

**WETLANDS IN DRYLANDS:  
THE AGROECOLOGY OF SAVANNA  
SYSTEMS IN AFRICA**

**PART 3d:**

**Khor Baraka - a key resource in eastern  
Sudan and Eritrea**

**by Zeremariam Fre**

**IIED**

INTERNATIONAL  
INSTITUTE FOR  
ENVIRONMENT AND  
DEVELOPMENT

**DRYLANDS PROGRAMME**

**WETLANDS IN DRYLANDS:  
THE AGROECOLOGY OF SAVANNA SYSTEMS IN AFRICA**

**Edited by Ian Scoones, Drylands Programme, IIED, London.  
January 1991**

This review project was supported by the Swedish Agency for Research Cooperation with Developing countries (SAREC) and was coordinated by IIED, London. The review is a collaborative effort, drawing on the wide experience of researchers based in Europe and Africa.

The review is in three parts and is aimed at providing a broad overview of the role of 'valley bottomland' wetlands in savanna agroecosystems in Africa. The role of spatial heterogeneity and farmers' and pastoralists' responses to patchiness is often ignored by researchers, planners and extensionists. The review aims to map out the key issues and suggests a new way of interpreting savanna agroecosystems with important implications for future directions in agricultural and pastoral development in drylands areas.

**Part 1 by Ian Scoones: Overview - ecological, economic and social issues.**

The overview provides an introduction to the case studies (part 3) and the detailed assessment of biophysical aspects (part 2). It attempts to highlight key issues that run through all analyses of patch use within dryland agroecosystems. Bottomland agriculture and pastoral systems are investigated with a series of case studies. Questions of environmental degradation, land tenure and appropriate economic analysis are also explored. Part 1 concludes with a discussion of the implications for agricultural and pastoral development.

**Part 2 by Julie Ingram: Soil and water processes**

The review of soil and water processes examines the literature on soil processes by looking at interactions between top- and bottomland in soil formation and movement. Bottomland wetland areas are placed in a landscape context by reviewing catchment level processes. In situ soil and hydrological factors are also examined. Part 2 concludes with an assessment of the potential impact of land use change on patchy wetland areas.

**Part 3: Case studies**

Part 3a by Are Kolawole: Economics and management of fadama in Nigeria.

Part 3b by Folkert Hottinga, Henk Peters and Sjoerd Zanen: Potentials of bas-fonds in agropastoral development in Sanmatenga, Burkina Faso.

Part 3c by Mohammed Osman El Samanni: Wadis of North Kordofan - present roles and prospects for development.

Part 3d by Zeremariam Fre: Khor Baraka - a key resource in Eastern Sudan and Eritrea.

Part 3e by Misael Kokwe: The role of dambos in agricultural development in Zambia.

Part 3f by Ian Scoones and Ben Cousins: Key resources for agriculture and grazing: the struggle for control over dambo resources in Zimbabwe.

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**PART 3d: KHOR BARAKA - A KEY RESOURCE IN EASTERN SUDAN AND  
ERITREA**

Zeremariam Fre

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# 1 INTRODUCTION

## The Eastern Region of the Sudan

With a population totalling 20 million in an area of 2 million km<sup>2</sup>, almost the size of Western Europe, Sudan is Africa's largest country (see Map 1). The Eastern Region of the Sudan comprises Kassala and Red Sea Provinces. The Red Sea Province covers a total of some 212,490 km<sup>2</sup> and is divided into seven rural districts (see Map 2). The Red Sea Province lies between latitudes 17° and 24° north and longitudes 33° and 39° east. The Khor Baraka Wadi System in North Tokar District is found in the south eastern part of the province towards the Eritrean border. This is the home of the Beja people and the Beni-Amer.

The Red Sea Province has a low rainfall and is described as a semi-desert region where the rainfall varies between 75-300 mm per year. Rainfall patterns are highly unpredictable.

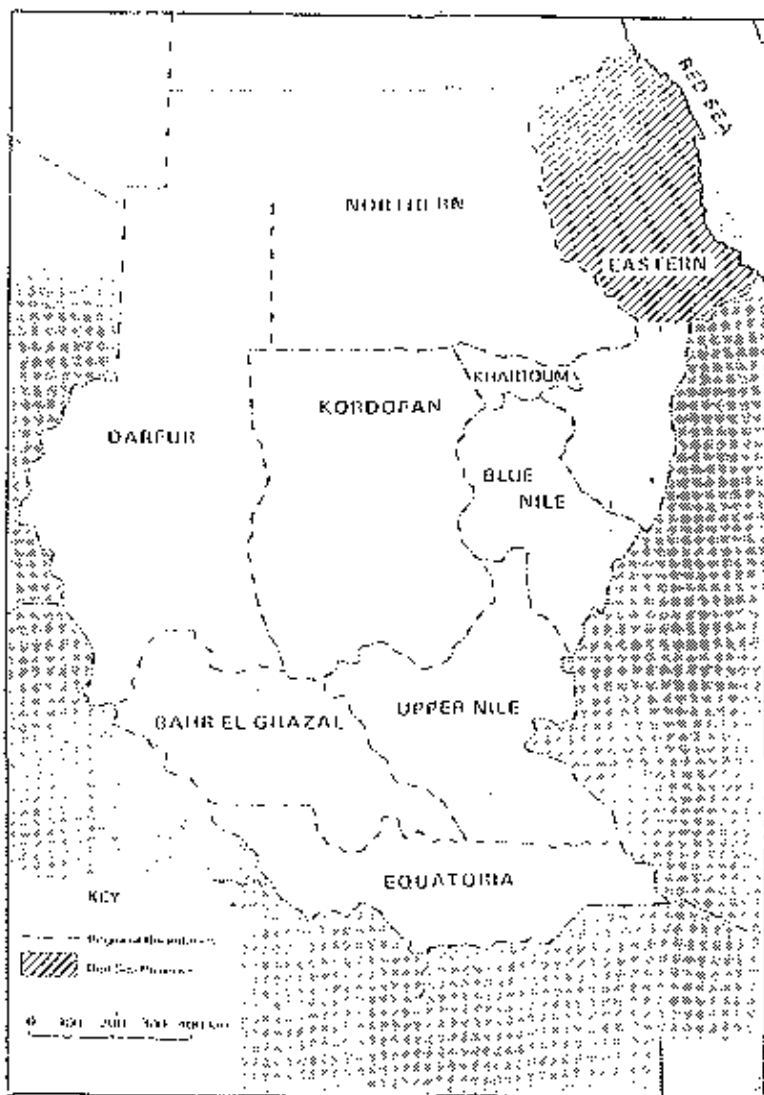
The dominant topographical features of the Red Sea Province are rocky hills and mountains beside water courses and streams. The low lying coastal areas are extremely arid. The khors and wadis that dissect the landscape provide the critical resource of water and fertile soils essential for both agricultural and livestock production. These areas are the key resources in this barren environment.

