

THE DEMOCRATIC REPUBLIC OF THE SUDAN

THE EXECUTIVE ORGAN FOR
THE DEVELOPMENT PROJECTS
IN THE JONGLEI AREA

THE ECONOMIC AND SOCIAL
RESEARCH COUNCIL
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THE IMPACT OF THE EXTENSION OF JONGLEI CANAL ON THE AREA FROM KONGOR TO BOR

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1. INTRODUCTION

1. A new proposal, has been recently formulated suggesting a major change in the orientation of the line of the Canal between Jonglei village and Bor. Instead of starting at a point in the Northern end of the Atem River as specified in the old plan, the proposal suggests a new alignment which implies further extension of the Canal from a point near Kongor down to Bor. This proposed extension will make the Canal pass through inhabited areas; crossing the high lands on which human settlements are located, as well as the road connecting them at a number of places.
2. It is therefore anticipated that the proposed extension of the Canal will disturb local conditions, and results in a number of changes which need to be identified, assessed and catered for, in terms of programmes of action to restore a new equilibrium in future.
3. The present report concentrates on the first two aspects of the question i.e. the identification and assessment of the effects of the proposed extension on local conditions in the area between Kongor and Bor.
4. In writing the report emphasis is given to the following aspects:
 - i. The general land use patterns to bring out the interrelationships between human settlements, agricultural and grazing lands.
 - ii. The traditional economies with special reference to livestock breeding as a major occupation in the area.
 - iii. The population of the area to determine its size and geographical distribution.

III. METHODOLOGY

5. To carry out the study the following methodology was adopted. Interviews were held with some of the informative figures at Bor. Also data was collected from a number of Government departments, particularly those of Veterinary Services and Local Government. Use was also made of the work of the Social and Economic Research Team which was operating in the area at the time the study was conducted. The data obtained from these sources was later supplemented by the findings of the field work done in the area between Bor and Kongor. Each of the main services on the road was visited and interviews were held with the local leaderships.

6. In addition to these sources the area on both sides of the road from Kongor to Bor was mapped in a detailed transect at one kilometre interval. The results obtained from this exercise furnished very valuable data which is utilized in the preparation of a number of maps to which reference shall be made.

III.

LAND USE PATTERNS

A. The Local Government Units of the Study Area

7. Prior to the enactment of the recent Local Government Law which brought major changes on the boundaries of Local Government units, the area under the study formed what was known as Bor District, with its centre at Bor. The new territorial organization that came with the enactment of the law, broke the district, into two Local Government units: a Northern one with its centre at Kongor, and a Southern one with its centre at Bor.

8. The two districts are part of the wider Dinka country, which is made of a confederation of tribes and sub-tribal units. The Northern district is occupied by the Twich Dinka and the Southern one by the Bor Dinka.

B. Cattle Grazing as a dominant Type of Land Use

9. Cattle breeding is the predominant occupation in the two districts; and cattle is the core of life in all respects, for the group as well as the individual, cattle is the source of livelihood, status, prestige, and viability in economic and social transactions.

10. With the exception of the area occupied by Bor forest which extends for 40 km. north of Bor, grazing lands spread to the east and west of the transect line, from the northern fringe of Bor forest up to Kongor: a distance of 14 km. The depth of the grazing lands to the east from any point on the transect line is variable ranging from 10 to 25 km. at its maximum reach.

1....

11. During the early fifties the Twich and Bor Dinka used to roam over wider grazing lands to the east; but because of the intensified Murle raids, penetration eastwards proved to be insecure, inflicting heavy losses in cattle and lives. Many of the previously established settlements in the east moved westwards for this reason. As a result, the eastern grazing lands are reduced in area, and confined at present to a narrow strip running parallel to the transect line. Grazing lands extend also to the west of the transect line upto the "Twich" proper.

C. Distribution of Human Settlements

12. Because of the dominating role of cattle in the life of the people grazing emerges as the basic type of land use in the two districts. Two other patterns of land use are also present, namely: human settlements on high lands, and the patches of cultivations surrounding the homesteads.

13. The transect referred to as a landmark in the maps used in this report is actually the main road following the terrain of the high lands, and along which human settlements are aligned. The use of the term high lands is arbitrary, and it should be taken in a comparative context to its surroundings. Topographically the high lands are in most cases elevated grounds: one to two feet higher, than the inundated plains surrounding them. In many places they are not continuous and are interrupted by intervening low lands.

