

Rapid Rural Appraisal for Economics: Exploring Incentives for Tree Management in Sudan

Edited by

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STUDIES

**RAPID RURAL APPRAISAL FOR ECONOMICS:
EXPLORING INCENTIVES FOR TREE MANAGEMENT IN SUDAN**

Report of a field based workshop conducted in Sudan
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International Institute for Environment and Development
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ARABIC GLOSSARY

Abu Sab'in	Short duration fodder sorghum
Arak	<u>Salvadora persica</u>
Berseem	Alfalfa-like fodder crop
Dura	Sorghum
Feddan	0.42 hectare
Gardud	Clay soil
Gasud	Land allocation system
Goz	Sandy soil savanna
Haraz	<u>Acacia albida</u>
Hashab	<u>Acacia senegal</u>
Heglig	<u>Balanites aegyptiaca</u>
Jerif	Flood retreat land
Kantar	100 lbs (45 kg)
Kitir	<u>Acacia mellifera</u>
Laot	<u>Acacia nubica</u>
Neem	<u>Azadirachta indica</u>
Salem	<u>Acacia raddiana</u>
Samur	<u>Acacia tortilis var. spirocarpa</u>
Sayal	<u>Acacia tortilis var. radiana</u>
Sidir	<u>Ziziphus spina-christi</u>
Sunut	<u>Acacia nilotica</u>
12 Sudanese Pounds (LS)	1 US\$ (at February 1989)
Talh	<u>Acacia seyal</u>
Tundub	<u>Capparis decidua</u>

EXECUTIVE SUMMARY

Rapid Rural Appraisal techniques offer an approach to understanding the complexity of farming and livelihood systems. For the topic of tree management this complexity must be disaggregated so as to understand how incentives work at regional, village, group and individual levels.

This study focusses on two villages in the proximity of Khartoum, Sudan and illustrates these different determinants of local incentives.

At regional level the influences on tree management relate to changing patterns of wood product supply and demand and the interaction of urban and rural markets.

For the village farming system uncertainty over economic, tenurial and environmental are key influences on tree management incentives; land use, tenure patterns and institutional control over communal forest land are also found to be significant.

The preferences for their trees by different groups in a village influence assessments of the costs and benefits of alternative tree management options. Similarly, different socio-economic groups have varying, and sometimes competing, interests in the local resource base and are affected to different degrees by changes in the wider wood economy.

Thus, this investigation of economic incentives at different levels enables the development of integrated insights for a more effective understanding of incentives for tree management in rural Sudan.

1. INTRODUCTION

Background to the Exercise

This Rapid Rural Appraisal (RRA) was originally seen as having two important objectives: first to train staff of the Institute of Environmental Studies, University of Khartoum, together with additional trainees and observers from other university and government institutions and NGOs in the techniques of RRA; and second to link this training to the Gum Arabic Rehabilitation Project (GARP) undertaken by the IES and the International Institute for Environment and Development (IIED), London. This was to be the first attempt to use an RRA specifically to obtain information and develop hypotheses about the economic incentives involved in the production of gum arabic from the tree Acacia senegal. But because of logistical difficulties it was impossible to visit gum producing areas.

The objectives of the exercise were revised to training in RRA techniques to be achieved by:

1. Training participants specifically in the use and understanding of various diagrammatic and ranking techniques.
2. Learning-by-doing to use those skills to conduct village appraisals to generate a set of key research questions relating to the economic incentives to tree management.

Rationale for RRA for Economics

Since the 1960s economic development thinking has become less occupied with increasing food production to feed the growing world population and has begun to emphasise the basic and special needs of the poor. The early policies that promoted relatively simple technological innovations were implemented primarily in the regions of developing countries containing biophysical and socio-economic conditions favourable for economic and agricultural development. These new technologies held great promise of effecting major change from relatively small investments. Indeed these efforts to assist food production in the resource-rich regions were highly successful, resulting in a growth of food production per person of about 7% in all developing countries over a 20 year period to the mid 1980s (FAO, 1965-86).

Yet this has proven insufficient. Despite the change in emphasis many people still lack basic needs, remaining short of food or the resources to acquire or grow sufficient food. The picture of success requires some disaggregating. In terms of food production per person, Asia and Latin America have seen the greatest rises,

but production has fallen by about 1% per year in Africa over this period. Within countries the favoured lowland regions close to roads, ports and cities have tended to perform better than those that are more remote and lack infrastructure. All the more successful regions, whether continents, countries or regions would appear to have a common feature: they are all relatively resource-rich and could be developed with simple, widely applicable interventions.

This greater complexity of resource-poor areas arises from several important factors:

1. The nature of these resource-poor rural systems, in which the livelihoods of people are often characterised by great diversity.
2. The perceptions and knowledge of rural people themselves, in particular the indicators and criteria for choices and decisions, are often much more diverse than those of outsiders.
3. The need to analyse and understand systems as part of a hierarchy, in which the behaviour of lower systems in a hierarchy from field-farm-livelihood-village-region-nation, is not readily discovered from a study of higher systems, or vice versa. The effects of macro policies at the household level are likely to be complex and variable, and although there is a considerable body of research upon the way such policy affects agricultural production and food security, the consequences tend to be assessed on aggregate indices of development also at macro level. In this way farmers and rural people are treated as groups en masse, assuming an average behaviour in the face of policy changes (Conway, 1987a).

These factors all have important consequences for rural economic development policy and planning. First there is a need for information gathering and analytical techniques that can understand this complexity. Second strategies must be sufficiently fine-tuned to suit variable and diverse conditions. Third development cannot be based solely, or even largely, on macro economic policy, or other disciplines fixed to certain levels such as genetic engineering or farming systems research: each level must be analysed in relation to other levels above and below.

Trade-offs in costs and benefits of development options differ according to perspective, whether national, regional, village, group, household or gender. To develop policy and development strategies that are suited to local conditions and acceptable to local people, investigations from the national to the local level need to be integrated. In this study to determine the incentives perceived by rural people to the cultivation, maintenance and use of trees, processes acting at various levels will be considered. These incentives take several forms -

institutional, economic, cultural, and act at different levels, from national to regional, to village, to cohesive groups within a village, and to individuals.

2. RAPID RURAL APPRAISAL

Rapid Rural Appraisal has been developed over the last ten years in response to concerns over the commonly encountered pitfalls to conventional approaches for rural research and development. The term RRA has now come to refer to a wide range of techniques and methods. Indeed not all RRAs are rapid, not all are restricted to rural situations, and not all are appraisals. It is best defined as a structured and systematic activity designed to generate new insights about the range of opportunities open to rural people and the factors and incentives which influence decisions over these opportunities.

There are a number of important principles that illustrate the key features of Rapid Rural Appraisal. RRA should not be thought of as a pre-set methodology in package form - instead it comprises a series of **CHOICES** for any given situation. Investigators can thus select from a "basket of choices" according to their needs and experience, and are able to investigate the full range of people and situations encountered in the field. The process is **ITERATIVE** and is modified by the investigatory team as information is progressively revealed. Insights arise because of the **MULTIDISCIPLINARY** nature of the investigatory team. RRAs encourage team members to be **INVENTIVE**, and thus there is no standard procedure. The procedure is systematic and **SEMI-STRUCTURED**, whilst maintaining flexibility and adaptability. Accuracy is achieved through **TRIANGULATION**, which involves the use of a diversity of methods and information sources rather than statistical replicability. Unnecessary detail is avoided through **OPTIMAL IGNORANCE**, and the key trade offs between precision - breadth - depth - timeliness are made explicit through **APPROPRIATE IMPRECISION**. Finally it is recognised that investigators interfere, and RRAs thus attempt to make **BIASES EXPLICIT**.

There are seven categories for RRA techniques, methods or tools (McCracken et al., 1988). These are as follows:

Secondary Data Review

Secondary data and information are published or unpublished data acquired by other people at an earlier time that are relevant to the topic or system under study.

Semi-Structured Interviewing

This is guided interviewing where only some of the questions are predetermined and new questions arise during the interview, in response to answers to those interviewed. Checklists are used as reminders of the topics that should be covered.

Direct Observation

This encompasses any direct observation of field objects, events, processes, relationships or people that are recorded by the team in note or diagrammatic form.

Diagrams

These are any simple schematic device that presents information in a readily understandable visual form. Their value lies in dramatically simplifying fairly complex information. The act of constructing the diagram is in itself an analytical procedure which promotes communication, stimulates discussion and furthers consensus. Some diagrams are best drawn directly as information is being discovered; in this way it is then possible to present them to informants to check that the representation is valid.

Analytical Games

These are games in which the knowledge and preferences of those being interviewed are used to both produce a comparative ranking and discover the criteria upon which those choices and decisions have been made.

Portraits and Stories

These are short, colourful descriptions of situations encountered or stories told by people met in the field that describe information which is difficult to incorporate into diagrams. They help to bring to life the conditions of rural people.

Workshops

These are a means of bringing people together, including the field team and outsiders introduced for their skills and experience, to participate actively in reviewing, analysing and evaluating the information gathered. Workshops are typically fairly intensive, switching between plenary and group work, and aim to arrive at a consensus of opinion over priorities for action.

Procedure for the RRA in Sudan

The RRA was conducted over a period of 11 days, and divided into a number of short intensive phases in order to foster progressive and sequential learning. The focus of activities was regularly shifted between workshop and fieldwork. Within the workshops activities were switched between plenary presentations and group work. This type of structured RRA involving workshop and field analysis, together with the analysis of larger systems than just farming system level, is typified by the approach of Agroecosystem Analysis (Conway, 1985, 1987b; ERCS, 1988; MFVDP, 1988; McCracken, 1988).

The two villages studied in the RRA were Faki Hashim, some 30 km to the north, and Shekih El Siddiq, which is located 90 km to the south (Figure 1). The principal objective was to ascertain the key incentives arising from national to individual level to tree management. Over the course of the RRA the following foci were progressively emphasised:

1. Secondary data review

2. Village profiles.
3. Livelihood profiles within each of villages
4. Issues for tree management

First Workshop (2 Days): Introduction to RRA and Secondary Data Review

The workshop began with an introduction to the concepts and principles underlying RRA, and a history of its development. The range of choices and methods available under the RRA rubric were described - in particular semi-structured interviewing, all the different diagrams, and the four ranking techniques. The second part comprised an historical review of RRA and the context in which it was developed.

The methods were introduced by first a practical application of a ranking game, and then the secondary data review. The game comprised the technique of Preference Ranking, in which informants are asked to make pairwise choices between 6 different items of interest to both the interviewer and interviewee. The participants split into groups of 3, each containing a mix of disciplines. Some of the groups explored consumer preferences for fruits, and the others preferences for vegetables. First the six most important fruits and vegetables are determined in plenary; each group then draws up a matrix to record the results and writes the name of each food item on 6 separate pieces of paper. The interviewee then asks pair-by-pair which is most preferable, together with the reasons why. In this way a ranking of most to least preferred is produced, along with all the criteria used to make those choices. The game takes about one hour, including writing of results on overhead transparencies. These were then presented by the participants to plenary.

The secondary data review presented the opportunity to introduce some diagrammatic methods. The team split into two groups to review each of the two villages. A map, seasonal calendar and historical profile were drawn on transparencies and presented. This then provided the first focus for the fieldwork.

First Phase Field Visits (2 Days): Village Profiles

The two groups of participants remained allocated to one of the two villages for the duration of the exercise. In order to produce village profiles, each team aimed to complete the following activities :

1. Map - bold and schematic to obtain an overview of the resources of all types in the study area
2. Transect - a representation of spatial differences that includes the major distinguishing features, including soils, crops, trees, livestock and problems
3. Seasonal Calendar - a single diagram containing between-season changes in related components of the system under study, including climate, crop sequences, pests and

diseases, perennial and wild harvests, labour demand, prices, human diseases, social events, consumption of food, etc

4. **Historical Profile** - major events recalled by informants and obtained from the secondary data
5. **Preference Rankings** on trees, fruits, vegetables
6. **Direct Matrix Rankings** - in which the items under investigation are ranked by informants according to favourable and unfavourable characteristics
7. **Wealth Rankings** - in which the perceptions of informants are used to rank households within a village or quarter of a village according to overall wealth. This technique requires careful preparation: first the list of households must be prepared ; second the name of head of household must be written onto separate pieces of card or paper; next the informants identified; next the interview begun with a discussion of the informant's perceptions of wealth; then the cards are sorted by the informant into piles or wealth classes; these are reviewed and changes made accordingly; and finally the informant is asked to name the principal features of each household's livelihood strategy. The ranking is cross-checked with several rankings of the same list, and the final wealth classes computed.
8. **Venn Diagrams** - in which key institutions and individuals responsible for decisions are represented by circles with differing degrees of overlap
9. **Any other diagrams**
10. **Key Informant Interviews** - in which informants with special knowledge or who hold a position of interest are identified and interviewed on these topics

Second Workshop (2 Days): Analysis of Village Profiles and Posing Questions

This workshop began with analysis in separate groups of findings by the drawing of the diagrams. These were then presented by participants to the plenary group. This is a key part of the procedure, helping to foster ownership of information represented on the diagrams. The inter-group discussion and critique also ensures that the information represented is cross-checked. Following these summarised village profiles each group began the process of filtering information and understanding down to individual livelihood options. The major livelihoods in each village were characterised, together with the economic incentives for these options. Each group finished with the production of a list of major unknowns, a checklist of topics and some important hypotheses concerning tree management (See Appendix B for hypotheses generated for Sheikh el Siddiq).

Second Phase Field Visits (2 Days): Livelihood Profiles and Tree Management

The field teams conducted key informant interviews, focussing upon the different livelihood strategies and tree management. This enabled the exploration of the range of socio-economic situations in the village. Interviewing women proved to be almost impossible. One team was able to stay overnight in the village, thus both maximising the opportunities for intergroup discussion and further interviews. The same group also managed to arrange a feedback meeting to present two of the diagrams to a group of 20 senior men of the village. The meeting lasted for about one hour.

Final Workshop (1 Day): Formulating Key Questions for Research

Activities focussed upon reviewing of the original set of diagrams, followed by the drawing of new diagrams. This is the stage when all the information and knowledge generated during the field and workshop phases is drawn together to produce a set of hypotheses and key questions for further investigation and research.

Review Workshop (1 Day)

An audience was invited in addition to the participants in the RRA training. Robert Chambers gave a presentation entitled "RRA and New Directions in Rural Development". This was followed by presentations of each of the village profiles by the participants. A short discussion of the different applications of RRA then followed, including Rapid Zoning techniques and Adaptive Action for extension workers.

3. REGIONAL ISSUES

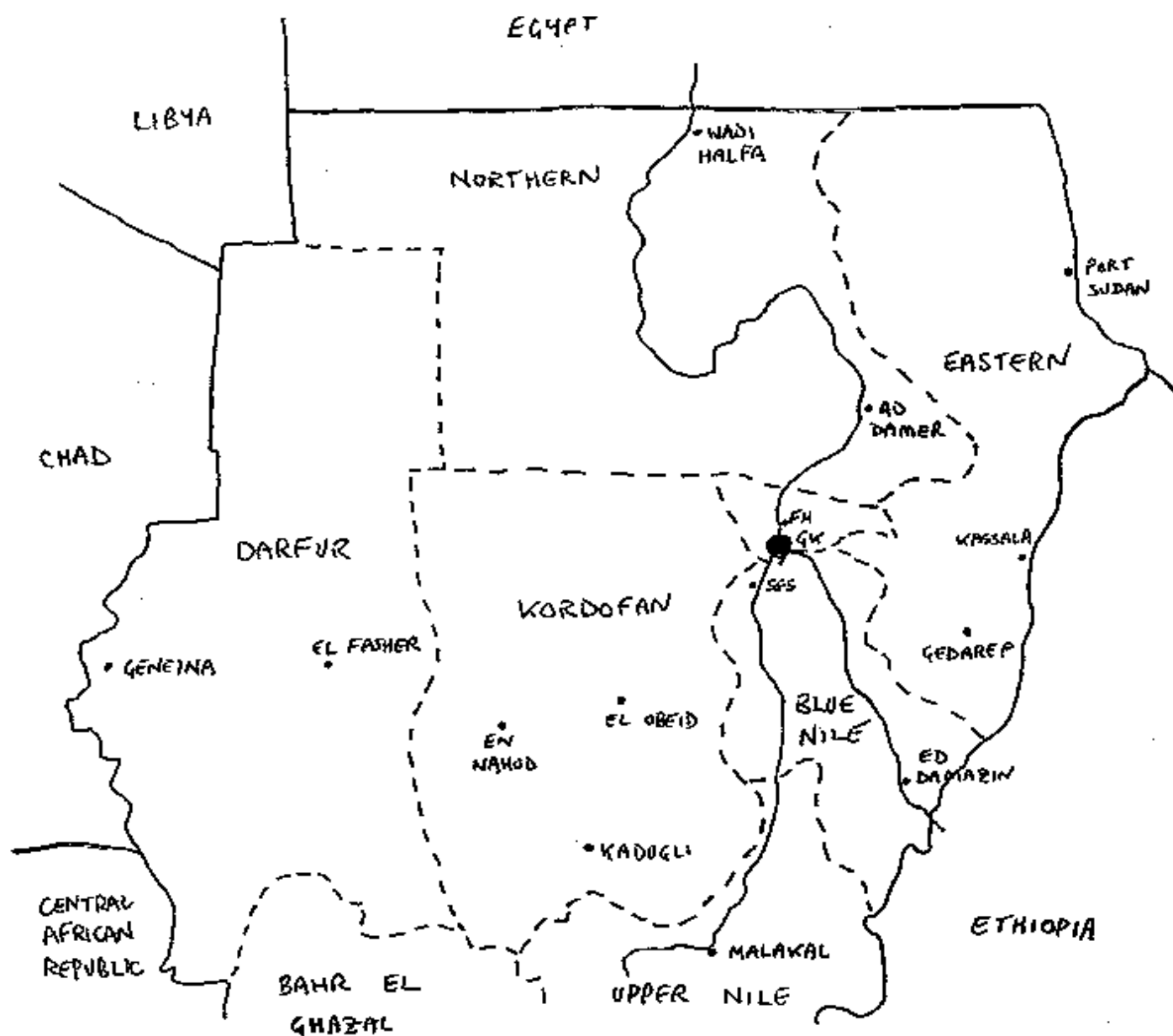
Profile of Greater Khartoum and Its Surrounds

Greater Khartoum is a significant magnet for both people and goods in the Sudan. The city population doubled between 1973-1983 to about 1.5 million, with some 70% of the increase due to net in-migration. Many rural people were displaced following the severe droughts of the early 1970s and mid-1980s. In 1984 it is estimated that some 120,000 people moved to Greater Khartoum as "environmental refugees" from Kordofan and Darfur alone (El Sammani et al, 1989). Many more refugees are thought to have immigrated from the eastern region. The influx of rural populations is expected to continue, through a combination of deterioration in rural economies together with perceived better options in Greater Khartoum. Figure 2 shows the growth of urban area since 1971.

The settled area of the city is extremely widespread, from Omdurman to the south by the White Nile, to Khartoum by the Blue Nile, and Khartoum North after the confluence of the two rivers. But the city is not entirely urban: there are large populations of livestock residing in the city. Cattle have been brought by their owners from at least 100 km distant because the city is the only place where they can purchase fodder; sheep are also fed on fodder, but the population of some one million city goats feed only on urban wastes and refuse. There is therefore a significant demand from within the city from both humans and livestock for agricultural produce.

The climate in and around Greater Khartoum is unfavourable to rainfed agricultural activity. The average annual rainfall is of the order of 150-200mm. But since the early 1970s rainfall has become less predictable, and rainfed agriculture has become increasingly insecure (Figure 3). In Faki Hashim there has been no grain harvest from rainfed sorghum since 1981. The most successful food producing areas are therefore the irrigated lands close to the Niles, and flood retreat agriculture. Nonetheless the drylands remain critical to the livelihoods of many people.

Out-migration from rural areas as a strategy for supplementing locally generated income has increased since the 1960's. Seasonal labour opportunities on the mechanised farming schemes to the east grew massively through the 1950's and 1960's to the present. The growth of Greater Khartoum during this period also opened up chances for urban based employment. The oil boom of the 1970's attracted many Sudanese to the Arab states for employment. Although these opportunities are no longer growing, many inhabitants of Sheikh el Siddiq rely on income earned outside the village. Similarly, many of the local traders and artisans were able to establish their businesses thanks to such sources of income in the past.



- FKH = GREATER KHARTOUM
 FH = FAKI HASHIM VILLAGE
 SES = SHEIKH EL SIDDIQ VILLAGE

Figure 1. Regional map of northern Sudan

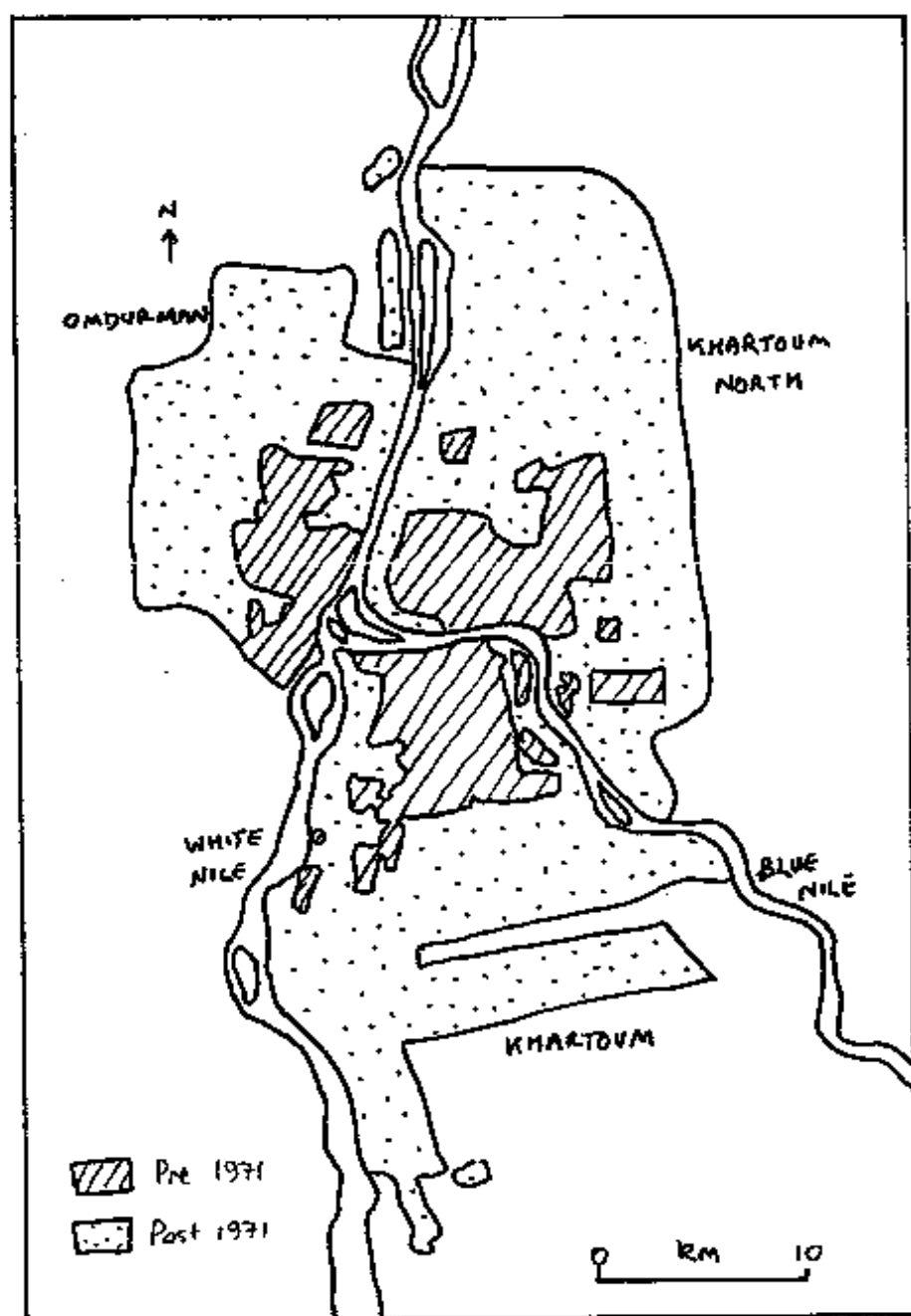


Figure 2. The growth of the urban area of Greater Khartoum (from El Sammani et al, 1989)