The Red Sea Province vegetation consists of desert, semi-desert, montane and riverine vegetation (Lebon, 1965). Vegetation over the northern two-thirds of the Beja country is extremely sparse and is composed of semi-desert *Acacia* scrub. Southwards scrub increases in density as the area receives scanty summer rains. *Acacia mellifera* is replaced by *A. glaucophylla* towards the eastern border. Other species include: *A. etbaica*, *Delonix elata*, *Moringa aptera*, *Euphorbia cuneata*, and *Dracaena ombet*. The montane vegetation towards the Eritrean border consists of *Juniperus procera*, *Olea chrysophylla*, *Olea chrysophylla*, *euphorbia abyssinica*, *Dracaena ombet*, *Gymnosporia senegalensis* and *Euclea divinorum*.

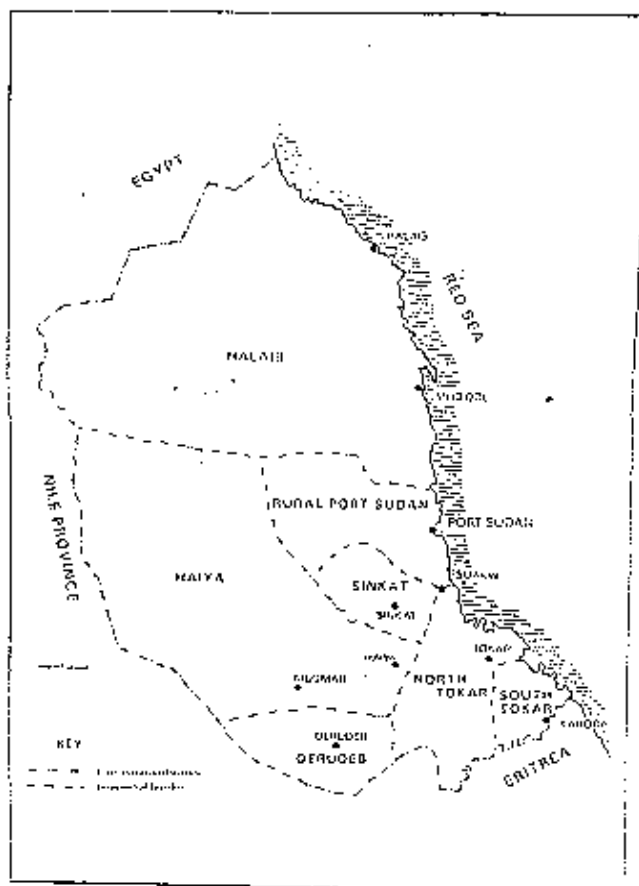
The total population in the Red Sea Province is about 694,874 (Shami 1986, quoting 1984 census figures; see Map 3 for tribal composition). The rural mode of subsistence is primarily pastoral and agropastoral. After recent droughts more Beja are now involved in wage labour and urban employment. Many reinvest their earnings in livestock as a way of returning to traditional forms of pastoralism.

The recent drought (1984-85) had a devastating impact on the Beja pastoral economy and society. According to recent estimates (Hale 1986, Fre 1985), families in the Red Sea

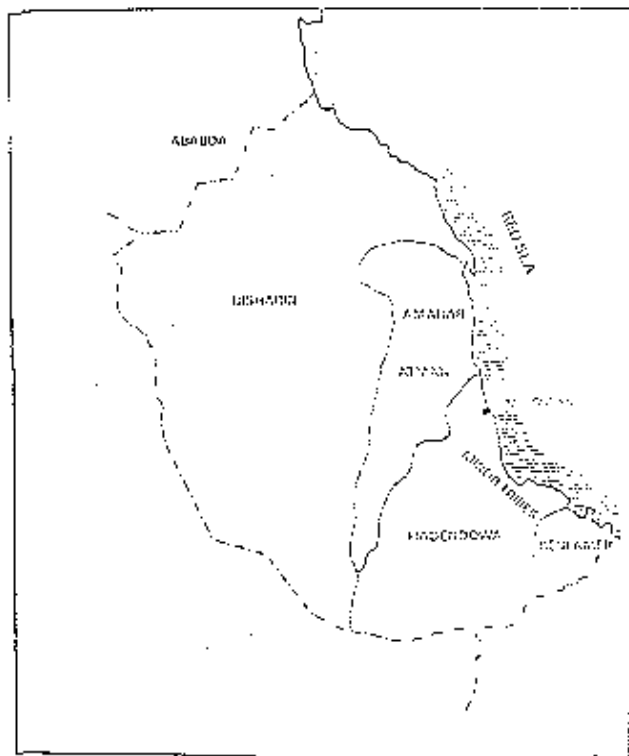
Map 1: Sudan and Red Sea Province



Map 2: Red Sea Province: administrative districts



Map 3: Red Sea Province: tribal areas



Province lost up to 90% of their livestock and large numbers were forced to abandon their villages in the hills in a desperate search for food. Many found their way to the outskirts of Port Sudan, while others camped out along the main Port Sudan-Khartoum highway. In response to this mass exodus of people from their home base the Government of Sudan had to request external assistance in 1985. Many rural Beja and Beni-Amer have also migrated to high potential wetland patches within the Red Sea Province. The Khor Baraka area is one of the most important wetland patches (see Map 4) which saw a dramatic increase of destitute population migrating from the surrounding hills.

