THE IMPACT OF THE JONGLEI SCHEME
ON THE ECONOMY OF THE DINKA

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The Jonglei Scheme is the most ambitious project currently being undertaken in the Sudan. Its social, political and economic impact on the country will obviously be great; but in particular, it will affect the lives of the people living there dramatically.

The main aim of the Jonglei Scheme is to provide additional irrigation water to the North and Egypt. But it is hoped by the planners that the scheme will also create social development and increase wealth amongst the societies that live in the canal zone. This paper sets out to examine some of the ways in which the scheme will affect the Dinka transhumant pastoralist way of life. Most of the data was obtained during a field survey of 110 Dinka households carried out between January and June, 1981, in various villages in the canal area, particularly Kongor.1 In addition, my previous research experience in the area as a member of a government-sponsored research team between November 1975 and July 1977 augmented gaps in my 1981 fieldwork.

Section One begins with a short history of the origin of the idea of the Jonglei Canal and provides some basic information about the technical, financial and administrative aspects of the project. The canal has been under construction since 1978. Sections Two and Three sketches the present day Dinka social, political and economic organization. This is important in order that the contrast between government and Dinka views about development (discussed in Section Three) and the analysis of the impact of Phases One and Two of the project (discussed in Section Five) are placed in the proper perspective. The paper concludes with some remarks which, in general, cast doubts on the benefits that the canal has been expected to bring to the Dinka.

Origin of the Idea of Jonglei Canal

Britain and Egypt invaded the Sudan in 1898 and formed a condominium administration in which they were, in theory, co-partners; but in reality

This paper was written before the recent unrest in the Southern Sudan which has caused work on the canal to be suspended.

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1. I thank the British Council for a studentship which enabled me to carry out my research and present it as a PhD thesis at the University of Manchester. This paper is based on that thesis. I am grateful to the Jonglei Commission for assistance in the field. I thank Mr P. Leeson and Dr P. T. W. Baxter for their guidance and comments.
competition characterised their relationship. Sometimes this competition was strategic and commercial, but more often it was over the Nile and the use of its water. In practice Britain’s interests were supreme.

Almost immediately Britain embarked on a programme of dam construction and development of artificial irrigation works, mainly for growing cotton for export to the metropolis. Pressure from the British Cotton Growing Association pushed the Sudan Government to begin the construction of the Sennar Dam in 1913. This was completed in 1925 and the well-known Gezira Scheme was born. But this event ‘raised the most serious apprehensions in Egypt’, for whom the Nile is the only source of water for irrigation. Inevitably, a series of meetings and negotiations started between the condominium partners to settle the question of the Nile waters, culminating in the Nile Waters Agreement in 1929 and its revised 1959 version. These agreements allotted Egypt a greater share than that of the Sudan. In accordance with the 1959 Agreement, the Sudan’s share of water was fixed at 18.5 milliards while Egypt was to receive 55.5 milliards per annum (1 milliard = 1,000 million cubic metres). The significance of these figures lies not in that waters are unequally divided but in that the Sudan is not allowed to use more than its allotted share of water in a year. Rather than compete for water the two countries were to cooperate in increasing the Nile yield of water. The vast Sudd Region in Southern Sudan was regarded as the main source for additional water.

The seasonal behaviour of the White Nile System is such that in the South, from about April onwards, and in the North from about June, the river rises as the main water from its main catchment in the region of the Great Lakes and the Ethiopian foothills begins to arrive. The rise in White Nile waters is also supplemented by local rainfall. After having passed its peak period, the river begins to drop again. During the flood period the river overspills its banks in all reaches where it is flanked by marshes and swamps and inundates the surrounding country.

The spilling of the river over its banks causes great loss of water. Although some of this spilt water may eventually return to the main channels of the river downstream, nevertheless, much (about 50 per cent of water entering Mongolla annually) is lost through evaporation and transpiration in the swamps.

Thus the system of the Nile has been regarded by planners in Egypt, the British and the Sudanese as wasteful and the problem of how to reduce the loss of water in the swamps of Southern Sudan has haunted them. Sir William Garstин, of the Egyptian Irrigation Department, is credited with the first plan for the reduction of the loss of water in the Sudd. 2

was in 1904, and since then, with the accumulation of hydrological data, alternative plans have gradually been produced.

William Garstin’s proposal in 1904 was the first in a series (1932, 1936, 1938) by officials of the Egyptian Government. These were summarised in one document in 1946 and became known as the Equatorial Nile Project (ENP). The ENP was later revised by the Jonglei Investigation Team (JIT) which prepared a report in 1954. The details of these plans need not detain us here as they are available elsewhere. Suffice it to say that all these plans aimed to reduce the loss of water in the Sudd through the construction of a canal.

**Basic Facts About the Present Scheme**

Like its predecessors the present Jonglei Canal project has undergone changes and modifications. Originally, the project included the construction of two regulators at the Atem head and at the Sobat mouth (see Figure 1). But a new course (Eastern Alignment) proposed in 1978, four years after the official announcement of the project, has now been adopted to replace the Direct Line. We shall discuss the reasons below. The important point to note is that the Eastern Alignment increases the total length of the canal from 300 kms to 360 kms. The canal is planned to be 54 metres wide and 4.5 metres deep, with a carrying capacity of 20 million cubic metres of water per day. The speed of flow would be at the rate of 0.95 metres per second and its slope would be in the order of 7 to 12.5 cm per kilometre. The Sobat Tail Regulator would remain, but the Head Regulator would be moved to a point north of Bor town. The Head Regulator at Bor would have 10 openings, each 4 metres wide. In addition to the Tail Regulator, a Navigation Lock would be constructed at the Sobat.

Perhaps in a way similar to the embankment of the Bahr el Gebel on its western side as envisaged in the Equatorial Nile Project, the present scheme includes the ‘improvement’ of the canal from its Head Regulator for a distance of 60 kms, to avoid any over-spilling of water.