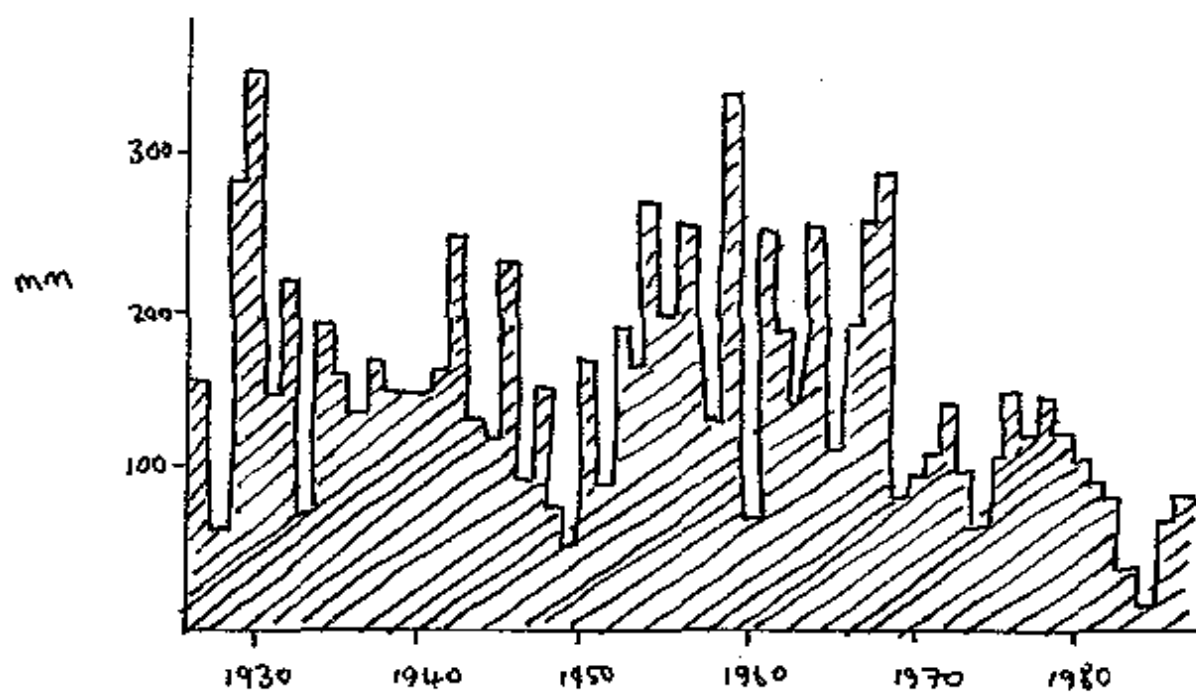


Figure 3. Rainfall at Shambat, Khartoum, North, 1930-85

Patterns of Wood and Charcoal Supply and Demand

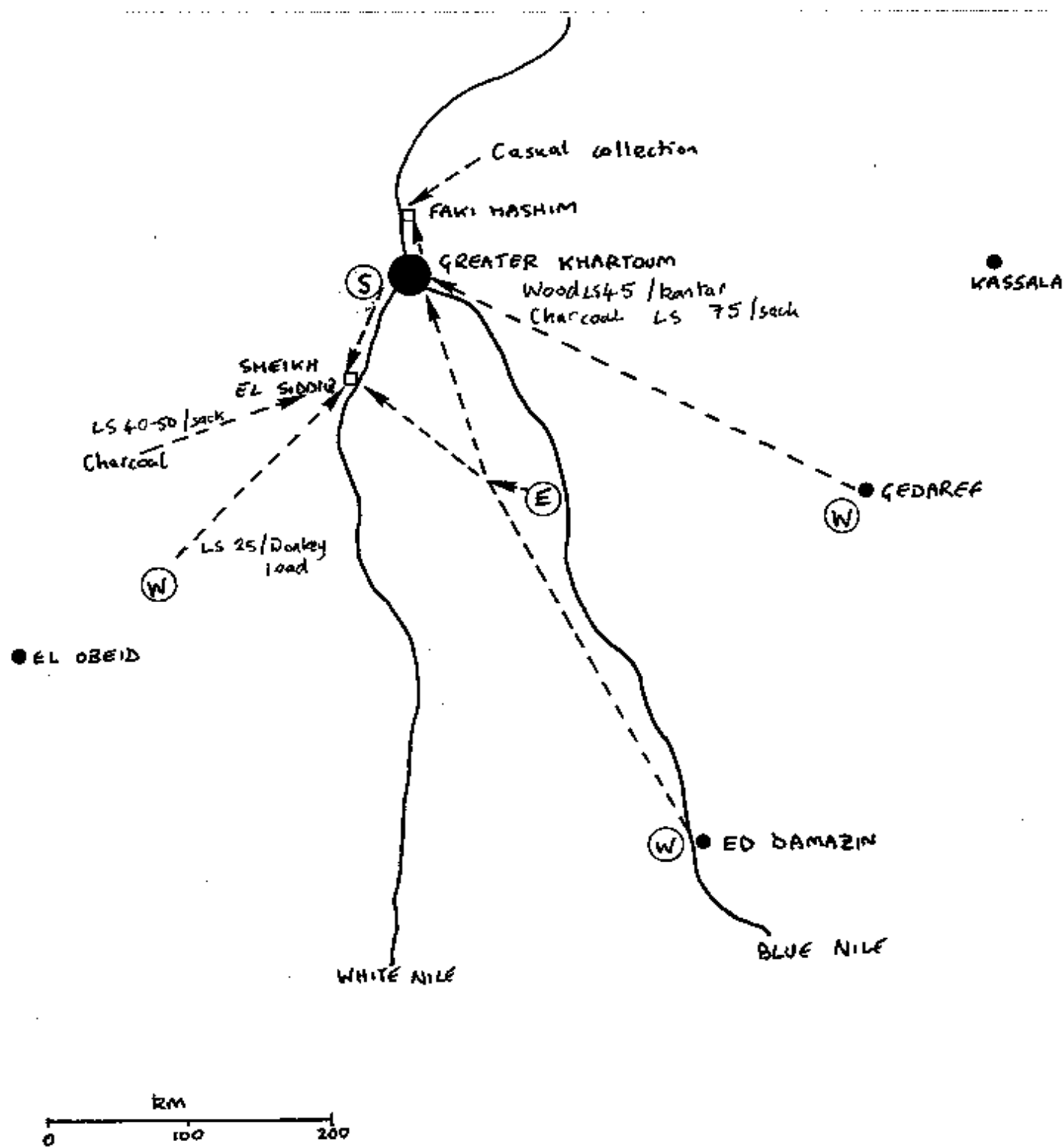
A series of key informant interviews were carried out to investigate the changing patterns of wood supply from outside the villages. These aimed to explore the impacts of changes in the regional economy on the local wood resources, and were conducted with brick-makers, a builder, carpenter, cheesemaker, baker, wood merchant, eucalypt pole and charcoal merchant, and farmers and displaced migrants; all of whom are involved in the import of wood products into their respective villages.

Charcoal and wood are widely marketed and the demand is met by three main sources:

- Clearance of savanna woodland for mechanised agricultural schemes to the south and south-east of Khartoum, particularly in Blue Nile and Kassala Provinces.
- Cultivated trees, mainly Eucalyptus and Sunut, on irrigated plots.
- Casual clearance and harvesting of local trees, including from goz lands.

The rate of land clearing for mechanised agriculture is expected to decelerate over the coming years. This will constrain access to both wood and charcoal. Take Blue Nile Province as an example - it currently supplies much of the charcoal for the urban markets, yet most of it is already under cultivation. In 1985 it was estimated that some 900,000 feddans (380,000 ha) remained to be cleared of trees, which could produce 50 million sacks of charcoal. As Dewees (1987) put it "if only a third of the demand from Blue Nile Province, the Gezira and Khartoum were met by these supplies, they would be completely cleared by 1999". However the Mechanised Farming Corporation intends to move extensively into South Kordofan, Upper Nile, White Nile and Southern Darfur Provinces, which all have the potential of becoming significant suppliers of wood and charcoal. The extent of supply from irrigated plots and from peasant farmer clearance of goz land is not expected to increase significantly.

The flows of wood and wood products was investigated by a series of interviews in both of the case study villages and Khartoum and a map was produced to summarise the information (Figure 4). The majority of wood and charcoal is transported long distances. Most travels first to Greater Khartoum, before being transported to outlying villages, such as Faki Hashim and Sheikh el Siddiq. Some does travel directly to villages though: charcoal has long been imported from Kordofan to Sheikh el Siddiq, where clearing of land in the goz areas has provided a steady supply. Charcoal is transported by camel to the village and sold to merchants there. Despite the long distances it appears that the costs of



- > Movement of wood products
- (E) Eucalyptus from irrigated plots 1 pole LS 30-50
 - (W) Wood + charcoal from Sunut, Samer, Kitar, Heglig, Tach, Hashab
 - (S) Softwood planks LS 40-70 each

Figure 4. Movements of wood products

the large scale production of both charcoal and wood, together with low transport costs, even over distances of 4-500 km, still produces a product at a competitive price. A recent survey indicates that transport costs account for only 20-25% of total retail costs for charcoal (Deweese, 1987).

Charcoal and wood are uncontrolled commodities, and prices fluctuate freely according to relative abundance or scarcity. Within years charcoal prices are highest during the wet season, when transport becomes difficult and labour costs are high, and lowest at the end of the dry season. In the long run, though, real prices have shown very little change for the Khartoum market (Figure 5). Price fluctuations appear to result from a combination of factors: changes in oil prices that affect transport costs; good agricultural harvests, which cause migrant labour not to seek work in the charcoal industry; high agricultural prices, leading to more rapid clearance of land; pressures on capital markets, which finance charcoal entrepreneurs; formation of temporary cartels between merchants, which drive up prices; and competing export markets to the Middle East (Deweese, 1987). Wood prices trends have not been recorded, but are thought not to have changed significantly in real terms over recent years.

The demand from wood products comes largely from household fuel requirements, brickburning and building. Fuelwood and charcoal demands are high in Greater Khartoum and the heavily populated peri-urban fringe. Demand is likely to increase as the population of the urban and surrounding areas grows, since there is no evidence of widespread switching to non-wood based fuels.

An additional significant demand for wood comes from the many brickworks situated to the north of Greater Khartoum. These are along the banks of the Nile, and draw seasonal labour from as far as Darfur. Firing the bricks requires large amounts of wood, which is purchased from the large traders, not locally. One brickworks in Faki Hashim fired 7 kilns of 115,000 bricks each in the January-May season of 1988. This used a total of 875 kantars of wood (40 tonnes). There are sufficient brickworks in this region to consume more than 400,000 cubic metres of fuelwood annually (Ahmed and El Magzoub, 1985). This alone is estimated to require the harvesting of 11000 feddans of Sunut forest each year, assuming a 20 year rotation with an increment of about 2m³ per year. The price of wood is now LS 40-45, though last year was only LS 16/kantar.

The demand for wood, though, is not just for a fuel. There is also a significant demand for building materials. Since the coming to maturity of the irrigated eucalypt plantations in the Gezira and in the Khartoum 'green belt', there has been a greater demand for marketed building materials.

The availability and price of alternative wood products at the regional level affects the patterns of local wood use and future substitution possibilities. The regional pattern of demand and

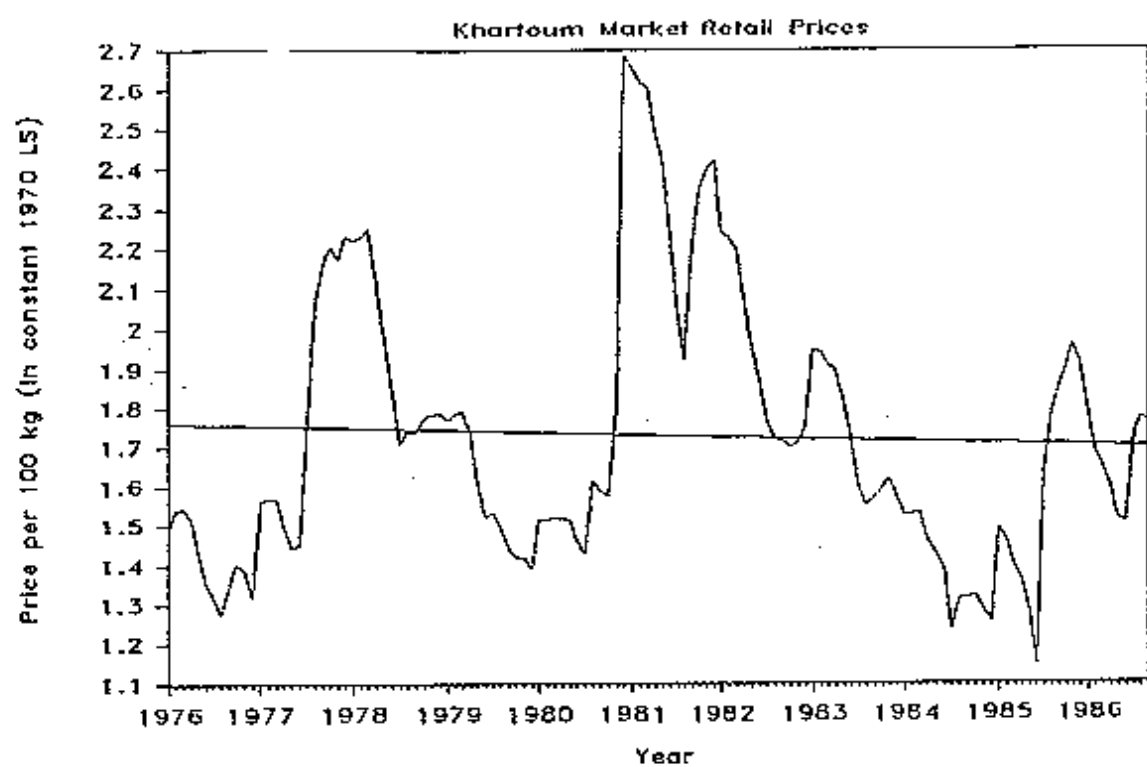


Figure 5. Charcoal price trends for Khartoum, 1976-86 (Deweess, 1987)

supply is therefore important to understand to provide context for investigations at other levels. The relative prices of different wood products was investigated in a series of interviews. The Sheikh el Siddiq changes in prices since the mid 1960s of eucalypt poles, lengths of sawn timber and bags of charcoal relative to a donkey load of firewood are shown in Figure 6. Clearly imported products have become cheaper relative to local firewood since the 1970s. For instance, in 1970 a donkey load of firewood was equivalent to 0.02 eucalypt poles; now it is equivalent to 0.6 poles. Reduced availability of wood from local clearance has pushed up prices. With these prices of local wood resources rising in real terms there is clearly an increased incentive for those with money, to cut local wood for cash sale. Conversely, if protection regulations are respected there will be greater incentives to substitute for imported products with lower real price changes over time.

During the 1960's there was an almost complete switch from local wood for building and furniture-making to eucalypt poles in Sheikh el Siddiq. As soon as eucalypt poles became available from the irrigated areas around Khartoum, first the builders and later bed makers switched to the imported product. The straight and long eucalypt pole was soon regarded as superior to the wide, uneven trunks of local trees. In Sheikh el Siddiq the heightened protection of the local forest area during the period of the Native Administration (from 1951) provided an additional incentive to import wood from outside.

Substitution of local wood for charcoal is difficult to predict because of the seasonal and interannual unpredictability in charcoal prices. Similarly the factors that would result in substitution of local fuel wood by eucalyptus are also unclear, since individual preferences and specialist qualities are important in guiding substitution decisions. As the cheesemaker of Sheikh el Siddiq commented: it would be impossible to change from local wood to eucalyptus since the quality of the burn is so different and it would affect the final product. Domestic fuel supplies may be different and, like other areas in Sudan, a substitution to other sources than local wood for fuel may appear economic in the future - as was the case for building materials in the 1960s.

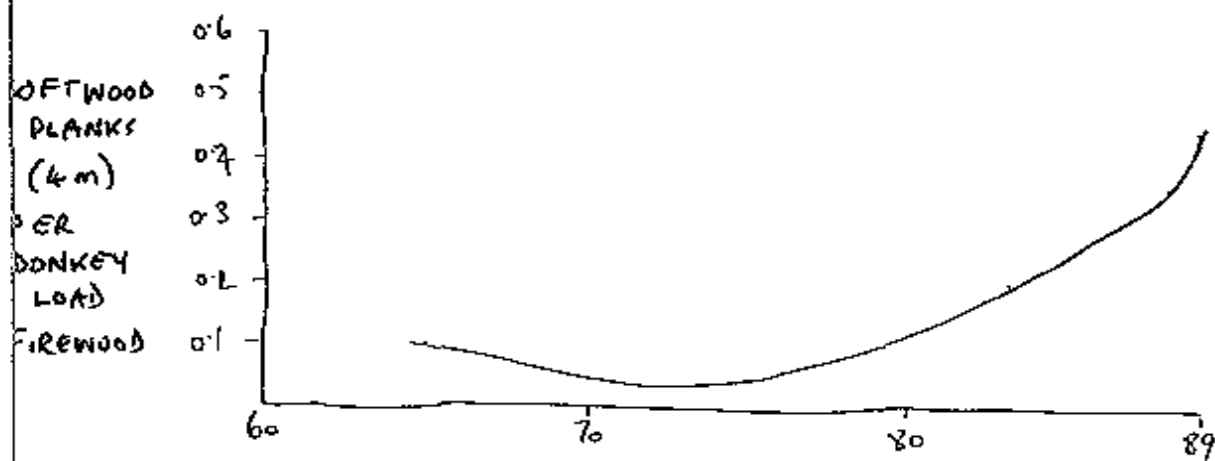
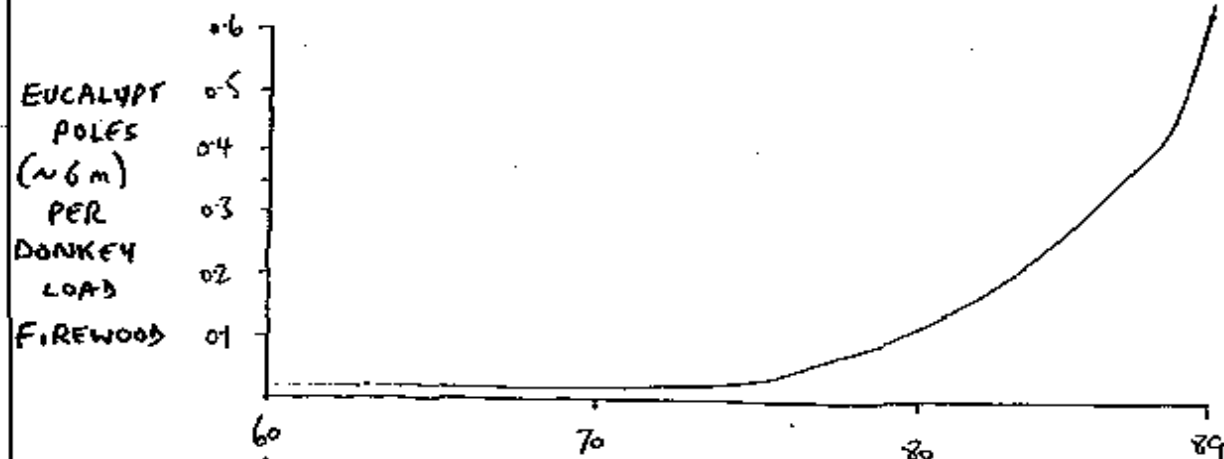
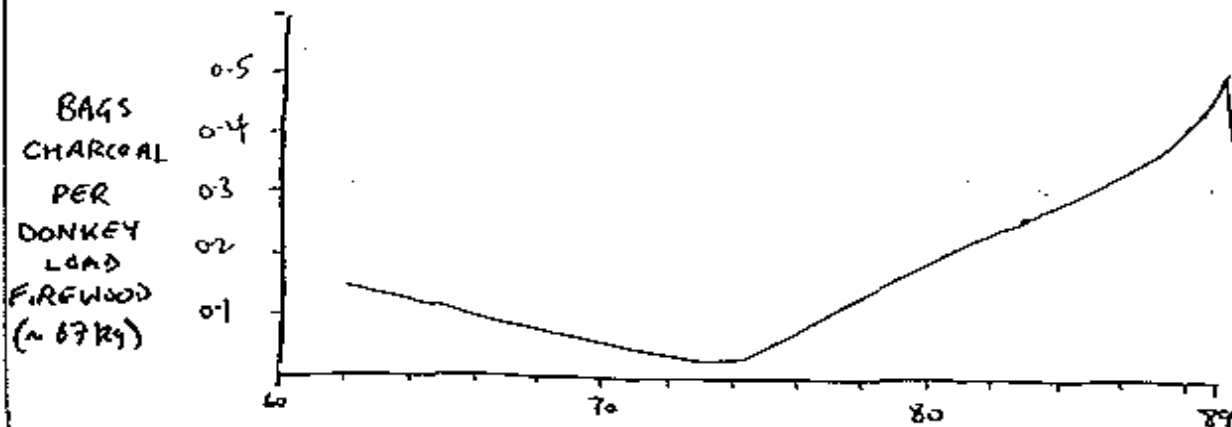


Figure 6. Relative prices of charcoal, eucalypt poles and softwood planks measured against donkey loads of firewood in Sheikh el Siddiq

4. VILLAGE LEVEL ISSUES

Profile of Faki Hashim

There is a long history of settlements along the banks of the Nile. The village of Faki Hashim itself is situated some 30 km to the north of Khartoum on the eastern bank of the River Nile. The road connecting with the capital is asphalt, and thus transport time is short in all seasons. The village has a long history (Figure 7). Land was first distributed in 1925 to private owners - these families remain at the core of the village. Shortly after land registration a private irrigation scheme was begun. This eventually was consolidated to a total of some 3400 feddans, comprising of both mango and other fruit plantations and annual crop land. This scheme was nationalised in 1970, the fruit remaining under government department control and the remainder redistributed to households of the village at the official rate of 3 feddans per household. This private land is subject to fragmentation because of partible inheritance and the large size of families. Some of the land held by several members of a family is managed as consolidated blocks. Apart from the mango plantation there is only one other orchard in the village. Government impact upon the village remains strong because of proximity to the capital (Figure 8).

Pastoralists are reported to have first begun to seasonally migrate to the area in the late 1940s, to water their livestock from the Nile and to use seasonal grazing. Later following the severe droughts of the early 1970s and mid-1980s many of these pastoralists have become permanently settled in the dryland areas. In addition there has been a growing reliance of residents of western Sudan to get employment during the dry season only. Before settling the pastoralists relied entirely upon livestock for their livelihoods. Since settling, though, they say that "life is better": they have access to education - a long walk to Faki Hashim - and employment as labourers in Faki Hashim and on the livestock fattening scheme at Wadi Seleit.

But some of the pastoralists, such as those at Awlad Moktar, have no water source, having settled in an area with saline groundwater. Moreover, various forms of development have been attempted, but failed. A Koranic school was established three times, but no longer exists; a health care unit was built by the villagers, a medical worker came, but did not stay because of the lack of drinking water. And a government school cannot be approved without water. Although there are some trees on the drylands, the settled pastoralists say the distance to the trees is growing as the amount of wood available declines. People now organise into groups to hire a vehicle perhaps once every 2 weeks, and then travel up to 50 km to collect fuelwood.