This case study is based on first-hand field experience, especially in the Khor Baraka area. The author worked as an OXFAM consultant and researcher over a two year period (1985-87). Much of the information was obtained directly through interviews with the Beja and Beni-Amer inhabitants of the Khor Baraka area. The research also depends on a review of available published data.

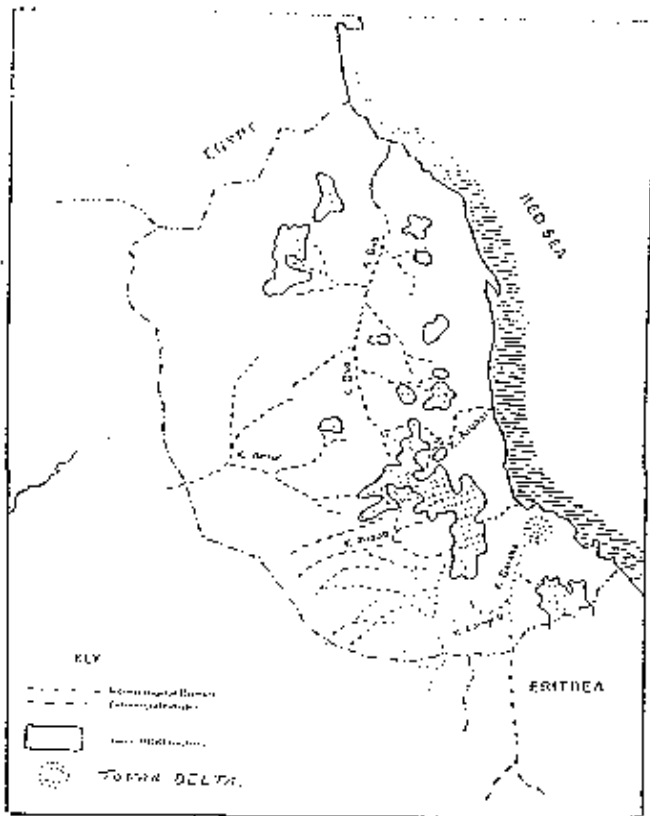
## **2 KHOR BARAKA: A WETLAND RESOURCE IN AN ARID ENVIRONMENT**

The Beja term 'khor' means a stream, while 'Baraka' probably means blessing in Arabic. The Arabic equivalent for a 'khor' is 'wadi'. The khor lies between latitudes 17°-18°30' north and longitudes 37°15'-37°45' east towards the Eritrean border.

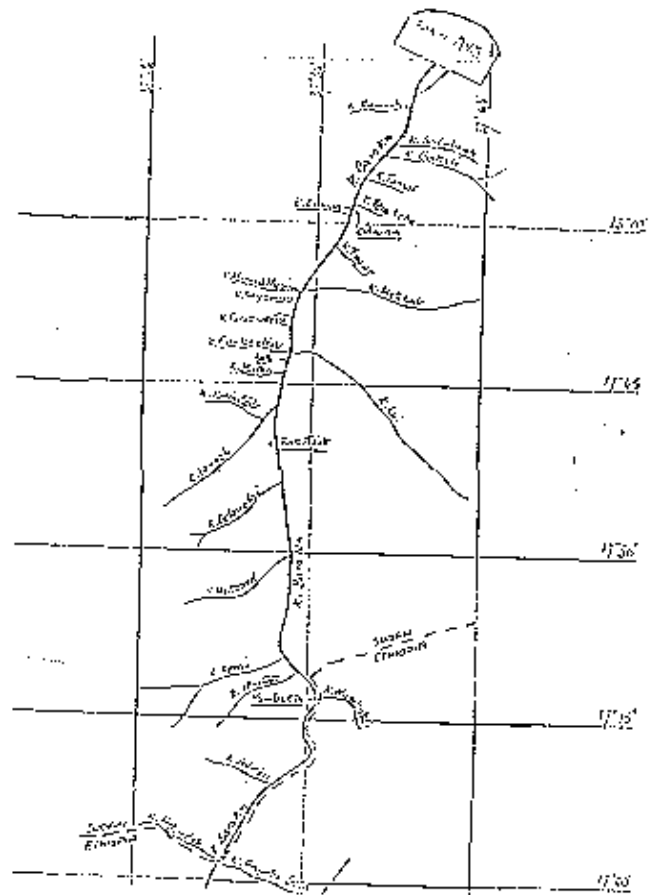
Khor Baraka originates from the Eritrean plateau and is joined by several smaller khors on its way to the Tokar Delta and the Red Sea in the north. It rises on the western side of the Eritrean highlands and flows northwards until it reaches the Eritrean-Sudanese boundary. At the border it alters its course and flows north east towards the coast of the Red Sea. Khor Baraka is about 630 kms long, of which 430 kms are inside Eritrea. This research concentrates on the part of Khor Baraka which is inside the Sudan. Khor Baraka and its tributaries (Map 5) are seasonal streams which flow between July and September. The rich alluvial soils provide the best medium of growth for millet and the forest resources for which Khor Baraka is well known.

Along Khor Baraka there are major agropastoral settlements (see Map 6) which partly depend on millet farming, which takes place between September and April every year in the flood plain and along the banks of the khor. During the drought crisis of 1984-85 Khor Baraka was able to support almost double its normal population. Its own people did not leave their area, as millet farming along the khor reduced the impact of the drought.

