The rangelands of the Sudan: A field trip note

By: M. M. Mirreh
FAO Range Management and Fodder crop Production Officer RNE
Cairo/Egypt
Email: Mohamed.mirreh@fao.org
Field trip observations
Sudan is one of the largest livestock producing countries in the Near East and North Africa region with nearly 128.5 million heads of animals obtaining nearly 80% of their feed requirement from direct grazing of rangelands.
I visited Sudan in October 2003 for an exploratory mission of its rangeland. The distance traversed during the field trip was approximately 2200 km covering six states. The route was through the asphalt road from Khartoum to Kassala and from Kassala through Medani to Northern Kordofan.
The area traversed is mainly in the Central plain with the Blue Nile and White Nile majestically maundering through. The vast flat plains of the Central Region have two soil types. In the Khartoum, Medani, Gadaref, Kassala and Sidar, the soils are predominantly black cracking clays (vertisol) while in Kosti and Obeid, Goz or fixed sand dunes is the predominant soil.
The vast area of land covered during the trip is flat plain with no other prominent land form except near Gadaref with isolated mountain range. The area covered fall with the semi-arid zone with annual rainfall of 300 to 500 mm. This belt of semi-arid land extending from Kassala to Northern Kordofan is a principal livestock producing area. Pastoralists from the north move to these areas during the dry season for better pastures while cattle owners in the south move into this area during the wet season to escape biting flies.
Areas near the Blue Nile were observed to have small sized farms where lift irrigation is used to produce different types of vegetables such as Bamia (*Hibiscus esculentus*), Mulkhiya (*Corchorus olitorious*), Bedijan (*Solanum melongena*) and tomato (*Lucopersicum esculentum*). Small number of cattle and goats are also kept by farmers. Invasion of *Prosopis juliflora*, *Calotropis procera* and *Cassia sp* is a problem in irrigated areas. Sudan grass (*Sorghum vulgare*) is also growing densely in many areas sown to sorghum reducing the yield of the crop (but the grass has forage value).
In areas of the plains where the Nile flows through, dense and healthy stand of *Acacia nilotica* is dominant along the river banks. The species also grows well in more mesic habitats such as Khors (ephemeral rivers) associated with other acacia species, primarily *Acacia mellifera*.
dense stand of dry standing annuals grasses and forbs are found. Ocular estimate of the standing dry matter in fallow lands is approximately 2500-3000 kg/ha.

Quite a few farmers use *Acacia nilotica* and *A. millifera* as live hedge wind break and as supplementary dry season feed in addition to their value as fuel wood and for bee keeping. Most of the heavy clay soils are farmed, there are however few areas under forest cover and open rangelands which have not been converted to croplands. Open rangelands of the clay plains are annual ranges dominated by ephemeral grasses and forbs. Dominant annual grasses include *Sporobolus sp*, *Aristida sp* and *Pennisetum cenchroides*. *Corchorus olitorius* and *Cassia tora* are dominant forbs while the noxious *Solanum dubium* is the major perennial in the heavily grazed open ranges.

Permanent exclosure in open plains with no tree cover in Al Malwiya of Kassala under managed seasonal grazing is an indicator of high site potential. Ocular estimation of production of the standing dry biomass of annual grasses and forbs in the site is in excess of 3000 kg/ha.

The highly preferred *Blepharis linariaefolia* was observed growing relatively dense in the fenced area. Few plants of *Clitoria ternatea* and *Ipomea sp* are present. A dense and vigorous stand of *Sesbania sp* growing as high as two metres which is very well consumed as dry feed is dominant and particularly in depressions. Species of *Blepharis linariaefolia* and *Clitoria ternatea* are re-establishing after reseeding in this site as they are protected from grazing during the summer growing period.

The area covered can be described as acacia–short grass scrubland where acacia species is characteristic of the tree layer of the vegetation. In areas where trees have not been cleared for cropping and particularly in the few protected or managed forest such as Rawashda-Wad Kabo, *Acacia seyal*, *A.mellifera*, *A. senegal*, *A.nubica*, *A.nilotica*, *Zizaphus spina-christi* and *Balanites aeyptica* are common in the clay vertisol soils of the central plains. The Rawashda–Wad-Kabo forest managed as multiple use resource (wood cutting for fuel and building, gum Arabic and forest grazing) support a healthy stand of
*Acacia sp* and high biomass of under growth of grasses and forbs. The quantity of biomass from the lower layer seem be inversely related to the density of the over-storey layer. Apparently optimum forage and tree production density relationship need to be established for optimum production of the forest area.