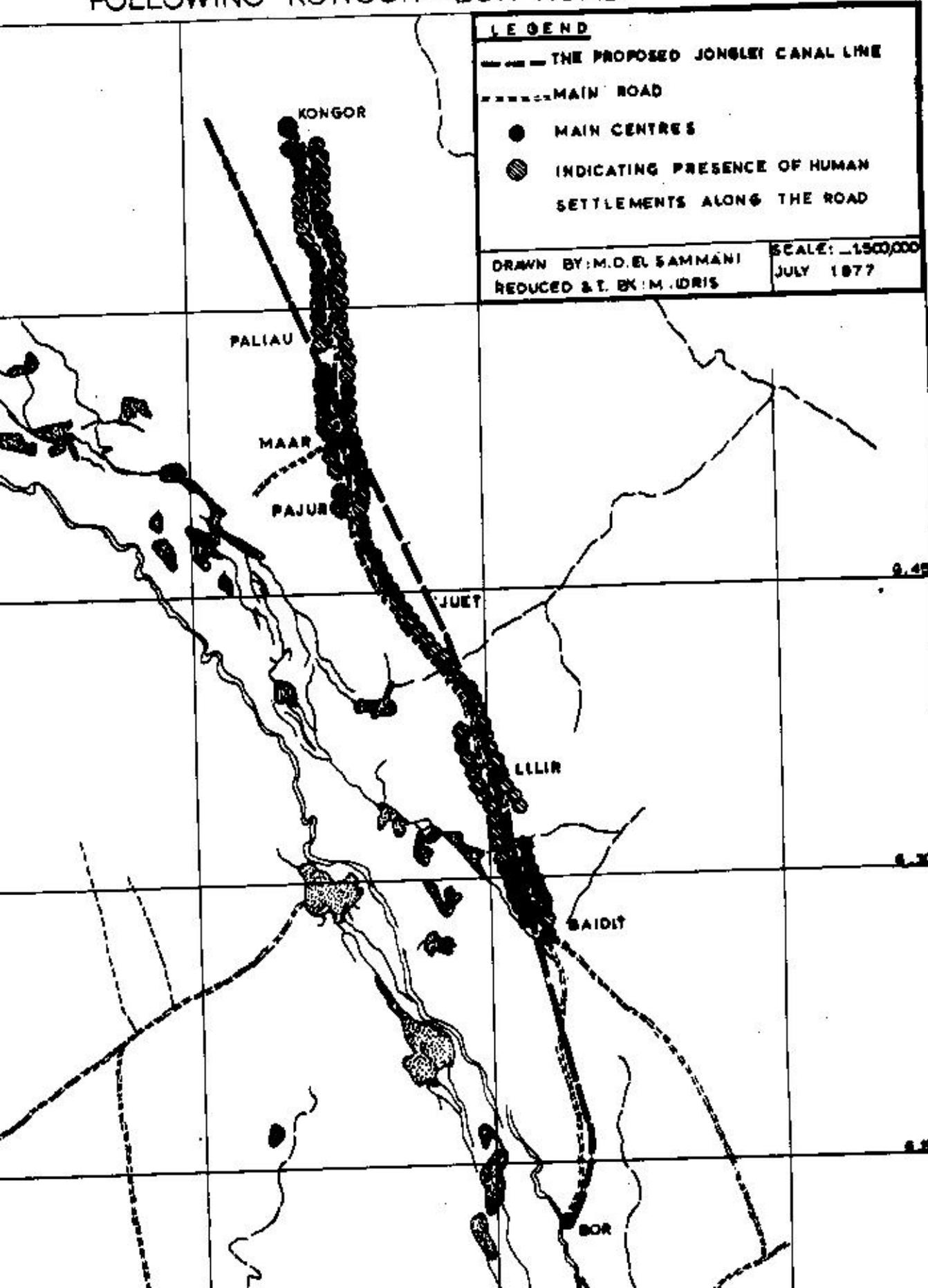
14. Being relatively higher than the plains extending to the east and west of them, the high lands attracted human settlements, and provided refuge for the local tribes from the annual floods; caused by the river system and sheet flow, which inundate the whole country side during the rainy season.

15. It follows that human settlements, taking the form of independent homesteads, are seen scattered all over the stretch of the high lands. Other developments such as the road system, and service facilities followed the concentration of population on the high lands; generated by the evolution of economic and social activities.

16. Consequently a number of local centres emerged having their *moleli* in tribal courts, located in the residing places of native chiefs. Except for Kongor, most of these central places do not take the shape of nucleated villages with sizeable population; and rather look as clusters of huts, constituted of the homestead of the court president, some of the sub-chiefs, and the close relatives. In the vicinity of this cluster are seen the few service facilities, serving the community at large.

17. A fair picture of the distribution of human settlements in the two districts is given in Fig.1, based on the findings of the transect taken from Kongor to Dor. Travelling on the main road from Kongor southwards, settlements are seen to extend continuously on both sides of the road up to Palian, for a distance of 22 km. From Palian southwards, and except for a stretch of 7 km on the western side of the road north of Maar, no settlements exist west of the road up to Jale; and all settlements are confined to the eastern side of the road. From Jale up to Liliir and further south, for a distance of about 8 kms., settlements continue on both sides of the road, except for a gap of 5 kms. south of Liliir on the eastern side of the road.

FIG.1 SHOWS THE INTENSITY OF HUMAN SETTLEMENTS
DISTRIBUTION ALONG THE TRANSECT TAKEN
FOLLOWING KONGOR-BOR ROAD



18. The location of settlements in relation to the road is governed by the local morphology of the plain. In places where the high lands are continuous, settlements are found closer to the road as in the area between Kongor and Palau. The picture continues up to a point 15 km. south of Muak. Further south from this point settlements tend to disperse on the country side away from the road, at a distance ranging from 1 to 7 km., approximately. From Jole southwards settlements come closer to the road, and their density increases compared to the northern area.