A number of cross-drainage works would be made along the canal to syphon off water at other water courses (e.g. the Khor Atar) which the canal would cross. In addition to the construction of crossing points for humans and animals, ferry boats and cattle ramps would be provided. The crossing points would be gentle slopes on both the eastern and western sides of the canal. On the eastern side of the canal, an all-weather

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permanent road is being constructed by utilizing the earth dug up by the mechanical digger.

The actual digging of the canal is being done by a French Consortium (Compagnie de Constructions Internationale) using the world's largest single mechanical digger, moving an average of 60,000 cubic metres of earth per day, and consuming some 20 tons of diesel oil per day in the process. Very little labour is thus being used in the actual digging which has now reached a point slightly over 150 kms to the south of the Sobat.

The shift of the course of the canal from the Direct Line to the Eastern Alignment was based on three main arguments. First, it was argued that the Direct Line would have crossed over the main village settlements in the
area, causing massive displacement of population. Secondly, the Direct Line would have greatly hindered the necessary seasonal migration of people and animals to the toorches (grazing areas on the edges of the swamps). Thirdly, a lot of potentially usable grazing land would have become inaccessible to the livestock and more crossing points would be needed. These and related points are very relevant to our discussion below of the impact of the scheme on the inhabitants of the area.

Phases One and Two

The Jonglei Scheme is to be implemented in two phases; all the basic facts and activities already mentioned related to the implementation of Phase One. In addition, as the canal is being dug, a number of ‘development’ programmes have been planned. These programmes include: increasing the area under agricultural production; introduction of new crops and creation of forest belts; improvement of the present traditional livestock resources through provision of animal vaccines and drugs; and the improvement of social services.5

The main feature would be that a 3·7 million feddans (1 feddan = 1·038 acres) of fertile land reclaimed from the Sudd would be irrigated for cash crops and food production as well as fodder. This would involve the construction of an irrigation canal with a capacity of 5 million cubic metres of water a day, parallel to the main canal on its western side. Unfortunately, whereas the programmes to be implemented in Phase One have been spelt out in some detail, those in Phase Two have only been broadly outlined.

Administration and Finance

There are three main bodies involved in the planning, administration and the execution of the Jonglei Canal and its related development programmes. The first is the National Council for the Development Projects in the Jonglei Canal Area (National Council) whose function is to formulate plans and generally supervise the execution of the project. The second body is the Executive Organ for the Development Projects in the Jonglei Canal Area (Executive Organ) which carries out the policies of the National Council. The canal civil works themselves, are entirely the responsibility of the third body, the Permanent Joint Technical Commission for Nile Waters (PJTC), consisting of Sudanese and Egyptian experts. The PJTC supervises the actual construction of the canal and proposes the necessary

5. Details of these projects can be found in the following publications by the Executive Organ (a) ‘Proposals for a Mid-Term Programme and a Crash Programme for the Development of Agriculture, Livestock and Socio-Economic Services in the Jonglei Canal Area’, Executive Organ, Document No. 11, Khartoum, 1979; and (b), ‘Integrated Rural Development in Jonglei Area’, Executive Organ and United Nations Development Programme, Khartoum 1979. The Jonglei programme is to be gradually applied in all the districts within the canal zone.
technical modifications that may be required as well as advising the Executive Organ on technical matters.

The canal and its related development programmes are being financed mainly by the Sudan and Egypt who share all costs equally. At the time of the announcement of the present project in 1974, the Executive Organ released the following figures as project costs.

| TABLE 1  
| Project Costs |
| Costs in (£.S.M.) |
| Million Sudanese Pounds |
| Excavation of Canal | 18.0 |
| Cost of Regulator | 9.5 |
| Cost of Canal Head Regulator | 5.5 |
| Cost of Canal Tail Regulator | 5.0 |
| Cost of Improvement of Atem Bank and Channel | 5.0 |
| Cost of Local Development | 18.0 |
| Contingency Fund | 9.0 |
| Total | 70.0 |


The above estimates were provided by the PJTC to the Commissioner of the Executive Organ. In addition to the L.S.70 million, a million Sudanese Pounds would be added annually to meet local increases due to inflation.

Ideally, more up to date figures, showing actual annual costs of the project should be available. But this is not possible for two reasons. Firstly, the Executive Organ does not publish annual reports. It only provides memoranda to the National Council about its activities and the costs incurred, as well as budget proposals for the following fiscal year. Secondly, the budget for the scheme falls under a general item (called ‘Palace’) in the national budget and is controlled by the President of the Republic. For these reasons, it is not possible to know the actual costs.

However, from discussions with the officials of the Executive Organ and looking through the files in the headquarters in Khartoum, it seems that the total cost of the project (including the amount for local development) is now estimated to have risen to $200 million U.S. dollars or about £S.180 million Sudanese Pounds. This is due largely to inflation and also because of changes that had to be made in the course of implementation of the project. For example, the shift from the Direct Line to the Eastern Alignment has added some 60 km to the length of the canal and this increases costs. Furthermore, the single huge plough wheel which digs the earth has met with unexpectedly hard soil and the ploughs are often broken so
that harder ones have had to be made. The 'revised' costs are broken down as shown in Table 2.

Even the 'revised' costs are likely to increase as work progresses due to inflation and necessary adjustments. The cost of local development is now estimated to be LS8 million per annum which includes the budget for the functioning of the Executive Organ. The total amount for local development and administration of the Executive Organ will certainly be greater than $20 million U.S. dollars by the end of Phase One. Apart from the effects of inflation, the development programmes under Phase One may change in content, particularly if the programmes are to be extended to include areas other than those listed or new projects are introduced.

**TABLE 2**

*Revised Costs of the Project*

<table>
<thead>
<tr>
<th>Costs (Million U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation</td>
</tr>
<tr>
<td>Control Structures of the Canal</td>
</tr>
<tr>
<td>Bridges, Ferries and Crossing Points</td>
</tr>
<tr>
<td>Local Development</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*Source: Executive Organ, Khartoum, 1981.*

_The Dinka_

An analysis of the present social and political organization of the Dinka is important for understanding the various ways in which the Jonglei Scheme may affect their lives. Full accounts are available in the works of Lienhardt (the leading authority on the Dinka) and of Deng (himself a Dinka), amongst others. Thus, the following discussion will be brief and selective, but hopefully adequate to enable discussion of the impact of the Jonglei Scheme on the Dinka.

