	A.edgeworthii
Alluvial upland (outwash)	8S	alluvial plain (droughty)	
	8D	alluvial plain (mesic)	
	8C	complex of these 2	C.incisa-A.horrida
Alluvial plain (High terrace)	5A	clay depressions	
	6A	slight rises	(Indigofera ruspolii)
	7A	complex of these 2	A.stuhlmannii
Low terrace	9R	recent alluvium	(A.tortilis)

		COVER CLASS & % COVER			
Ten CTs ('communities'):	land types	herb	.2-1.5m	1-4m	>4m
a Sporobolus helvolus	clay depressions	19	28	26	t
b Enteropogon rupestris	clay depressions (also)				

d	Panicum coloratum	clay depressions (also)				
c	Grewia villosa	alluvial plain (mesic)	45	48	23	6
e	Indigofera ruspolii	slight rises	5	8	16	t
f	C. boranensis	basaltic	t	2	34	7
g	C. corrugata	limestone uplands & hills	3	8	28	3
h	C. incisa-Acacia horrida	alluvial plain (droughty)	1	1	2	0
i	Acacia edgeworthii	gypsum	6	5	14	0
j	Tetrachaete elionuroides	alluvial plain (droughty)	85	5	0	0

Limestone:

Abundant Satanocrater somalensis, C. corrugata, C. ellenbeckii, Boswellia microphylla, A. horrida. A. reficiens, Grewia tembensis, G. tenax, I. spinosa, Gardenia fiorii, Boscia coriacea, Euphorbia glochidiata, Cadaba glandulosa, Cordia monoica

Common C. ciliata, C. chiovendana, C. erythraea, Euphorbia cuneata, Carphalea, Seddera, Maerua sessiliflora, Grewia penicillata, Heliotropium subulatum, Caucanthus albidus, Gossypium somalense, Cleome brachycarpa

Overall, very wide ecological amplitude for Boscia coriacea, Cadaba glandulosa, Aerva javanica, Sericocomopsis pallida, Grewia penicillata, G. tenax, Abutilon anglosomaliae, Euphorbia glochidiata, Acacia reficiens (one of the commonest plants), A. senegal, Indigofera schimperi, Commiphora incisa, C. myrrha, C. monoica (or sinensis?), Aristida sieberiana. Many other plants with wide ecological amplitude.

Acacia horrida with wide ecological amplitude and one of the commonest plants, absent only on gypsum and scarce on basaltic