19. As stated previously the Dinka do not live in nucleated villages. All of the inhabited part of the country viewed from the line of the transect is seen dotted with dispersed homesteads; the location of which is governed by the micro-topography of the high lands. The basic settlement unit is the homestead. A homestead is usually composed of a tank (which is a big hut in which a tile is housed during the rainy season) plus one or two huts located about ten meters from it. The three units are built on a platform of about one hundred square meters; in some case naturally developed, in others artificially raised. Annexed to this residential unit is the family farm which ranges in area from one to three feddans. On the average, one homestead with its farm is separated from a neighbouring homestead by a distance of about 300 metres. In between the homestead units some independent huts are seen all over the place; and these are the homes of relatives, and individuals affiliated in one way or the other to the occupant of the homestead.

21. Apart from the physical factors governing the distribution of homesteads in space, there are the social factors which also have their influence on the layout of human settlements. The Dinka land is divided among the various tribal units with tenure rights acknowledged by everybody.

22. However, the Dinka do not follow a rigid ownership system which imposes static rights on the use of land. Outsiders belonging to other sub-tribal units could usually be accommodated in any sub-tribal domain, once permission is granted by the concerned chief. This has resulted in continuous fusion, and even distribution of human settlements over space. It follows that any spot potentially suitable for settlement is occupied, which is one of the factors accounting for the continuous spread of human settlements over the high lands.

IV.

LIVESTOCK ECONOMY

23. The economy of the area is based exclusively on livestock. The Dinka are fully and wholly occupied by their animals. Cattle represent their wealth and pride, their hopes and disappointments. Before describing the effects anticipated after the canal is operational, it is necessary to describe the basic parameters of the livestock economy as they exist now. This embraces the following:

A. Animal numbers

24. There are no exact figures of the animal numbers in the area between Bor and Kongor. The recent population census (1977) undertaken by the Veterinary Section, Ministry of Agriculture, Food and Natural Resources, gave only the total numbers of animals in the whole province; and as such, therefore, is of little value for this particular area. However, we have collected evidence on animal numbers from various sources. These are:

- (i) Figures available at the Provincial Veterinary Office at Bor, on vaccination numbers.
- (ii) Number of Lunks along the road between Kongor and Bor.

...

(iii) Identification of cattle camps between Kongor and Bor.

(iv) Several interviews with all the chiefs, local administrators and the Veterinary staff in the area.

25. The animals in the area are owned by two Dinka sub-tribes inhabiting the areas along the suggested route of Jonglei canal. These are the Dinka Twich and the Dinka Bor. The latter will be mostly affected than the former since a large part of their area is traversed by the canal.

26. The area inhabited by these two sub-tribes can be divided arbitrarily into 7 regions according to the siting of villages or court centres along Bor-Kongor road (Table I).

Table I

Number of cattle by region along Bor-Kongor road

Serial No.	Region Between	No. of cattle
1	Kongor-Wangkulei	203
2	Wangkulei-Palieu	579
3	Palieu-Maar	495
4	Maar-Jalle	377
5	Jalle-Lilir	423
6	Lilir-Bor	388
7	Bor-Bor	1000

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27. These can be depicted in Figure 2 which shows the intensity of distribution of Lukas and cattle camps by chieftainship.

28. When adding all the various pieces of evidence, the number of cattle between Bor and Kajgor can be estimated at 250,000 animals. From Table 1, it can be seen that the concentration of the majority of settlements is between Palau and Lilir. Also it is to be noted that settlements in this area tend to cluster together nearer than in other areas. For the intensity of settlements refer to Fig. 1.

3. Grazing Activities and Migratory Movements

29. The activities of the Dinka are very well moulded with the climatic changes throughout the year. The migratory pattern of Dinka is divided, broadly speaking, between three areas. The first is what was described previously as the high lands. These are elevated areas of between 1-2 feet. They stand as interrupted bits of land which escape inundation by flood waters, of about 100 sq. metres occupied by the homesteads.

30. The second are the sites of the cattle camps, which are transitional areas where animals are kept just before and after the peak of the rainy season when cattle are moved into and out of the Lukas. The animals are moved into the cattle camps of the high lands and into Lukas from mid May where they stay up to mid November.