Figure 7. Historical profile of Faki Hashim

- 1907 Railway line constructed
- 1925 Land registration
- 1927 Private irrigation scheme established
Mango trees planted
- 1935 First citrus grown
- 1946 Severe flooding
- 1956 River shifted ; pumphouse moved for scheme
- 1960 Asphalt road constructed
- 1970 Nationalisation of private scheme (Malouf)
- 1970 - 75 Malouf scheme under Land Reform Administration
- 1972 Severe drought
- 1975 - 85 Malouf under Agricultural Production Administration
- 1976 Pipeline
- 1978 Seleit scheme opened : brought water, employment,
diseases and weeds for livestock
- 1984 Drought : first permanent settlement of nomads
first arrival of migrants from W. Sudan
- 1985 Malouf under Dept. Horticulture
- 1988 Locusts destroy sorghum crop
Flooding destroys housing, kills all bananas

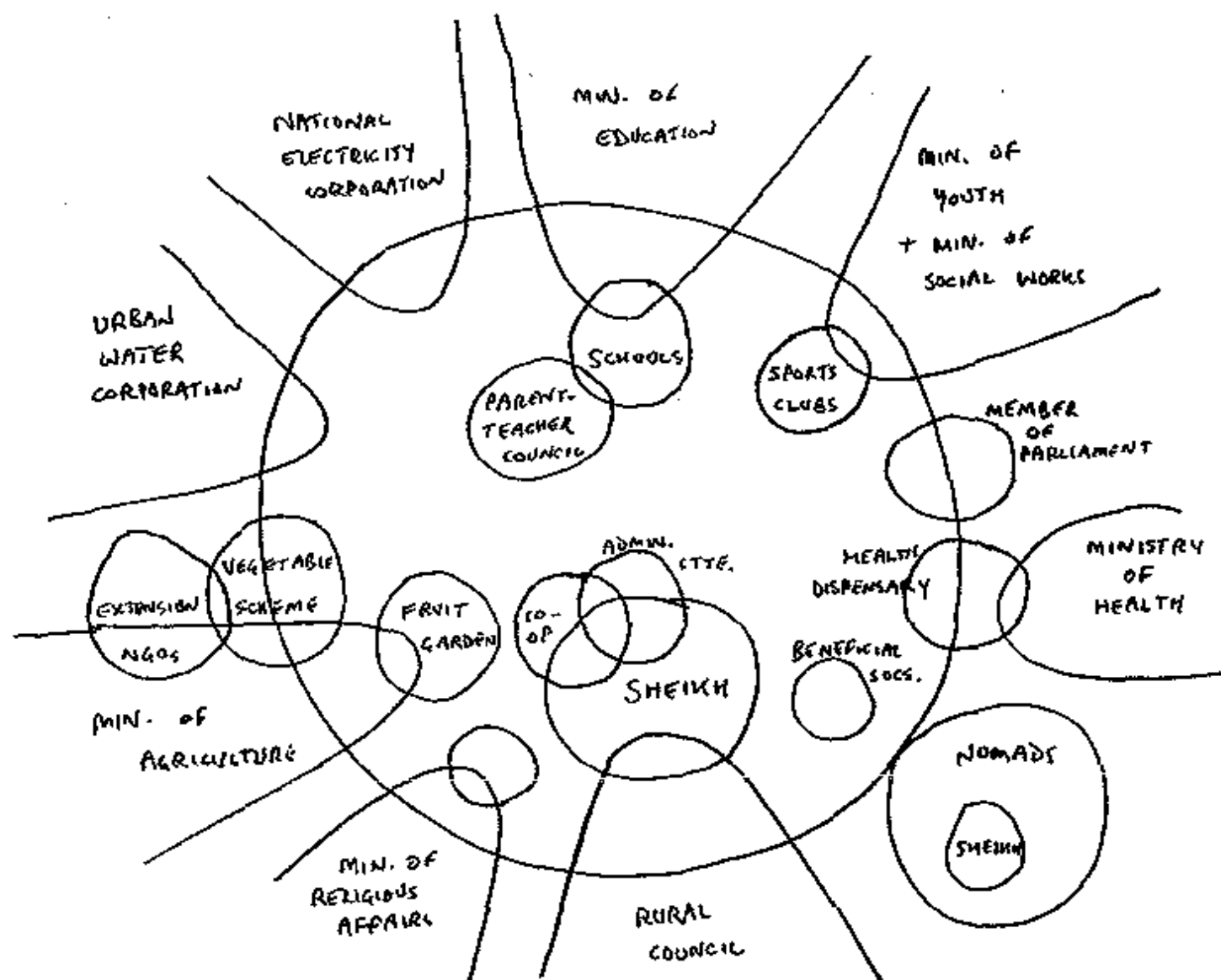


Figure 8. Venn diagram of institutions in Faki Hashim

The original land allocation was based upon the system of gasud - families were allocated land in strips perpendicular to the river as far as the main road, some 4 km from the river. The land to the east was not allocated, but tenurial rights continue opposite these strips. This land is mainly for grazing livestock, though in the wadis wet season cultivation of sorghum also occurs (Figures 9 and 10). The best soils are close to the river, but they become increasingly sandy with distance from the river.

The village is short of residential land, and an application was recently lodged with the appropriate authorities to develop land to the east of the road for future expansion of the village. This is formally government owned land, over which villagers have rights to farm and collect wood. But parts of this government land are now settled by displaced migrants. This land can potentially be claimed by landowners of the village on the principle of gasud. But a competing principle favours the new residents - by "laying their hand on the land" this is equivalent to ownership. In addition portions are being purchased by merchants in anticipation of expansion of Greater Khartoum. New tubewells have been installed, which are opening up previously unproductive land for cereals. This land is being sharecropped by migrants; but Faki Hashim residents are already in conflict with the merchant owners of the land and wells who reside in Omdurman.

The other conflicts within the village relate to differences between the settled residents and the displaced migrants. The villagers need the labour, but want to remain socially distinct. They allege illegal brewing and theft of crops. This, they say, is why they do not cultivate maize and watermelon. The displaced migrants are socially and physically isolated (see Box 1).

Box 1 Portrait of a displaced migrant family in Faki Hashim

We met the head of household of a displaced migrant family. He used to be a hashab (gum arabic) collector in Western Sudan, but now he works as an agricultural labourer on berseem. For this he receives LS 300 per month, plus an extra LS 150 for cutting 50 kantars. He lives with his wife and nine children in a semi-permanent residence located between two fields, well away from the village proper. They own 6-7 goats, but have had to sell 2 this year following the floods. The goats survive on the grasses and weeds he removes from the berseem fields and irrigation ditches. Last year's floods were so severe that they have decided to move to comparative safety to the south of Omdurman. Although they are registered on the sugar ration list they do not receive a ration card, and sugar costs LS 5-6 per pound on the black market compared with only LS 1.5-2 by ration. There are reputedly no migrant workers receiving sugar. The family eats twice a day: at 10 am sorghum porridge and lentils, and sometimes 1/4 kg of meat, and at 7pm the same plus milk. Occasionally they have enough to eat 3 times daily.

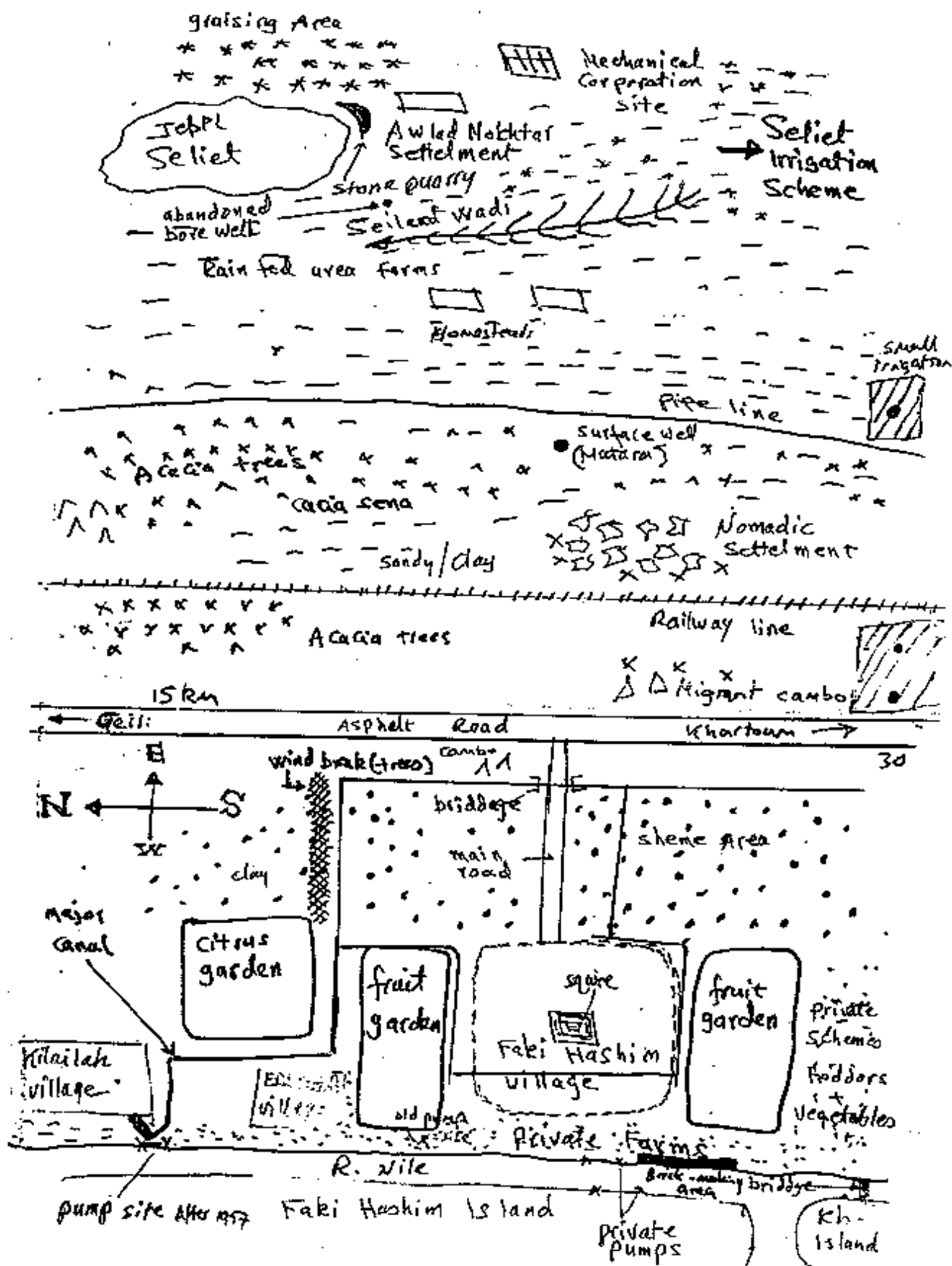


Figure 9. Map of Faki Hashim

ROAD									
LAND USE AND VEGETATION	VEGETABLES + FODDER IRRIGATED	FRUIT GARDEN	WINE	VEGETABLE + FODDER IRRIGATED	DRYLANDS GRAZING - TREES + GRASS	DRYLANDS GRAZING - TREES + GRASS	DRYLANDS GRAZING - TREES + GRASS	DRYLANDS GRAZING - TREES + GRASS	DRYLANDS GRAZING - TREES + GRASS
LAND TENURE	PRIVATE SHARECROPPING	GOVT. OWNED		GOVT. LEASED	GOVT. LAND, PRIVATE USE	GOVT. LAND, PRIVATE USE	GOVT. LAND, PRIVATE USE	GOVT. LAND, PRIVATE USE	GOVT. LAND, PRIVATE USE
TREES	SUNUT, HARAZ TALH, SIDIR CITRUS, NEEEM, BANANA	MANGO, TAMARIND, GUAVA, DATE, CITRUS	NEEM, CITRUS, EUCALYPT	SIDIR, ALCALIA, TAMARIND	HARAZ, SALEM, SIDIR, TUNDUB, TALH	HARAZ, SALEM, SIDIR, TUNDUB, TALH	HARAZ, SALEM, SIDIR, TUNDUB, TALH	HARAZ, SALEM, SIDIR, TUNDUB, TALH	HARAZ, SALEM, SIDIR, TUNDUB, TALH
LIVESTOCK	GOATS, SHEEP, CATTLE FOR DOWNEY FOR TRANSPORT		CATTLE, SHEEP, GOATS, DOWNEYS	GOATS, SHEEP	CATTLE, SHEEP, GOATS, CAMELS	CATTLE, SHEEP, GOATS, CAMELS	CATTLE, SHEEP, GOATS, CAMELS	CATTLE, SHEEP, GOATS, CAMELS	CATTLE, SHEEP, GOATS, CAMELS
PROBLEMS	* AMID PESTS * LACK PESTICIDES * BANK EROSION + RIVER MIGRATION * FLOODING * DIFFICULT TRANSPORTATION	* POOR MANAGEMENT * LACK INVESTMENT * CROP THEFT * MARKET MONOPOLIES * LACK SPARES FOR MAINTENANCE	* HUMAN DISEASES * LACK MEDICINE * LACK WATER	* THE END OF IRRIGATION * PESTS * LACK INPUTS * CREDIT	* WATER SHORTAGE * SALINE GROUNDWATER * HEMMA CARE	* LACK FERTILIZER * INSTABILITY OF GRASSING	* LACK FERTILIZER * INSTABILITY OF GRASSING	* LACK FERTILIZER * INSTABILITY OF GRASSING	* LACK FERTILIZER * INSTABILITY OF GRASSING

Figure 10. Transect through Faki Hashim

For those landowners of Faki Hashim either short of labour or preferring to invest their time in other activities, sharecropping is a land management option beneficial to them and the sharecroppers. There are 3 systems, in all of which the sharecropper chooses the crops:

1. Land owner also owns the water pump: all costs and inputs are deducted from the total product, and the rest divided 50/50.
2. Land owner does not own the pump: land rented for LS 250-300/year by the sharecropper, pump owner pays for water, and the product and costs divided 50/50 between pump owner and sharecropper.
3. As in 2, but the pump owner does not pay costs.

But it would appear that the trend in sharecropping is beginning to decline. As the financial status of owners improves, so they can afford to hire labour, the supply of which has increased following the recent drought. This then results in the owner getting all the agricultural product whilst only paying out labour costs.

The Nationalised scheme has undergone three significant changes in administration, which have had an important impact upon farming and land use in Faki Hashim. Between 1970-75 the Land Reform Administration supplied all the inputs for farmers, including water, but received 50% of produce. Then between 1975-85 the Agricultural Production Administration took over: they again provided all the inputs, other costs were paid by farmers, and all the produce went to the farmers. Since 1986 the scheme has been administered by the Horticulture Department, who only supply water, for which farmers pay a rent, though all the produce goes to farmers. Now that farmers completely rely on the free market, they no longer can get hold of fertiliser or pesticide inputs. This is despite the fact that the fruit garden currently has in store some 15 tonnes of nitrogen fertiliser received as aid from Europe. Not surprisingly all farmers preferred the second administration.

The appraisal team also counted six tractors donated by Syria in the village. These arrived after 1986, yet now all are in a state of complete disrepair.

The final significant feature of the village profile is that of climate induced shocks and stresses. The droughts have led to increased in-migration, in complete failure of grain crops in the wadis for the past eight years, and in the deaths of many trees. Floods have damaged perennial crops such as banana and berseem, and have destroyed wells, housing and other infrastructure. And the river itself has shifted course from time to time, most notably in 1956. Now the pump site by the mango plantation is

situated about 1 km from the river. A new pump station had to be constructed in the neighbouring village of Kheleila.

Economic, Tenurial and Environmental Uncertainty

Villages in close proximity to Greater Khartoum, such as Faki Hashim, are in the special position of being near to a very substantial centre of demand for agricultural produce. Like many large cities two important components of this demand are vegetables and fruits; unlike most cities fodder crops are also in high demand. In Faki Hashim almost all privately farmed land is used either for the cultivation of berseem (a type of alfalfa) and Abu Sab'in (a short duration fodder sorghum), or for a wide variety of vegetables (Figure 11). No staple cereal crops are grown on irrigated land. There are two large government owned mango gardens in the village, but very few trees are cultivated on privately owned land, save for a few mango close to the river and citrus trees in courtyards. Tree production and management is not a current feature of the Faki Hashim production system. This is in contrast to villages further away from Greater Khartoum, where land use is much more extensive and where many more trees are grown.

There are three important factors determining this pattern of land use which currently excludes trees. These relate to economic, tenurial and environmental issues. Each factor encourages farmers to adopt a risk averse strategy with low time preference rates and to invest for short term returns because of uncertainty about the future.

The national economic climate is unstable and inflationary pressures are strong. The returns to cultivating fodder and vegetable crops outweigh the advantages of planting mango trees today and waiting several years before the first harvest. This latter option is perceived as too risky. This is despite the fact that the mango is viewed as the "donkey of the market" - demand is always strong (Figure 12). Although banana is most preferred, it is also viewed as too risky. The demand for berseem is stable, if not increasing as urban residents restock with livestock following the drought of the mid-1980s. Berseem is a perennial that is cultivated for 4 years on the same piece of land. It is harvested every 25 days, and net returns are very high (Figures 13 and 14).

We have no data for returns to vegetables: prices vary seasonally, usually with higher prices for any given crop at the early and late parts of the season. Abu Sab'in is planted after the vegetables have been harvested. It is harvested after 70 days, and sometimes a second crop is grown. Egg plant is the most favoured vegetable when the pairwise comparisons were made by a group of three vegetable Farmers (Figure 15). But in the direct matrix ranking, onions eventually came out top because of the previously unmentioned, but critical, feature of storability

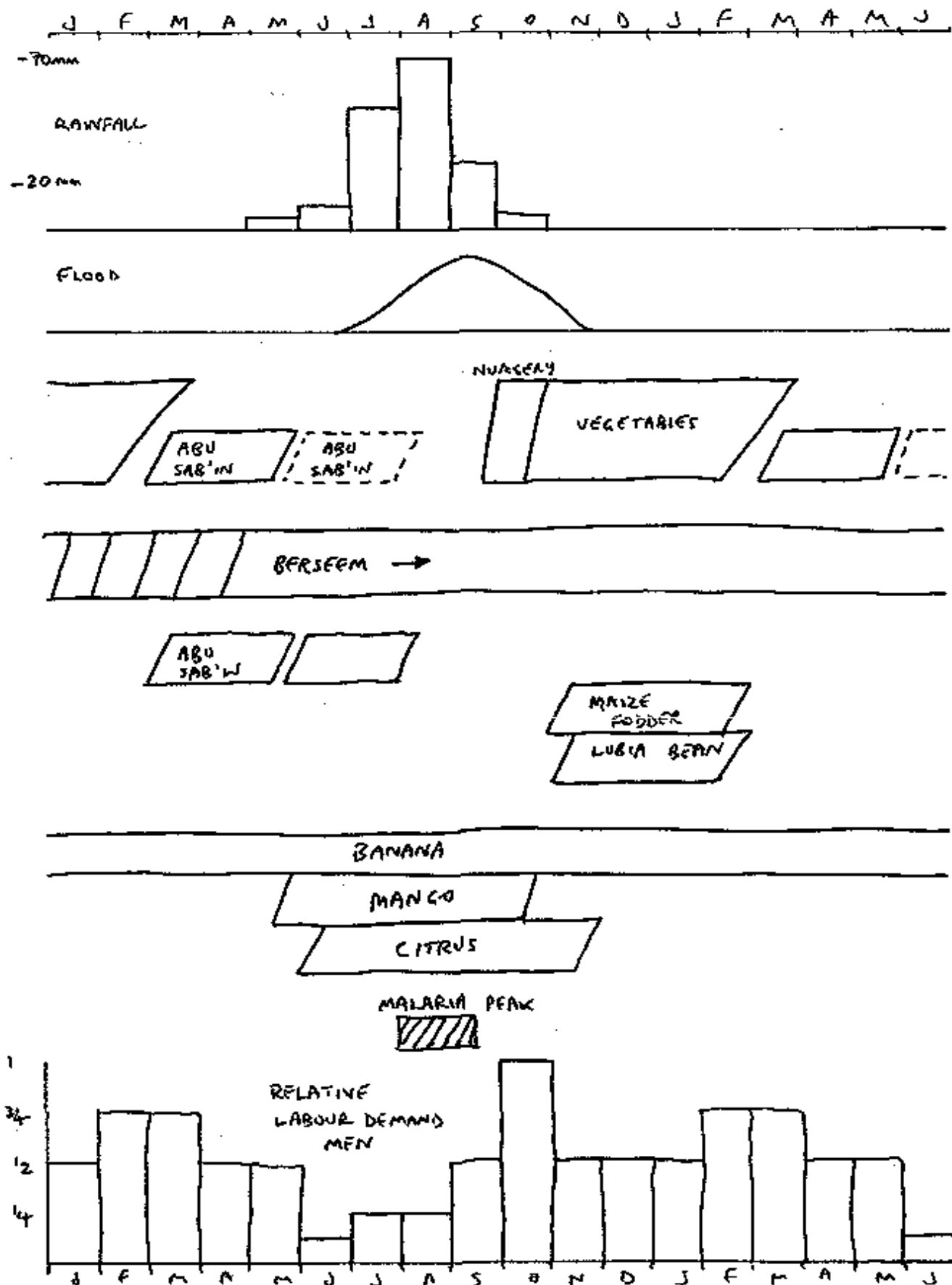


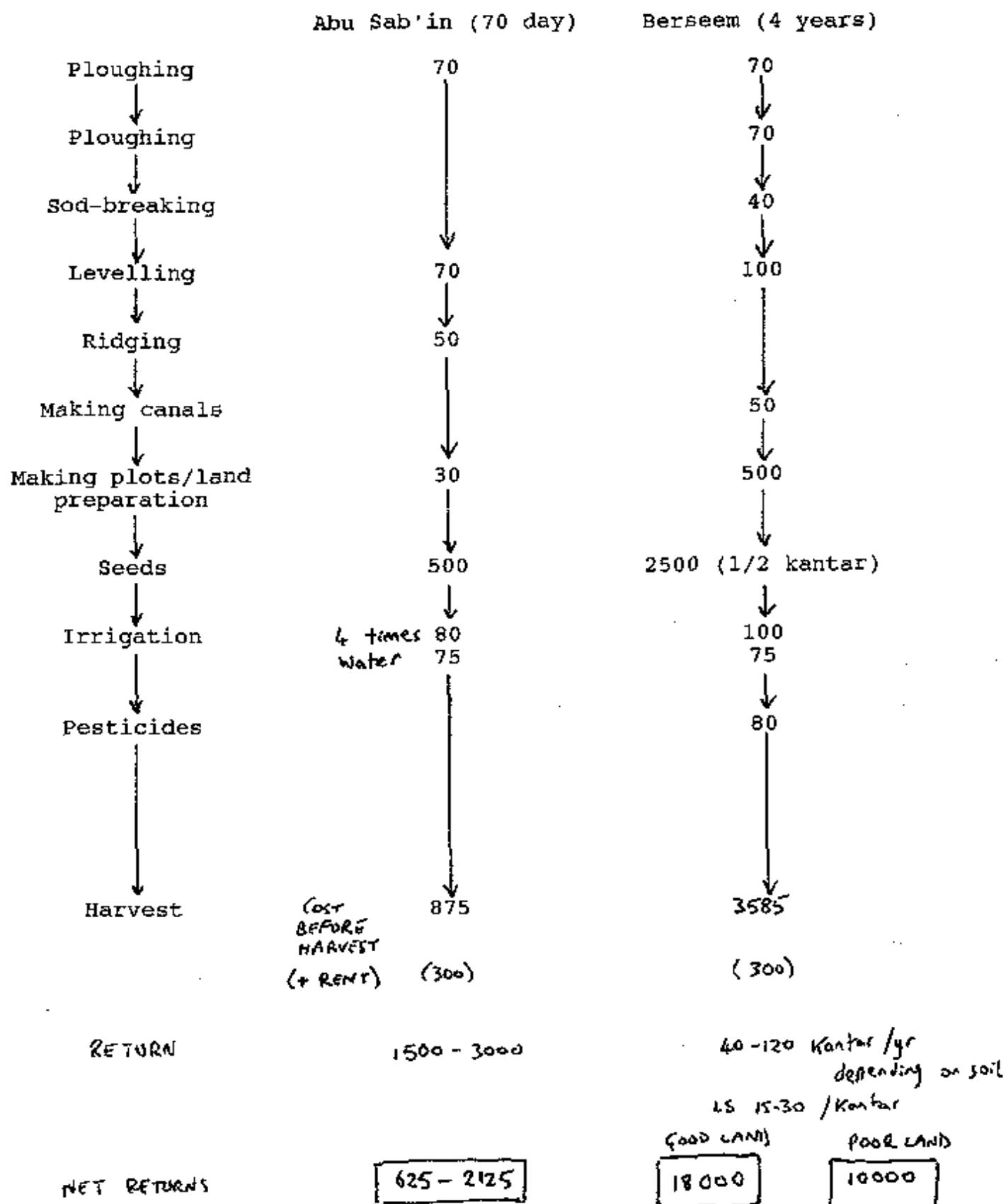
Figure 11. Seasonal calendar for irrigated land in Faki Hashim

Figure 12 Preference ranking for fruits in Faki Hashim

	Favourable Features	Unfavourable Features
1. Banana	Continuous harvest Predictable income Good production People's fruit	More labour High risk from flood
2. Mango	High productivity Longevity of tree Sells easily (donkey of market) Little work and tending Less diseases Good returns	Poached Wind damage
3. Orange	High market demand Less diseases More product	High labour Declining production after certain age Need timely watering
4. Guava	Everyone likes Tasty Sells well (marketable) Two harvests	Pests and diseases Variable quality Requires special treatment
5. Tangerine	Sells well Attracts insects for pollination Stock for grafting	Only one harvest Diseases Requires much labour
6. Coffee		Needs special environment Variable harvest

