Integrated Land Escape Management at Eastern Sudan (Kassala state)

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The project was intended to give special attention to disadvantaged pastoral communities, expected to serve pastoral societies and assist them to recover from the devastating effects of drought and its accompanying poverty and destitution.
Kassala State is situated in the eastern Sudan between latitudes 14°15' and 37°15'N and longitudes 34°30’- and 37°55’-E. Eritrean hills in the east and River Nile and Red Sea States in the North and Khartoum and Gedaref States in the West and South. Covering an area of about 24,282 km². The four major towns of the State are Aroma, Kassala, KhashmelGirba and New Halfa.

The most characteristic features of this land are several seasonal rivers flowing from the East. The Atbara River with its two tributaries, Setit and Basalam rivers both have a flow of water during the greatest part of the year. The Atbara belongs to watershed of the Nile. The Gash River runs along a water course (wadi), and carrying water directly, after a shower, into a very fertile inland delta (the Gash Die).
Climate

- Kassala State can be broadly divided into arid climate in the northern parts and semi-arid in the southern parts. Aridity decreases gradually southwards. The central parts fall between arid and semi-arid zone.
- Mean maximum temperature occurs in summer months with values of 40°C in May. Means minimum temperature is 15°C in January. Rainfall is unreliable, ranges from 200-250 mm, occurring dominantly between May to October while evaporation amounts to 2-2.5 mm.
The vegetation types are a varying mixture of grasses and herbs either without any woody vegetation at all, or more usually, with a variable scatters of scrub bushes up to 2 meters high interspersed with bare areas. The following simplified classification of the vegetation cover which is on the zonation of Harrison and Jackson (1958) has been used in Kassala State:

(A) Semi-desert grassland and bare areas with variable grasses and herbs, trees and shrubs scattered in large areas.

(B) Semi-desert grassland on clay: undulating clay plains of the central Butana carry mainly short grasses. Trees occur around hills (jebels) and along water courses. This zone is used for grazing, mainly by camels and goats but where water is available near the mountains of the central Butana also cattle are found. Many areas are overgrazed, and are practically bare.

(C) Arid zone grassland on clay: found in the southern parts of Butana plains, grasses are more abundant, taller and more varied. These grasslands are heavily grazed. Rain-fed durais sporadically grown by terraces cultivation or low-lying water receiving sites.

(D) Acacia melliferathorn land: The Acacia mellifera (Kitr) thorn land occurs in the north part of semi-arid climate zone.

(E) Gash Delta: This inland delta is watered from the seasonal Gash River. The original vegetation has been altered greatly by long use. Weeds are numerous such as Indigofera oblongifolia (Dehassir).
Water resources

Surface water

(1) **Atbara River**: This is the most downstream tributary of the Nile; it flows into the main Nile at about 320 km downstream. Its catchments lie in Ethiopia with an area of 112,460 km² and at altitude ranging from 2,500 to 3,500 meters above sea level. The tributary of the Atbara is the Setit which flows from June to December but dry for the rest of the year.

(2) **Gash River**: is the main intermittent river in the state. Its catchments area is 465 km long before reaching Kassala town. The average annual flow is 483 million cubic meters. Its runoff is important for the recharging of the alluvial aquifers in the Gash Delta.

(3) **Surface runoff**: this includes sheet flow, gullies, and streams mainly along border areas. Watercourses are many but small in size and carry small amount of water towards the Gash Delta.

(4) **Water ponds (Hafirs)**: The hafir represents the only appropriate water points in the areas where geologic formation and structure do not favor the presence of ground water. Most of these large Hafirs retain water for the entire dry season. The water holding capacities of all hafirs in the State is about 350 million cubic meters.

(5) **Ground water**: The ground water sources are mainly confined to Atbara River bank and Gash basin in Kassala. The storage capacity of the basin is about 5,000 million m³ with an annual recharge of about 20 to 30 percent yearly. Along with the River Atbara ground water is found in thick deposits of 7.33 meters of sand with an average of output per borehole of 7,000 gallon/hour.
Scope of project implementation

Trail-based action oriented research
This is intended to cover:
- Rangeland improvement and management
- Water resource management in the pastoral areas
- Paravet training

Gender-based activities:
These to assess and address:
- The gender relations in resource management
- Gender specific needs, awareness, training and empowerment
- Introduction of income generating activities
Scope of project implementation

Initiation of policy dialogue:
This is to address policy through:
- Sensitization.
- Lobbying and institutional building.

Extension and methodologies:
This covers assessment and improvement of the types of extension approaches prevailing and develop new ones that will help serve the participatory and action research to include:
- Workshops, field day and seminars
- Publications and facts sheet
- Electronic media including radio programs and video films
- Technical training and demonstration
Scope of project implementation

Sensitization, awareness raising & dialogue session
Scope of project implementation

Awareness raising for formal leaders
Range management

- Range improvement and management was attempted through water harvesting, seeding, and active involvement of pastoralists. The intervention was conducted in Malawia fenced enclosure (600 ha) contributed to the project by Kassala State Range and Pasture Administration. Using different types of Terraces-crescent, U, V. shaped terraces have enabled satisfactory management of water run-off for the benefit of the broadcasted desirable native range plants seeds.

- The resultant plant cover increased in both diversity and productivity. For example the herbage production dry matter increased to more than four folds (from 0.12 tons/acre to 0.50 tons/acre). The contrast in vegetation height and diversity between the stand inside and outside the enclosure tempted and induced the agro-pastoralists to adopt the idea of protecting the range plants during their germination and the active growth period.
Construction of crescent-shaped terraces
Community participation in range reseeding
Reseeded Malawia enclosure
Standing hay of indigenous range plant-*Malawia*
Range seeds collection in Malawia enclosure
The first activity was conducted to direct the water from the Gash River to Tambi basin whereby a canal was constructed to provide water for the nomadic pastoralists and their livestock during the dry season. The water management sub-committee was able to survey the watershed areas from which the surface run-off can be diverted through simple earth embankment where possible towards the basins before the rains and during the early sporadic showers.