FIG.2 SHOWS THE INTENSITY OF DISTRIBUTION OF LUAKS

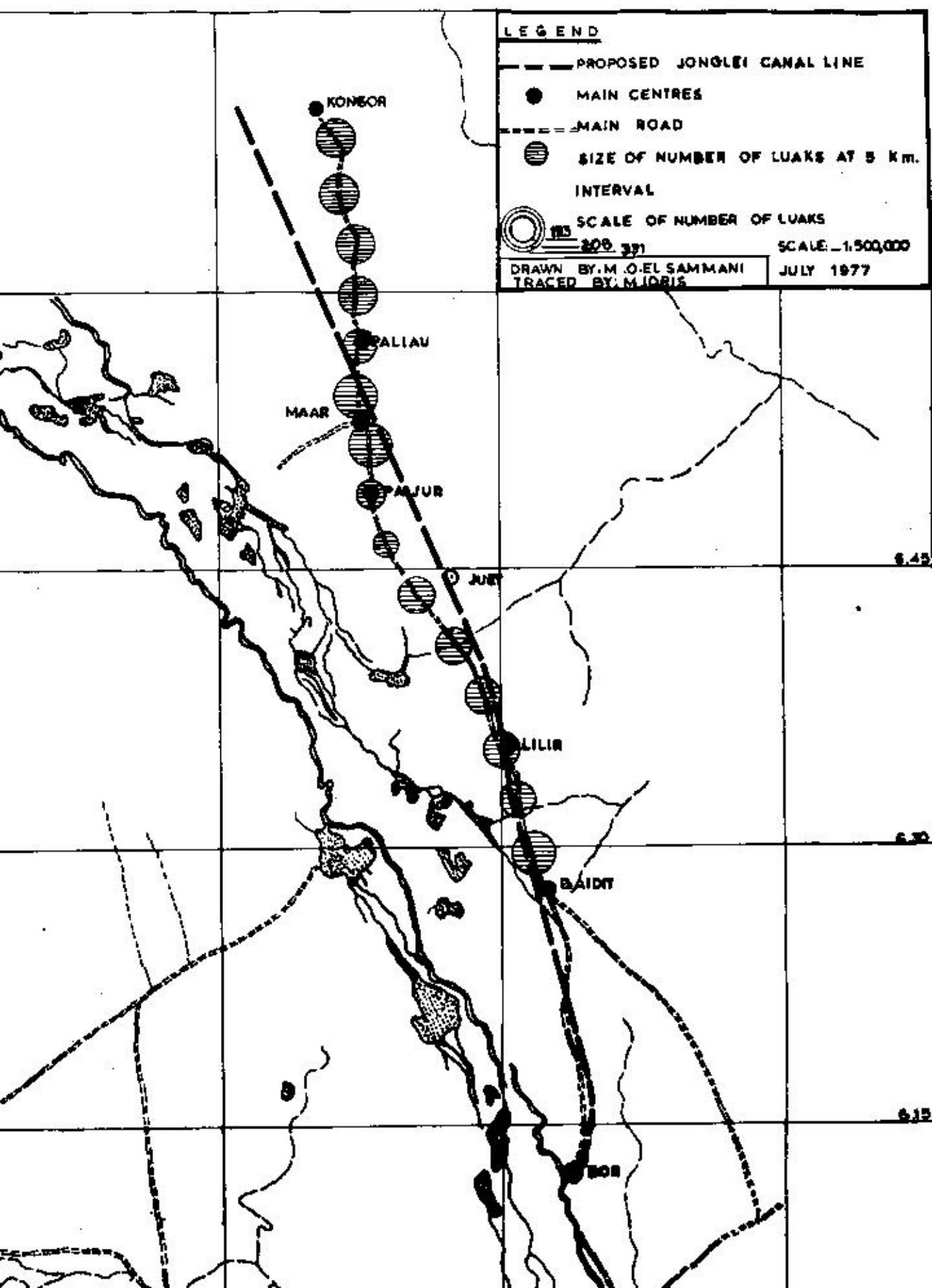


Table 2

Number of cattle camps between Bar and Kongor

<u>Serial No.</u>	<u>Region Between</u>	<u>No. of cattle camps</u>
1	Kongor-Palieu	10
2	Palieu-Maez	6
3	Maez-Jalio	11
4	Jalio-Lilir	6
5	Lilir-Baidit	3
6	Baidit-Bar	12
		<u>55</u>
		<u>====</u>

31. The third major activity takes place in the "toich" or grazing lands. These are the areas which are inundated by the flood waters during the rainy season. In summer, the pasture is lush and plentiful. Water is also available in the river and areas adjacent to it. This period extends from mid-December to mid-May.

C. Traditional grazing areas, right and reverse

32. The cattle are driven out of the Lukas to the cattle camps at the end of the rainy season, sometime in October. They remain grazing in the vicinity of the cattle camps till the end of December. Then starts the journey towards the "toich" which they might reach in January depending on normal grazing conditions. Toich grazing continues up to May when they start the journey back towards the cattle camps in the intermediate lawls. They reach there sometime in June-July depending on rainfall.

33. In general, cattle are driven to and from the teich in synchrony with the availability of grass and water along the traditional cattle route. In their journey back from the grazing areas, they set fire to the grass to make sure of a better regrowth in the oncoming seasons. In the Lukas they house only the most important animals such as good bulls and bulls.

