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MINISTRY OF AGRICULTURE
NATIONAL IRRIGATION BOARD

BURA IRRIGATION
SETTLEMENT PROJECT

PROJECT PLANNING REPORT

VOLUME 4 - ANNEXES

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Sir M. MacDonald & Partners
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The Bura Irrigation Settlement Project, Project Planning Report, comprises the following volumes:-

- 1 Main Report
- Annexes
- 2 Soils
 Hydrology
 Agricultural Planning
- 3 Livestock
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- 4 Sociology and Settlement
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BURA IRRIGATION SETTLEMENT PROJECT
PROJECT PLANNING REPORT
SOCIOLOGY AND SETTLEMENT ANNEXE

BURA IRRIGATION SETTLEMENT PROJECT

PROJECT PLANNING REPORT

SOCIOLOGY AND SETTLEMENT ANNEXE

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SUMMARY

Part 1 – The Present Situation in the Area

The present population of the four locations in the area to be occupied by the project is estimated at 21 500 people. Most belong to the Pokomo or Malekote tribes and occupy the riverine area.

The rural economy of the area is based on crop production along the river banks and livestock kept by the nomadic Orma tribe. There is scope for developing both components and this is recommended to ensure that the new project does not create an island of prosperity in an ocean of poverty.

The project will occupy an area which apparently is used for grazing only in times of drought. Thus, while it is of little significance in normal years, it may be of crucial importance to survival in drought periods.

The present population it is estimated, could yield about 1 000 applicants who would be eligible for the project. This represents some 20 per cent of the total tenant intake, and every effort should be made to accommodate such a number to avoid friction with the local inhabitants.

Part 2 – Population Growth Associated with the Development of the Bura Project

The incoming tenant population will differ quite markedly from the normal rural population in the rest of the country. There will be a high proportion of young children and the adults too will be relatively young and inexperienced in the duties of elders.

The implications are that the tenant population will grow relatively fast increasing from some 40 000 people in the mid-1980's to 50 000 by the end of the decade.

Non-agricultural settlement will occur due to the need for people specialising in commercial activities and owing to informal settlement of the periphery of the project. Thus the total population of the project area will, it is estimated, be some 50 000 people initially increasing to 60 000 by 1990.

Part 3 – Settlement Procedures and Programme

The criteria proposed for the selection of tenants are reviewed and in general agreed to. The need to adopt a realistic attitude to medical fitness and the requirement for experience in agriculture is recognised. Strict compliance with the labour requirements would also appear to be undesirable.

The requirements of the tenant recruitment organisation are identified at the NIB headquarters, district and project levels. The duties and responsibilities of the settlement staff involved are detailed. The procedures for establishing District Selection Committees and their requirements in terms of staff and working procedures are discussed as they are of vital importance to the success of the project.

The selection procedures to be followed are set out in a detailed programme in the last quarter of 1977. Two of the most critical aspects of the programme are the dissemination of appropriate publicity material throughout the country and the sorting and selection of the 5 150 tenants required from a large number of applicants.

The rate of settlement proposed is based on maintaining the intake of tenants as evenly as possible through the year according to the following overall programme:-

Year	Number of Tenants	Family Members
1979/80	1 125	5 380
1980/81	1 800	8 060
1981/82	1 800	13 440
1982/83	425	2 550
	5 150	30 900

The programme also details the mobilisation and transport of tenants and their families from their home districts to Bura. The requirement for transport, transit camps and reception accommodation at Bura are dealt with. Maximum flexibility and economy will be achieved by hiring locally available buses recommended for the transport element of the exercise. Other aspects dealt with include the following:-

- (a) Provision of subsistence advances to be paid to tenants for some 7½ months, at the rate of K Sh 6 per day.
- (b) Project management to ensure that adequate basic food supplies are available during the first three years when deficits occur in the production-consumption balance.
- (c) The development of village social structures and organisations, through a local hierarchy of representation and community functions.
- (d) The role of livestock on the project in providing some dietary needs should be thoroughly investigated.
- (e) The role of women and recognition of their need for adequate resources (mainly money) to keep the family fed and clothed.