Figure 13. Production flows for two major fodder crops

LS per Feddan



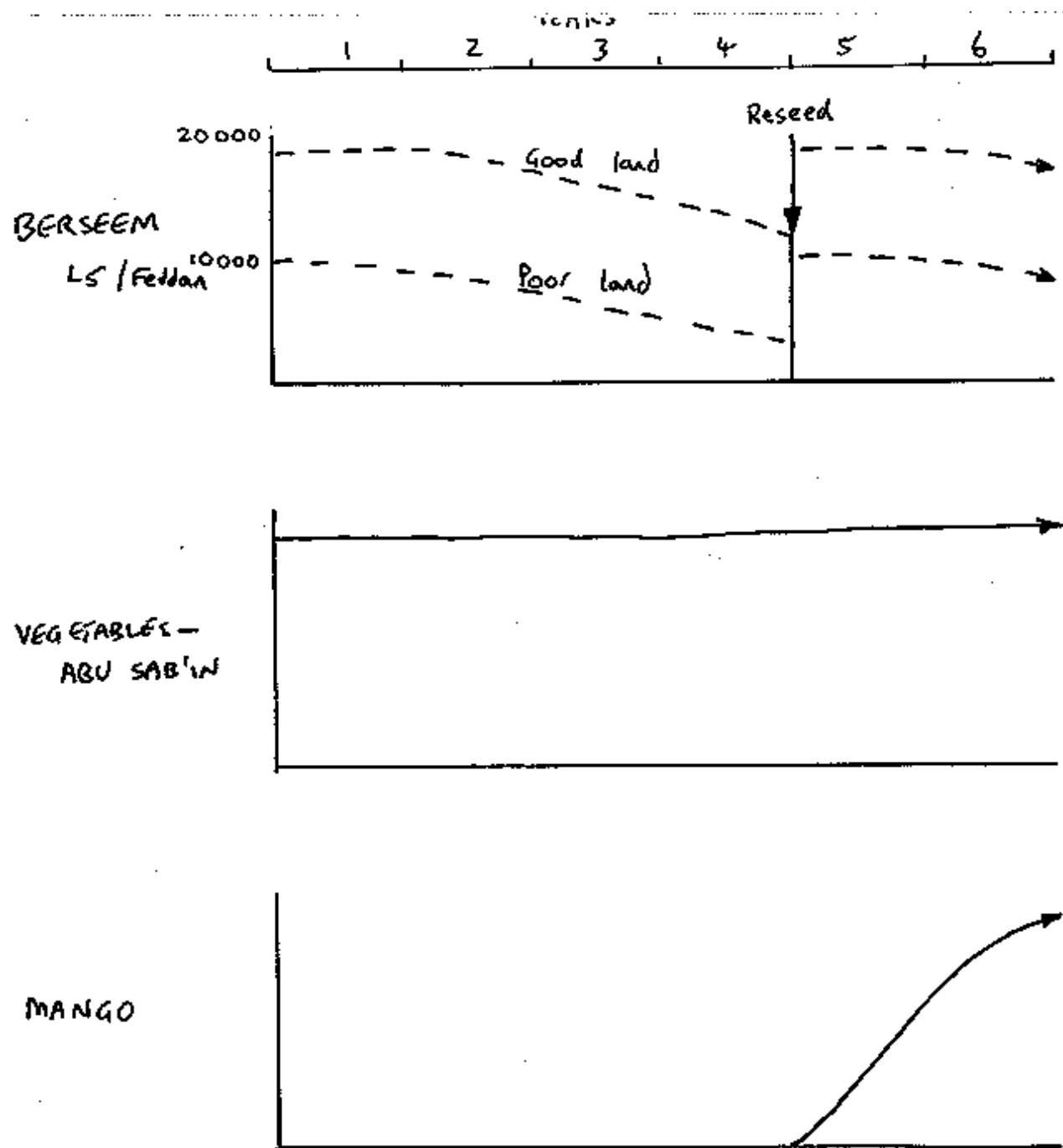


Figure 14. Relative net returns from three single feddan plots of land used for Berseem, vegetables - Abu Sab'in or Mango

Figure 15 Preference ranking for vegetables in Faki Hashim

	Favourable	Unfavourable
1. Egg Plant	Prolonged harvest period Resistant to pests Market demand always high (Donkey of market) More productive Easy to plant More options in food Least labour	
2. Tomato	Low labour required Small nursery Good production Easy to sell Easy to transport Prolonged harvest period	Pests Perishable
3. Green Pepper	Good productivity Prolonged harvest period Sells well Eaten by many people Easy for transport	
4. Onion	Storage Two harvests Favourable market opportunity Sells well	Requires much labour
5. Cabbage	Easy transport Good prices	Only eaten by few people One harvest only Susceptible to diseases
6. Cauliflower	Easy transport Good prices	Only eaten by few One harvest only Susceptible to diseases

(Figure 16). Despite the rosy picture for these vegetable crops, there may be problems in the future for vegetables. Large scale vegetable farms are now being developed to the south of Greater Khartoum. These may flood the market with goods at prices that small scale producers cannot match.

The second important pressure is that of competition for land. This occurs within the village, and between inhabitants and outsiders. Private land in the village has undergone two redistributions. First in 1925 as a result of the Land Registration Act, and the oldest families still have up to 10 feddans from this time. In 1970 the 3000 feddan private scheme was nationalised, and land redistributed at 3 feddans per household. But all this land is subject to fragmentation, because of division on inheritance and the large size of families. In general land is either too fragmented, or just too small, to allow leaving unproductive for a long period of time. The village is also sufficiently close to the city to be subject to land speculation. Agricultural land prices are currently LS 11,000 per feddan, and are expected to rise as the city expands. Development is occurring along the asphalt road leading north from Greater Khartoum, and already merchants and speculators are reputed to have purchased land, hoping to build houses in the future. Farmers, perceiving sale of their own land as a possible opportunity at some point in the future, will not be tempted to plant tree crops that have a long lead time.

The third factor is the action of climate-driven shocks and stresses. Highly uncertain environmental conditions also influence farmers' perceptions of the riskiness of investment in tree crops. Such environmental factors take the form of:

- droughts, which have killed many trees in the dryland region.
- floods, which drowned bananas and berseem (following the floods of September 1988, berseem was back in cultivation by the next February, but many farmers spoke of never growing bananas again because of their ready susceptibility to total loss).
- river migration, where changes in the course of the river have had a major impact upon location of pump sites and the workings of irrigation networks.
- erosion of the river banks, which has been enhanced by the loss of Sunut and willow trees from the jerif land.

In the village of Faki Hashim, different types of uncertainty about the future have contributed to a general low commitment and investment in tree crops. In particular, local factors have influenced this outlook: the profitability of fodder crops and vegetables, the land speculation because of close proximity to Khartoum and the flooding, river migration and erosion due to the village's site close to the Nile. These factors are not

Figure 16 Direct matrix ranking of criteria for vegetables

	Green Pepper	Cabbage	Egg- Plant	Cauliflower	Tomato	Onion
1. Continuous harvest	3	5	1	6	2	4
2. Production per unit time			2		1	
3. Production per duration			1		2	
4. Ease of marketing	4	5	3	6	1	2
5. Farmer eats	4	5	3	6	2	1
6. Ease of transport	4	1=	5	1=	1=	6
7. Resistance to pests/ diseases	1	6	2	5	4	3
8. Size of nursery	3=	3=	1	3=	2	3=
9. Labour required for transplanting	5	2=	1	2=	2=	6
10. Labour for harvesting	3=	1=	3=	1=	3=	6
If you could only plant one			2			1 (storage)

generalisable and the series of interviews with local people that uncovered these themes were necessary to understand the local perspective.

Profile of Sheikh el Siddiq

The village of Sheikh el Siddiq is a small market centre situated about 90km to the south of Khartoum on the west bank of the White Nile. The first permanent settlement was made during the late nineteenth century when Sheikh el Siddiq established a mosque and a centre for religious instruction (See Figure 17). Before this time the inhabitants had been nomadic herders moving between the Nile and the hinterland of Kordofan. The village has grown dramatically since its establishment and in 1985 had a population estimated at 2600 (Figure 18a-c).

A significant feature of the village's history has been the continuity of influence of the religious Sheikh in the affairs of the village. This influence, which continues today, has had an important impact on the local conservation laws governing the protection of the Acacia forest that surrounds Sheikh el Siddiq. The interaction of local religious-political control with outside forces over the management of the local woodland resource developed as an important theme of the village appraisal.

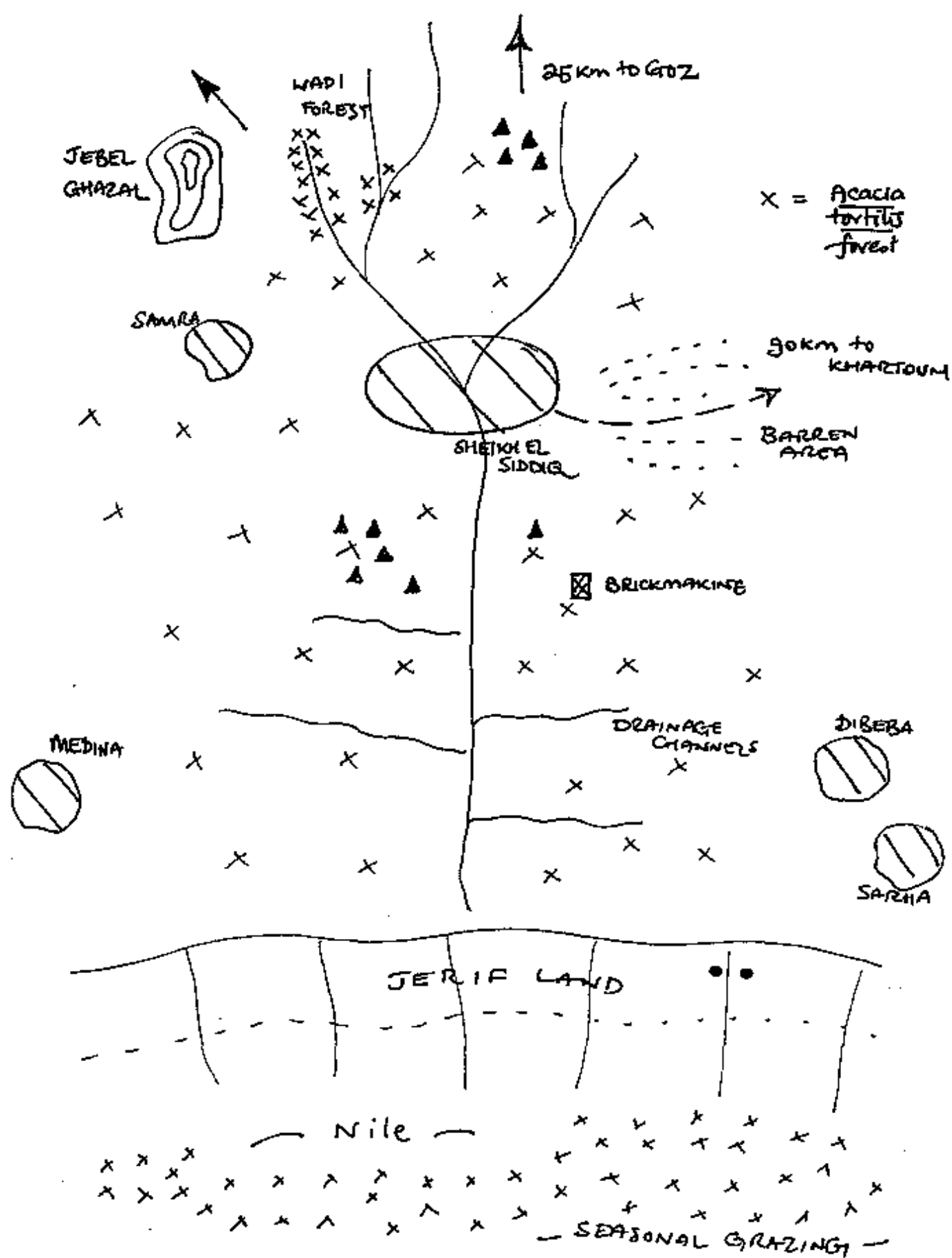
Agricultural and other economic activities are markedly seasonal (Figures 19a and 19b). Agriculture is reliant on either the rains (goz) or the period of flood retreat (jerif). Rainfall is expected from the end of June until early September with a peak in August. It is immensely variable between years and averages only around 200 mm. Goz agriculture had failed for many years prior to 1988 due to low rainfall. Locust damage had seriously affected the goz harvest of millet during the 1988 season. The Nile floods reach their peak in August and are low enough for jerif cultivation by March. High value vegetables are cultivated on the jerif land until June when the river level rises again.

Since the building of the Jebel Aulia dam in 1937 the jerif land area has been restricted. There has been a switch away from grain crops to higher value vegetables. Grain crops began to be grown in the goz land and the wadis after 1937. Some compensation was given for the loss of land and a few individuals managed to establish pump schemes along the Nile. Others were given plots in the livelihood schemes established in 1943 at Abu Gota and Geboga. The floods of August 1988 did not seriously affect the farmers of Sheikh el Siddiq. Livestock are grazed in the goz area during the rainy season and are gradually brought back towards the village via the wadis where grass production is higher and remains greener for a longer period. By December livestock are reliant on browse and supplemental feed from sorghum stover. As the river flood retreats seasonal grazing is made available for the late dry season. Acacia leaves, flowers and pods are a vital source of forage for animals from December until the beginning of the rains in June.

Figure 17. Historical profile of Sheikh el Siddiq

Funj period - Mahdia	Village established; sheikh moved from place to place late 19th C. He settled in present location, dug a well, built Koranic school and a mosque.
1884	Sheikh moved to Omdurman.
1885	Sheikh died.
1925	Land registration; farming <u>feterita</u> (sorghum) along W. Nile and wadis.
1937	Jebel Aulia dam constructed; land flooded; loss of crop residues; start of goz cultivation; villages compensated for loss of production.
1943	Livelihood schemes established; villagers given hawashas in Abu Gota and Geboga schemes; some establish pump schemes.
1951	Local government Act; establishment of Native Administration (Omda) with administrative and judicial powers to implement Forest Act.
1956	Primary school for boys established.
1960/61	Senet el Mahal; loss of cattle; some move to Gezira.
1970	First Forest guard appointed.
1971	Abolition of Native Administration; establishment of people's courts; new village institutions established (village councils).
1973	Drought.
1975	Some cattle owners moved to Omdurman - Hamad el Neel area.
1979	Start of the mesquite project.
1981	Building of the Kosti Road, decline of local catering business; some moved to Gezira.
1983/4	Drought.
1988	Good rainy season; locusts invaded Goz land.
1989	Return to Native Administration; appointment of an Omda

Figure 18a. Regional map, Sheikh el Siddiq



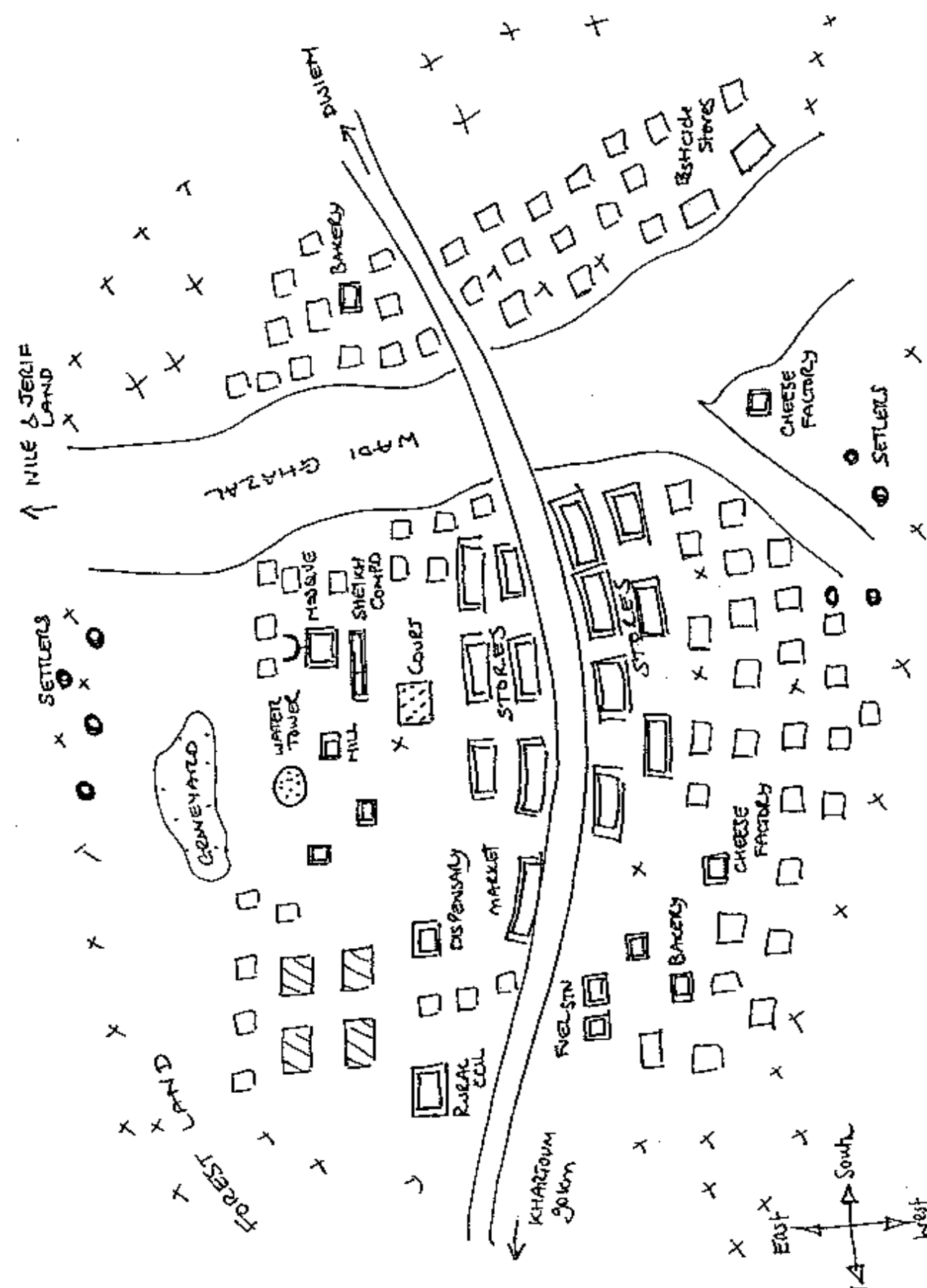


Figure 18b. Map of village

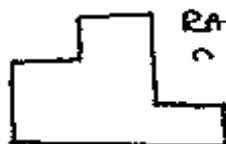
J J A S O N D J F M A M J J A S O N

SEASONS:

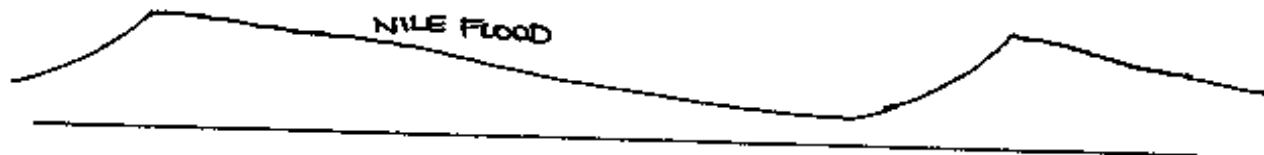
KHARIF

RUSHASH

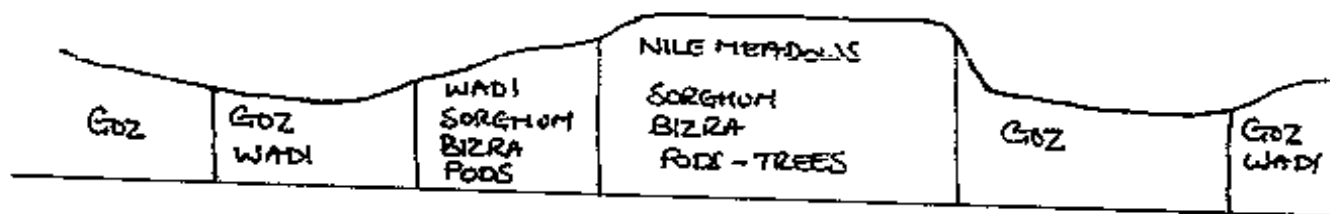
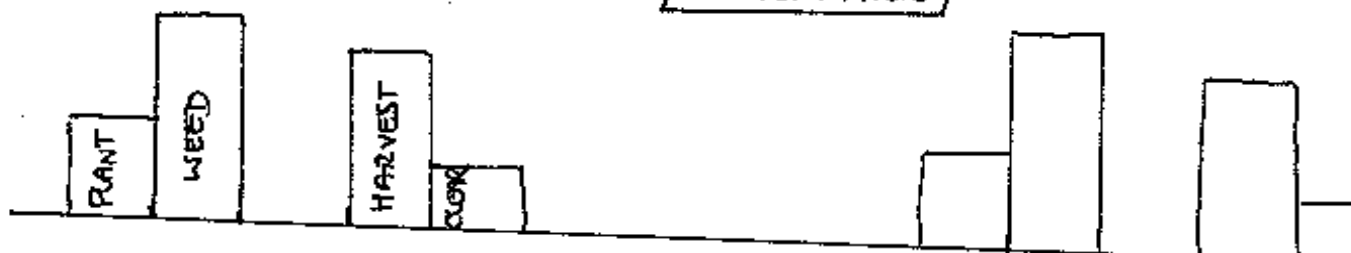
RAINFALL
~ 200mm



NILE FLOOD



JERIF
CULTIVATION



CHARCOAL MAKING;
WOOD COLLECTION
CONSTRUCTION

LABOUR MIGRATION -
TOWNS - GEZIRA.