The Dinka are a Nilotic people numbering about two million. Although known to the world as Dinka, they refer to themselves as _fieng_ (singular _jang_) and they refer to all 'foreigners' or non-Dinkas as _juur_ (singular _jur_), a term often used with contempt. In all there are about 25 mutually

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6. The figure of LS 8 million was given by the Commissioner of the Executive Organ in a conversation in London on 6th October, 1982.
independent tribal groups forming the jieng but all of them can be regarded as a largely homogeneous ethnic and cultural whole.

Although our concern is with those Dinka in whose land the canal is being dug (e.g. the Kongor Dinka), a description of the general features of the land of the Dinka is useful, since the differences between tribal territories is slight. In general, the land of the jieng lies in a vast arc around the swamps of the Central Nile Basin. It is a flat country of open savannah and savannah forests, intersected by many rivers and streams which converge upon the Central Nile Basin. For part of each year the heavy rains and river flooding render much of the land uninhabitable and impassable. Communications become difficult between the higher stretches which remain above the flood, and where alone it is possible to build permanent homesteads and cultivate gardens around them.

The natural poverty of the land, particularly the Jonglei Canal area, has been aggravated by the losses in human life and property, caused by the great floods of 1918, 1950 and 1961–64, which turned much of the country into a near semi-desert.

An important feature of Dinka country is the seasonality of its climate, being characterised by the succession of dry and wet seasons. The dry season lasts from November to April. During this period there is virtually no rain, and temperatures may rise up to 40°C, especially before the onset of the first rains in late April or early May which gradually intensify to reach their maximum in August and September. However, the onset and the amount that falls vary with the years.

The same general physical and climatic characteristics apply to all Dinka country which, and particularly the Jonglei area, can be divided into three parts. Firstly, there is the narrow strip roughly the area along the Bor-Malakal road which provides the land suitable for human settlements. Most of the lands that remain above the flooded areas are to be found within this narrow strip and are together called the Highlands. Secondly, there are the toiches (or Lowlands) on the western fringes, which extend up to the main channel of the Nile and provide dry-season grazing and water. Thirdly, in between the highlands and the toiches, there is a vast stretch of land known as the Intermediate Land. When moving to and from the toiches, the Dinka cross the intermediate land and use some of the grass and water that is still there for their animals.

The conditions of land and climate make transhumance inevitable and give rise to the mixed economy of cattle herding, cultivation, fishing and hunting and gathering. The Dinka have developed their own specific political and social system which is suited to transhumant pastoralism.

The social and political system of the Dinka is very much centred around cattle and their use. Feelings of nationhood and togetherness among the Dinka hardly extend beyond the tribal group or descent groups. Conflict
and rivalries over grazing land and water for animals are frequent. The *wut* (cattle-camp) is the arena where much of the Dinka political expression takes place. To quote Lienhardt (1967: p. 110):

'A *wut* is any cattle-camp, any site upon which cattle are usually tethered or which is associated with camping in the past; any group of cattle with or without their herdsmen, or any group of herdsmen even without their cattle if it is understood that the purpose of their association is the tending and protection of a herd.'

The political significance of the *wut* emanates from the fact that it provides the pattern through which members of a tribe are segmented into sub-tribes, sections and descent groups. Important decisions regarding war or peace and reconciliation as well as social matters are determined in the cattle camp.

The resolution of conflict over grazing and other activities in the cattle-camps is the responsibility of the ‘leaders of the cattle-camps’ and the ‘masters of the fishing spear’, who have ritual and religious functions as well as playing important political roles. The ‘leaders of the cattle-camps’ organize seasonal migration to the *toiches*, and generally advise and help in the management of the cattle-camps. In addition, when disputes over grazing arise between cattle-camps, they have to work out a solution. If they fail, and fighting occurs, then they have the difficult task of bringing it to an end through negotiation. Similarly, the ‘masters of the fishing spear’ plan and organize fishing trips in the *toiches*, as well as being involved in the resolution of conflicts that may arise over fishing areas.

Cattle dominate a Dinka’s life since he derives his livelihood from, and identifies with, them socially and politically. Their importance is much more than just as a source of livelihood.

A Dinka is very much tied to cattle in a spiritual and even ‘sensual’ manner. Herdsmen enjoy spending hours with a favourite animal, usually a bull, singing to it and deriving satisfaction from merely watching it. Sometimes Dinka treat their animals as almost human. An animal is addressed by name before being slaughtered in sacrifice. Cattle are even differentiated in terms of intelligence in that those with short horns are regarded as stupid, and those with long horns as intelligent. When dancing, Dinka curve their arms in a way that imitates the curvature of their favourite ox. The Dinka do not count their herd; nor allow that to be done by anyone else. People rarely give the correct figure of the size of their herd when asked. Cattle, like children, are not to be counted. Any person who attempts to count cattle is considered as bewitching the herd, and often failure in marriage negotiations is attributed to some malicious gossip that has ‘numbered’ the cattle being bargained for.
The most important role of cattle is their use as bridewealth. Marriage cattle range from as few, by Dinka standards, as 40 head to as many as 200, particularly if the bride is educated, education being regarded as having increased the 'value' of the girl. My fieldwork survey showed that few men marry much before 30 and that the divorce rate (0·3 per cent) is negligible.

There are many explanations for this delay in marriage. Though the issue is individually motivated, the approval of the agnatic kin is decisive, for or against a marriage. This very strong concern of relatives in the marriage of their agnatic kin is associated with the important role of cattle. A man intending to get married needs the support of his relatives who must contribute from their cattle to the payment of his bridewealth. On the other hand, his relatives are interested in securing their future shares of the bridewealth paid for the daughters to be born to the woman whose relative is going to marry. Because marriage negotiations are lengthy and involve many relatives in the process, inevitable delays occur in their settlement.