Part 4 – Organisation of the Settlement Programme

The overall organisation requirements of the settlement programme are seen to require specialised and dedicated staff to handle settlement, publicity and sociological aspects of the work.

The need for experienced staff leads to the proposal that staff should be seconded to the NIB organisation from the Ministry of Lands and Settlement and the Ministry of Information. The staff requirements, responsibilities and budget requirements are detailed.

The need for a specialist sociologist in the NIB organisation, to advise on specific aspects of the programme and the policy adopted, is discussed. A programme of work covering six to seven years is identified and proposals made for recruiting the required staff. The need to involve the University of Nairobi and the Institute of Development Studies is emphasised.

CHAPTER 1 THE POPULATION OF THE LOWER TANA

1.1 Introduction

In this chapter an attempt is made to place the Bura Project in the context of a programme in the development of Tana River District, rather than as an island of intensive agricultural activity. A suggested approach to ways of developing the main indigenous riverine and pasturing sections of the area in relation to the project are briefly discussed.

1.2 The Present Population

The four locations in the immediate vicinity of the project have a combined indigenous population of about 21,500, as shown in Table 1.1, of the total approximately 7,000 live on the Holt Park scheme (1976 state census). Thus there are some 14,500 persons living in villages along the river and in Oryza settlements. If the Oryza constitute approximately one third of the total, as they do in the overall district population, the riverine Pokomo and Mbatia are estimated to number some 10,000 people.

Table 1.1 - Present Population of the Project Area

Location	Population ¹	Area in sq km	Population per sq km
PART I			
Zusaki	8,130	400	21.3
Mbatia	4,000	280	13.3
Bura	2,000	100	2.0
Nalyf	3,570	240	1.5
Total	21,500	1,020	2.1

¹ Projected to 1980.

Source: Range Development in Tana River District, F.A.O., 1973
Kenya Statistical Digest, September, 1972.

The northern locations are much larger than the southern ones, yet their populations are smaller, and the density of settlements along the river is appreciably lower by the north. Areas of dense forest tend to be less densely populated because access is less easy and wild animals are a continuous menace to crops. It may therefore be possible to graze certain areas of the forest without displacing people from their houses and fields in the smaller locations. This aspect needs further study; it is suggested that a survey should be made of the riverine peoples from Holt to Mbatia to determine:

- (a) the number and distribution of people;
- (b) the agriculture of the area and other sources of livelihood;
- (c) the possibilities for minor irrigation schemes; and
- (d) the implications of grazing certain areas of forest reserve.

The three main population groups and their general distribution are described below.

Pokomo and Mbatia

The banks of the Tana River between Holt and Mbatia are inhabited by Pokomo and Mbatia people who are agriculturalists. The Pokomo are far more numerous and their territory extends approximately as far north as Mbatia, while the Mbatia occupy the riverine area from Mbatia northwards to a second flood plain. In general the density of the population decreases from Holt northwards as conditions for settlement become increasingly less favourable.

CHAPTER 1 THE POPULATION OF THE LOWER TANA

1.1 Introduction

In this chapter an attempt is made to place the Bura Project in the context of a component in the development of Tana River District, rather than as an island of intensive economic activity. A suggested approach to ways of developing the main indigenous riverine and pastoral economies of the area in relation to the project are briefly discussed.

1.2 The Present Population

The four locations in the immediate vicinity of the project have a combined estimated population of about 21 600, as shown in Table 1.1; of the total approximately 7 000 live on the Hola Pilot scheme (1976 Hola census). Thus there are some 14 500 persons living in villages along the river, and in Orma settlements. If the Orma constitute approximately one third of the total, as they do of the overall district population, the riverine Pokomo and Malekote are estimated to number some 10 000 people.

Table 1.1 - Present Population of the Project Area

Location	Population ¹	Area in sq km	Population per sq km
Zubaki	8 730	400	21.8
Milalulu	4 740	458	10.3
Bura	4 440	1 712	2.6
Nanigi	3 670	3 412	1.1
Total	21 580	5 982	3.6

Note: ¹ Projected to 1980

Sources: Range Development in Tana River District, F.A.O. 1973
Kenya Statistical Digest, September, 1972.