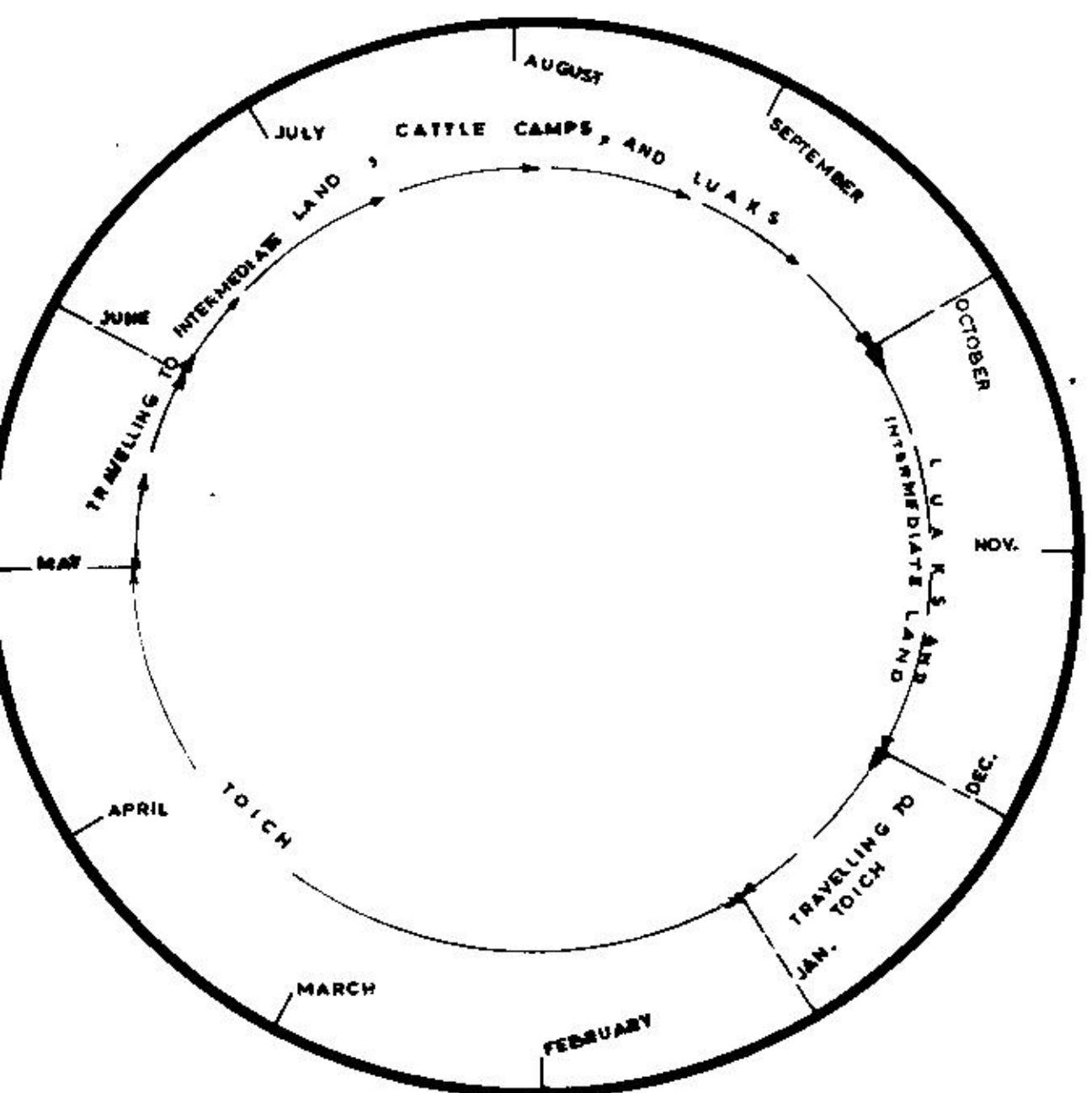
34. The diagram Fig.3 illustrates the major activities undertaken throughout the year.

35. The use of Lukas for housing cattle is not carried all over the area. All the animals in the area between Jalo and Kowgor are housed in Lukas during the rainy season. From Jalo to Bor they divide the cattle between the Lukas and the cattle camps.

36. Before the floods of 1961-62, the cattle of the northern parts (Jalo-Baidit) used to cross the river to the western grazing lands, in the dry season: Dangkor to Kuri. The animals of the southern region (Bor-Baidit) have different grazing patterns as they graze in the teich near to this area. When the teich is poor, people of the southern area drive their animals as far southwards as Gancim.

37. The journey back to the Lukas is not a straight drive to the villages. In the past, the Dinka used to drive their animals past the Bor-Kowgor road to the Eastern plains when they are returning from the "teich" grazing lands in May. These movements were halted in recent times by the conflicts which developed between them and the Murle. The plains to the East seem to provide an attractive alternative for future developments.

G.3 A DIAGRAM ILLUSTRATING MAJOR ACTIVITIES UNDERTAKEN THROUGHOUT THE YEAR



It is quite obvious from the interviews held with Dinka cattle-men that the area is very suitable from their experience, for cattle grazing especially at Kher byre. The only limiting factor as revealed is water availability. Some of the cattle-men interviewed go as far as saying that if security and water are provided they do not need to go to the "toich" grazing areas.

38. The movements of cattle for grazing between the different parts of the area depend upon two factors:

- (i) Weather conditions, and
- (ii) Availability of grazing.

39. The selection of camp is decided upon by the chiefs after having sent scouts to assess the condition of the "toich" pasture. Then the "toich" is divided up into various camps according to traditional grazing rights and people usually go to the same areas grazed by the camp in previous years (by) right of inheritance. This right was agreed upon in the past with another interested party, the fisherman "Many Thay". Disputes occur, occasionally, when a disease flares up, or when grazing conditions are恶劣, but generally there is a high degree of tolerance and flexibility. This is understandable under conditions when communal grazing is the predominant practice.