The situation becomes aggravated when a young man intending to marry has many brothers and half-brothers, since the rule of age-succession of brothers (the elder marries first) applies, at a time when all of them draw their bridewealth from the same family's herd. Though priority in acquiring cattle for marriage is governed by the above general rule, it is also influenced by the status of one's mother among the other wives of one's father. The situation becomes more complex when a father acquires more wives for himself; which implies paying his bridewealth from the same family herd, thus undermining the chances of his sons getting married early.

More recently, money has been reluctantly accepted as payment for part or all the bridewealth. Sometimes when a Dinka is known to have no cattle at all, or particularly when a person who impregnates a Dinka girl is a foreigner, he may be required to pay a fine in cash or the monetary equivalent of the required bridewealth. But in general bridewealth is still transferred in cattle.

**Agriculture**

The mainly subsistence economy consists of three main components. Cattle rearing is rated the most important, followed by crop production and then fishing, hunting and gathering; but crops provide the bulk of a families subsistence.

The Dinka cultivate a number of crops, namely: dura (sorghum), tobacco, pumpkins, maize, okra, lubia (type of bean), groundnuts and sesame as can be seen from the following table 3.

Cultivation takes place around the Luaks (cattle byres) and huts on the
high patches of soil, to avoid the effects of floods and to facilitate the closer supervision of the farm since wild animals and herds might damage the crops.

It is clear from the above table that crop production is predominantly dura cultivation and to some extent tobacco and pumpkin cultivation. Maize is grown as a substitute for dura in case the dura crop fails or falls short of the target amount required for consumption. It is also appreciated for its quick maturing characteristic as well as the possibility of its sale in the market for cash. The only vegetables grown by the Dinka are beans, okra and pumpkins, and are eaten with dura or maize porridge. Groundnuts and sesame butter are used as seasoning.

Crop yields are difficult to determine for a number of reasons. Firstly, people do not often remember how much of each crop they produced in a year. Secondly, the method of harvesting each crop (e.g. dura) is such that there are, in fact, many ‘harvests’ in each cultivation season. For example, dura is consumed from the time when the first unripe grains appear up to the time when it is fully matured. Thirdly, the harvested crop is kept in various containers of different weights, e.g. sacks, gourds and guks (cylindrical-shaped containers made from goat, sheep or cattle skins).

Despite the above difficulties, I obtained some general data about crop yields. Dura yields normally range from 1 to 5 sacks per cutting. A few households produce between 5 to 10 sacks per cutting. In general, the first cutting yields the most dura and the amount decreases as the cultivation period progresses.

Yields of crops other than dura are also difficult to estimate. However, we have estimated that the average output per household, in a year, of tobacco is about 8 guks (1 guk weighs 8–10 kilograms). Tobacco is always kept in guks while pumpkins are kept inside the huts but in a place safe from insects and rats. The average annual output of pumpkins per household ranges from 40 to 60 pieces. For the remaining crops, average output per
annum per household is 42·14, 21·00, 26·88, 7·70 and 2·94 kilograms of maize, okra, lubia, groundnuts and sesame, respectively.

Almost all crops are consumed by the household, except some tobacco (25·5 per cent of the crop) and maize (16·0 per cent of the crop, mainly in the case of households with poor tobacco yields). Significantly, although some crops may be lent or given to kinsmen suffering from poor harvests or sold in the market (e.g. tobacco and maize) no barter takes place in crops.

Crop production and yields are affected by a number of factors, of which rainfall is the most important. The sequence and intensity of rains expose crops to floods or droughts, with floods being the more common problem. The clay soils have poor water percolation and, in the absence of run-offs, the problem of water-logging becomes acute and an obstacle to cultivation on a greater scale. In addition a variety of pests and diseases affect crop yields. Those affecting dura include birds, grasshoppers, worms, the stem borer and dura head smut. Tobacco is mostly affected by frog eye and leaf wilt. Maize yields are affected largely by birds as well as floods and drought. The commonest hazard for the groundnut crop is drought. Untimely planting of groundnuts and sesame often results in poor yields. Of course weeds are a common problem for all crops and much time is spent in weeding. There are no problems with labour, all members of a family take part in cultivation.

Animal Husbandry

The seasonal activities of the Dinka are integrated with the climatic changes throughout the year. In general, the wet season is devoted more to cultivation than to cattle care since animals graze around the luaks or in cattle-camps nearby. The dry season is almost entirely devoted to cattle care and, to some extent, fishing and hunting. Cattle are driven to and from the lowlands in synchronization with the availability of grass and water along the traditional routes.

The organization of this migratory process is based on the tribal, sub-tribal, clan and family units. Members of these units graze their animals over well defined areas and follow routes that belong to the tribe at the wider level, and to a clan or family or groups of these more specifically. The role of the 'leaders of the cattle-camps' and 'masters of the fishing spear' is very crucial in this process.

There are no exact figures of the animal numbers in the area. A recent animal population census (1977) undertaken by the veterinary section of the Central Ministry of Agriculture, Food and Natural Resources gave the numbers of animals in the whole Jonglei Canal Area as slightly over a quarter of a million head. Our estimates of the distribution of cattle, sheep and goats, for individual households can be seen from the following tables.
THE JONGLEI SCHEME

TABLE 4
Household Distribution of Cattle

<table>
<thead>
<tr>
<th>Range of Number of Cattle</th>
<th>Absolute Frequency</th>
<th>Relative Frequency (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Cattle</td>
<td>16</td>
<td>14.5</td>
</tr>
<tr>
<td>1-10 head</td>
<td>44</td>
<td>40.0</td>
</tr>
<tr>
<td>10-20 head</td>
<td>31</td>
<td>28.2</td>
</tr>
<tr>
<td>20-30 head</td>
<td>9</td>
<td>8.2</td>
</tr>
<tr>
<td>30-40 head</td>
<td>6</td>
<td>5.5</td>
</tr>
<tr>
<td>40-50 head</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>&gt; 50 head</td>
<td>3</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>100.0</td>
</tr>
</tbody>
</table>