The northern locations are much larger than the southern ones, yet their populations are smaller, and the density of settlement along the river is appreciably lower in the north. Areas of dense forest tend to be less densely populated because access is less easy and wild animals are a continuous menace to crops. It may therefore be possible to gazette certain areas of the forest without displacing people from their houses and fields in the smaller locations. This aspect needs further study; it is suggested that a survey should be made of the riverine peoples from Hola to Nanigi to determine:

- (a) The number and distribution of people;
- (b) the agriculture of the area and other sources of livelihood;
- (c) the possibilities for minor irrigation schemes; and,
- (d) the implications of gazetting certain areas as forest reserve.

The three main population groups and their general distribution are described below.

Pokomo and Malekote

The banks of the Tana River between Hola and Nanigi are inhabited by Pokomo and Malekote people who are agriculturalists. The Pokomo are far more numerous and their territory extends approximately as far north as Masabubu, while the Malekote occupy the riverine area from Masabubu northwards to beyond Nanigi. In general the density of the population decreases from Hola northwards as conditions for settlement become increasingly less favourable.

The Food and Agricultural Organisation (FAO) report (1) estimates the number of pastoralists in the whole Tana River District to be 21 000. The large majority of these are Orma people who follow a nomadic way of life. They graze their livestock over a wide area which extends down into the delta of the Tana river and far out to the west. A number of Orma have now established more or less permanent settlements around the periphery of the Hola Scheme due to the availability there of water, the opportunities for seasonal employment and other services.

Somali

There is very little information available on the Somali and none on their demographic characteristics. Their numbers on the west bank of the river are relatively small and they tend to be nomadic herdsmen of camels. There are a few Pokomo villages on the east bank of the Tana River. There appear to be no Somali land or grazing rights in the four locations considered here: Zubaki, Milalulu, Bura and Nanigi.

Table 2.1 - Minor Irrigation Schemes on the Lower Tana River

Name	Area (ha)	Crops	Remarks
Hakari	75	Rice and maize	Constant pump breakdowns
Hakari	60	Maize, rice onions and tomatoes	Being resumed by FAO, only 15 ha actually cultivated in 1978
Wara	75	Rice, maize, green grams and vegetables	
Oka	25	Rice, maize, green grams and vegetables	
Mwaga	25	—	Still developing
Nanigi	15	—	Still developing

A further minor irrigation scheme has been proposed for Chirochi, but the District Development Committee has not allocated funds as it considers it is undesirable that the Government should finance all agricultural development between Hola and Nanigi pending finalisation of the plans for the Bura project. This appears to have intimidated local farmers that the Government is preparing to take over the whole riverine belt for purposes connected with the Bura Project, and to evict the local inhabitants. The County Council has responded by asking the Ministry for Lands and Settlement to withdraw land registration proceedings, but was told that no decision could be taken on this matter.

Between Lake and Bura much of the land immediately adjacent to the river is cultivated, more heavily in the relatively lightly wooded areas, and less in areas where dense forest reaches down to the river. One reason for avoiding the forest is the constant destruction of crops by the wild animals who inhabit it.

The main crops grown include:

- Staples - cereal, maize and rice (small quantities)
- Vegetables - green grams, peas, green beans

CHAPTER 2 THE RURAL ECONOMY

2.1 The Riverine Economy

The reach of the Tana River between Laza and Nanigi is said to have undergone many changes in the last two decades. There was a major flood in 1962 which altered the topography of the river banks so greatly that much land went out of production, especially on the west bank, because the thick silt deposit had raised it above the normal flood level of the river. On the east bank, however, more land became available for cultivation, but for many years the threat of Somali 'Shifta' attack made it unsafe to live there. Since this danger diminished, over the last few years some people have moved from the west to the east bank. Today, many riverine villages are built on either side of the river.

There has been very little positive encouragement for agricultural development in the area. There are two Ministry of Agriculture Technical Assistants stationed in the area, one at Hola, who spends much of his time on or around the pilot irrigation scheme, and the other at Milalulu, covering the area from Hola to Bura. There is no extension coverage between Bura and Nanigi.