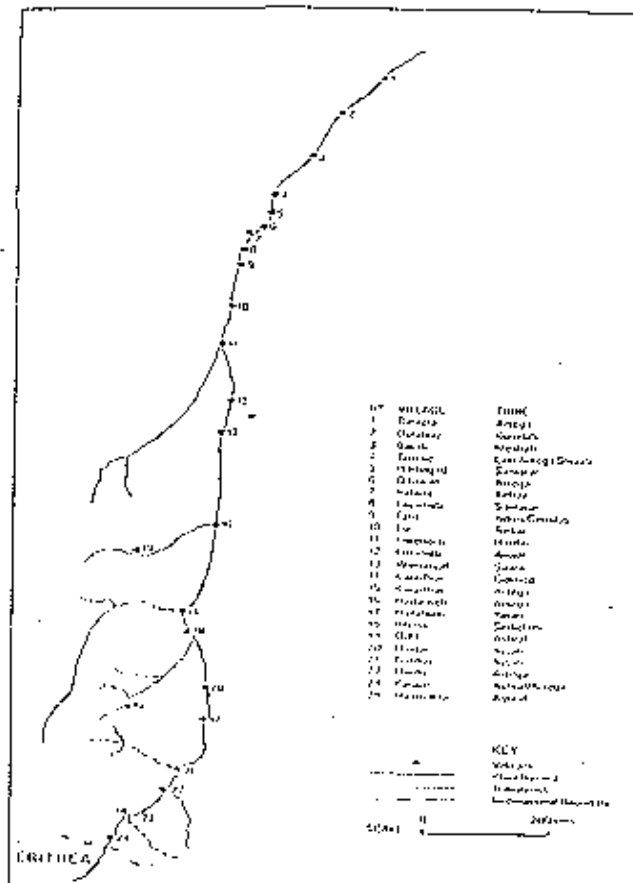
Map 4: Red Sea Province:  
topography and rivers



Map 5: Khor Baraka and tributaries



Map 6: Khor Baraka and settlements





## The People of Khor Baraka

It is difficult to give a reliable estimate of the population of Khor Baraka. According to the village sheiks' estimates (1985) there are about 8,000 farmers involved in Khor Baraka farming; the total population is estimated to be 20,000 (Shami 1986).

Following the recent drought in Khor Baraka, there are two categories of inhabitants: those who are settled land owning agropastoral tribes and the drought victims who are landless.

The first group are agropastoralists who combine millet farming with traditionally semi-nomadic livestock rearing. The second group are those who descended from the hills due to drought and who are traditionally goat and camel nomads. Some of these nomads are trying to settle along Khor Baraka whilst others are returning to the hills empty handed, as they could not find enough land in Khor Baraka.

During a survey carried out in 1986 nine settlements were visited along Khor Baraka (Fre, 1986). The following section is a discussion of findings:

- The settled tribes claimed that they shared the same level of livestock losses as the nomads, but most remained in their original settlements during the 1985-85 drought. The area has accommodated up to 40% more pastoral people who came from the hills to share World Food Programme rations. Some of the new settlers were trying to adjust to agriculture as share-croppers and settle permanently. Some moved onto the Tokar Delta and others came down regularly to Khor Baraka to receive monthly rations.
- Millet farming is the predominant economic activity in all the settlements of Khor Baraka. Crops are sown in September and early October and harvested in January and February. Millet farming is integrated with livestock rearing. The crop fodder serves as an essential food source for animals during February, March and April when fodder is scarce. All the areas can be described as mixed farming areas where livestock and crop production are integrated.
- The pattern of vegetation is uniform and water resources are good along the Khor. The vegetation consists of dum palm (Hyphaene thebatica), muskit (Prosopis chilensis) and amab (Tamarix articulata). All these trees are useful for fodder and building material. Some sanganeb (Acacia tortilis) are also found scattered outside the banks of Khor Baraka. As you go further out of the khor towards

the hills the vegetation is almost non-existent and the soil is exposed, bare and treeless.

- Khor Baraka is now exposed to a much greater ecological pressure because of the concentration of people from the hills. Because of the lack of animal products, such as milk, many people are resorting to collecting unripened dum nuts for food raising cash from the and sale of forest products.
- Charcoal burning and wood cutting is observed in many places along the khor. Increased demands for alternative income sources have resulted in use being made of the extensive forest resources along the khor. Traditional controls on forest resource use have broken down with the increase in new settlers in the area since the 1985 drought.
- The settlements along Khor Baraka have similar patterns of subsidiary economic activities. These include: saaf (palm leaves) production for sale, making birish (palm mats), rope and string production (palm leaves), bed frames from 'amab' trees, and so on. Much of their produce cannot be taken to Tokar market because of the lack of transport animals. Merchants come and buy the produce at very low prices and make large profits in towns such as Tokar and Port Sudan.
- People in the settlements (both settlers and new migrants) share the same burden of underdevelopment. Illiteracy is as high as 90%, malnutrition is very common, tuberculosis and malaria are widespread. In 1985 there were no medical services for people, no veterinary department, or other functioning government services except two main elementary schools in Odowan (shut since 1984) and Dolabiay settlements. Both schools are short of staff and teaching materials.

### **Natural Resources**

Khor Baraka is considered as a source of life to new and old settlers because of its thick forest resources and rich, alluvial soils. Different sections of the khor belong to different tribes which also own the land, the water and forest resources in their section of the khor (see Map 6).

The natural resources are protected by tribal tradition. Every tribe is expected to stop outsiders from cutting trees and also to use the resources moderately and with care. The tradition is still intact, but greatly weakened after recent droughts.

The millet farming which is practised between September and May along the khor, limits livestock movement within the area and thus shields the natural vegetation from excessive use by animals.

There are three dominant forms of land use in Khor Baraka. They are, in order of importance, farming, use of forest resources and pastoralism. According to Shami (1986) (see Table 2.1) almost 80% of the family's annual cash income comes from forest resources. This is very much a post-drought phenomenon.

Table 2.1

Breakdown of Average Family Cash Income by Sources  
in Khor Baraka Area

Economic Activity Income	Total Annual Income/Year	Per Capita	% Total
Millet cultivation	62.5	10.42	15.5
Production of forest plants	320.9	53.48	79.7
Other	19.2	3.20	4.8
Total	*LS402.6	LS67.10	100.00

\* LS = Sudanese pounds

Source: Shami 1986

There are three dominant tree species in Khor Baraka. These are dum palm or 'akab' (Hyphene thebatica); amab (Tamarix articulata); and muskit (Prosopis chilensis). Bed frames, ropes and birishes (tents) are made from amab and dum palm.