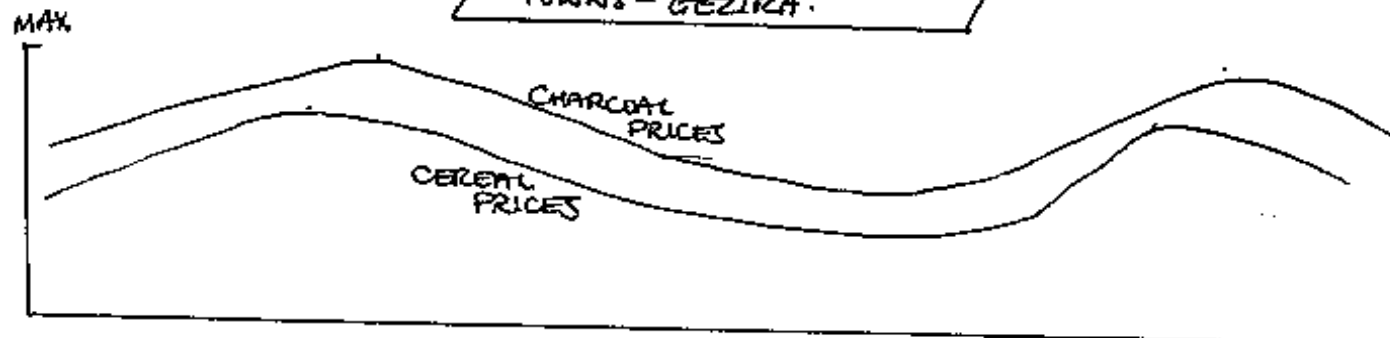


Figure 19a. Seasonal calendar: crops

J J A S O N D J F M A M J J A S O N

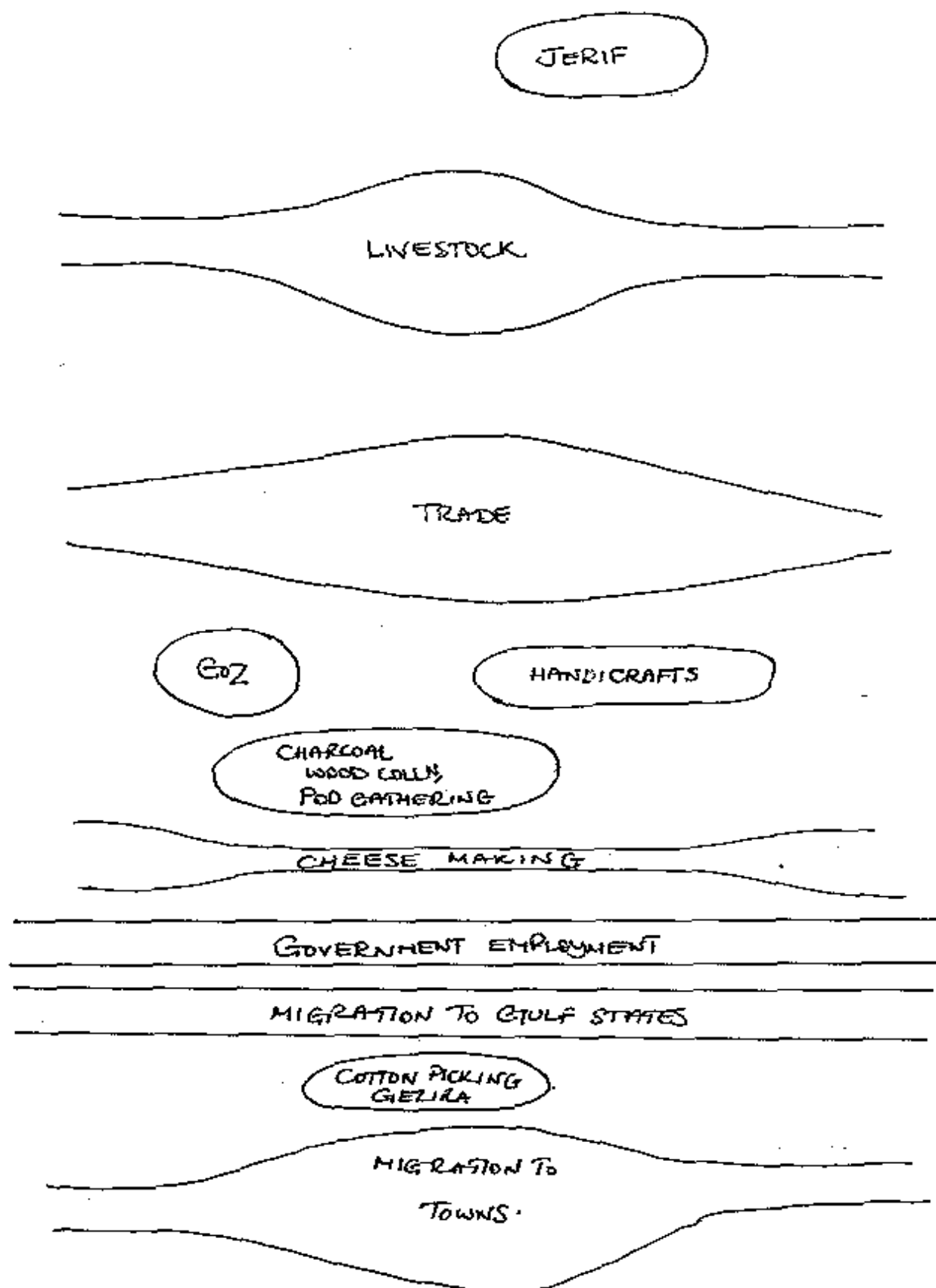


Figure 19b. Seasonal calendar: activities

Reductions in dura stover availability due to the contraction of jerif land and the switch to vegetables had a negative impact on livestock. It has meant that there is an increasing reliance on Acacia tortilis pods from the local forest for fodder. One older informant explained that:

"In the past the goats used to have the dura stalks as the 'main dish' and the pods as the relish, now it's just the pods. That is why the Samur are so important."

In addition, livestock owners have suffered large losses due to droughts in 1960/1, 1972/3 and 1984. Cattle production locally has been abandoned after the 100% loss of all cattle in the last drought period. Many cattle owners from Sheikh el Siddiq moved to Omdurman in the mid-70's with their cattle to sell milk and meat to the growing urban market. Smallstock production remains an important part of the village economy. One farmer commented that: "without milk we are not healthy, we cannot relax.."

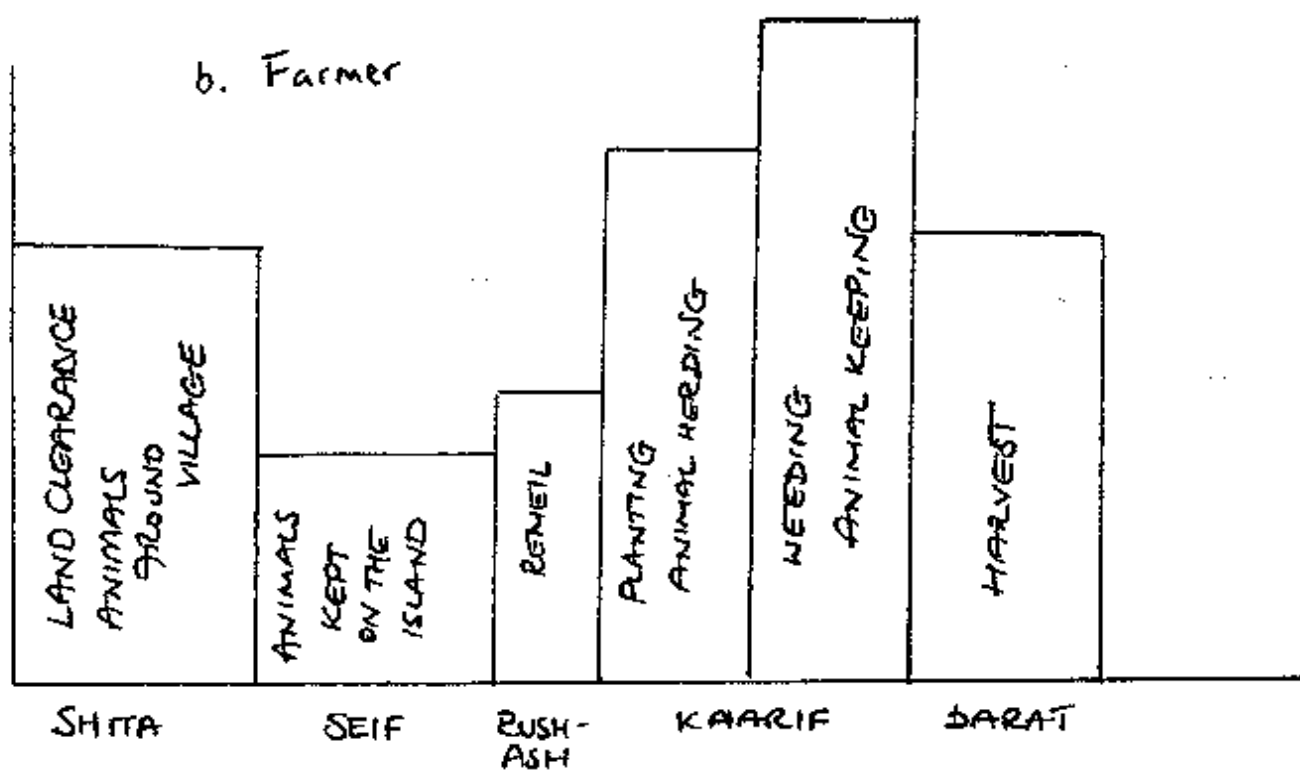
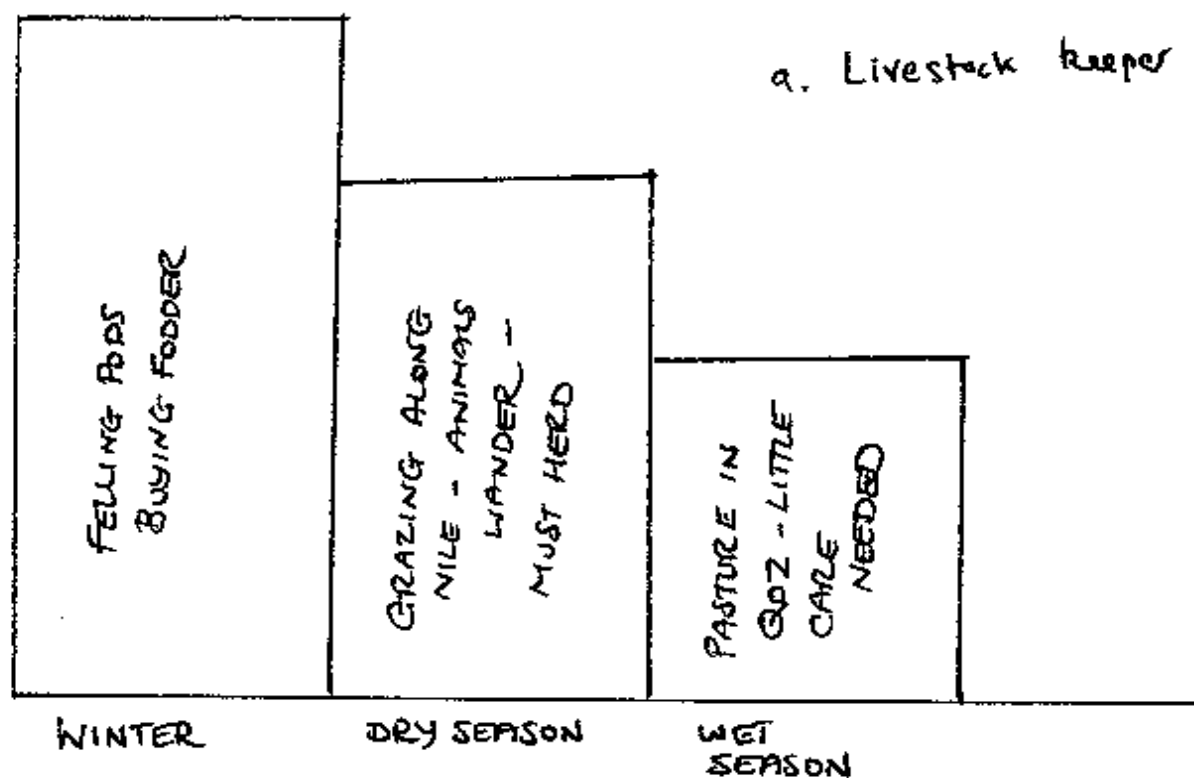
The droughts have had an important impact on the development of the village. The droughts of the 1960s and 1970s saw significant out-migration to Omdurman, Khartoum and Gezira, while the 1984 drought in particular resulted in a significant influx of new settlers to the village area. These people were largely herders from Kabbabish, Kordofan who had lost their stock in the drought. They have now settled beyond the boundaries of the main village and are developing permanent settlements.

Uncertain agricultural or pastoral returns have resulted in a great diversity of income generating activities in Sheikh el Siddiq. The proximity to Khartoum and the existence of a trucking route through the town meant that trading and artisanal businesses could be established. However the building of the new Kosti to Khartoum road in 1981 has diverted much of the traffic and many of the businesses are now suffering.

Labour requirements for farming differ according to the ownership of land and livestock. Two labour profiles were drawn with farmers which illustrate the seasonal labour requirements of a farmer with goats and goz land and a farmer who only herds smallstock (Figure 20a and 20b). Livestock rearing does not especially conflict with agriculture as stock can be grazed adjacent to goz fields whilst people are temporarily resident there. Jerif land tends to be fenced, but stock must be herded to the seasonal grazing at the river edge to avoid crop damage. During the dry season pods may be collected or shaken off the trees for animals. Much of this work is done by young boys. Jerif land cultivation does not clash with goz farming, and some farmers in Sheikh el Siddiq cultivate both areas.

Other income opportunities are largely found in the dry season. Labour migration either to the urban centres or to the Gezira schemes occurs between November and June. Trading opportunities also increase after the harvest, although some restaurant owners

Figure 20. Seasonal labour profiles for livestock keeper and farmer, Sheikh el Siddiq



expect a year round trade. Handicrafts, such as rug making, are concentrated in the dry season also. Certain local businesses, such as cheese making, are dependent on seasonal supplies of milk from Sheikh el Siddiq and surrounding villages and peak during the rains.

Out-migration as a strategy for supplementing locally generated income has increased since the 1960's. Seasonal labour opportunities to the mechanised farming schemes to the east grew massively through the 1950's and 1960's to the present. The growth of Greater Khartoum during this period also opened up chances for urban based employment. Although these opportunities are no longer growing, many inhabitants of Sheikh el Siddiq still rely on income earned outside the village. In the past, many local traders and artisans were able to establish their businesses as a result of such sources of income.

A simple wealth ranking exercise was carried out to investigate the relationship between the local perception of wealth and the range of livelihood options of the villagers. The results are presented later in this report (see Livelihood Issues). It highlighted how significant off-farm income sources are in securing a livelihood; most are involved in some kind of activity which raises money from work off their own fields.

The RRA team attempted to carry out interviews with the full range of groups within the village. A general classification was drawn up, and interviews were carried out with representatives from each group.

Figure 21 shows the key institutions of the village identified during the village appraisal. Quite clearly government agencies dominate to a far lesser extent than in Faki Hashim. Here the village is dominated by the influence of the Sheikh's family, the descendants of Sheikh el Siddiq who founded the village. The religious origins of the village are also reflected in the importance of the mosque and the existence of a Koranic school. The villagers are proud of their independent development and Government services have not had a large impact on the village. The Rural Council offices formerly operated from the village but are not currently functional. The water supplies are serviced by the Rural Water Corporation, the schools by the Ministry of Education and the dispensary by the Ministry of Health. Much of the local infrastructure has been constructed through self-help projects run by the community. The schools were built in this way and the current project is the extension of the health service facility. Strong local leadership, both political and religious, that has been continuous through successive administrations has resulted in a stable local political structure. This has been critical in the evolution and enforcement of local rules concerning forest protection.

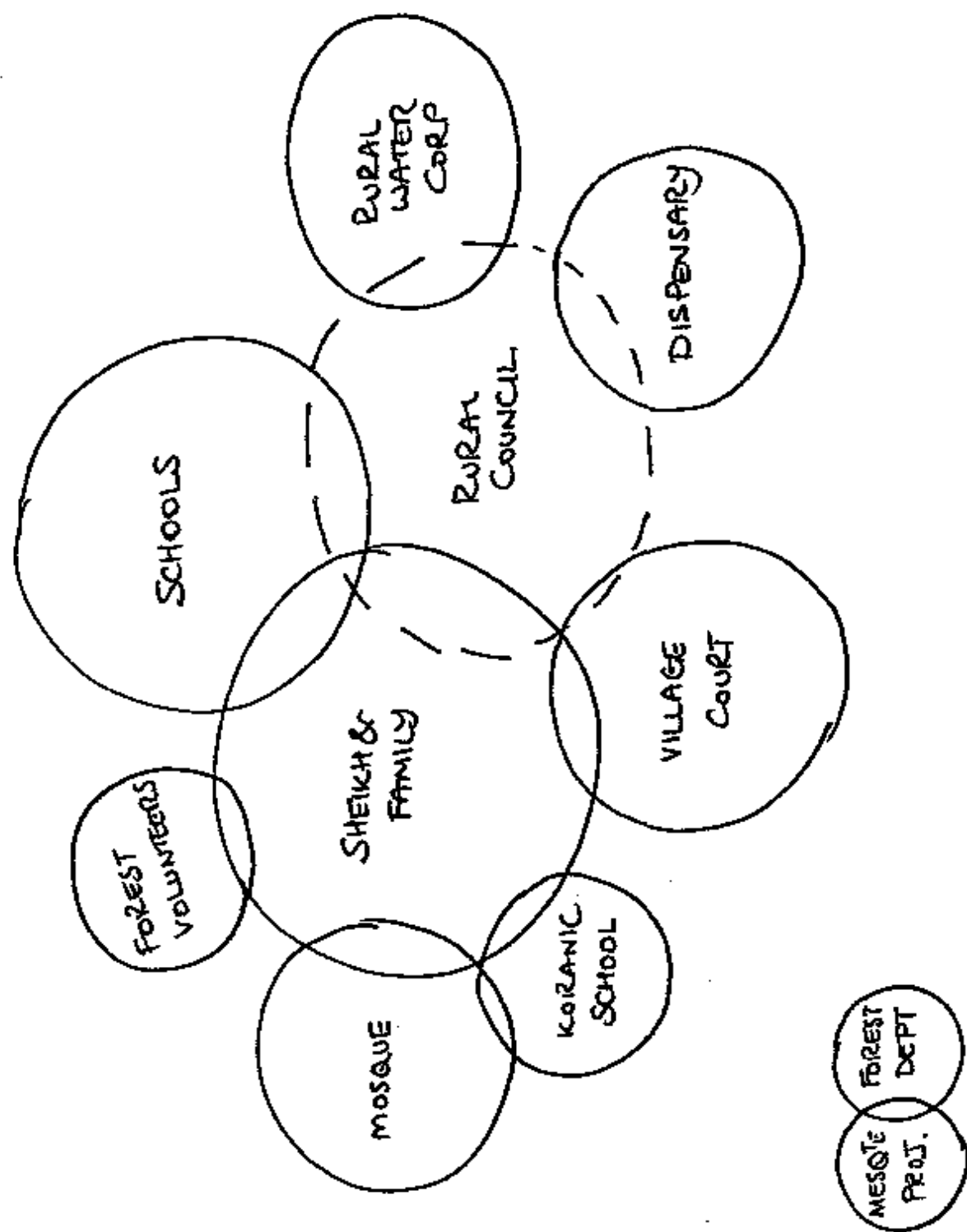


Figure 21. Venn diagram of institutions in Sheikh el Siddiq

Land-use: the Impact of Tenure and Ownership on Incentives

Incentives for tree management are affected by the ownership and tenure of the resources. The appraisal team developed a hypothesis after the first phase of the RRA concerning management/planting of trees on private land. It stated: trees are managed or planted on private land (in home areas, goz, jerif) for short term economic gains, rather than for conservation reasons. This was investigated with visits and interviews to each land tenure type identified in the village.

Different land use categories can be identified in the area of Sheikh el Siddiq. The RRA technique of walking village transects with local people was employed to investigate the patterns of land use and tenure. This was followed up with semi-structured interviews with various key informants. The results are illustrated in a transect diagram that traverses the area from the banks of the Nile to the goz land 25km to the west (Figure 22). A number of categories of private and communal land can be identified for Sheikh el Siddiq village. Trees that have decreased or disappeared are listed in Table 1.

Home areas

The new settlers are open to eviction as they have settled on what is officially government reserve land. This is despite the fact that they have been welcomed by the local village leadership. The security of their home areas is therefore less than those of the established compounds in the main village. It was hypothesised by the RRA team that the likelihood of investment in tree planting in the displaced settlers' home areas is less than for the villagers with secure compounds. No trees were discovered to have been planted in the settler's home areas, whereas some planting was noted in the main village. However, the investment in watering is high, with water being purchased from the village well. The labour required is also significant as watering must be carried out virtually throughout the year. This is particularly the case for the exotic trees favoured in the home compounds. A few people have experimented with the planting of indigenous species with less water requirements, but knowledge of indigenous species' propagation appeared to be limited.

Goz land

The goz land is marginal, sandy agricultural land where millet is grown. Rotations are necessary to maintain soil fertility and structure. Frequently people shift their field sites, so that continuous tenure is relatively uncommon. The goz land is around 25kms from the village, much of it in Kordofan, and is only visited during the rainy season for agricultural activities and some grazing. There is apparently no active management of woodland resources in this area. Use is made of wood resources that have grown up on fallow fields. This is either given away



DISTANCE FROM HIGH FLOOD	25	4	3	2	1.5	0 kms
LAND TYPE	GOZ LAND	COMMUNAL (WADI) (DISPLACED)	VILLAGE	FOREST RESERVE DISPLACED	JERIF	
SOIL	SAND	(alluvium)	GARUD	GARUD	ALLUVIUM	
TENURE	TEMPORARY PRIVATE (grazed)	COMMUNAL (pasture) (+ illegal settlement)	PRIVATE	COMMUNAL (illegal settlement)	PRIVATE	
PROTECTION	CUT ± FREELY	TOTAL PROTECTION	CUT FREELY	TOTAL PROTECTION (- illegal cutting) (- exemptions)	CUT WITH PERMISSION	
CONTROL	INDIVIDUALS	SOME LOCAL REGULATIONS	COMPOUND INDIVIDUALS	LOCAL REGULATIONS - SHEIK - VILLAGE COURT - FOREST GUARD	INDIVIDUALS UNDER F.A. CONTROL	
INCENTIVE ISSUES	LITTLE/NO MANAGEMENT FEW PROSPECTS	PROTECTION EFFECTIVE (near villages)	COMPOUND PLANTING WITH POOR RESULTS	PROTECTION EFFECTIVE; NO MANAGEMENT FOR REGENERATION	CONFUSED UNDERSTANDING OF TREE TENURE	

Figure 22. Tenure and control over woodland use in different land categories of Sheikh el Siddiq

Table 1 Trees that have decreased or disappeared in the region
 of Skeikh el Siddiq

Local name

Sidir	Ziziphus sp.
Gudiem	Corrdia rutii
Dayog	Solanum sp.
Greygdan	Abutolon sp.
Meikari	Salvadora sp.
Arak	Salvadora persicca
Indrab	Cordia sp.
Tundub	Capparis decidua
Laot	Acacia nubica
Kitir	Acacia mellifera
Gaffar	??

to charcoal makers or the field owner gets a share of the charcoal product. The output of this is very low as most of the charcoal is derived from newly cleared fields. Some fields are still being cleared in the goz, as the new settlers indicated that they had been allocated land there after their arrival in 1984. A few villagers noted that the only significant trees in the goz area were large Acacias left as shade trees in the fields. One informant mentioned that he intercropped with young trees, so as to cut down on the labour of clearance.

As much of the goz land is in Kordofan the area does not come under any official local jurisdiction, so the tree management rules developed locally in Sheikh el Siddiq and enforced by government agents do not apply in the goz land. As the local forest guard commented: "since only a small area of goz belongs to the Kawahla people we must pay the Kabbabish to cultivate there. Because we pay taxes to the people of Kordofan that should allow us to cut down the trees there..". Due to the distance from the village, the temporary tenure of the land and the lack of attachment to a "foreign" tribe's land, for which taxes must be paid, there is little investment in tree management or planting. This is likely to remain the case. Unfortunately the goz land was not visited by the appraisal team due to lack of time.

Jerif land

The jerif land was allocated under land registration laws in the 1920's. Individual people hold title to the land, which stretches in strips of rich alluvial soil out from the Nile bank to the point where the flood retreats to. Any islands in line with the allocated strip also fall under the individual owner's title. Much of the strip is cultivated using residual moisture. Only one diesel pump for supplemental irrigation to land beyond the high flood level was noted. This project had not been successful in recent years, as the land designated for irrigation was of the garud type. In addition, pests had destroyed the sorghum crop on several occasions. Vegetables are the principal crop; okra, beans, and cucumbers were noted as being the major crops by jerif land farmers. The area furthest from the high flood level is left as seasonal grazing. The time when this is not submerged is too short, making vegetable cultivation too risky. This strip of green grass and herbs is made available in the dry season and is an important source of fodder at a critical period.

Prior to the building of the Jebel Aulia dam in 1937 the area of jerif land was more extensive and was available for cultivation for a longer period. People would grow sorghum (dura) which was an important source of fodder for the village's livestock. Dura is no longer grown in the jerif land and a switch to high market value vegetables has taken place.

The only trees on jerif land are sited along the high flood level. Only Sunut can withstand long term flooding. Because of

higher water availability the riverine woodland was more diverse, greener and with larger trees. In particular a number of large Haraz were noted in the jerif land area. Some especially large trees are guarded by herd boys, sons of the land owners, with flocks of goats. This ensures that the valuable pods and leaf fodder that is available in the dry season was for the exclusive use of the owner's goats. Tree products on jerif land were locally regarded as individually owned according to the title of the land. However, there was much confusion over rights to cut trees on jerif land. There was also confusion over tenure rights of trees on the boundary between jerif land and the communal forest area. There has been no planting apparently on jerif land and little cutting or management of trees.

Although the regulations about protection of the communal forest area appear to be well known, considerable confusion surrounds the status of trees on individual title land in the jerif land. People do not know whether they are allowed to cut trees on their own land or not. Legally, according to the Forest Act, anyone planting trees on his own land needs permission from the Forest Administration to cut them down (although this does not apply to trees in home compounds). Since this permission is difficult to obtain very few people are interested in actively managing trees on their jerif land. The only recent case in Sheikh el Siddiq of cutting on jerif land was one individual who secured permission and cleared a large number of Sunut for sale. A clarification of the status of tree tenure on private lands is forthcoming in the new Forest Act (1989), but the dissemination of new regulations and their acceptance will clearly be difficult.