Between Hola and the coast there are six minor irrigation schemes, four are well established and two are in early stages of planning or implementation as shown in Table 2.1.

Table 2.1 - Minor Irrigation Schemes on the Lower Tana River

Name	Area (ha)	Crops	Remarks
Ngao	75	Rice and maize	Constant pump breakdowns Being resurveyed by FAO, only 15 ha actually cultivated in 1976
Hewani	65	Maize, rice, onions and tomatoes	
Wema	75	Rice, maize, green grams and vegetables	
Oda	25	Rice, maize, green grams and vegetables	
Mlanjo	25	—	Still developing
Madogo	18	—	Still developing

A further minor irrigation scheme has been proposed for Chamole, but the District Development Committee has not allocated funds to it because it is understood that the Government has frozen all agricultural development between Hola and Nanigi pending finalisation of the plans for the Bura project. This appears to have intensified local fears that the Government is planning to take over the whole riverine belt for purposes connected with the Bura Project, and to evict the local inhabitants. The County Council has responded by asking the Minister for Lands and Settlement to institute land registration proceedings, but was told that no decision could be taken on this matter.

Between Laza and Bura much of the land immediately adjacent to the river is cultivated, more heavily in the relatively lightly wooded areas, and less in areas where dense forest reaches down to the river. One reason for avoiding the forest is the constant destruction of crops by the wild animals who inhabit it.

The main crops grown include:

- Staples - Bananas, maize and rice (peas and little sorghum).
- Pulses - Green grams, cowpeas, groundnuts.

Vegetables - Onions, cabbages, tomatoes, okra, eggplant, carrots, leeks, spinach.

Roots - Sweet potatoes and cassava.

Fruit - Pawpaws, mangoes (plentiful), cotton, sugar cane, simsin, sunflowers.

Beans, fruit, rice, vegetables and pulses are regularly sold in Laza and in the Hola Scheme villages.

The Bura tenants should be able to grow all or most of their food on their holdings and vegetable gardens, but the inhabitants of the rural centre will have no such facilities and will need vegetables. Some may be available from tenant surpluses, but there will be an outstanding demand which would be met by the riverine farms which are producing a wide variety of nutritionally valuable crops.

The District Agricultural Officer and Crops Officer at Hola are convinced that there are many areas of up to 50 hectares in size along the river banks which could be successfully irrigated with small pumps and a minimum of levelling. The soil is a rich alluvium, much of it laid down during the 1962 flood, and lying 1.5 to 3 metres above water level (March, 1976). It appears feasible, as has been done further downstream, to irrigate these areas and to grow a large variety of crops suitable for sale on the project or elsewhere.

Existing minor irrigation schemes encounter two main difficulties: pump maintenance and repair, and marketing of fresh produce. With standardised pump and engine units it would be relatively simple for the mechanical workshop on the Bura Project to provide a pump repair and replacement service for the riverine schemes. The project population, which will include 10 000 inhabitants of the rural centre, could provide a large and convenient market for most produce. The fruit and vegetables produced on the river banks would be a valuable addition to a diet which otherwise is likely to be singularly short of fresh foods.

Because road communications with Nairobi and the Coast are scheduled for improvement, any produce surplus to the project requirements could be shipped to those markets. This is already done, but transport costs and damage to fresh fruit and vegetables en route are high.

It is recommended that NIB discuss the parallel and related development of the riverine area and the project with the Ministry of Agriculture and the Tana River Development Authority. If agreement can be reached on the nature and extent of the riverine programme, the Ministry of Agriculture should survey the area and its potential. Depending on the outcome, funds should then be sought for implementing the development proposals as rapidly as possible.

There are several agencies who are likely to support such a small farmer oriented, low capital, simple technology programme, especially because failure to develop this riverine economy will probably lead to its eventual demise.

The Swedish International Development Aid (SIDA) has financed projects for the development of small farmers who fall under the shadow of a large, heavily capitalised project and the British Ministry of Overseas Development (ODM), with its 'aid for the poorest' programme, might be interested. If the sum required is not large, one of the non-governmental agencies such as Oxfam, Christian Aid or World Neighbours, might fund it.