Muskit (Prosopis chilensis) is a recent arrival, being introduced to Khor Baraka by the Forestry Department only ten years ago. It was introduced to the Sudan in the 1960s as a potential desert-greening plant. Muskit has its positive aspects in the drier parts of the country, but is expanding at an extremely high rate at the expense of valuable trees such as amab and dum palm. Because Khor Baraka soil is very fertile and the water table is high, muskit can germinate

easily and grow fast. Under the canopy of every muskit tree you can find up to 200 seedlings growing. A muskit seedling becomes a tree in under two years within Khor Baraka conditions.

Farmers try to cut down as many muskit trees as possible, but because the wood has little economic value they have no incentive to continue cutting. Khor Baraka is perhaps the only area in Red Sea Province where the forest expands annually and farmers practice tree clearing to grow millet crops on the khor bed.

Soil fertility is guaranteed by the seasonal floods which bring the best alluvial soils from the hills and highlands across the Eritrean border. Such an annual enrichment of the khor and its banks ensures the best plant growth for food and range use throughout the dry season (October-May).

Khor Baraka is one of the few areas in Red Sea Province where water shortage does not dominate village meetings. The water table is generally high; people say during the driest season water is found at about 5 metres deep. People obtain their water from hand-dug wells, seasonal bore holes and sometimes standing water.

People in Khor Baraka have limited water management tradition or skills. Their semi-nomadic origin which was more livestock oriented and flood based millet mono-cultural farming has left them without any tangible irrigation or well building skills or tools. This contrasts with other areas of the Sudan. For instance, the shadouf is common in Western Sudan and Eritrea, and the shagia water wheel is common in Kassala.

Despite the fertile soil and accessible water resources horticulture is still underdeveloped in most areas along the khor. Khor Baraka offers a great horticultural potential which is as yet unrealised.

#### **Millet Farming in Khor Baraka**

The bullrush millet, or 'bultug' in Beja, is an important cereal crop widely grown in Khor Baraka. It probably belongs to the Pennisetum typhoides species widely grown in East Africa. Traditionally millet is the main staple food for the Beja.

Millet is known for its drought resistance, its ability to survive in poor sandy soils, its short maturation periods and its provision of abundant fodder for livestock.

Most millet in Khor Baraka is grown in pure stands and it dominates the area. Because of its vigorous tillering which depresses weeds and its resistance to the parasitic weed Striga hermonthica, millet is a clean crop. The greatest damage to millet crops in Khor Baraka is caused by Autumn winds (hababay), wild pigs (throughout the season) and Quelea and other birds (pre-harvest, at milky stage).

It is difficult to give an accurate estimate of the land cultivated in Khor Baraka. According to a 1984 survey carried out in the village of Odowan, a total of 56 farmers cultivated a total of 506 feddans, making an average farm size of 9 feddans. Details for millet yields over a three year period are given in Table 2.2. Millet prices also fluctuate seasonally as shown in Table 2.3.

Table 2.2

Decline of Millet Yields in Khor Baraka:  
Household Survey, Odowan Village

Total No of Farmers	No of Feddans* Cultivated	Total Yield in Sacks	Year
56	624	183.5	1982
56	585	165.0	1983
56	506	81.25	1984

1 feddan = 0.42 ha (1.04 acres)

Table 2.3

Seasonal Millet Price Fluctuations in Khor Baraka

1982 (£)		1983 (£)		1984 (£)		
Tamaka*	Sack+	Tamaka	Sack	Tamaka	Sack	
1	0.75	45	1.40	84	2.00	120
2	0.50	30	1.00	60	2.00	120
3	1.00	60	1.50	90	2.50	150

1 Harvest Period  
2 Middle Period  
3 Cultivation Period  
Source: Fre 1986

\* 1 Tamaka = 1.6 kg  
+ 1 Sack = 60 Tamakas

The Agricultural Cycle in Khor Baraka

There are three distinct seasons within the Beja calendar. These are the khor cultivation, the harvest and the post harvest seasons. The three seasons however may overlap, but they serve different agricultural purposes.

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## **Box 1: Agricultural Calendar in Khor Baraka**

### **(i) The Cultivation Season (September-December)**

Khor Baraka farming is unique in the area in the sense that it is not rainfed. When harvest starts in most other areas cultivation starts in Khor Baraka, and harvest commences in January.

The cultivation season is the busiest season in the agricultural calendar. Ideal sowing dates are between the middle of September to early October, but in practice all depend on the flooding. Millet farming in Khor Baraka has always been a risky business affected by flooding and Autumn winds (hababay) damage.

Because of such risks farmers are used to sowing three times in order to ensure crop germination during this critical period.

First sowing takes place between August and September and they concentrate their sowing along the banks (less flood risk areas) of the khor.

Second sowing is carried out between October and November, and the whole khor will be sown. Ideally no floods should come after the end of October and the second sowing is the most important in relation to total millet output. A flood in November would be a disaster.

Third sowing takes place between the end of November and December. In the event of flooding in November which may wash away 90% of the crop, the third sowing is the last insurance for the small farmer and perhaps his last chance to feed himself.

In most cases seeds are hand sown. A hoe, locally known as 'seluka', is used to dig a 10 cm hole in the ground where up to 40 millet seeds will be buried. The high seed rate is an insurance against losses, caused by strong winds. Seeds are spaced (using steps as a measure) about 90 cm apart.

### **(ii) Harvest Season (January-May)**

The first major harvest is between January and February. After that period side shoots and tillers flower giving up to four harvests in intervals of 8 to 21 days.

Migrant labourers come to the area to do the harvest work during this period. This underlines the importance of Khor Baraka as a source of labour to other communities. Such labourers are paid in kind; how much they get depends on how good the harvest is. In good years for example, they will get 1/6th of the total harvest but if the harvest is very poor they will share half the yield with the farmer.

The second, third and fourth harvests continue until the end of April and the beginning of May. Total production and millet quality gradually decreases through the season. By the 5th May the harvest season is over. The strong summer winds etebit start in May and people concentrate on non-agricultural activities from then on.

### (iii) Post Harvest Season (May-July)

This is considered as a rest period after the long agricultural season between August and May. During this period people concentrate on non-agricultural activities. Men work on ropes and bed/chair frames and women work on birish (palm mats). Other people travel and others simply rest until the next agricultural season.