D. Division of Labour

40. The life of a Dinka is built around his cattle. His life is divided into two stages, either following the cattle when young, or remaining in the village when getting old. Young boys and girls are both engaged all the time with cattle whether, in the toich, cattle camps, or Jucks. Their daily activities are repeatable operations carried nearly the same way throughout the season.

1...

41. In the "teien" the girls milk the cows in the morning (when not menstruating), and leave them for the boys to release them. This is rather time-consuming since animals are individually paired. This period is finished at about 9 a.m. After an hour or so, the men let out since they are expected to graze moreso, yet they should follow older cows and suckle their milk. In the evening all the animals are tied down to their individual pens and thereafter milked. This period finishes at about 9 p.m. In between, the time is distributed among other various jobs such as dung collection and drying for fire making, robe washing, and other small jobs.

42. Sons, of the older, young children and old women remain all the time in the villages. They are entered into by a few goats and sheep. Some newly forthcoming ewes are brought from the teien "Murch" to provide milk for those remaining in the villages.

43. In the rainy season, both men and women have the additional work of cultivating the crops around the huts.

E. Agriculture

44. By tradition the Dusun are not cultivators, but they practice a seasonal cultivation around their huts. The crops cultivated are limited by the primitive tools they use, and the amount of effort they devote for growing their crops. The major work is needed for clearing the agricultural plot for sowing followed by weeding. Weeds represent a major obstacle in the crop as it is at its initial growing stages.

45. There are two cultivation seasons; June and September. The area cultivated is a part of the high ground around the hut. The average area cultivated per hut is about 1.3 feddha, with

a range of $\frac{1}{2}$ - $2\frac{1}{2}$ feddans. The predominant crop grown is dura followed by groundnuts, maize, tobacco and pumpkins. Production of dura is low amounting to about $1\frac{1}{2}$ sack/feddan.

F. Wildlife

46. The canal in this part will fall in the routes of a number of species of wildlife, which migrate to the eastern border in the rainy season and return towards the river in Surur. Antelopes, elephants, buffaloes, etc. cross the area in their annual migratory habits.

V. POPULATION

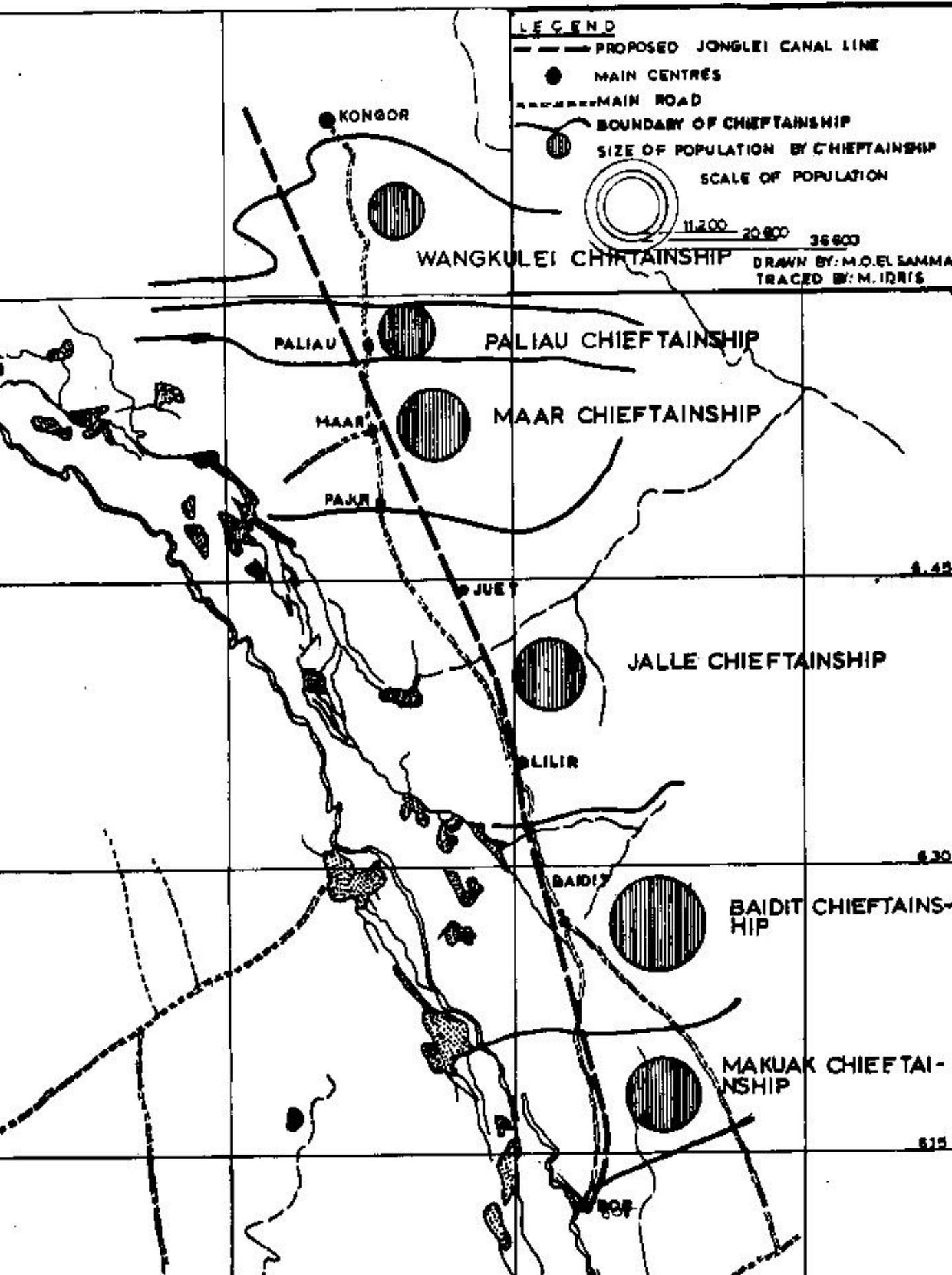
47. According to 1956 census the old Bor District had a population of 130,620 people. Not all of this population is affected by the newly proposed canal line. Fig. 1 shows the court centres between Kongor and Bor, the boundaries of the chiefships administered from these centres and the proposed canal line. Based on the number of headmen in each chiefship, and on an average of 200 persons per headman, an estimation of the population of the areas directly affected by the proposed canal is given in Table 3.