If possible development of the riverine area should precede settlement on the project. It could thus forestall agitation from the riverine people who had not been granted holdings on the project and it would provide regular source of food for the early tenants and the rural centre population.

2.2 The Pastoral Economy

Little has been written about the Orma and the pastoral economy of the area and the main sources of information for the present study are the FAO (1973) report on Range Development in the Tana River District, the Livestock Officer at Hola, and interviews with about 15 Orma at their semi permanent camps (manyattas) around Hola and in the vicinity of the Bura Project,

during March, 1977. The pastoral economy which encompasses the project area extends to the Tana river delta, and thus the project area is in fact a small part of a very extensive system.

The area between Hola and Nanigi is used mainly for wet season grazing by the Orma. During the dry season, from December to March, most of the cattle and their owners migrate to the delta area of the Tana River. The Orma interviewed were therefore unrepresentative of their people, and had remained in the central and northern divisions of the district for the following reasons:

- (a) They are poor, many having suffered severe stock losses during the recent drought, and have too few livestock to support them. Those who live near Hola do so largely for the seasonal employment.
- (b) They are too old or too young to move with the cattle and are therefore left in the manyattas with some milk cows and goats, while the stronger members of the group are away with the main herds and flocks.
- (c) They want to be near the water and the shops at Hola and other villages.
- (d) They are keen to be on hand when new holdings are opened at Hola, and when selection for the Bura Project begins. Several produced forms acknowledging receipt by the Hola Scheme manager of their applications for irrigated holdings.

The presumably more typical Orma, who are committed to a pastoral economy, were not available for questioning and the present enquiries about grazing in the Bura Project area may have elicited biased responses from Orma anxious to give the impression that the Bura Project would not interfere with their grazing habits.

There was a general consensus, however, backed by the Livestock Office, that the actual area that Phase I of the project will occupy is little used except in periods of drought. This is because the grazing there is of poor quality and improves for only a short period after rain. There are much better grazing areas to the west, where most Orma prefer to graze their cattle during the wet season.

The floodplain area between the irrigated block of the project and the river contains better grazing, but most are said to avoid it, especially in the wet season because of the presence of tsetse fly in the relatively close bush. This area is said to be used mainly as an emergency grazing zone. When the rains fail, and water in the wet season pastures to the west is scarce, it becomes necessary for Orma to move closer to the river because the cattle cannot walk long distances. Apart from several manyattas to the west of Bura village no Orma were found to be living in this area. Further to the north, to the west of the river between Bura and Nanigi, is an area of better grazing, apparently in perennial use by several manyattas of Orma and there are well used stock routes radiating to the west of the river.

The present enquiries suggest, therefore, that the actual loss of grazing occasioned by the project will not affect the Orma very seriously, except in emergencies, when in fact it may be essential to the survival of considerable numbers of cattle.

The importance of marginal and little-used pastures in the pastoral strategy of nomads is often underestimated. There may be periods of many years when such areas are vacant, and are not used for pasturing stock, but in severe drought they become a key to survival, perhaps precisely because they have not been used for so long. Many group grazing schemes, ranches and the like have failed to take this factor into account, and have collapsed during the first drought as a result.

The consultants could not assess, in the short time available, whether the area in question at Bura is crucial to the survival of certain Orma over the long term. Some local Orma indicated that it could be. It is a subject which the NIB Sociologist should investigate, and on the outcome of his study will depend the nature and extent of the compensation due to the Orma when this area is no longer available for their use.

Because the best grazing lies to the west of the project area cattle grazing there do have to be walked a considerable distance to the river for water. They do this every two or three days and have to pass through the tsetse belt en route. Much of this walking and the fly, could be avoided by the provision of watering points off the main canal supplying the Bura Project area. Although this observation seems reasonably sound it needs thorough checking before it is acted upon. Although the proposed water points may be acceptable to the Orma as compensation for loss of access to the river they may set in motion a train of events which could have serious adverse effects. Thus, if the water points become foci of informal settlements, this would lead to overstocking of the grazing around the water points and, more seriously, could lead to unseasonal and perhaps perennial grazing of the pastures to the west. If this area of grazing were to degenerate as a result of its misuse by the semi-settled Orma on the project's periphery, the consequences for the large herds of nomadic cattle, which use the area for wet season grazing, could be disastrous.