TABLE 5
Household Distribution of Sheep and Goats

<table>
<thead>
<tr>
<th>Range of Number of Animals</th>
<th>Absolute Frequency</th>
<th>Relative Frequency (Percentages)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sheep</td>
<td>Goats</td>
</tr>
<tr>
<td>None</td>
<td>92</td>
<td>39</td>
</tr>
<tr>
<td>1-10</td>
<td>15</td>
<td>52</td>
</tr>
<tr>
<td>10-20</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>20-30</td>
<td>—</td>
<td>6</td>
</tr>
<tr>
<td>30-40</td>
<td>—</td>
<td>1</td>
</tr>
<tr>
<td>40-50</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>110</td>
</tr>
</tbody>
</table>

Perhaps the most important point that emerges from Table 4 is that 14.5 per cent of the sample said they had no cattle at all. This was unexpected since most observers have assumed that all Dinka own some cattle. However, this finding should be regarded with caution—as it is not uncommon to find a Dinka denying having any cattle because of the fear of taxation. In case of failure to pay a tax, a fine or fee, the chief would confiscate an individual’s animal instead. The point simply is that being deprived of cattle is the worst possible calamity that could happen to a Dinka.

Table 5 suggests that most Dinka (83.6 per cent) do not own sheep and 35.5 per cent have no goats. Over half the households (58.2 per cent) have 1 to 20 goats but only 16.3 per cent have between 1 and 20 sheep. Very few households have over 20 goats but none has over 20 sheep. These estimates seem reasonable since the emphasis of the Dinka is on rearing cattle and less so on sheep and goats which are slaughtered on various sacrificial, social or religious occasions as well as being killed for meat. Cattle are mostly sacrificed at large feasts such as marriages or very serious social occasions like the settlement of tribal disputes over grazing areas.
However, the Dinka do part with their cattle in a way that is contrary to the view that is still currently expressed, despite all that Lienhardt and others have written, that they suffer from a 'cattle complex'. Ring has described how Dinka not only sell cattle in the market for profit, but also how a special group of what he called 'wealth seekers' is emerging. The important point to note here is not how large or small the size of the commercial off-take is, but rather that it is taking place mainly as a result of indigenous or 'internal' forces of change in the traditional economy.

The main reason why a Dinka may sell an animal is to buy food (usually dura, the staple food) with the cash. Other reasons are to buy clothes and veterinary drugs.

Other Economic Activities

Fishing is far more important that hunting and gathering. The fish in toiches is plentiful and provides an important supplementary diet to animal and agricultural produce. At the time of the Jonglei Investigation Team (1954) it was estimated that the peoples of the Jonglei Canal area consume 3,000 metric tons of fish annually. Total catch must have increased over the years since it is not uncommon to find dried fish processed by Dinka being sold in such far apart places as Juba and Khartoum. There is evidence to the effect that dried fish from the Jonglei Canal area is being exported to neighbouring countries, like Zaire (dried fish from Jonglei Province is one of the export items listed in the files of the Regional Ministry of Commerce and Trade in Juba).

Hunting provides another source of meat for the Dinka. There is a variety of wildlife in the area: Thiang (a type of gazelle), water buck, common zebra, ostrich, shoebill stork, elephants, etc. Of these animals the most hunted for meat is Thiang. It is important to note that all these animals migrate seasonally to and from the toiches, just as humans and their livestock do.

The traditional economy is being gradually transformed through the influence of trade in modern sector goods not locally produced, e.g. cooking oil, salt, clothes, household utensils, etc. Furthermore, some Dinka have joined the retail trade, tailoring in the market centres, beer brewing for profit and the sale of tobacco. We mention this aspect of the monetization of the traditional economy because the picture painted above might be mistakenly construed to mean that Dinka society is stagnant and not responsive to change and modernization. Certainly, the use of money is becoming more and more common. However, it is a fact that the basis of Dinka society is still largely traditional animal husbandry and agriculture.

Both are conditioned by seasonality and the migratory nature of cattle husbandry.

**Government Intentions and Attitudes**

The present Jonglei Canal Project is viewed by the Sudan Government as being capable of transforming the traditional subsistence economy. The government hopes that people like the Dinka will become part of the modern economy. Modern irrigation will be introduced, particularly in Phase Two of the project. The people would retain their livestock, but in modern ranches using better animal husbandry techniques. Clearly, government policy towards the people of the canal area entails a radical transformation of the economic and social basis of these societies.

In following such a policy, the government hopes that the response of the people to such a radical change will be positive, because they are also assumed to be dissatisfied with the existing natural hazards. In the event of people rejecting such a radical change in their semi-pastoralist way of life, that would only mean that 'people do not necessarily know what is best for them' to quote the words of an official of the Executive Organ.

The dissatisfaction with and outright dismissal of the subsistence economy is coupled with a determination to impose the canal on the people as the only way that can and will lead to development or modernization. 'If we have to drive our people to paradise with sticks, we will do so for their good and the good of those who will come after us.'

The government has little faith in the ability of the subsistence economy to modernise through its own internal dynamism. This is believed to be so because of the 'alleged' inherent weaknesses and impotence of the subsistence economy to extricate itself from the environmental and physical constraints affecting both agriculture and animal husbandry. In addition, the present social and political organizations of the people are considered too 'primitive' or 'rudimentary' to suit the needs of a 'modern' society.

For example, people are deemed unwilling to increase the commercial off-take from livestock because of their 'cattle-complex', at a time when they are apparently willing to part with their animals for social, ritual and cultural purposes.

To convince people of the benefits of the canal, a massive 'enlightenment' campaign has been conducted in the villages of the canal zone. These campaigns have been carried out by the 'Basic Units' of the Sudanese Socialist Union (SSU), the country's only political party. The

11. People are considered uneducated, unskilled and often clinging to social values that are regarded unsuited for a 'modern' society.
basic 'attractions' being presented to the people are apparently clear solutions to the hardships and deprivations that they normally face. People are told that the canal would put an end to the present shortage of water for themselves and their animals during the dry season. More pastures would be available and so the quality and numbers of the livestock would be improved. Veterinary services would be readily available. Obviously, nothing touches a Dinka's heart more than the cure or prevention of the diseases that beset his animals.