The outcome of the intensive surveys resulted in construction of 17 Km canals to the basins. The simple designs implemented by the grassroots guided by the water management sub-committee have enriched the ground water aquifer of the basins raising the water table level to six meters below the basin floor.

Regular maintenance of damages occurring along the embankments affected by strong water flows during heavy rains occasions accompanied by wind storms were carried by the beneficiaries.

Digging of silt trap wells at the inlets of the basins and removal of bushes from basins’ floors and catchments areas remains the responsibility of the beneficiaries.
Dry Grateit water basin-siltation & bush encroachment
Grate it water basin—after silt removal, bush eradication, floor grading—full of water
Pulling water from deep hand-dug wells by animals, before DHP intervention (embankment & basin floor grading)
Consolidated water basin embankment by the pastoralists resulted in holding enough run-off water
The local inhabitants were found to have good experience in digging of hafirs that with some modifications and some technical advise and training; could be improved for the best.
Digging the Hafir floor
Compacting Hafir ground
Participatory action research on fodder crops

This intervention was conducted to fulfill the following objectives:

- **To up-grade the food and forage** crops through introduction of an indigenous food, fodder and cash crop (cowpea) under rain fed farming system.
- **To maximize the productivity** of the fodder and the food crops at both quantity and quality levels.
- **To acquaint, the agro-pastoralists** with the inclusion of an alternative crop, with the traditionally and continuously cultivated exhaustive food crop (Dura).
- **The introduced crop being a legume** that adds nitrogen to the soil, hence increasing fertility, it is a food, cash and animal feed crop.
- **Four selected farmers in different** locations supplied with cowpea seeds. The Range and pasture Administration-Kassala State prepared half an acre for each farmer (ploughing and ridging) free of charge.
- **The results obtained impressed** three farmers who succeeded to establish a good crop. Crop is eaten as food source during harvest period of the produced dura crop.
The main objective of training is to unify the methodology of range surveying, management and improvement techniques. Range and Pasture Administration RPA who conducted the training programmes produced training manual in collaboration with lecturers from different universities and related fields.

The training phase was done at two levels:

1. In the first one nine technicians were trained by professionals in all aspects of water management, range management and improvement as well as social aspects aimed at developing active good working relations among the beneficiaries.

2. In the second, three outstanding technicians were allowed to train eleven key informants who later guided the grassroots under close supervision of technical trainers.
Paravet training

Male

Selection of trainees took place among people from target areas nominated by their rural people’s councils and committees or by tribal chief sand after subjecting them to an intensive interview. Selected persons should at least have completed the basic education level and show the will to work as community based animal health workers.

Selected persons were usually subjected to an intensive training course in aspects of animal health care, epidemic control, disease notification, and animal husbandry and pasture management. They received theoretical lessons besides practical activities on history taking, general and physical examination of cases, measuring of temperature, pulse and respiratory rates, sample taking, diagnosis and treatment of sick animals, camel breeding and diseases, poultry production as well as meat inspection.

During the course, trainees usually visit the slaughterhouse, vaccination crushes, livestock markets, animal concentrations at water sources and private animal production units. Each trainee received a manual of paravet training at the beginning of the course and at the end; all trainees were subjected to written and oral examinations. A manual for paravets was produced which was also used in New-Halfa and Kasm Elgirba.
Paravet training

Women

• The idea of women paravet training came from the fact that women are more inclined to look after sick and pregnant animals. Para-vet training programme similar to that of males was conducted to 20 females who are capable of reading and writing in Kassala town. They were subjected to a written examination.

• At the end of the training course they were given certificates and equipped with drug kits. These trained women could then move to remote areas where they can deal with animal health. A revolving fund was allocated for purchasing of the drugs.
Female paravets during practical training
Improved stoves
Milk collection for processing
Milk products (cheese, mish & yogurt)
Establishment of seeds production center at Malawia fenced area (600 ha - store and guards room). The seeds produced were supplied to Red Sea and Khartoum States having similar ecological conditions.

The results obtained were convincing to the agro-pastoralists.

Establishment of milk products processing center for training pastoral women.

Improvement of the productivity and diversity of the range plants.

Development of drinking water resources, management and creation of an enabling environment.
Development of range management training manual from the training courses delivered during the project life to capacity build the range management personnel working among the pastoralists.

Production of dry land encyclopedia of the Butana.

Production of documentary video films illustrating range improvement and water management. Milk products processing (income generating activity) as useful educational materials.
In pursuit of project sustainability there are some indications of success that are of varying degrees attached to the project various activities as outlined in the following:

- There is an increasing involvement of the beneficiaries with the scientists, government departments/NGOs towards the implementation of the activities in natural research management.

- A long-term interest is fully developed by the policy makers, development workers as well as the pastoralists to develop and use the means furnished by the project to maximize their resources management, improvement and utilization.

- The project facilitated strong linkages and collaboration with and among various related institutions and community-based organizations.

- A new outlook has been shown by the pastoralists towards the government agents, local organizations and others who contributed in range and water managements.
Recommendations

- Good relations among the natural resources personnel, the pastoralists and the Gash Delta Rehabilitation Agricultural Scheme must be strengthened, and developed.

- Indigenous knowledge must not be overlooked.

- Rangelands and pastoralists communities in the different parts of the State must find the chance to have similar viable interventions according to their perceived needs.