Table 3

Estimation of the Population directly affected by the proposed canal line by chiefship
(at the time of the survey)

<u>Name of court centre</u>	<u>No. of headmen</u>	<u>Est. size of population</u>
Kongor	73	36,500 ✓
Wangkulei	100	21,800 ✓
Palim	56	11,200 ✓
Maat	58	11,600 ✓
Jolle	103	20,600
Baidit	103	20,600
	36	
	71	
	116	
	66	
	122,400	
		<u>.....</u>

FIG.4 SHOWS THE BOUNDARIES OF CHIEFTAINSHIPS, MAIN CENTRES, AND POPULATION BY CHIEFTAINSHIP.



48. As seen from Table 3, the total population affected comes to about 122 thousands people. Fig.4 displays the same figures in comparative form, reflecting variations in distribution between the different chieftainships. Except for Baidit where settlements are concentrated to the east of Bor forest, the population of the other chieftainships is lined along the main road.

VI.

DISTRIBUTION OF SERVICE FACILITIES

49. The distribution of service facilities is given in Fig.5 which shows the main centres, and the facilities available in each. The main types of services found in the area are:

- Native courts
- Police posts
- Rural markets
- Livestock markets
- Water yards with Bore holes
- Open shaft wells
- Primary schools for boys
- Dispensaries and the like, stagnated
- Veterinary dispensaries
- Churches and Mosques.

50. The availability of service facilities varies from one centre to the other, depending on the many factors which governed the evolution of the different centres. Of the many centres shown on Fig.5, Bor and Kongor command most of the services. The present situation reflects acute shortages in services whether taken by type or size in relation to population served. This is further exemplified by the condition of buildings as most of the facilities are housed in temporary huts built of local materials.

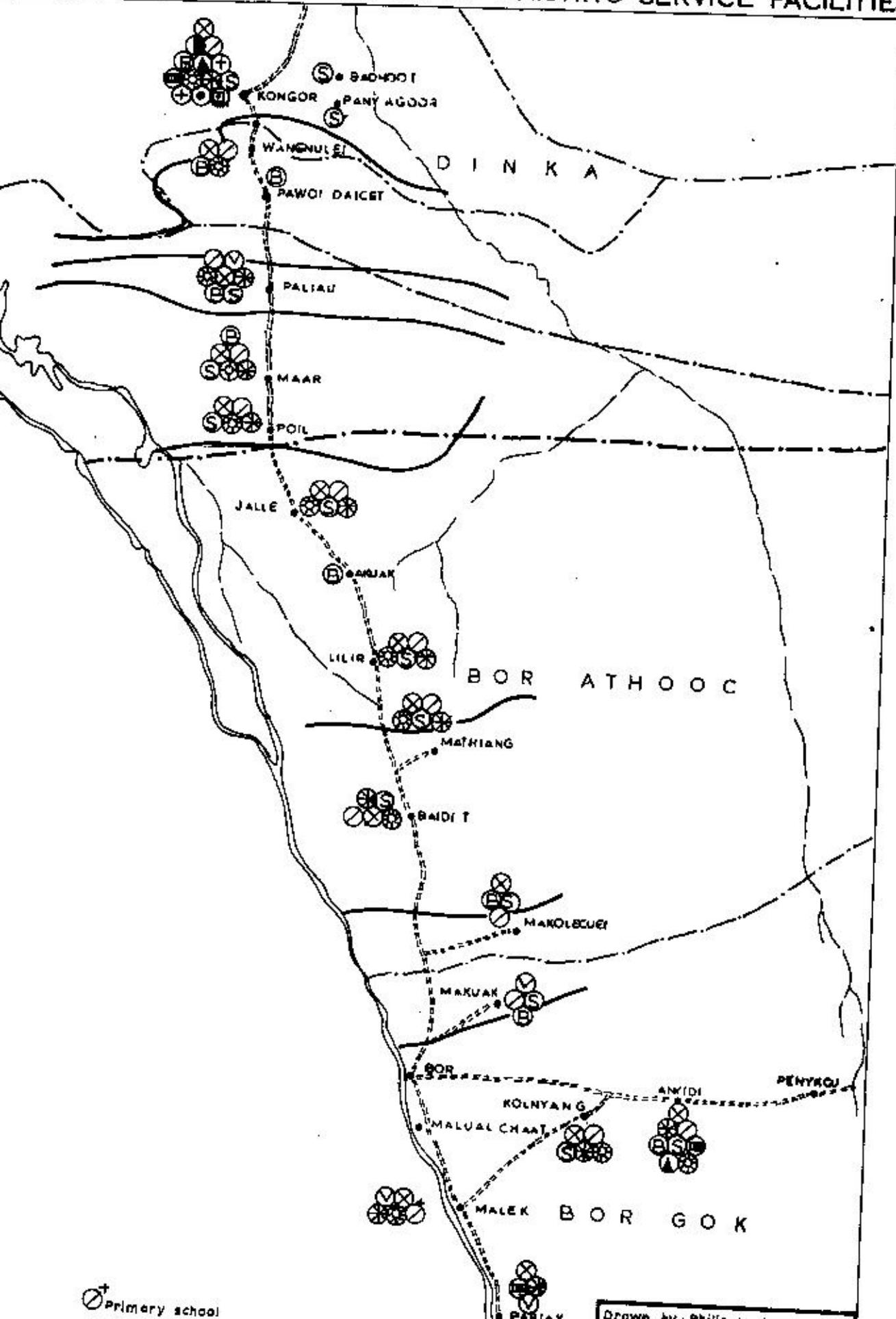
VII. THE IMPACT OF THE PROPOSAL ON THE AREA