Wadi areas

Wadi areas used to be cultivated for sorghum. This practice has been abandoned because of the experience of a series of harvest failures. The labour input required for land preparation in the heavier soils of the wadis is higher than for goz land, although crop yields are expected to be higher. The wadi lands have been left for grazing land for about a decade. Other villages to the west of Sheikh el Siddiq still reputedly crop the wadis. From the point of view of livestock fodder one farmer commented that a combination of dura stover and wadi grasses and trees is best. The wadis that are used for grazing are mostly situated to the west of Sheikh el Siddiq. These were not visited by the appraisal team. Some uncultivated wadi areas have been colonised by a dense Acacia woodland. This is an important fodder source for the goats of Sheikh el Siddiq.

Communal Woodland

The communal woodland that surrounds the village consists of dense Acacia tortilis woodland. It is a protected forest reserve and cutting of wood in the area is forbidden by law. The area is protected through village institutions and through the operations of the local forest gaurd. Despite restrictions some wood is cut. Dead wood is collected as firewood and Acacia pods, flowers and

leaves are a vital source of fodder. People noted that the density of trees had declined over time due both to drought deaths and cutting. The age structure of the forest stand indicates a lack of regeneration. Most trees were estimated to be 20-30 years old. It was noted that little effective regeneration was occurring. Young trees that had grown up during the good rains of 1988 were being heavily browsed. It was thought that they would have little opportunity of surviving to maturity under current browsing pressure.

An understanding of the local system for forest conservation observed in the communal woodland area requires an understanding of the local institutions and their impact on the political economy of the village. The appraisal team in Sheikh el Siddiq constructed a number of hypotheses about forest management after the initial phase of the appraisal. These were:

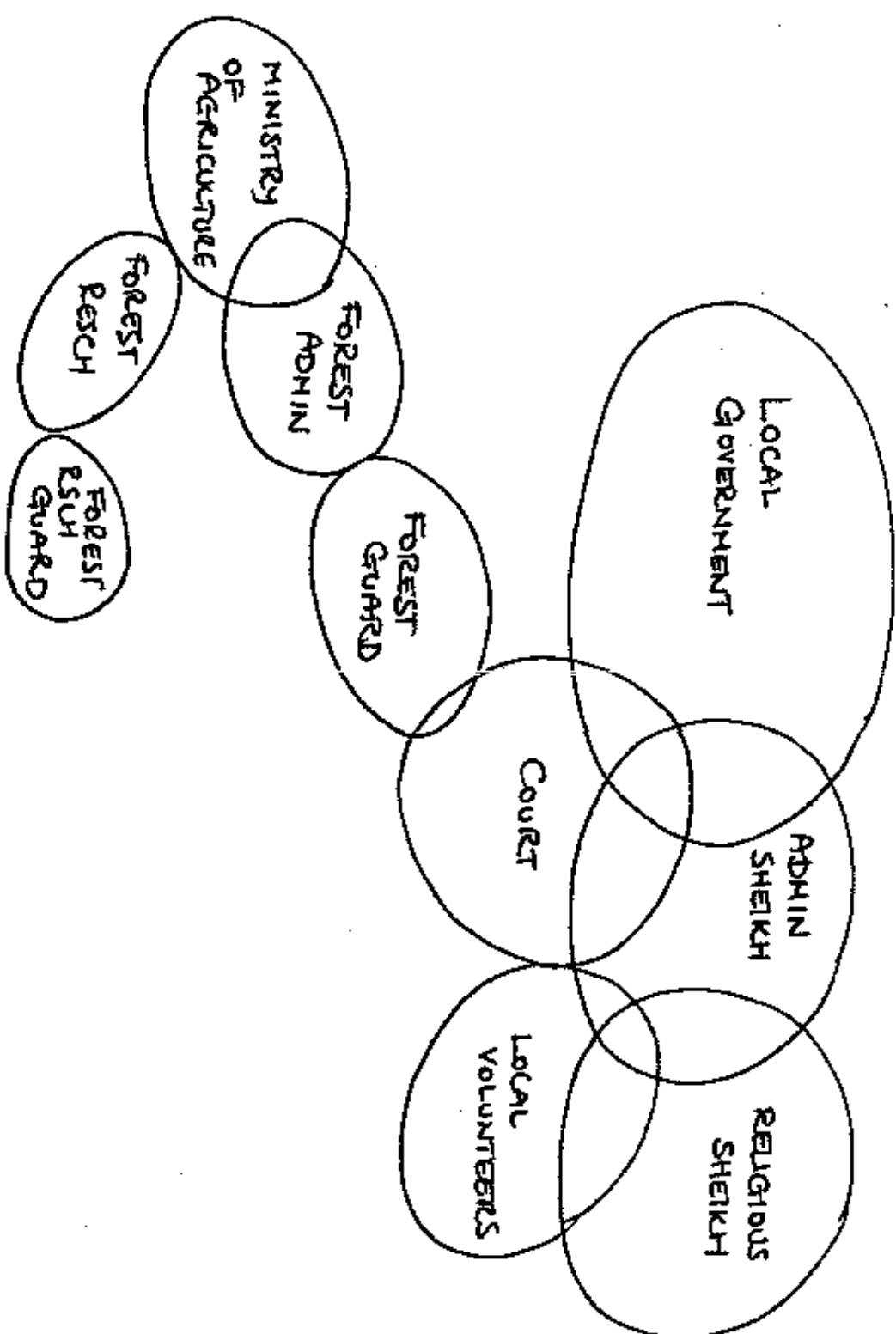
- Everyone in the community shares the products of the forest reserve equally
- Everyone shares the responsibility for the protection of the forest reserve equally
- The Sheikh's authority is one of the key elements in ending forest protection.

These hypotheses were investigated by interviews on management of the communal forest area, and a number of actors involved in forest management were identified (Figure 23). Interviews were carried out with the sheikh (religious), the forest guard, a local volunteer and the local person responsible for the research project. An ex-member of the Forest Dept. research project was a member of the team. Different people had different ideas as to what/who was important in forest management. Figure 20 is an overall impression of institutional interactions gained by the appraisal team after all of the interviews. The overlap of circles represents the degree of contact and the size of the circles represents the relative influence in forest management.

A key factor seems to be the long term commitment of the sheikh's family to forest protection. Their role became particularly important during the Native Administration period (1951 - 1971). It appears that the strict enforcement of laws started during the 1960s. In 1971, with the start of the rural councils, the official responsibility was transferred to the government and the Forest Department.

The forest guard first started operating in the late 1970's. He has a large area of responsibility covering 5 villages in the Sheikh el Siddiq area. The guard's efficiency is ensured by widespread awareness of regulations (certainly amongst men) and cooperation of local people and their leaders. It is only recently that he has been officially employed by the Forest Department. In Sheikh el Siddiq a number of volunteers patrol the area to check on wood cutting activities. Prosecutions are

Figure 23. Key institutions involved in forest protection in Sheikh el Siddiq



brought by locals reporting contraventions of the laws to the guard. The guard has to check on the offence and then brings the accused to court. Two courts are used: either the local court in Sheikh el Siddiq or the district court. The guard commented that the number of offences has greatly decreased since he started work, although there was a sharp rise during the drought. These were the result of people cutting in order to raise money for food. Lenience apparently was shown to such offenders. The standard penalty for an offence involving tree cutting is 25 lashes or up to LS200 fine, if the offender can get a medical exemption. The last local conviction was reputedly some time in late 1988 for a charcoal burning offence.

Forest guards and regulations exist in many other parts of rural Sudan, but few seem to be as effective as that found in Sheikh el Siddiq. It is interesting to speculate why the forest around Sheikh el Siddiq is apparently so well protected. A combination of factors seem to be important:

- The strong and long standing commitment of local leaders
- Widespread knowledge and apparent acceptance of the rules
- An effective enforcement by local people, rather than external forestry agents

Although protection of existing tree stock is ongoing there was no evidence of active management of the communal woodland resource. The existing, conserved trees are about 30 years old or more and there is little effective regeneration of young trees. This has been due to long term drought and the effects of goat browsing. This is certainly a concern for the long term viability of the forest area.

Land tenure clearly has a significant impact on tree management in Sheikh el Siddiq. It appears that the more secure the tenure over the land, the greater the incentives to plant or manage trees (eg. home compounds within the village or jerif land). Any uncertainty over tenure or tree cutting regulations appears to result in reduced management input (eg. the goz land and the uncertainty over control over jerif land trees). Communal forest land is different. Management is effected in this area through strong, village level institutions, rather than individual incentives determined by tenure.

The range of existing tree species may not be meeting local people's needs, particularly those relating to fodder. A number of older informants emphasised the changing species composition of the Sheikh el Siddiq woodland. They noted that a number of tree species have decreased or disappeared, and attribute this to both prolonged drought and cutting. There exists an important complementarity between the different species of Acacia as sources of fodder, particularly between the dominant Samur and others. For instance, Haraz has a dry season leaf out, whilst Samur has most leaf production during and after the rains. Laot

flowers and fruits early and has fruit/flower fodder available several months before Samur. The reduction or disappearance of certain species that fill critical seasonal fodder gaps could be significant in affecting overall livestock nutrition. The phenology of the major fodder tree species is represented in Figure 24.

There are important differences in phenology between years due to rainfall, temperature and pest attack. Several interviews highlighted the effect of a major locust attack in September 1988 on the development of leaves, flowers and fruits of the Acacias. The heavy defoliation meant that new leaves had to be grown and the availability of pods was significantly delayed this season. This may have been a reason for the observations of industrious bashing of trees to release pods.

One tree that has shown promise in similar areas, both in providing pods and fuelwood is mesquite. A government research project established in 1979 ran in the village for 4 years. Its aim was to investigate the possibilities of introduced Prosopis species for the area. A 10 feddan area of Samur woodland was cleared next to the village and 10 species of Prosopis planted according to an experimental design. Today only a handful of trees are still alive; all of these are the particular Prosopis species that has long been planted in Sudan. Casual observation is sufficient to show that the local Samur performs better in local conditions than imported exotic species. The only surviving mesquite in Sheikh el Siddiq is a plantation that grew up on a river island due to goats seeding it. The mesquite pods, which sell at LS 30/bag are a useful source of income to the owners of the island land. It was estimated that each mature tree would yield LS 3/year worth of pods. The returns per unit area are certainly competitive with vegetables and require less labour and difficulties of marketing are less.

The existence of a market for pods, observations of the effort expended in removing young pods from Samur and the comments of older men about the decreasing availability of fodder for goats suggested a further investigation fodder shortages for smallstock.

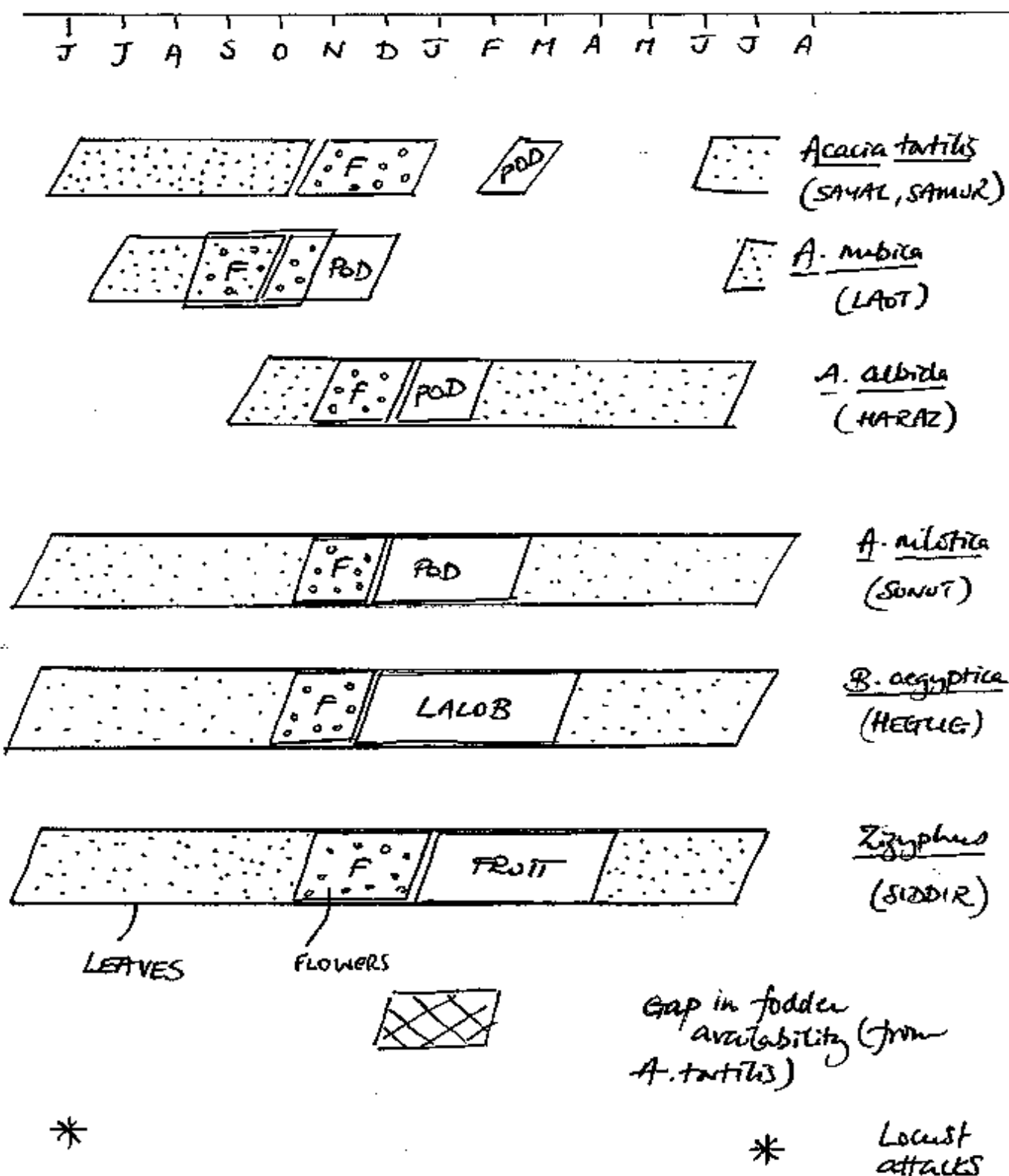


Figure 24. Seasonal phenology of local tree species for fodder availability

5. GROUP INCENTIVES

Settled Inhabitants and Displaced Migrants

In order to assess the true economic value of tree resources, together with the likely perceived incentives for management and use, it is important to understand local perceptions of criteria relating to functional uses. Conventional economic assessments of tree resources tend to concentrate on apparent economic benefits such as wood yield, total fodder biomass, value in soil stabilisation. However, rural people use many more parameters in assessing benefits and costs of different tree species or management practices. In order to get an insight into groups' or individuals' perceptions of economic value it is necessary to investigate local preferences. Recommendations based on cost-benefit ratios using outsiders' criteria may not be appropriate to local situations. Local perceptions are manifest in terms of preferences for particular species or mixes of species. Although these can differ between individuals, different cultural groups may hold significantly cohesive perceptions of trees.

There are two main ethnic groups in Faki Hashim, comprising of the long-term inhabitants, the families of whom have mostly been present since land registration in 1925, and the more recently arrived displaced migrants, mainly from western Sudan. Each group lives in geographically distinct regions of the village, has access to different resources and has fundamentally different ways of securing a livelihood. Each have different preferences for tree species. A series of preference ranking exercises were carried out in order to assess differences in priorities and cost/benefit criteria between the two groups.

The first interview was of eight men from the migrants' encampment situated on the drylands, but close to the main road. They came from Darfur after the drought of the early 1970s, but still live in semi-permanent huts and compounds. They work as agricultural labourers on the irrigated schemes, some are also sharecroppers, and they keep goats and sheep. They have no formal tenurial status over the land or the trees, but they do make use of the local tree products. They do not plant any indigenous trees. The second interview was of a group of farmers from the settled part of the village. They are representatives of a group in which households own small amounts of irrigated land, and also tend to have at least one member involved in non-farm income generating activity in Khartoum. They are involved in intensive vegetable and fodder production, and have some trees on field boundaries and in the courtyards of houses.

The two groups of informants were first asked to name the six most important trees to them. The name of each was written on a separate piece of paper. The team then asked pair-by-pair which was most preferable, together with the reasons why. The results of the choices were recorded in a matrix. In this way a ranking

of most to least preferred was produced, along with all the criteria used to make those choices. The technique takes up to one hour to complete.

This forced choice approach produces many criteria as each pair is compared by the informant group. The results of the two interviews are shown in Figures 25-27. The most important tree species omitted from the two lists of six included Mesquite (*Prosopis* spp.), Tamarind (*Tamarindus indica*), Kitir, Laot and Heglig. In all, the two interviews produced the remarkable total of 31 quite different valued criteria for the use of resources from these eight trees. About half were common to both groups, with the remainder reflecting particular characteristics of each group.

There are several interesting features arising from this analysis:

- Each group chose different trees.
- All except the least favoured trees in each ranking had at least 5 valued criteria, emphasising the multiple functions of favoured trees.
- Some of the criteria are strictly functional, such as value to livestock, wood as a resource for building or for other domestic uses, wood for fuel; some are aesthetic, such as ornamental value and density of shade; and some are strongly culture-based, such as value in funeral and marriage ceremonies.
- Each group had unique criteria: the village residents were particularly concerned with the capacity to grow trees from seedlings and availability of seedlings. Because of the proximity to the Nile only they mentioned the value of Sunut for boatbuilding. The displaced migrants described the value of aromatic smoke whilst cooking, important perhaps in their small huts.
- The criteria do not carry equal weighting, for example Sidir was the most preferred tree in the displaced Darfur community, yet this was solely because of the critical role of its bark in funeral ceremonies. Because of this it would be difficult to accord a replacement cash value to such criteria.

In conclusion, it is clear that the two groups of people from Faki Hashim recognise a great variety of economic uses for trees, even though they do not actively encourage growth from seedlings - save for in the courtyards. Each group has a different set of criteria to measure the costs and benefits of each species and so comes up with a different overall ranking. This may be equally true for other groupings in the village: men/women, rich/poor etc. These are the factors that determine decisions about planting and management at the local level. The

Figure 25 Results from two preference ranking exercises conducted in Faki Hashim

A. Displaced migrants (Western Sudan)

Haraz						
Talh	T					
Salem	Sa	T				
Sunut	Su	Su	Su			
Tundub	H	T	Se	Su		
Sidir	Si	Si	Si	Si	Si	
	H	T	Sa	Su	T	Si

Preference List:

1. Sidir
2. Sunut
3. Talh
4. Salem
5. Haraz
6. Tundub

B. Long-term residents of Faki Hashim

Haraz						
Talh	T					
Sunut	Su	Su				
Eucaluptus	H	T	Su			
Neem	N	N	N	N		
Sidir	Si	T	Su	E	N	
	H	T	Su	E	N	Si

Preference List:

1. Neem
2. Sunut
3. Talh
4. Sidir
5. Haraz
6. Eucalyptus

Figure 26 Comparisons of criteria for tree uses given by two different groups in Faki Hashim

A. Criteria suggested only by displaced migrants

1. Bark critical component for washing bodies in funeral ceremonies
2. Fruit pods for tanning leather
3. Aroma of smoke whilst cooking
4. Straightness of wood
5. Wood for mortars

B. Criteria suggested only by Faki Hashim residents

1. Regrowth following pruning
2. Grows from seedlings
3. Availability of seedlings
4. Ornamental and beauty value
5. Wood for boats
6. Perfume and skin colouring
7. Wood for writing tablets
8. Fruit pods used in marriage ceremony
9. Nuisance in compounds: attracts stone-throwing young boys after fruits
10. Windbreaks on field boundaries
11. Fuel for brickmaking and bakeries

C. Criteria common to both groups

1. Fruit edible to humans
2. Fruits/pod/flowers for fodder
3. Leaves for fodder
4. Fruit pods medicinal
5. Strength of fire
6. Susceptibility to termites
7. Wood strength
8. Produces gum - valued ingredient in inks and for mixing with sand for building purposes
9. Branches good for hedges
10. Shade tree
11. Wood for handtools
12. Wood for building - walls
13. Wood for building - roofs
14. Smoke anti-rheumatic
15. Wood for furniture, beds

Figure 27 Combined criteria for eight trees from the two preference rankings

FAVOURABLE

UNFAVOURABLE

SIDIR: Ziziphus spina-cristi

1. Edible fruits
2. Thorny fencing
3. Leaves for fodder
4. Medicinal bark
5. Windbreak
6. Bark for washing bodies in funeral ceremonies
7. Wood for building and furniture

1. Cannot plant
2. Source of trouble in courtyards because of thieving children

NEEM: Azadirachta indica

1. Shade tree
2. Fuelwood
3. Wood for building huts
4. Trees will grow after pruning
5. Grows from seedlings
6. Ornamental
7. Multiple uses
8. Wood for handtools

SUNUT: Acacia nilotica

1. Pods medicinal
2. Pods used in marriage ceremony
3. Strong burn - used in brickmaking
4. Wood for roofs, boats, furniture, beds, tools
5. Produces gum - ingredient for inks and strengthens sand when mixed for building
6. Pods used for tanning leather

1. Cannot plant

TALH: Acacia seyal

1. Strong fire
2. Smoke with good aroma
3. Smoke anti-rheumatic
4. Produces gum
5. Fuelwood
6. Skin colouring and perfume
7. Flowers for fodder
8. Wood for burning

1. Very susceptible to termites and wood-borers
2. Wood has to be soaked for 3 months for resistance to termites
3. Never planted

FAVOURABLE

UNFAVOURABLE

SALEM: Acacia raddiana

- | | |
|---|------------------|
| 1. Wood for building | 1. Moderate fire |
| 2. No aroma to smoke | |
| 3. Straight and strong, good for sticks | |
| 4. Flowers and fruits for fodder | |
| 5. Wood for building huts | |

HARAZ: Acacia albida

- | | |
|--|--|
| 1. Fruit for fodder | 1. Susceptible to termites and wood-borers |
| 2. Wood for furniture and beds | 2. Mild fire |
| 3. Wood for mortars for grinding | 3. Weak wood |
| 4. Shade tree | 4. Wood not straight |
| 5. Best wood for building boats - very light | |
| 6. Wood for tablets for writing Koranic verse upon | |
| 7. Young boys use it to float across river | |

TUNDUB: Capparis decidua

- | | |
|---------------------------|------------------------------------|
| 1. Fruit for fodder | 1. Mainly branches, no thick stems |
| 2. Used to treat jaundice | |
| 3. Hedges | |

EUCALYPTUS: Eucalyptus sp.

- | | |
|--------------------------------|--|
| 1. Ornamental and beauty value | 1. Too tall for dense shade |
| 2. Seedlings available | 2. Wood fragile, not tough enough for building |
| | 3. No regrowth after pruning |
| | 4. Susceptible to termites and wood-borers |

preference ranking techniques therefore provide a valuable insight into the rationale for local prioritisation.

Men and Women

In Sheikh el Siddiq the focus of investigation was differences in the preference criteria of men and women. Pairwise ranking was used to elicit criteria that guided preferences between all possible pairs of 6-8 species and produce a ranked list in order of overall preference. The trees were then ranked by the Direct Matrix Ranking method by using each of the criteria generated by the pairwise exercise. This exercise was carried out by a male teacher aged about 40 (helped by onlookers) and two women: a young teacher (aged 30) and an older woman (aged 50). The results are presented in Figures 28a-b and 29a-c.

Although the rankings were done only with a small group of people who cannot be claimed to be representative of overall preferences of all groups in the village, the exercise did demonstrate the range of criteria used by local people to distinguish trees: the man, for example, named 25 criteria during the pairwise ranking. The results are shown in Table 2.

The direct matrix ranking method does not produce a ranked list as the criteria have no weighting. However the overall impression gained was a reasonable constancy between the two methods. Combining the two rankings at one time was quite lengthy (more than 1 hour), which resulted in the tiring of the interviewee.

Overall comparisons:

- All ranked Laot low relative to others, but it received high rankings on some criteria.
- The man has a higher preference for Heglig than the women. Heglig was ranked highly for such uses as furniture, saddle making and building.
- There was higher agreement between the older woman and the man, than with the younger woman. They emphasised the utility aspects of different trees, whereas the younger woman concentrated on aesthetics, shade etc.
- The older woman focussed on household and cooking attributes (fuel properties, medicine etc.) whereas the man focussed on economics and sustainability (fodder, pest susceptibility, drought resistance, construction properties).
- Both the man and the older woman listed the same order of importance for fuelwood: Samar, Seyal, Sidir, Sunut.