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## **Livestock Production in Khor Baraka**

### The Impact of Drought on Livestock

Traditionally people had home herds and migrant herds which required different types of management. The home herds included small flocks and milking cattle and were kept near the settlement all the year round feeding off millet crop residues and grazing in the natural forests of Khor Baraka. The migrant herds were kept out in distant grazing areas towards Gash in Kassala Province and Eritrea. The scarcity of fodder and water in many areas and the prolonged drought has forced the agro-pastoralists to give up the latter form of semi-nomadism. The majority of settlers now concentrate on keeping smaller livestock units and combine it with millet farming.

During the 1984-85 drought livestock losses were dramatic. Many livestock were slaughtered for home consumption. Some were sold at very low prices and many more died due to disease and starvation. Information indicates that losses were over 90% including off-take (sale and slaughter) (Fre, 1986). To verify these estimates a complete household survey of present livestock in Odowan village in Khor Baraka was carried out (see Table 2.4).



Animal recovery rate in Khor Baraka has been slow. In 1986 only goats were increasing. Cattle and camels were in a reasonable physical condition, but were hardly reproducing.

Camels and goats are becoming dominant at the expense of cattle and to some degree sheep. Camels are needed for market and home transport, while goats provide work for children and can be a quick cash source when sold (see Table 2.5).

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**Box 2: The traditional pattern of movement in the Khor Baraka area (see Map 7)**

- i During summer (June to September) the movement is towards the Eritrean Border, as the range situation beyond Khor Langeb improves. Homib area inside Eritrea is the most important grazing area. Other important areas are Emalal, Tolic-Magateb and Haragga.
  - ii During winter (October to March) the migration towards the gunub (coastal areas) takes place. After good rains in October and November the rangeland improves in the coastal areas. Herders move to the coastal areas from different directions. Some return to the area between Bahr-Era and Ashat up to Erim. Others move to South Tokar up to Agig, where there is the best grazing after rains.
  - iii During drought periods or when grass is limited in the traditional rangeland (in gunub and the Eritrean border) herders migrate towards the said (clay plains) areas in South Kassala, Gedaref and the Eritrean/Ethiopian borders. This was the case during the 1984-85 drought when the regular pattern of movement was greatly disturbed. Competition for grazing land with mechanised agricultural schemes is increasingly a problem for the Beja. Movement in times of drought results in conflict with other landusers. This means that there is an increased reliance on local resources, such as Khor Baraka, at such times of local crisis.
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Table 2.4

Changes in household livestock holdings due to drought

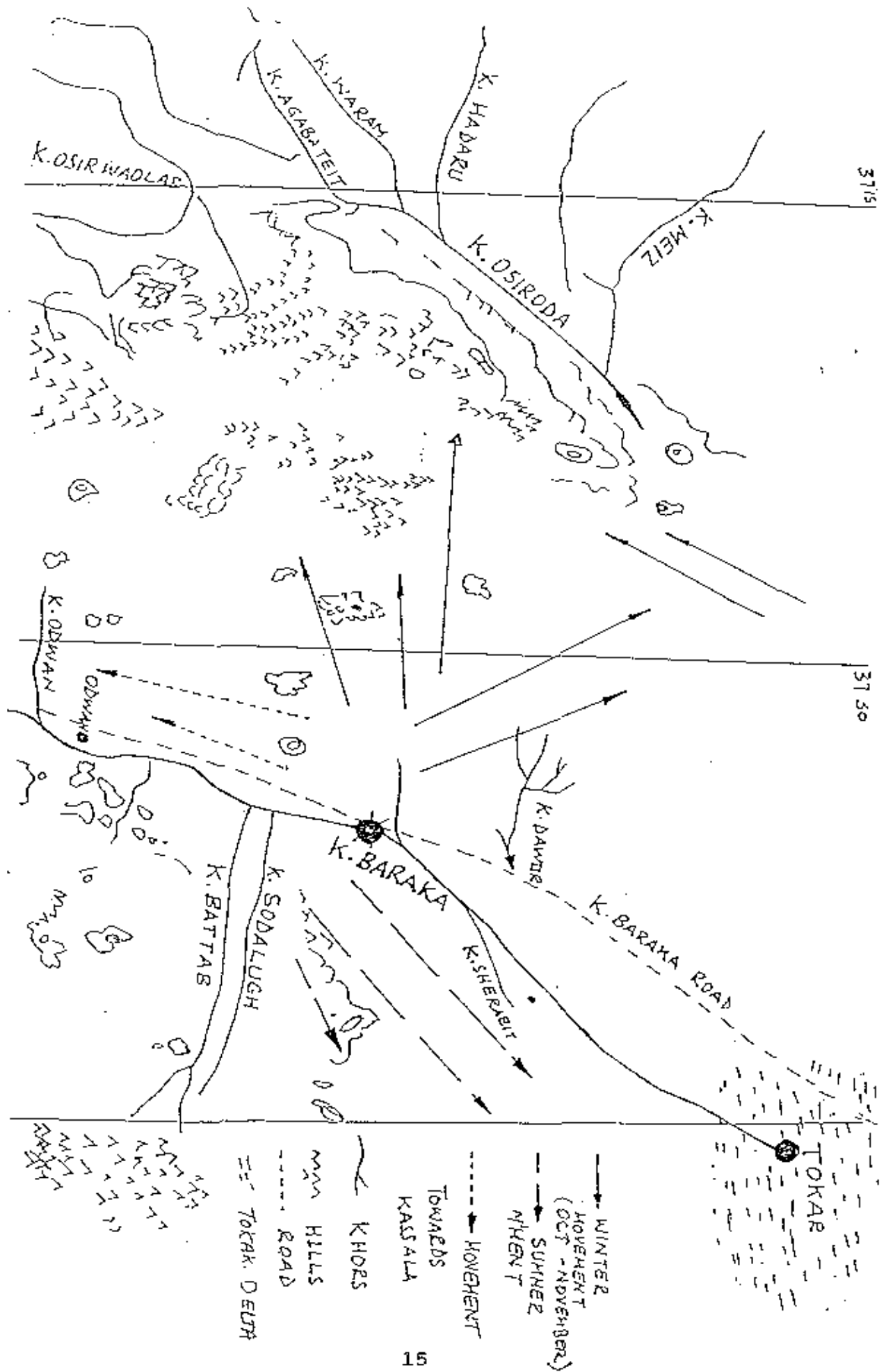
	Post-drought (1986) Average/household	Pre-drought Average/household
Camels	0.76	1
Goats	0.75	4
Sheep	0.70	10
Cattle	0.16	10
Donkeys	0.28	1