In the sphere of agriculture the government is persuading the people by encouraging them to believe that the canal project would bring them the prosperity of the Gezira Scheme in the North. Their land would become 'a second Gezira' through the introduction of modern irrigation and new commercial crops (e.g. cotton, sugar cane, rice, etc.). It is further argued that, of course, hunger, which is not an uncommon phenomenon at present, would cease to exist. This argument is further instilled in people's minds by statements made by those Dinka who had seen developments in the Gezira.

Further 'attractions' are those regarding health and education, which are included in the development programmes associated with the canal project. The canal project purports to lead to the development of easier and better roads linking the villages. This would be possible, since a major road is being constructed on the eastern side of the canal and all other roads would be linked to it.

The above contentions of the government contrasted sharply with those of the Dinka we talked to in the canal area (especially in Kongor).

**Dinka Attitudes**

It is by no means an easy task to measure people's attitudes, but it is important to try to do so. We held guided interviews and lengthy discussions with fifty Dinka (both sexes) in Kongor and other villages, as well as some of those working in government or the private sector. These talks were mainly about attitudes towards the canal project and how people might respond to the changes that might occur in their way of life.

Over three quarters of the villagers interviewed had first heard of the project from lorry passengers who travel up and down the road between Juba and Khartoum. Some had heard from educated Dinka who made home visits to the villages and others from returning migrants. A few had heard from the radio or read it from newspapers. Later on, various research teams and the SSU 'enlightenment officers' visited the permanent settlements, preaching the merits and benefits of the project to the villagers. Thus, most people are aware of the project and in fact some (who live close to the mouth of the Sobat river) have seen the cut.

Although most people know of the impending reality of the canal, their
views and response often differ from those desired by the government. While the government regards the canal as an alternative that would end or reduce drastically the annual dry season migration to the *toiches*, most of the people considered it an addition to the already existing wells and boreholes. Most people think that they would like to continue travelling to the *toich*, since it is there that they can catch fish. Moreover, it is in the cattle-camps in the *toich* that the 'masters of the fishing spear' and the 'leaders of the cattle-camps' have their influence. Since so much of their socio-political organization centres around these figures, it is not surprising that most people interviewed, do not contemplate an end to, or even disruption of, the working of these institutions.

People also do not see that the reorganization of animal husbandry along the lines of modern ranches and irrigated agriculture is not commensurate with their present practice and may, in fact, lead to them having to abandon their traditional system of subsistence as well as their social and political organization. One of their most prominent chiefs in Kongor summed up their feelings as follows:

'We do not know how the government wants us to change our way of looking after cattle and digging the land; and so we shall wait and see. If it turns out to be bad for us, then we shall refuse although I do not know how we can fight the government. You know the government is very powerful. I was told by the people in Bor (meaning the provincial commissioner and his officials) that things will be alright and better for us.'

The Dinka also fear the settlement of other tribes who might come to work on the scheme. Most people questioned the need for such settlement and proposed that if this was necessary at all, then these newcomers should settle in the east of the canal line and their number should be kept small, so as not to 'disturb' their way of life. A thirty-five year old man in Panyagoor village told us that: 'if other tribes come and they don't cause troubles, then we can stay with them in peace; but if they don't maintain peace, then we can easily clash.'

One of the often cited aims of the Jonglei Scheme is the improvement of land and river transport in the area. Thirty of the fifty people interviewed expressed indifference towards these proposed improvements. Again the paramount chief of Kongor summed up: 'We do not wish to leave our land and so we do not need roads or steamers. We want schools for our children and more medicines for us and our animals. That dispensary over there has remained as a mere foundation for five years. You see that ruin over there? We used to receive drugs for our cattle from there before the war with the Arabs. Why has it not been rebuilt?'
Most of the interviews and discussions with the Dinka in their villages were generally cordial and frank. This was not the case with the educated Dinka, who form a substantial number of the civil service in the South and work in towns like Juba, Bor and Malakal. Those in top positions of authority in government preferred to recount the familiar 'benefits' of the project as stated by the government. However, most of the Dinka elite expressed private doubts about these 'benefits', but only agreed to air their views if they were assured of anonymity. I can only offer a general outline of their attitudes. They feared the canal could lead to the destruction of their tribal system of social and political organization, at a time when such institutions in other tribes remain undisturbed. They fear that the Dinka would lose their identity, in which they pride themselves so much.

Moreover, in their opinion, the resources earmarked for the construction of the canal could have been used better for the provision of more health and educational facilities, as well as for the improvement of agriculture and livestock production. In this they were close to the position of the elder cited above. In addition, they refer to the likely adverse environmental effects of the project such as the drying up of the lakes and swamps, the reduction in fish supplies and the 'desertification' of the area through the reduction in conventional rainfall caused by the vast swamps.

A third group of Dinka, comprising big and also small businessmen, cattle traders and top civil servants, whose eyes were set on owning large farms in the forthcoming Jonglei Irrigation Scheme, expressed total and unqualified support for the project. Their model of development for the Dinka is the Gezira Scheme just as propagated by the government. A typical expression of this group's position is the following statement by a Dinka merchant, who owns four shops and a fleet of lorries and trucks in Bor and Juba:

‘Our people (Dinka) are too lazy and will never develop. The canal will enable us to invest in irrigated agriculture, commerce and agro-industries. We shall make them work and pay them well and so their standard of living will improve. Why worry about adverse environmental, social and political effects when we shall all be richer?’

Clearly, then, different groups have different views of the canal depending on their economic and educational positions. However, on balance, the views and attitudes of the Dinka in the villages (who form the majority of Dinka and are most likely to be affected immediately by the canal) do not indicate any great enthusiasm for or anticipation of the completion of the canal. They have not been persuaded of the need for it.