TREE	SCORE	ADVANTAGE	DISADVANTAGE
SUNUT	5	fuelwood construction fodder shade available medical	-
SAYAL	4	firewood construction fodder available shade	-
SIDIR	3	food (nabaq) sale beauty fodder firewood	bad spines
HERAZ	2	boat construction firewood fodder shade size (large) beauty	not available loses leaves during rains
HEGLIG	1	food (lalob) shade medical charcoal	bad smoke bad smell
KITIR	0	used for fences	sharp spines

Figure 28a: Pairwise ranking of six trees by younger woman teacher

TREE	SCORE	ADVANTAGE	DISADVANTAGE
SIDIR	7	fruit (food) firewood medical smells good	-
SUNUT	5	charcoal construction fuelwood tanning angareb medical	-
KITIR	4	medical fuelwood	-
SAMAR	4	fodder fuelwood construction charcoal	short ales
HEGLIG	3	construction angareb fruit (food) fodder	bad smoke bad fire bad charcoal
HERAZ	3	fodder angareb	bad fire
SAYAL	2	fodder fuel construction charcoal	-
LA'OT	0	-	bad smoke no fodder

Figure 28b: Pairwise ranking of six trees by older woman

	<u>Samar</u>	<u>Seyal</u>	<u>Laot</u>	<u>Sidir</u>	<u>Heglig</u>	<u>Sunut</u>
1. Resist drought	1	2	6	3	4	5
2. Good for growing on hard soil	1	2	6	3	4	5
3. Fast growing	6	5	2	3	1	4
4. Best for fodder animals	1	2	4	3	5	3
5. Ease of getting pods	1	6	2	5	3	4
6. Leaves as fodder	2	1	3	4	6	5
7. Fruits as fodder	-	-	-	1	2	-
8. Unripe pods are bad	-	6	-	-	-	-
9. Low for grazing	3	6	1	2	5	3
10. Gum good	-	3	1	-	-	2
11. Best fuelwood	1	2	5	3	6	4
12. Best for burning	1	2	5	3	6	4
13. Smoke less	1	2	5	3	6	4
14. Best for slow burning	1	2	5	3	6	4
15. Best smell	1	2	6	4	5	3
16. Best for building	5	4	6	3	1	2
17. For making furniture	4	3	6	4	1	2
18. For making boats	-	-	-	-	-	1
19. Making saddles	-	-	-	-	1	-
20. For rosaries	-	-	-	-	1	-
21. For human food	-	-	1	2	-	-
22. For medicines	-	-	-	-	1	2
23. Does not attract pests	-	-	-	1	2	-
24. Providing good shade	3	2	6	1	5	4
25. Ability to regerner- ate from seed	4	2	5	1	3	6

Figure 29a: Direct matrix ranking of 25 criteria by primary school teacher (age c. 40). Criteria derived from pairwise ranking.

	<u>SUNUT</u>	<u>SAYAL</u>	<u>SIDIR</u>	<u>HARAZ</u>	<u>HEGLIG</u>	<u>KITIR</u>
FUELWOOD	5	3	4	6	7	2
CONSTRUCTION	1	4	6	7	3	2
FODDER	6	2	4	3	5	7
SHADE	2	3	7	4	5	6
AVAILABLE	4	2	7	5	3	6
BEAUTY	2	1	8	3	5	7
CHARCOAL	1	4	5	6	7	3
SMOKE	5	3	4	6	7	2
TOTAL	26	22	45	40	42	35

RANK: PW: SA, SI, SU, KI, SAM, HEG, HER

DM: SAM, SAY, SUN, KI, HER, HEG

Figure 29b: Direct matrix ranking of eight criteria by older woman

	<u>SUNUT</u>	<u>SAYAL</u>	<u>SIDIR</u>	<u>HARAZ</u>	<u>HEGLIG</u>	<u>KITIR</u>
FUELWOOD	1	2	4	3	6	5
CONSTRUCTION	1	2	4	3	6	5
FODDER	2	1	3	5	4	6
SHADE	2	1	5	3	4	6
AVAILABLE	2	1	3	6	4	5
BEAUTY	3	2	4	1	5	6
CHARCOAL	1	2	5	3	4	6
SMOKE	1	2	5	3	6	4
TOTAL	13	13	33	27	39	43

RANK: PW: SU, SA, SI, HER, HEG, KI

DM: SU, SA, HER, SI, HEG, KI

Figure 29c: Direct matrix ranking of eight criteria by younger woman (teacher)

Table 2 Pairwise rankings of trees by three informants in Sheikh
el Siddiq

Male teacher	Older woman	Younger woman
1. Samar	1. Siddir	1. Sunut
2. Heglig	2. Sunut	2. Sayal
3= Sayal	3= Kitir	3. Sidir
Sidir	Samar	4. Heraz
Sunut	5= Heglig	5. Heglig
6. Laot	Heraz	6. Kitir
	7 Sayal	
	8 Laot	

6. LIVELIHOOD ISSUES

Wealth Ranking in Faki Hashim

This technique uses the perceptions of informants to rank households within a village or quarter of a village according to overall wealth. Researchers very often feel reticent before embarking upon Wealth Ranking. Wealth is a sensitive topic. But this game ensures that any discussion of absolute wealth does not take place with reference to specific households. Classes or groups may be characterised as having certain features; wealth as a whole may be discussed; but when it comes to individual households these are only compared with each other, and the discussion remains solely of relative wealth/poverty.

This technique requires careful preparation: first the list of households must be prepared; second the name of head of household must be written onto separate pieces of card or paper; next the informants identified; next the interview begun with a discussion of the informant's perceptions of wealth; then the cards are sorted by the informant into piles or wealth classes; these are reviewed and changes made accordingly; and finally the informant is asked to name the principal features of each household's livelihood strategy. The ranking is cross-checked with several rankings of the same list, and the final wealth classes computed (Grandin, 1988).

There were no lists of households available for Faki Hashim. The team of investigators had hoped to use the sugar ration lists held by shopkeepers. These contain all the households in the immediate neighbourhood, and had the apparent advantage that people would have an incentive to be on the list, unlike tax or census lists. But on the day that the team came to collect the lists and elicit the help of a shopkeeper, the shop happened to be closed.

Instead a key informant, the supervisor of the government mango scheme and a lifelong resident of the village, was asked to name all the heads of households residing in the central part of the village. He had previously been interviewed and by this time knew the team well. From his list of about 70 a sample of 50 was taken at random, and the name of each written on separate pieces of paper. Although this may have produced a biased list through selective recollection of the informant, he did indicate that he was conducting a geographical sweep of the village to ensure none were omitted. The wealth ranking was then conducted on these 50 households.

The procedure of discussing terms for wealth and the placing of these cards into separate piles was conducted with three different informants. All three were in agreement over the features of household livelihoods that characterised their level of wealth. In general the most wealthy were thought to own

agricultural land, own livestock, own transport vehicles, be involved in commercial activity or be receiving remittances from overseas. Those of middling wealth were involved in farming, but mainly as sharecroppers, and might own a few livestock; and the poorest households were those relying solely upon agricultural labouring as a source of income.

The first informant was wealthy. He began with five piles, but during checking after allocating all 50 cards he divided the pile for the richest into two. All changes then made were from richer to poorer piles. Finally he created an extra category for the very poorest, leaving seven piles in all. The second and third informants were both poor. Neither changed the number of piles from their starting five. Following the rankings the first informant was asked to name the key components to the livelihood of each household. This produced summaries such as merchant, lorry owner, land owner in agricultural scheme, government worker, and so on.

The results of the ranking are shown in Table 3. Only 48 were eventually given aggregate scores as informants 2 and 3 were not asked to rank themselves. Informant 1 was not contained on the list. The aggregate scores for each household were then broken into 5 classes: A for 2.5-3, B - 2.0-2.49, C - 1.5-1.99, D - 1.0-1.49, and E - < 1.0. Households with major occupations are listed by class in Table 4.

This exercise produced some very interesting results:

1. Clearly the majority of households rely on non-farm income sources. Very few rely solely upon farming. Those that do so are mainly in Class E.
2. The large number of merchants and owners of transport reflects the proximity and opportunities of Greater Khartoum.
3. There are some interesting comparisons to be made between the rankings of the 3 informants. Over some households they are in close agreement: all of 17, 30, 34 and 47 are wealthy; and all of 2, 8 and 13 are very poor. But there are also some large disagreements, particularly between the rich and the two poor informants: household 44 was placed in the top pile by informant 1, but in the bottom piles by the other two. Perhaps informants 2 and 3 did not know of the two migrant sons sending remittances. Informant 1 may have had some special information about household 23, or just believed he was a successful pedlar.

Livelihood Options in Faki Hashim

In order to explore the reasons for choosing different livelihood options the appraisal team conducted a wide range of interviews with village farmers, settled pastoralists and migrant workers

Table 3 Results of wealth ranking conducted by three informants on 50 households of Faki Hashim

HOUSEHOLDS	INFORMANTS' RANKINGS			AGGREGATE SCORE	WEALTH CLASS
	1	2	3		
1	0.72	0.4	-	-	-
2	0.29	0.2	0.2	0.69	E
3	1.00	0.8	0.6	2.40	B
4	0.43	0.6	0.4	1.43	D
5	0.72	0.8	1.0	2.52	A
6	0.43	0.2	0.4	1.03	D
7	0.57	0.2	0.2	0.97	E
8	0.29	0.2	0.2	0.69	E
9	1.00	0.2	0.6	1.80	C
10	1.00	0.8	1.0	2.80	A
11	0.86	0.6	0.6	2.26	B
12	0.72	0.4	0.2	1.32	D
13	0.14	0.2	0.2	0.69	E
14	0.43	0.2	0.2	0.83	E
15	0.72	0.8	0.2	1.72	C
16	0.86	0.8	1.0	2.66	A
17	1.00	0.8	1.0	2.80	A
18	0.72	0.6	0.2	1.52	C
19	1.00	1.0	1.0	3.00	A
20	0.57	0.4	0.2	1.17	D
21	0.57	0.2	0.2	0.97	E
22	0.29	0.2	0.8	1.29	D
23	0.86	0.2	0.2	1.26	D
24	1.00	0.6	0.8	2.40	B
25	0.43	0.8	0.2	1.43	D
26	0.72	0.4	1.0	2.12	B
27	0.72	0.4	0.4	1.37	D
28	0.43	0.2	0.2	0.83	E
29	0.72	0.2	0.4	1.32	D
30	1.00	0.8	1.0	2.80	A
31	0.72	0.8	0.6	2.12	B
32	1.00	0.4	0.4	1.80	C
33	1.00	0.6	1.0	2.60	A
34	1.00	1.0	0.8	2.80	A
35	0.57	0.4	0.2	1.17	D
36	0.43	0.2	0.2	0.83	E
37	0.57	0.6	0.4	1.57	C
38	0.43	-	0.2	-	-
39	0.43	0.2	1.0	1.63	C
40	0.43	0.6	0.8	1.83	C
41	0.57	0.6	0.2	1.37	D
42	1.00	0.6	1.0	2.60	A
43	1.00	0.6	1.0	2.60	A
44	1.00	0.2	0.2	1.40	D
45	0.86	0.6	1.0	2.46	B
46	0.57	0.6	1.0	2.17	B
47	1.00	1.0	1.0	3.00	A
48	1.00	1.0	0.8	2.80	A
49	0.86	0.6	0.2	1.66	C
50	0.43	0.4	0.4	1.23	D
No. Classes	7	5	5		

Table 4 Major occupations of each household in the five classes produced by the wealth ranking

Household
Number

Class A - Wealthy
Principal components of household livelihood

5	Merchant
10	Lorry; pick-up; tractor; shop
16	Flour mill; sorghum merchant
17	Merchant
19	Farmer; brick maker; 2 lorries
30	Merchant; good agricultural land
33	Agricultural scheme
34	Army colonel
42	Big merchant
43	Army Major
47	Medical laboratory owner
48	Medical assistant

Class B

3	Big merchant
11	Butcher; lorry
24	Merchant
26	Lawyer; 2 lorries
31	Son in Saudi Arabia
45	Merchant; good agricultural land; shop; trailer
46	Lorry and merchant

Class C

9	Supervisor of agricultural scheme, owns land and 20 cows
15	Supervisor of scheme, owns land
18	Shop, tractor, owns land
32	Agricultural scheme, owns land (owner)
37	Lorry, merchant
39	Lorry and taxi
40	Taxi
49	Lorry and taxi, son is a Doctor

Class D

4	Retired Army officer
6	Civil servant with agricultural land
12	Medical assistant
20	Farmer and several lorries
22	Cultivator in scheme; average farmer
23	lorry and pedlar
25	Taxi
27	Lorry, good agricultural land and sons University graduates
29	Taxi, shop
35	Fodder shop
41	Farmer, lorry, and 2 migrant sons
44	Agricultural land, farmer, 2 migrant sons
50	Lorry; official in University

Class E - Poorest

2	Small farmer
7	Poor farmer
8	Old man; small farmer
13	Street sweeper
14	Government worker, some livestock
21	Lorry
28	Not cultivating his agricultural land, migrant sons
36	Lorry

(Table 5). The full range of options, together with expected financial returns, for each of these 3 groups is described in Figure 30 a-c.

Individual Incentives to Tree Management

People's attitudes to tree management are coloured by individual socio-economic conditions. It is necessary to understand how economic differentiation affects people's options if a full picture of incentives is to be built up.

During the appraisal of Sheikh el Siddiq village a classification of different income opportunities was produced (Figure 31) through a series of key informant interviews and a wealth ranking exercise (Grandin, 1988). Different people combine different opportunities, but the classification proved helpful in focussing attention on the range of livelihood options available in Sheikh el Siddiq.

For the wealth ranking exercise, a shopkeeper was asked to allocate the names from the sugar ration list from that neighbourhood of the village to five different wealth groups. He allocated all the names to the lower three (average, poor and very poor). He was also asked what was the primary occupations of each of the individuals (Table 6). The wealth ranking was not fully pursued because of a shortage of time so did not represent a village wide sample of income opportunities/distribution. Further investigations would have to cross-check for spatial variability in socio-economic status within the village. The team's attempt to develop a social map of the village did not produce any significant spatial differences except for the displaced settlers and the Sheikh's family representing separate units. The comprehensiveness of the sugar ration list would have to be cross-checked more thoroughly to derive any quantitative sampling. Certain households, such as the recent settlers were not included on ration lists in the village. However the exercise did provide another insight into the different livelihood strategies from another direction.

The socio-economic characterisation of the village was used to identify a range of individuals to interview. The major income sources for each person interviewed were assessed in order to further understanding of the range of livelihood options in the village (Figure 32). The aim was to explore in what ways different people have different access to wood resources. Differences in species use were also explored. Eight in-depth interviews were carried out.

It was found that those of lower socio-economic status were more reliant on collection of local wood resources and did not purchase. The displaced settlers were given special dispensation to cut building materials on their arrival from Kordofan. All other people were reliant on the purchase of building poles, which are imported to the village from outside. The only locally derived wood used for construction or tool making that was found

Table 5 List of informants in Faki Hashim

Berseem farmers
Vegetable farmers
Displaced migrant sharecroppers
Agricultural labourers
Fodder cutters
Berseem merchant
Wood/charcoal merchant
Supervisor government scheme
Pastoralists
Brickmakers
Religious sheikh
Cassia collectors