The likelihood that this situation will be realised should be investigated by the Sociologist. He should also consider the proposed development programmes suggested in the Livestock Annex to assess their value as compensation for the grazing lost to the Orma.

For purposes of holding allocations, there might be three applications from the Orma area that Phase I of the project would accommodate. It is proposed, therefore, that only the inhabitants of the four locations mentioned, Zubaki, Mibulu, Bura and Nang, who are mainly Pokomo, Malakote and Orma, be granted 'local' status and thereby priority in consideration of their own holdings.

The combined population (1960) of the four locations is estimated to be about 21 500. If we assume that 10 per cent are men between 25 and 45 years, this area could produce 2 150 applicants for the project. By no means all of these would be eligible because some would already have holdings on the Holo Scheme and on the river bank, while others would have permanent employment. If 50 per cent of the local applications were found to be eligible in terms of all the selection criteria (see Chapter 5), they would number just over 1 000 or roughly 20 per cent of the total number of tenants to be accommodated in Phase I. Of this number it is estimated that 100 to 200 will probably be Orma, so that the remainder will be riverine people, including eligible inhabitants of Lera, Holo, Bura, the Holo Pilot Scheme and so on.

The formula originally suggested by NIB, however, allocated only 405 holdings to the whole of Tana River District. If this allocation applied there would be a considerable excess of applications from eligible inhabitants of the riverine area of the project over the number of plots allocated them. The consultants were assured by many officials of NIB that such a situation would give rise to considerable local dissatisfaction. This view is shared by ILADO (1978) and the IIRD Appraisal Mission (1972) in their report. In May 1977 the Government and the International Development Association negotiated the draft Development Credit Agreement for the Bura Project which included an allocation of tenant holdings by Province (see Table 7.1). The Coast Province was allocated 1 200 holdings (25 per cent of the total), of which approximately 75 per cent (about 900 holdings) are proposed for eligible applicants from the Tana River District. This should satisfy the bulk of local eligible applicants if the above estimate of 1 000 is approximately correct. However, the manager of the Holo Pilot Scheme has indicated that he has received about 10 000 applications for holdings at Holo and at Bura, of which he estimates that some 2 000 may be duplications. The majority are said to be from 'local' people, meaning mainly from Tana River District, but the present population figures indicate that this is unlikely to be correct.

Nevertheless it would be advisable to make contingency plans to reduce the volume and urgency of local applications if these prove excessive. The most effective approach to the problem appears to be the provision of opportunities for economic development in the area. This would further ensure that the project itself does not become an island of prosperity in an ocean of poverty.

The proposals for such development were discussed in the previous chapter of this study. They largely concern the development of the riverine wetlands by means of mixed irrigation schemes.

CHAPTER 3 THE EXISTING POPULATION AS A SOURCE OF POTENTIAL TENANTS FOR THE PROJECT

3.1 The Riverine Peoples

The populated area along the river between Hola and Nanigi is the zone of primary interest here. The inhabitants of this strip have produced most of the tenants on the Hola Pilot Scheme and take the closest interest in the plans for the Bura Project. Most people living here seem to be aware of the governments' intentions to develop Bura. The area in question falls into the northern and central divisions of Tana River District, and comprises the locations of Zabaki, Milalulu, Bura and Nanigi.

It has been established policy that 'local' inhabitants be given priority in the allocation of holdings on projects established in their districts. In respect of the Bura Project the term 'local' has been used for the Tana River District population as a whole. We suggest here that the term 'local' be defined more narrowly, firstly because not all the inhabitants of Tana River District consider Bura as their 'local' project, and secondly, if they were all to be accorded 'local' status for purposes of holding allocations, there might be more applications from this District alone than Phase 1 of the project would accommodate. It is proposed, therefore, that only the inhabitants of the four locations mentioned, Zubaki, Milalulu, Bura and Nanigi, who are mainly Pokomo, Malakote and Orma, be granted 'local' status and thereby priority in consideration of their applications.