**Impact of Phase One and Two**

It is not possible to predict how all the wide ranging changes planned
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(particularly in Phase Two) will occur. However, we can identify some of the socio-economic impacts the project is likely to make on the livelihood of the local inhabitants.

**Impact on Human Population and Settlements**

There is no exact figure of the population living in the Jonglei Canal area. The 1955/56 census estimated this to be 130,620 persons. A more recent figure from the 1973 census puts it at 260,746 persons. Perhaps the distribution of this population is more important to note than its size. Although population and human settlements in the area are scattered, they nevertheless lie along the narrow strip of land we earlier referred to as the highlands where alone such settlement is possible.

Since the canal is still being dug, it is not possible for us to analyse its impact on the human populations and settlements throughout the canal zone. However, the cut has already had a serious impact on the Shilluk, Dinka and Nuer living around the Sobat mouth and southwards to the point reached by the earth-digger.

Some 200 or more households have already been forced to move from their traditional homesteads because the canal has crossed over their land. Although the actual width of the canal is 54-55 metres, an area of about a quarter of a mile on both sides is also being cleared for the construction of cross-drainage works.

The government has formed a Compensation Committee, headed by a Dinka judge, which assesses the economic and social cost of displacement and the subsequent resettlement of the people away from the canal line. At present the compensation is in monetary terms, i.e. between L.S. 50 and L.S. 250 per household. After receiving this money, the displaced persons have to find new sites, well out of the way of the canal line, for cultivation and construction of new homesteads, without government assistance. They have to find new land suitable for cultivation and grazing during the rainy season around the *luaks*. New wells and water points have to be constructed for them by the government.

As the digging progresses, the canal will cross more densely populated areas around Duk Fadiet, Duk Faiwel, Kongor, Maar, Jale, etc. Although the Eastern Alignment was adopted precisely in order to avoid this eventuality, it is nonetheless possible that displacement will occur and the number affected may on aggregate be quite substantial. In this case some social

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12. The figure of 200 households is an estimate based on interviews and informal discussions we had with some of the tribal leaders and some Jonglei Project officials and workers whom we met on the site in April, 1981.

13. We obtained these estimates from the surveyors working about 20 miles in advance of the earth-digger. Officially, no member of the Executive Organ or the Compensation Committee was willing to disclose the size of these compensations, let alone the criteria they used in deciding how much money a household deserved.
and political unrest may occur, although this has not so far been recorded in the area where the canal has been dug. Given that the attitude of the Dinka towards the canal is at best sceptical if not hostile, people may not be willing participants in any government-sponsored resettlement programme.

**Impact on Agriculture**

We have already discussed in Section One, that under Phase One the government plans to introduce 'improvements' in the present traditional agriculture in order to increase the level of productivity. For example, it was planned that a Centre for the Introduction of New technology (CINT) would be established in Kongor. CINT was to be charged with the task of finding solutions to the existing constraints to agriculture and livestock production and then to 'diffuse' innovations to the local inhabitants through education, training and extension work.

Unfortunately, CINT has not yet been established and so no agricultural extension services have yet been offered to the people. Most officials of the Executive Organ point out the difficulties of lack of building materials and skilled labour and the difficulties of importing these from outside the area due to lack of transport, bad conditions of the road and lack of fuel. These factors are frequently mentioned to explain the slow progress in the rest of the so-called 'improvement' programmes.

Another example of a Phase One project that has not had noticeable effect on agriculture, is the Penkou Plains Project, near Bor. This was established by a Dutch Consultancy Firm (ILACO), as a pilot agricultural and range management scheme. The project has been abandoned, eight years after its commencement, without achieving its objective of research and experimentation with a view to ultimately introducing new methods of agriculture and animal husbandry to the local Dinka.

The impact of Phase One on agriculture is negligible in that no new methods of agriculture or new crops have been introduced. Neither CINT nor the Penkou Scheme have 'diffused' any innovations through extension work or demonstration. It is possible that, at the present rate of progress, the entire length of the canal may be completed before the programmes under Phase One are fully realized.

A number of decisions regarding Phase Two agricultural policy have not been made public. For example, what will be the new system of land tenure to replace the present one based on tribal ownership? Will production be organized along the lines of the Gezira partnership arrangement between Government, a board and tenants, or would the organization be along new lines altogether? How would the process of production itself, irrigation, be organized? We cannot answer these and other questions that could be asked regarding Phase Two programmes because the planners
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themselves have not yet decided. At present, the main concern of the government seems to be the completion of the digging of the canal and the implementation of the Phase One programmes, albeit very slowly.

Impact on Livestock and Seasonal Migration Routes

The impact of the canal on livestock, particularly their movement in search of water and grazing, will be quite substantial. The displacement of people from their settlements, as is the case now where the canal has been dug, means that new areas for settlement have to be found. An important factor determining where such areas will be situated, is the availability of water and grazing for the animals. Either people and their animals will have to travel back to the canal itself for water or the government will have to provide wells or reservoirs in the new settlements. This latter alternative has been included in the Phase One programmes, but has not so far been implemented, even where some people have been displaced already.

But even if wells or reservoirs are constructed in the new settlement areas, these would be used mainly during the wet season when there is grazing around the homesteads. When the rains stop and the grass dries up, the animals will have to be driven to the toich for grazing. Whether this will be possible, depends on whether the canal becomes a barrier to the seasonal movement of humans and animals or not.

There are so many seasonal migration routes that no one, including the Dinka themselves, can enumerate them. In general, migration along these routes takes place at the beginning of the dry season with the return at the beginning of the wet season.

The authorities of the Jonglei Project argue that seasonal migration can continue because animals and humans will be able to cross the canal using the crossing points (about 20 along the Eastern Alignment) and the bridges and barges that will be constructed. The determination of the location and number of crossing points was based on the following factors: (a) the number of present migration routes; (b) the size of the human and livestock population that would cross the canal; and (c) the expected future crossing needs.