Table 2.5

The main animal breeds and their use in Khor Baraka

Animal Species	Name of Local Breed	Use	Remarks
Camel	Shalagait and Barakawi	Mainly transport	Shalagait are coastal Barakwi are smaller
Goats	Barakawi and Hill type	Milk, meat and sale	There are also other smaller breeds
Sheep	Aliat and Barakawi	Meat and sale	'Aliat' are of (Arab) Rashaida origin
Donkeys	Makadi	Transport	Small sized transport type
Cattle	Predominantly Erashay, also known as 'Arabi'	Breeding milk and sale	Large size Hadendowa (Beja) cattle. Good milkers.

Map 7: Livestock movements



### The threat and its implications

The most significant changes in the Khor Baraka ecosystem are discussed below.

Firstly, plant populations in the peripheries of the khor have been drastically reduced due to drought. Shrubs such as edleep (Sueda fruticosa); kurnut (Cabanda rotundifolia); arak (Salvadora persica); tundub (Caparis decidua); and other useful tree and grass species have disappeared due to recurrent droughts and overgrazing. The tributary khors are also affected in a similar way. Most of the above plants are palatable species. Their reduction has meant that livestock are moving further into the Khor Baraka forest, especially along the forested banks. Due to heavy use, more and more unpalatable plant species are emerging.

Secondly, the composition of plant populations in the lower stream of Khor Baraka has changed drastically. For example in the villages of Bahr-Era, Dolabiay and Harbagad (see Map 5) there is clear evidence that the recently introduced muskit (Prosopis chilensis) is replacing economically important trees such as edleep and amab (tamarix) and dum palm.

Thirdly, after recent droughts Khor Baraka has become much more exposed to water and wind erosion. Dum palm and tamarix regularly get uprooted or buried during the flood period. During the dry season wind storms bury some of the forest seedlings as well as millet crops. Muskit, on the other hand, is deep rooting and survives well under sedimentation. Erosion (both wind and water) is thus a major factor in distributing muskit seeds and seedlings.

Fourthly, North and South Tokar districts in general are sand dune prone territories; much agricultural land has been swallowed by moving sands. Khor Baraka is partly spared because of the thick forest cover, but over the years gaps have been appearing in the forest, and sand dunes have become a major constraint for millet farmers. The millet crops are simply buried by sand in the more exposed parts of the khor.

Fifthly, the greatest ecological threat to Khor Baraka comes from human settlement. Following recent droughts the human population in Khor Baraka has increased by 40%. Many destitute pastoralists came from the surrounding hills in search of relief food, agricultural land and water sources. They were accommodated in Khor Baraka by their Beja kinsmen to share land, forest resources and water.

Most of the inhabitants of Khor Baraka (including new settlers) are dependent on forest resources for income. Forest resources are thus being seriously depleted. Outside merchants who have lorries regularly visit Khor Baraka to collect wood, charcoal, birish tents, ropes, poles and so on at a very low price. They transport the forest products to major towns such as Tokar and Port Sudan where they fetch high prices.

The Khor Baraka area provides a place of refuge in an otherwise hostile landscape severely affected by recurrent drought. Only here is it possible to gain reasonable returns from flood retreat millet farming and find fodder sources for livestock. But with decreased millet yields and low livestock population due to drought, options for settled and pastoral Beja alike are limited. Unsustainable use of the forest resources is one option to overcome poverty in the short term.

### **Environmental Degradation in the Red Sea Hills**

To the outsider, the poor tree cover, the lack of grass and the rocky slopes provide evidence of a degraded environment of limited productivity. Yet in most years the Beja and their herds manage to survive and in periods of good rainfall prosper.

The hills here have provided political security to the Beja during conflict. The Beja entity was maintained by such natural shelter, as the hills stopped outside incursions and domination by alien forces. The mostly barren hills also provided grazing along their khors. Although Beja graze their herds along 900 kms of shore and some of their camels even drink sea water, they have always turned their backs on the Red Sea and lifted their eyes to the hills. With their hearts in the hills many Beja even during the Middle Ages, traded with Suakin (see Map 2). They bartered with milk, ghee, charcoal and skins. Their strong attachment to their land and its resources has more than 3,000 years of history.

Several authors, dispute the assertion that land is degrading (Harrison 1955, Kennedy-Cooke 1939, Alchrona 1989). Until recently, the Beja environment has been much the same for centuries. Over long periods, data does not record dramatic change in climate, vegetation or rainfall patterns. Although periodic droughts in Beja history have decimated much of the livestock, the rains following the drought regenerated the vegetation and herds recovered. A period of declining rainfall since the mid-1960s has had a major impact on Khor Baraka's resources and their use. The impact of major droughts has been particularly severe.

However, the rate of environmental decline caused by plant cover removal is much higher in other areas of the Sudan than in Beja country. In the Gedaref district, south-east Kassala Province, extensive cultivation meant clearing huge tracts of natural rangeland. Deforestation is very rapid in these areas. Therefore environmental degradation in the Red Sea Province, contrary to commonly held views, may not be as fast as is claimed. Older Beja interviewed in many villages said that their hills have always been barren as long as they can remember and their lives depended on the khors for grazing and cultivation. There is reference however to particular areas of better winter rainfall where deforestation has been created by overgrazing and charcoal making. For instance, the virtual disappearance of the wild olive (Olea chrysophylla) in Erkowit is linked to overgrazing. The slow rate of degradation and the constant nature of Beja vegetation was given some explanation by Kennedy-Cooke (1944) when he commented on Beja natural resource management practice:

'The slow rate [of degradation] may be due to resting of certain grazing areas due to lack of water, slowly flowing streams, encouraging vegetation growth and sound tribal forestry practices. Nobody really knows what the actual or potential carrying capacity of the land is in the Red Sea Hills.'