![Acacia seyal in a managed forest](image1)

![Acacia senegal re-established in cleared areas](image2)

*Fuel wood from managed forests of Sudan* (image3)

In the drier parts of the Central plains near Kassala, gulley formation of the black clay soil with active eat-back of run-in water literally cutting arroyos is common. Soil and water conservation measures including water diversion from active gulley, gulley plugging and grass seeding may help control expansion of the gulley before it becomes uneconomical or prohibitive to reclaim the land.

Serious invasion of Mesquite (*Prosopis juliflora*) is taking place, primarily in more mesic habitats of drainage channels, Wadis, irrigated farms, areas with temporary water ponds and in many water depressions in the central plains area. The species has already over powered local species and occupied farms. In open rangelands where the natural forest is cleared, the species is already making a dense thicket. This invasive species is present in all the states visited and is a major problem. Unlike the native acacia species, the vegetative part of mesquite is not grazed by animals. The pods are eaten by animals and primarily goats and are probably the main seed dispersed mechanism for its spread.
During the trip, no browsing of the species by any kind of animal was observed, even though goats were observed browsing on the broad leaves of *Clatropis Procera*, a species considered to be poisonous invader but goats apparently shy away from the taking bite of the lush green leaves of mesquite.

The spread of the species to the forested areas of the central plains was observed in many places. This is a great concern in poorly managed or unmanaged forest areas as reduced plant density of the native trees, shrubs and under growth may allow space for mesquite to establish itself in areas that receive more than 300 mm and in lower rainfall areas that receive run-off. Once established it may out compete the more palatable native species in which their vegetative parts can be subjected to over browsing by grazing and browsing animals.

Mesquite an introduced invasive species spreading to rangelands

Large population and high diversity of livestock was noted throughout the area covered in the trip. There is however, distinct segregation of the type of animals in the different states. The area between Khartoum, Gadaref and 50 km east of Kassala cattle and goats are dominant with low density of sheep and practically no camel. The lack of camel population is because most of the area is farmed and the few remaining open ranges are too narrow to accommodate the foraging range of camels.

The dominant cattle type found in the area is called the Kenana. Havirs (water pools) were full of water during the field trip with plenty of feed from the good summer rains allowing cattle to extensively graze the area. Only one herd of bulls of the “Umbororo” cattle were observed on-hoof to Medani market. This huge beast with a body weight of more than 500 kg and huge long horns were moved on-hoof from a distance of 300 km for a period of 15 days. The animals belong to the Fallata tribe and the breed perhaps originated from Nigeria.

Goats are extensively found in all the states with the black long-legged but small sized Nubian goats as the dominant. Goats of sedentary communities were found to be of large
herd sizes. They are apparently very versatile grazers but the browse of *Acacia mellifera* offer considerable green biomass and large quantity of pods for the small sized goats. Goat meat is not generally preferred in the Sudan but goats are a source of milk. This is in sharp contrast to countries like Yemen, Somalia and Saudi Arabia where barbequed meat of young goats is a delicacy.

Sheep and camel are the dominant livestock in Kassala area. The sheep found in the area is the long-legged brown type that can easily graze rangelands used by camel as long-
legged sheep are better suited to travel long distances and therefore able to utilize more distant rangelands. The Rashaida tribe keep large herd sizes of both camel and sheep. They normally have access to distant rangelands often with little drinking water. The Rashaida tribes have water tankers and truck water to animals on the range. This allows them to graze ranges in good condition.

In north Kordofan; the area south of El Obeid city with clay depressions has a very high diversity of over-storey vegetation. Baobab tree *Adansonia digitata* used by pastoralists as a drinking water reservoir (Stems of individuals are hallowed like a barrel), shows its majestic presence in the landscape. *Balanites aegyptica, Combretum cordofanum, Acacia*
senegal, A. nilotica, Cordia sp are frequent species. A relatively tall but very well grazed Indigofera sp seem to be key forage species in the mesic depressions. Heavy grazing of the species by cattle, sheep and goats was observed.