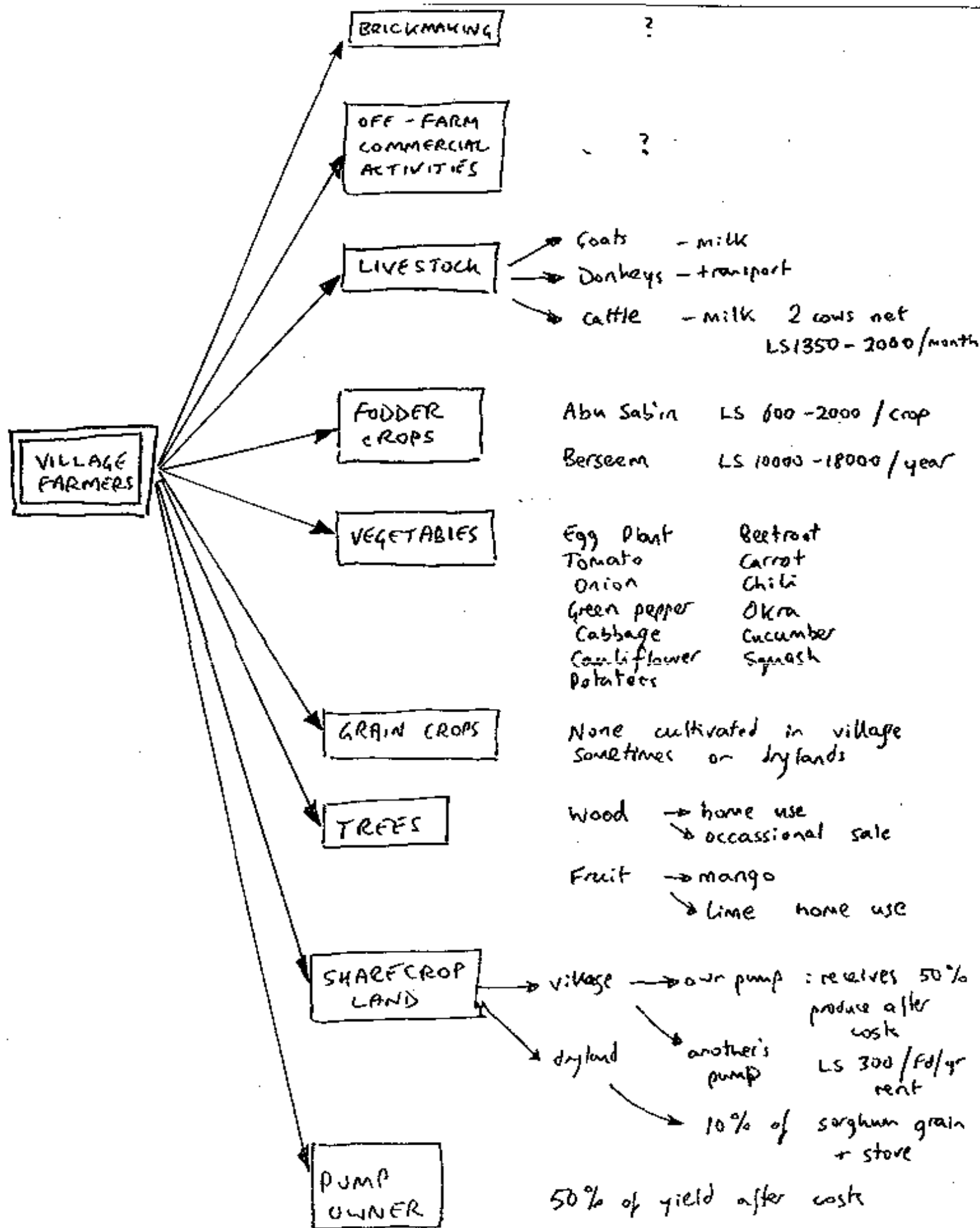


Figure 30a. Livelihood options for village farmers of Faki Hashim

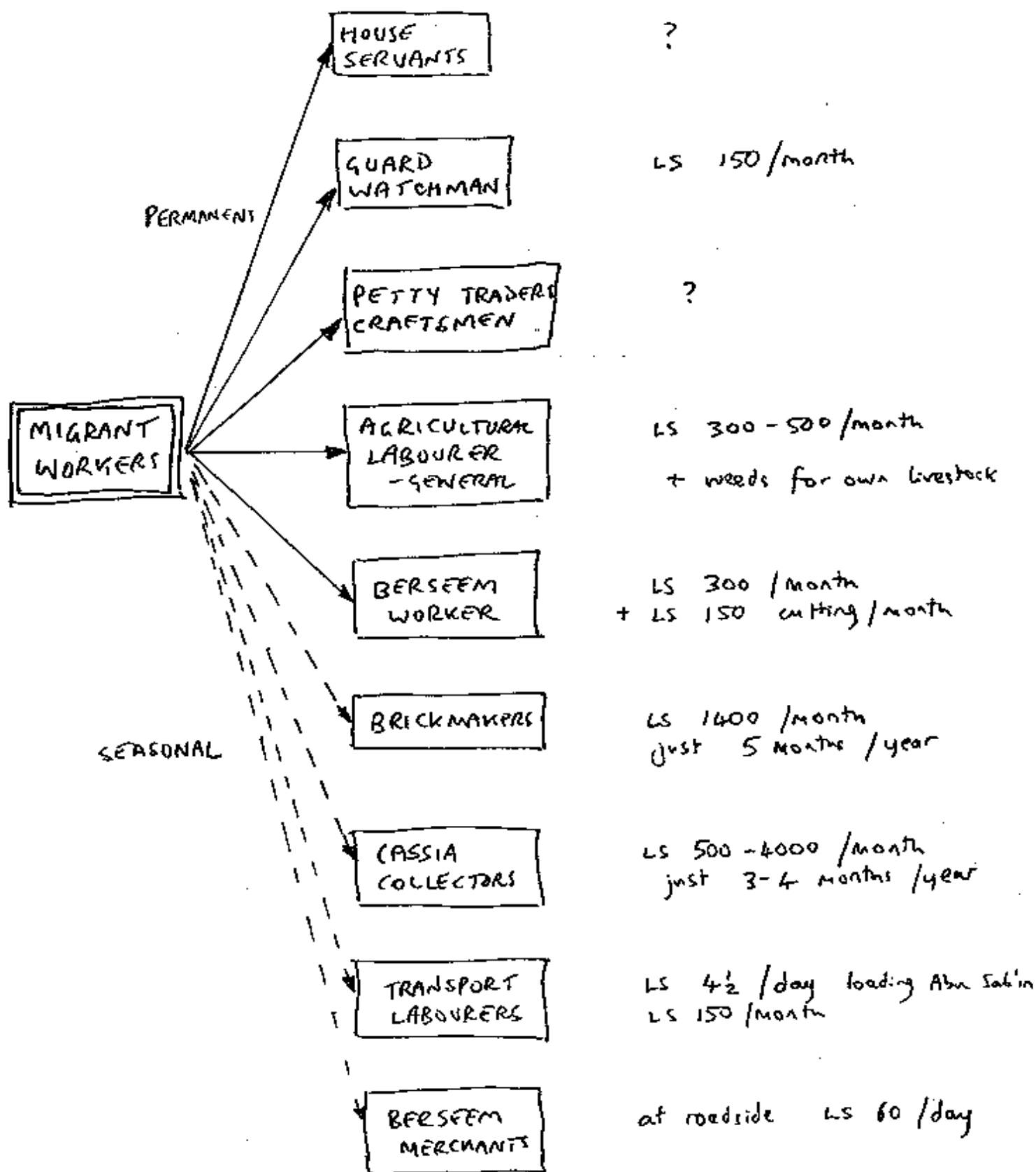


Figure 30b. Livelihood options for migrant workers

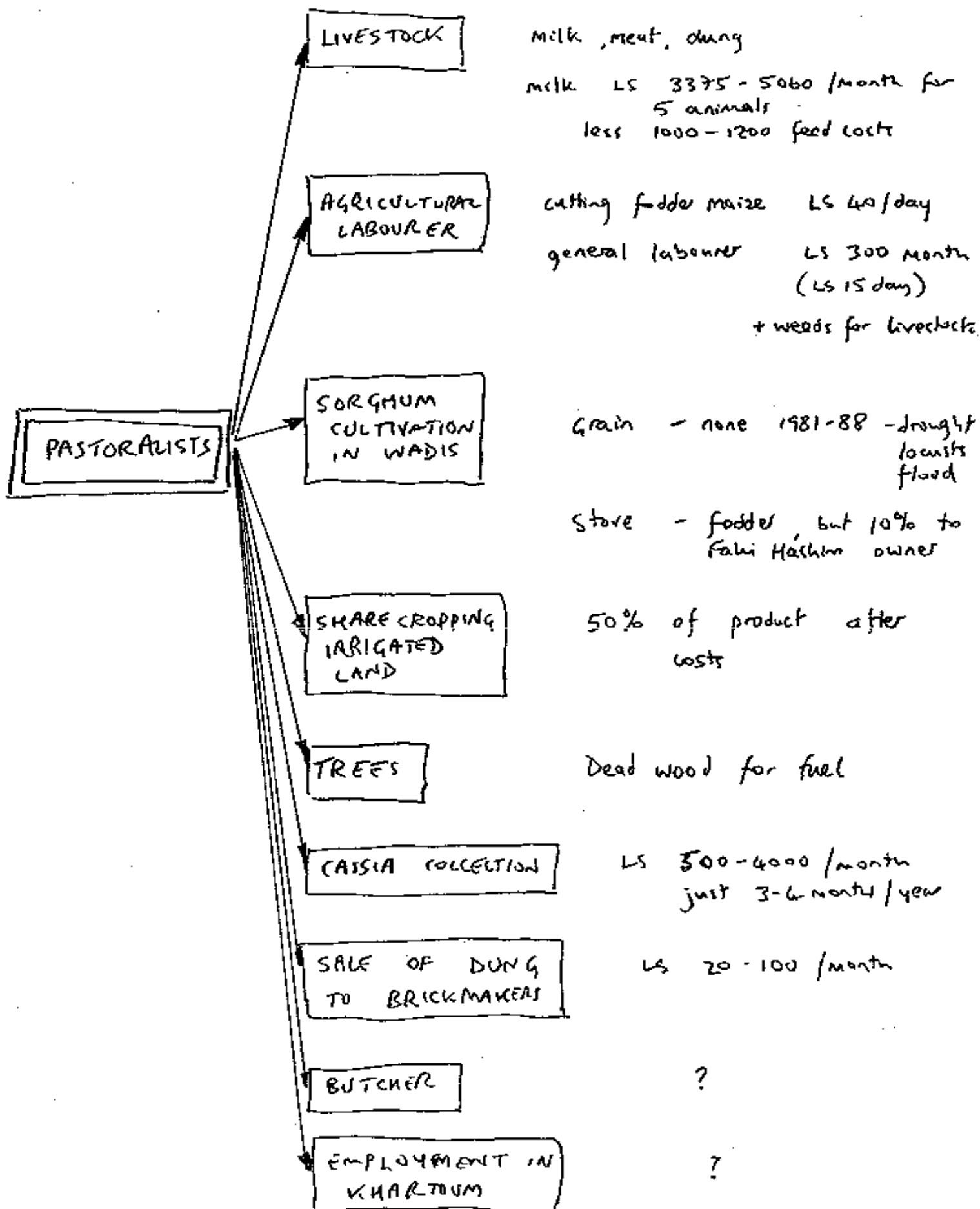


Figure 30c. Livelihood options for settled pastoralists

Table 6. Wealth Ranking in Sheikh el Siddiq

- 23 HOUSEHOLDS ON SUGAR LIST OF 1 SHOP
- 5 CATEGORIES OFFERED - ALL ALLOCATED TO LOWER 3

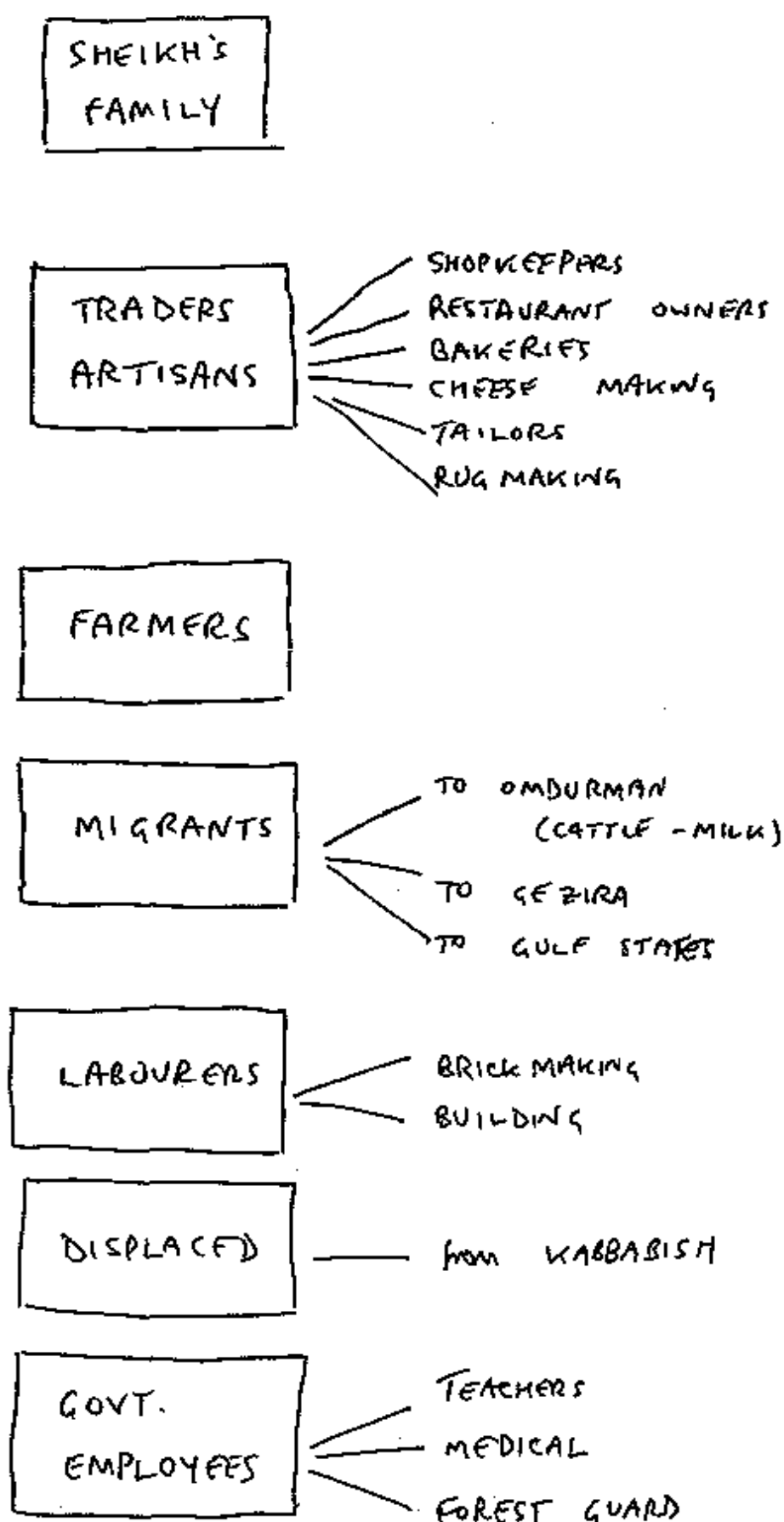
OCCUPATIONS NOTED FOR EACH CATEGORY

- A. LORRY DRIVER
 RESTAURANT OWNER
 HIRED LABOURER

 - B. LABOURER
 MIGRANT (OMDURMAN)
 WORKER AT BAKERY
 CARPENTER
 FARMER

 - C. BLIND MAN
 WOOD COLLECTOR
 HIRED AGRICULTURAL WORKER
 DAY LABOURER (BRICK MAKING)
 YOUNG MAN - (FATHER DIED)
 OLD MAN
-

Figure 31. Classification of income opportunities in Sheikh el Siddiq



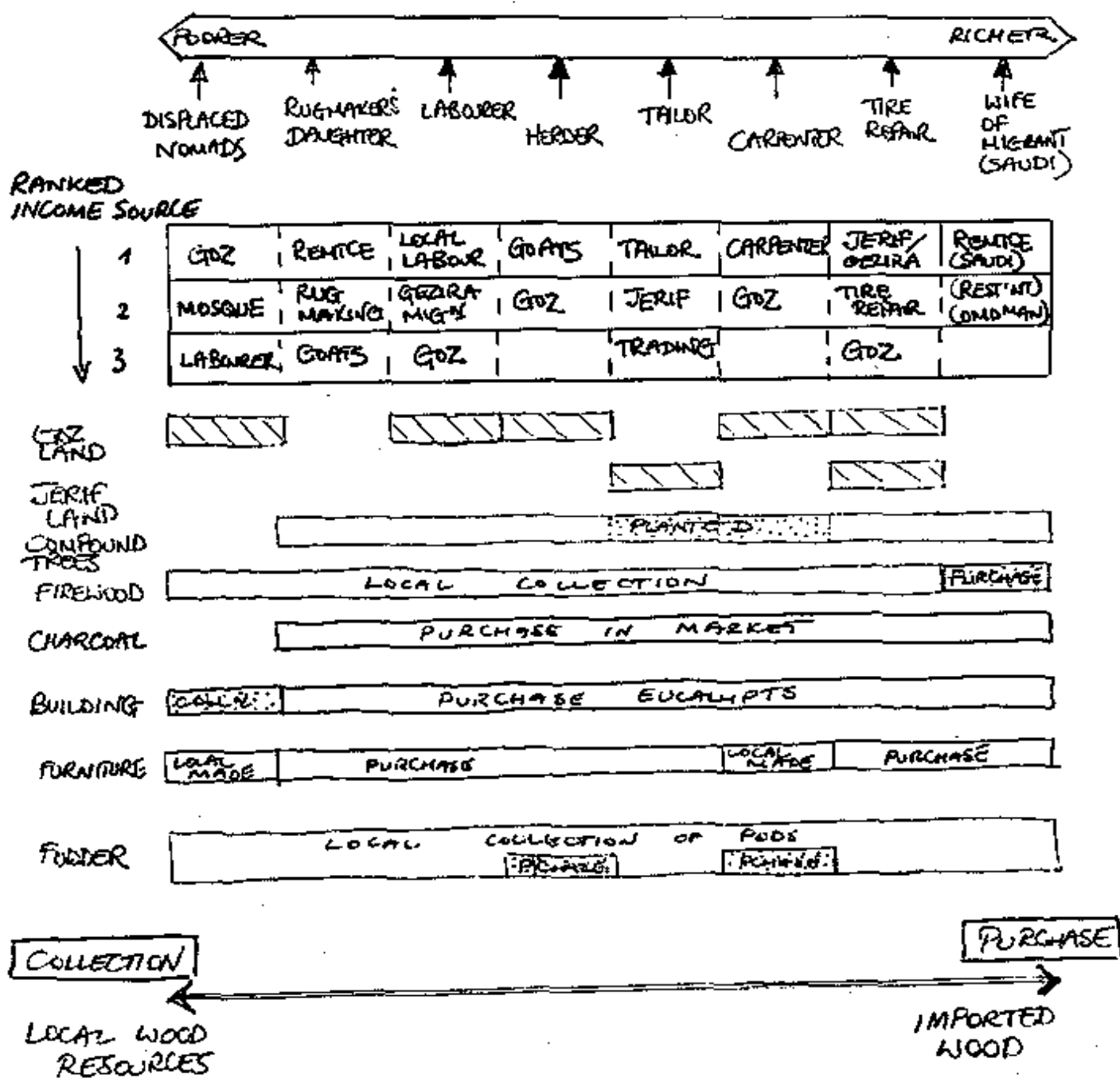


Figure 32. Range of livelihood options for each interviewee in Sheikh el Siddiq

to be roots of dead trees. Firewood was locally collected by most households from dead wood in the local forest area. Some households with higher cash incomes supplemented this with purchased charcoal. Those with livestock as significant components of their income sources also purchased some pods for goats. Changes in regional patterns of demand and supply will therefore affect those linked with the external wood and charcoal economy to a greater extent, while changes in the local resource base will affect others.

The role of women in wood resource use and management was not effectively pursued and remains an area for further investigation. Women are engaged in firewood collection, but those interviewed appeared less aware of the local regulations about woodland protection than the men. One woman, with her husband working away in Saudi Arabia, did not apparently collect or use any local wood resource and was totally reliant on remittance income to purchase all wood products.

There was no clear pattern of differential use of local tree species. The exception being that the displaced settlers used local species for furniture/building more than any other group.

Depending on amount and type of income received different households are reliant on the local resource base to different degrees. In particular, it is the poor, with minimal cash income, that are most dependent on local resources for all end-uses. In addition, livestock owners are also dependent on the local supply of pods for the nutrition of smallstock during the dry season. These conclusions imply that there is a common interest, transcending socio-economic differences, in sustaining the local forest resource. The difference is that the poorer section of the community are principally interested in the harvesting of wood products (firewood, building) that might require some cutting, whereas the richer livestock owners are keen to maintain a mature, pod producing forest largely for smallstock production.

The appraisal process thus generated a series of questions about how different sectors of the village have interests in tree management. Socio-economic differentiation is clearly an important factor to consider in any assessment of tree management incentives. Different sectors of rural society weight the costs and benefits of different forest management practices in different ways and feel the impact of external changes at the regional level to different extents.

7. KEY QUESTIONS FOR RESEARCH

A principal objective of any Rapid Rural Appraisal is to generate hypotheses and raise questions about the topic under study. Thus the study of these five different levels has raised a number of important questions about incentives for tree management in rural communities beyond the urban fringe of Greater Khartoum. The key questions generated by the RRA team are outlined in Table 7.

In areas closer to the city, such as Faki Hashim, trees, though important to the household economy, are playing a secondary role to fodder and vegetables. The most important questions relate to the likelihood that these crops will remain just as profitable into the future. Large scale fruit and vegetable farms being developed elsewhere may change the relative benefits of growing these crops compared with other trees.

Trees may further be encouraged if charcoal and wood from the mechanised farming regions does become increasingly scarce as these operations decline. More systematic cultivation of trees on field boundaries could meet some of the local demand for wood and other valued products. Trees on the river bank could certainly increase the sustainability of the production system, but again this would require the provision of seedlings of indigenous species. This requires a major change in how people perceive trees and their cultivation in relation to future uncertainty. The type of trees that might be planted will be affected by local perceptions and assessments of relative costs and benefits. These will differ between groups in the village and so no standard recommendation package can be expected to work.

The final question concerns the expansion of irrigation into the drylands - this could lead to more secure tenure for both the settled and the migrant residents by establishing permanent agriculture before the land is purchased as speculation for housing. In order to increase the tree planting in the dryland areas some significant change in the tenurial system for trees is needed: for example "if you plant a tree, you can use its products, or cut it down, at any time".

The key questions for the village of Sheikh el Siddiq mostly relate to the communal Samur woodland. The options for tree planting and management in home compounds are limited by the investment required for watering, although an exploration of opportunities for indigenous tree propagation appear a possibility. On jerif land issues relate largely to tenure and the necessity to clarify rights of use.

A combination of factors seem to be important in the maintenance of the communal woodland, including the strong and long standing commitment of local leaders, the widespread knowledge and apparent acceptance of the rules, and effective enforcement by local volunteers, rather than external forestry agents. The structure of local institutions rather than individual economic

Table 7 Key questions for research developed for the two communities of Faki Hashim and Sheikh el Siddiq.

Faki Hashim

1. What is the likelihood that large scale fruit and vegetable farms elsewhere, together with improvements to transport and roads, will lead to cheaper products that will undercut the small producers of Faki Hashim?
2. Would small scale experiments involving the raising of indigenous species from seed help to demonstrate to local people that the cultivation of trees would be a viable means of increasing the numbers of trees?
3. Would the encouragement of Sunut and Salix willow trees on the Jerif land succeed in minimising the erosion of the river bank by the Nile?
4. Would expansion of the irrigated land into the drylands to the east of the road improve the sustainability of the agricultural production base of the village?
5. Is there an opportunity for further intensification of vegetable and fodder production on currently farmed land?
6. Can the vegetable and fruit processing and drying factory be rehabilitated?

Sheikh el Siddiq

1. What are the knock-on effects of forest protection in the Sheikh el Siddiq area on regions further away?
2. How can regeneration of Samur be improved through the active management of portions of the forest area using the existing and effective institutions as experimenters?
3. Is there a real fodder gap caused by changes in the local woodland that is present every year? Are there locally adapted species that could be introduced or encouraged to fill such a gap to stabilise interannual fodder production?
4. What factors of pricing and marketing of imported wood products would affect the substitution for fuel of local wood sources for imported wood?
5. How can women be encouraged to take a more active role in the protection of forestry resources? How can women's environmental awareness be increased?

6. What are the most appropriate water harvesting techniques for increasing the amount of water available to trees growing in courtyards? What indigenous species that have low water requirements can grow from seed into good shade trees with limited management?
-

incentives are seen to be critical in the management of the communal woodland area. In two visits to neighbouring villages there was no obvious evidence of excessive cutting outside the Sheikh el Siddiq area. Indeed the area of local protection appears to spread beyond the immediate bounds of Sheikh el Siddiq village into the surrounding areas. Further investigations of the knock-on effects of complete local protection from cutting need to be assessed further. It appears that wood is imported largely from greater distances, for example in lorries from Kordofan, rather than from the immediate surrounding area.

The existing, conserved trees are about 30 years old or more and there is little effective regeneration of young trees. This has been due to long term drought and the effects of goat browsing. This is a concern for the long term sustainability of the forest area, since even in good rainfall years recruitment to the tree population is not taking place. This is of concern both to livestock keepers and those socio-economic groups particularly reliant on the communal woodland resource.

Both appraisal teams were unable to assess effectively women's access and use of tree resources. Lack of women on the appraisal team severely hindered pursuing this research theme. Questions about the degree to which women are involved in the protection of the forest resource remained unanswered. These require further research.

In both communities nearly all tree planting takes place inside people's compounds. Trees that are planted are largely exotic species such as neem, eucalyptus, tamarind or citrus. The principal reason for planting trees in home courtyards mentioned by people interviewed was shade, though other informants mentioned that courtyard trees were important to protect the houses from heavy rainfall. Seedlings had been acquired from external sources. Some indigenous species were tried such as Haraz, Sidir, and Albizia lebbeck, but people commented that the success rate was low. They mentioned that they did not know how to plant local trees and that local trees grew 'naturally'. In Sheikh el Siddiq one farmer mentioned that he had successfully protected a growing seedling of Samur in his courtyard and that it was now growing into a reasonable tree.

Many people interviewed had attempted to plant trees, but not all attempts had been successful. Informants noted that lack of water and goat browsing were the major causes of seedling mortality. One person had nurtured 7 trees in his courtyard including indigenous and exotic species. All the trees were protected from goats and he watered them regularly. He estimated that the cost of watering was around LS 1 /tree/week. Water has to be purchased from the water tank. The cost of keeping trees alive in an arid climate is therefore considerable. This does not of course account for the costs of the labour input and the protection. In straight economic terms tree growing is clearly uneconomic. The outputs of the trees in terms of wood or fruits is small and spread over a long period. However, in a hot

climate shade is highly valued and at least some people are prepared to invest time and money in growing or nurturing shade trees in their compounds.

Designing systems to make growing trees in compounds easier was considered by the appraisal group. Reducing the amount of water that needs to be purchased is a priority.

The final issue concerns factors of pricing and marketing of imported wood products. As we have demonstrated earlier, there has been substitution of new wood products for local species in the past. The future preferences of local users and the relative prices of alternative products are uncertain factors, yet ones that could have a significant impact on the local woodland resource base and the ability of particular groups to obtain their wood needs from external sources.

The key questions thus refer to influences operating at the regional, village and household level. The relevant cost-benefit trade offs relate to issues at each of these levels. It is therefore important to develop an integrated analysis that incorporates factors from the household to the regional economy. Aggregate statistical surveys do not generally achieve this. RRA techniques offer one route to develop integrated insights for a more effective understanding of incentives for tree management.

REFERENCES

- Ahmed, A.S. and El Magzoub El S. 1985. Survey of Fuelwood Consumption in Khartoum Province Industries. National Council for Research, Energy Research Council, Sudan
- Conway, G.R. 1985. Agroecosystem Analysis. Agric. Admin. 20, 31-55
- Conway, G.R. 1987a. Helping Poor Farmers. Report to the Ford Foundation.
- Conway, G.R. 1987b. Properties of agroecosystems. Agric. Syst. 24, 95-117
- Deweese, P.A. 1987. Consultants Report on Charcoal and Gum Arabic Markets and Market Dynamics in Sudan. Prepared for the UNDP/World Bank Energy Sector Management Assistance Program, Washington, DC.
- El Sammani M. O., El Had Abu Sin M., Talha M., El Hassan B.M. and Haywood, I. 1989. Management problems of Greater Khartoum. In: Stren R E and White R R (eds). African Cities in Crisis. Managing Rapid Urban Growth. Westview Press, Boulder, San Francisco and London.
- ERCS. 1988. Rapid Rural Appraisal. A Closer Look at Rural Life in Wollo. Ethiopian Red Cross Society and IIED, London.
- FAO. 1695-86. Production Yearbooks. Food and Agriculture Organisation. Rome Publications.
- Grandin, B. 1988. Wealth Ranking. IT Publications, London.
- McCracken, J.A. 1988. Participatory RRA in Gujarat: A Trial Lodel for the Aga Khan Rural Support Programme, India. IIED, London.
- McCracken, J.A., Pretty, J.N. and Conway, G.R. 1988. An Introduction to Rapid Rural Appraisal. IIED, London
- MFVDP. 1988. Rapid Agroecosystem Zoning of Alpuri, Pakistan. Ed. by J.N. Pretty. Malakand Fruit and Vegetable Development Project, Pakistan and IIED, London.
- Pretty, J.N. and Scoones, I.C. 1989. Rapid Rural Appraisal Training in Sudan: Incentives to Tree Management. Report to the US Agency for International Development, Sudan.

APPENDIX A

Checklist of Questions Developed for Interviews

WHAT ?	What tree species are grown? What are the multiple functions of particular trees? What are the preferences and criteria? What are the key problems and opportunities relating to tree management?
WHEN ?	Seasonality of production/management activities Interannual activities Historical trends, particularly focussing on changes following droughts
WHERE ?	Compounds, rainfed land, irrigated land or communal land Competition for land Influences of nearby villages and cities Where do people migrate to/from
WHO ?	Who manage and harvest the trees (men, women, rich or poor) Who pays for inputs? Who browses animals on tree fodder? Institutional control - tenure and ownership
WHY ?	Comparative advantages - short run costs and benefits versus other activities (crops, livestock, charcoal, fruit, firewood) - long run costs/benefits Criteria for choices
HOW ?	Management practices, marketing flows How do the various components of livelihood systems inter-relate?

APPENDIX B

Some Classifications and Questions from Sheikh el Siddiq

Classification of socio-economic groups in the village

Focussed interviews will be carried out with each of the following group (plus others that may arise). The classification is based on earlier interviews/rankings:

Traders
Artesans
Farmers (goats, jerif, goz)
Farmers (goats, goz)
Farmers (goats)
Labourers
Migrants to Omdurman
Migrants to Gezira
Migrants to Gezira
Displaced settlers
Government employers
Female headed households
Sheikh's family

Key Informants

Particular information relating to the hypotheses can be derived from the following informants:

Court official
Forest guard living in next village
Rural council/village council
Charcoal makers
Users and marketers of charcoal
Carpenter
Bakery owner
Mesquite island owner
People from neighbouring village

Hypotheses concerning tree management

- * Everyone in the community shares the products of the forest reserve equally
- * Everyone shares the responsibility for the protection of the forest reserve equally
- * The Sheikh's authority is one of the key elements in ensuring forest protection
- * Different socio-economic groups have different tree use patterns: in relation to use, access and attitudes

- * The range of existing tree species are not meeting local people's needs
- * Trees are managed (or planted) on private land (in compounds, goz, jerif) for short-term economic gains, rather than for conservation/aesthetic reasons
- * Due to the strong protection of the forest area at Sheikh el Siddiq the forest resources in the area surrounding it are more heavily exploited than would otherwise be the case

Checklist of questions for different socio-economic groups

(These questions relate to the hypotheses about tree management)

- * Which tree products do you use? What for? Where do these come from? Are they brought or collected? What are the important species? (Start the interview with matrix 1)

Probing questions:

- Do you get any of the products from the forest around Sheikh el Siddiq (which parts of the forest?)
- Do you cut trees? If yes, where? what species? what for?
If no, why not?
- * What tree products are difficult to get? Why?
What other products are needed? Why?
What species might fill these gaps?
- * What trees do you have in the compound? on the goz land?
on jerif land?
If there are trees: Why are these trees left there?
If no/few trees: why?
Who owns the trees in the compound/on the goz/on the jerif land?
- * Have you/members of family planted any trees?
If yes, what? Why?
If no, why not?
(Is there anyone in the village who does plant trees?)
- * Discussion: What are the benefits of the protected forest around the village? What may happen in the future?

Socio-economic profile for each household

- * Take notes on characteristics of household and informant

- * Discuss sources of income for each household visited (matrix 2). Rank top 3 sources

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