51. Apparently the newly proposed canal line will have the following effects on the area as interpreted from Fig. 1.

- i. The canal will cut across the grassy flats of the two northern chiefdomships of Kygor and Wangkulei, separating the high land settlement from the "toich" grazing lands, thus obstructing free migration westward as traditionally practised. The estimated population affected is in the order of 58 thousand people. However, the canal line is not expected to stand as an insurmountable hindrance in this part of the area; since accessibility and free movement between the high land settlement, and the toich grazing lands, could be maintained through bridges, ramps, or siphoning points, which could be used as crossing places.
- ii. Half-way between Polou and Koor the canal crosses the high land from west to east. At this point some disturbance as a result of the passage of the canal through the area is anticipated. The settlements presently existing at the points of intersection have to be relocated. Those to the north of this point will be cut from the toich grazing land and again crossing points have to be provided. The estimated population affected in this part is not large.
- iii. From the point of crossing mentioned previously and down to the boundary separating Liliir from Baidit chiefdomship i.e. for a distance of approximately of 50 kms., the proposed canal excavation will pass through densely settled areas; in some places rightly cutting through settlements, in others running close to their eastern fringes. Apart

FIG.5

MAP OF KONGOR AND BOR DISTRICTS SHOWING DISTRIBUTION OF EXISTING SERVICE FACILITIES



Primary school

Drawn by: [unclear]

LEGEND OF SERVICES EXISTING IN BOR-KONGOR AREA

ADMINISTRATIVE, JUDICIAL AND SECURITY SERVICES

- (●) AREA RURAL COUNCIL
- (X) NATIVE COURT
- (○) POLICE POST

EDUCATION SERVICES

- (X) PRIMARY SCHOOL FOR BOYS
- (○) ADULT EDUCATION CLASS

HEALTH SERVICES

- (A) DISPENSARY
- (V) DRESSING STATION

RELIGIOUS SERVICES

- (+) CHURCH

VETERINARY AND ANIMAL PRODUCTION SERVICES

- (@) VETERINARY DISPENSARY

WATER SUPPLY

- (B) WATER YARD WITH BORE-HOLE
- (S) SURFACE WELL

SHOPPING AND MARKETING

- (●) RURAL MARKET WITH SHOPPING FACILITIES
- (●) CROP MARKET
- (●) LIVESTOCK MARKET

from this, the passage of the canal through this area will result also in the isolation of the high land settlements from the grazing lands to the east. The estimated population affected is in the order of 32 thousands people. As reflected by the size of population, the area in question will be severely affected by the canal line than others. To rectify this situation, proper planning work is needed to work out the necessary settlement programme for the dislocated population.

- iv. South of the boundary between Jello and Baidit chiefships and down to Bor, the canal passes through Bor forest which is almost devoid of human settlements; except for few localised sites. Since the population of the two southern chiefships of Baidit and Mabar is concentrated east of Bor forest; the canal line in its southern reaches actually passes through uninhabited areas utilized for seasonal grazing. Hence, its effects are limited to the obstruction of the free eastward cattle movement between the seasonal grazing lands; which entails the provision of crossing points.
- v. Finally, wildlife will be substantially affected since some of the migratory routes will be cut by the canal.