It is important to emphasise that the Beja perceive their natural resources as perishable and degradation as an undesirable phenomenon. The Beja sense of good forestry conservation always impressed outside observers. Kennedy-Cooke (1939) writes:

'Throughout much Beja territory the Beja custom against tree-felling operates. They ruin the look of some trees, especially Acacia albida, by lopping branches for their goats to feed on, but wanton tree destruction, so common in Arab areas, is almost non-existent, and severely punished by tribal courts when it occurs.'

However since the mid-1960s declines in rainfall, and a series of major droughts have intensified pressure on the land. At present intense charcoal-making is the single most destructive factor. With drought-imposed destitution, charcoal production has been intensified and some Beja are bending traditional rules in order to survive.

Livestock rearing, which is the only viable means of exploiting an arid environment, has contributed to increased land pressure by concentration in certain higher rainfall areas in the Red Sea Hills, such as Erkowit and the Tokar Hills. The argument, however, that Beja flocks/herds are sole agents of 'desertification' is open to serious questioning.

#### 4 DEVELOPMENT INTERVENTIONS

##### Government Interventions

In the past, the planners seem to have had little perception of pastoral needs and potential. Policy was oriented towards settlement schemes, with a focus on irrigated or mechanised agriculture. Little attention was given to pastoral support. The government planned some projects in the early 1960s and 70s to help Beja settlement and rehabilitation. Abu-Sin (1975) writes that the Rural Council executive in Port Sudan outlined a plan for Beja pasture improvement and the creation of self-sustaining projects based on damming of khors. Thirty places were suggested for settlement of over 8,000 families in 13,000 feddans, each site sustaining 500 people and 2,500 livestock. The four main areas of work were Khors Amur, Arab, Arbaat and Hawashiri (Map 4). Surface wells, elementary schools and dispensaries were suggested in the plan. Most of these projects did not materialise and the Beja's response to the initiative was muted.

The limited development reflects the politically and socially marginal position of the Beja within wider Sudanese society. Beja lack the infrastructure, the institutions and power to enable them as a society to carry forward development plans.

The Forestry Department has a long standing involvement in Khor Baraka and, according to the forestry legislation of 1932, the department has the mandate to protect Khor Baraka forests. Unfortunately, the District Forestry Office is manned by only one forest ranger and one forest overseer and because of the lack of transport facilities, both of them reside in Tokar town, 40 kms away. The Beja themselves are protectors of their own forest with very little help from the Forestry Department. According to Shami (1986: 24):

'In most of Khor Baraka area, the inhabitants know the Forestry Department as a royalty collecting body. During the last period when the Forestry Department tried to help the inhabitants of Khor Baraka by proposing an income generating project and proper cleaning of the Dom forests. The people refused the idea as they believed that the Government Forestry Department was going to take their land and forest.'

The local experience of government intervention has not been positive. Government has failed to respond to the resource needs of the people of Khor Baraka.

## **NGO Intervention in Khor Baraka**

As a result of the 1985 famine there has been an upsurge of NGO interest in the Red Sea Province. In the Khor Baraka area OXFAM is the only NGO which is involved on a major scale. OXFAM's initial involvement in 1985 was with provision of emergency millet seeds to more than 3,000 farmers along Khor Baraka.

The seed provisions by OXFAM and its efficient distribution has raised farmers' expectations and have encouraged OXFAM to do more for Khor Baraka. The first phase of the Khor Baraka Rural Support Programme consisted of the Seed Distribution Project, Small Well-Digging Tools Project, pig traps distribution, research in forestry resources and agropastoralism.

Water shortage in Khor Baraka is not a serious problem because of the high water table. The use of water for irrigation and providing clean drinking water are the most important areas of intervention proposed by the settlers. An understanding has been reached with the Rural Water Corporation and OXFAM has provided well digging tools to some communities in Odowan and Enkiateb settlements in Khor Baraka. Khor Baraka people are generally interested in open wells which are multipurpose (for irrigation and drinking) and maintainable. In future OXFAM will be providing empty barrels for well lining and in some cases cement for lining.

Crop pests and diseases are a major hazard to farm crops and forests in Khor Baraka. A basic horticultural and forestry extension programme will be needed in future to support Khor Baraka farmers. Wild animals particularly wild pigs have been damaging millet crops seriously. In response to farmers' appeals for help, OXFAM has provided four locally manufactured pig traps to reduce the wild pig hazard.

OXFAM has spent considerable resources in researching the human, natural, livestock and agricultural resources in Khor Baraka. It now has adequate knowledge of the natural and human resources in the area in order to be able to plan long term community based intervention in Khor Baraka.

By supporting small scale activities that have been identified as priorities by the people of Khor Baraka, the NGO involvement in the area has been trying to explore ways of sustaining livelihoods within the khor.



## 5 CONCLUSION

Development options in the neighbouring hilly areas are limited given the overall marginality of the region. For instance re-seeding pastures would be highly uneconomic in the hills and forced reduction of livestock would be highly impractical.

The khors however offer a better prospect for development. By reviving indigenous tree species, introducing appropriate browse plants and by consciously integrating Beja conservation laws in the khors, some significant and sustainable development may be achieved in future.

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## **IIED'S DRYLANDS PROGRAMME**

The Drylands Programme at IIED was established in 1988 to promote sustainable rural development in Africa's arid and semi-arid regions. The Programme acts as a centre for research, information exchange and support to people and institutions working in dryland Africa.

The main fields of activity are:

- **Networking between researchers, local organisations, development agents and policy makers. Networks help exchange ideas, information and techniques for longer term solutions for Africa's arid lands.**
- **Support to local organisations and researchers to encourage sharing of experience and ideas, capacity building and establishing collaborative links.**
- **Action-oriented research in the practice and policy of sustainable development in Africa's drylands, focusing on the variability of resources and incomes on which populations depend, development-oriented research methodologies, and natural resource management systems.**



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