Regardless of the actual number of crossing points based on these factors it seems that unless we take into consideration the present system of the organization of the seasonal migration to the toich and the way in which cattle-camps are set up and managed, a number of problems are likely to arise.

We have seen that the wut, (cattle-camps), provides the key to the understanding of the Dinka view of their political and social organization. The danger in considering only the numerical distribution of migration routes and the numbers of people and animals using them, in the determination of
crossing points, is that these may actually become areas in which conflicts over grazing and cattle-camp sites develop.

It is not any Dinka with a herd who can use a particular migration route. The individuals who use a particular route are close kinsfolk and old neighbours who know each other and the animals they are droving. Besides, we have mentioned that the total number of routes is large and unknown, so that the planned number of crossing points is unlikely to be sufficient to make crossing orderly and free from disputes.

The establishment of crossing points might also lead to the devastation by overgrazing of the available pastures at the sides of the crossing points, as a result of the congestion of livestock on smaller areas. This possibility has been underestimated by the canal authorities.

There is also the possibility that cattle diseases and human ones (such as bilharzias and malaria), might spread more easily and might be more difficult to control due to the greater concentrations of animals and humans in small areas. The Jonglei canal authorities argue that 'if such adverse conditions occur, their rectification will demand additional planning work from the Executive Organ.'14 The authorities, therefore, seem to imply that they would rather see the problem arise first, before they consider any remedial or preventative action.

Impact on Fisheries

Although this is not a study of the effects of the Jonglei Project on the environment, climate and wildlife, nevertheless fisheries have a special importance to the livelihood of the people and so some comment on the possible effect of the canal on fish resources seems in order. The Jonglei Investigation Team (1954) concluded that the Equatorial Nile Project would undoubtedly cause a reduction in fishery resources in the area. The planners of the present canal argue that since the reduction in Sudd waters would be only 25%, the effect on fisheries would be negligible. However, a recent study15 has demonstrated that a reduction in the swamp level would have adverse effects on fish breeding and growth. The reasons given are that 'there are very little fluctuations in water level in the permanent swamps and also vegetation overgrowth are widely dispersed as substratum for oviposition and as sanctuaries and feeding ground for juvenile fish.'16

If fish retire into deeper waters, and since any reduction in these waters, as shown by the Hydro-biological Research Unit of Khartoum University,

16. Ibid., p. 18.
would have adverse effects on fish supplies, then the local inhabitants are likely to lose an important component of their diet. The planned commercial exploitation of fisheries resources does not necessarily mean that fish would be available to the Dinka households. On the contrary, people would have to obtain for cash (which is in very short supply) what they are at present able to obtain using their own labour and traditional means to the extent that they satisfy their domestic requirements and even sell. Perhaps it would be more appropriate to improve on the present system of fish exploitation, which has developed without any reduction in resources, rather than embark on a new system which may not benefit the households as well as the present practice does.

**Conclusion**

The idea of reclaiming the waters lost annually in the Sudd through evaporation and transpiration was conceived by Egypt, Britain and the Sudan Government for their interests and not those of the people living there. This is true for all the various canal proposals including the present one in its initial stage in 1974. It is only because of Southern Sudanese fears and opposition to the project (as demonstrated by the riots in Juba following the announcement of the present scheme in November, 1974), that concern for local development was included in the project plan and costs.

The Sudan Government regards the Jonglei project as an opportunity for transforming the local subsistence economies and modernizing them. A two-pronged strategy has been adopted under the Phase One and Two programmes. The government has shown a willingness to implement them, particularly the actual excavation of the canal, even without local consent and participation.

In general, the Dinka in villages, appear to welcome the canal but for reasons other than those held by the government; principally they hope the canal will become an effective barrier between them and hostile neighbouring tribes. Their apparent receptiveness towards the improvement programmes in Phase One (e.g. new seeds, vaccination and cure of animal diseases, health and education services, etc.) should not be construed to mean that they are aware of the radical nature of the Phase Two changes, or are willing to take part in them.

We have seen that most Dinka in villages are at best sceptical about the canal’s projected benefits, if not hostile towards them. This position is shared by students and lower rank civil servants who also worry about likely adverse environmental effects, and the loss of their tribal and cultural identity. The educated elite in top civil service jobs or rich Dinka in towns, on the contrary, give unqualified support to the project. This category of Dinka is not worried about adverse effects on the total ecosystem
or the disappearance of the present way of livelihood. As mentioned, their model of development is the Gezira Scheme, and so they await the implementation of Phase Two with enthusiasm.

There are many ways by which the scheme may have an immediate impact on the lives of the Dinka. The canal itself has already caused the displacement of people from their settlements. Although at present the numbers affected are small, these are likely to increase as the digging reaches more heavily populated areas.

The impact of the canal on the movements of livestock in search of grazing is likely to be tremendous. Despite crossing points, barges and bridges, crossing may be physically impossible for livestock given that the canal itself and the ramp road (6 metres high) east of it are sizeable barriers. An additional water channel and irrigation schemes, as planned for in Phase Two, would further exacerbate the difficulties of crossing for livestock. It is also possible that conflicts over the use of land for irrigation or grazing may also arise.

Crossing is not only necessary and important for animals but also for humans. Much of the organization and decision making concerning social and political life takes place in the cattle-camps. To stop seasonal migration completely, might for example, reduce or eliminate the role of the 'masters of the fishing spear' and 'leaders of the cattle-camps' and thus create a vacuum in social and political organization.

Since the canal is likely to become a reality, it seems proper that we make some proposals that may minimize the many adverse effects on the people. Firstly, there is need for more planning of Phase One projects than the government have undertaken. Such planning should be on the basis of full and open discussion with all the affected peoples as well as Dinka, so that they can bring their knowledge to bear on questions like resettlement, compensation, crossing, etc. Secondly, Phase Two should be regarded as completely open, i.e. only to be decided on after a very extensive study and discussion of the needs of the people and of the best way to bring modernization to them. If these points are not considered, it is almost certain that tribal life may disintegrate with nothing worthwhile arising in its place.