Dura (Sorghum) grows well in the clay soils which are temporarily water logged. Dura withstand temporary water logging and is an ideal crop for this environment.

In Northern Kordofan State, extensive area of land is covered by fixed dunes of blown sand, locally known as Goz. The Goz soil north of El-Obeid is in the semi arid zone with a rainfall of less 300mm. Agro-Pastoral and Pastoral land use is practiced in this area. In spite of the poor soil and low rainfall, forage production potential of the area is remarkably high. Ocular estimation of the under-storey biomass of grasses and forbs in uncultivated site was in excess of 1000kg/ha. The high production is partly because of the good rains received in the growing season.

The Boa boa tree, a Pastoral water reservoir

Large areas of the Goz soils are put under cultivation. Dukhn (Pennisetum typhoideum) is the most important food crop. Kerkade (Hibiscus sabdariffa) and Simsim (Sesamum indicum) are grown as cash crops. The current production of the farmed area is extremely poor for all the crops observed in the field. In the past the cropping land was used in rotation with a long fallow period of 30 years under gum Arabic (Acacia senegal). Following in the drop of the price of gum Arabic, the land was continuously farmed or shifting cultivation period was shortened depleting soil nutrients. Natural regeneration of gum Arabic in the long fallow period used to replenish the soil with nitrogen as Acacia senegal is a legume with nodules for nitrogen fixing bacteria. This used to maintain soil fertility in the ecosystem.

The rangelands of the area has an over-storey of variety of species most of which significantly contribute to the diet of grazing and browsing animals. Acacia tortilis
var.radiana, A.senegal, A. albida, Leptadenia pyrotechnica, and Balanites aegyptica is the main over storey species. The lower layer of vegetation is dominated by the perennial grass Aristida pallida mixed with scattered clumps of Panicum turgidum and sparse cover of Dactyloctenium aegypticum. Cenchrus biflorus and Eragrostis tremula are the key annual grasses. Requienia obcordata, Euphorbia aeyptiacea, Farsetia longisiliqua, Tephrosia sp and Fimbristylis dichotoma are common forbs. In contrast to poor output from cultivation, the use of the area for ruminant production is of considerable importance to pastoral and agro-pastoral communities in the Goz. Contrast in production of the farmed and non farmed open range areas are clearly seen inside and outside of hedges used as demarcation and protection of farmed areas.

The area left of the hedge not cultivated, right of the hedge cultivated

Natural potential (Left) poor Kerkade (right)

The area is a good camel and goat range but is also utilized by sheep. The browse upper layer and the lower grass and forbs layer make good dietary balance for ruminants during the dry period when browse leaves provide the necessary proteins, phosphorous and vitamin A, while the grass and forbs layers supply the energy. Ranges in good condition will perhaps maintain grazing stocks. Agro-pastoralists in the area favour livestock production in the Goz north of El-Obeid rather than farming. Farmers experienced a return period of one in ten years of getting good crop from their cultivated crops. This year (2003) was a high rainfall year in the
Sudan yet the production of farmed area was poor perhaps because of nutrient depletion of continuously farmed areas.

In contrast production of the natural vegetation was tremendously high. Species such as *Aristida pallida* grew to a height of almost 1.5 metres in the area. Rangelands of the Goz which was not subjected to recent farming appears to be in good condition even though the highly preferred *Blepharis linariaefolia* was not observed apparently suggesting some change in the vegetation composition due to more selective grazing or heavy grazing in recurrent dry years. Inaccessibility of the area to vehicles and scarcity of water maintain remote areas of these rangelands in good condition.

In heavily grazed areas near El-Obeid city *Calatropis procera* is covering extensive areas and no native species were seen growing under the canopy of the species. Large surface
area under the canopy is devoid of vegetation and may suggest allelopathic effect of Calatropis to other species.
In the cultivated areas there is a tremendous spread of parasites. The most frequent one is the Sorghum and millet parasite *Striga hermonthica*. *Cuscutus sp* is more prominent in clay soils and is found parasitizing on native range species including acacias.