The combined population (1980) of the four locations is estimated to be about 21 500. If we assume that 10 per cent are men between 25 and 45 years, this area could produce 2 150 applications for the project. By no means all of these would be eligible because some would already have holdings on the Hola Scheme and on the river bank, while others would have permanent employment. If 50 per cent of the local applications were found to be eligible in terms of all the selection criteria (see Chapter 5), they would number just over 1 000 or roughly 20 per cent of the total number of tenants to be accommodated in Phase 1. Of this number it is estimated that 100 to 200 will probably be Orma, so that the remainder will be riverine people, including eligible inhabitants of Laza, Hola, Bura, the Hola Pilot Scheme and so on.

The formula originally suggested by NIB, however, allocated only 495 holdings to the whole of Tana River District. If this allocation applied there would be a considerable excess of applications from eligible inhabitants of the immediate area of the project over the number of places allocated them. The consultants were assured by many officials at Hola that such a situation would give rise to considerable local dissatisfaction. This view is shared by ILACO (1975) and the IBRD Appraisal Mission (1977) in their reports. In May 1977 the Government and the International Development Association negotiated the draft Development Credit Agreement for the Bura Project which included an allocation of tenant holdings by Provinces (see Table 7.1). The Coast Province was allocated 1 290 holdings (25 per cent of the total), of which approximately 75 per cent (about 965 holdings) are proposed for eligible applicants from the Tana River District. This should satisfy the bulk of local eligible applicants if the above estimate of 1 000 is approximately correct. However, the manager of the Hola Pilot Scheme has indicated that he has received about 10 000 applications for holdings at Hola and at Bura, of which he estimates that some 2 000 may be duplications. The majority are said to be from 'local' people, meaning mainly from Tana River District, but the present population statistics indicate that this is unlikely to be correct.

Nevertheless it would be advisable to make contingency plans to reduce the volume and urgency of local applications if these prove excessive. The most effective approach to the problem appears to be the provision of opportunities for economic development in the area. This would further ensure that the project itself does not become an isolated island of prosperity in an ocean of poverty.

The proposals for such development were elaborated in the previous chapter of this annexe. They largely concern the development of the riverine economy by means of minor irrigation schemes

producing mainly fruit and vegetables to supply the needs of the rural centre population. This could be a profitable venture for the riverine farmers and could provide an attractive alternative to a holding on the project. A second proposal concerns the group ranching-cum-range management projects to the west of the Bura Scheme.

3.2 The Orma Pastoralists

There are over 40 Orma tenants on the Hola Pilot Scheme. They are reported by the manager to be among the most successful tenants, and in discussions held with some 15 Orma men living between Hola and Nanigi all but one indicated a strong desire for an irrigated holding. This view is supported by the FAO (1973) report on Range Development in Tana River District which stated that the pastoralists have expressed their desire to follow a sedentary life.

The Livestock Officer at Hola estimates that at least 100 applications will be received from Orma already in the area. This corresponds closely with the 108 Orma households enumerated in the Ministry of Health survey of Hola and its vicinity in 1976. It is possible that many more applications will be made by Orma who are now residing elsewhere in the District, and if the FAO's assessment of the Orma preference for the sedentary life is valid, many hundred or so applications could in fact be expected. The consultant's estimate that about two hundred applications from eligible Orma would be possible.

PART 2

POPULATION GROWTH ASSOCIATED WITH THE DEVELOPMENT OF BURIA

CHAPTER 4 THE TENANT FAMILY POPULATION

4.1 Characteristics of the Population

The size and composition of the incoming tenant population, and its tendency to grow due to natural increase and informal immigration, have so far received little attention. In the earlier certain assumptions concerning the demographic characteristics of the settlement population were made, and tentative projections were made for the first ten years of implementation. The results of these calculations have influenced the planning for social services, public health, education and village water supply.

The criteria used for selecting tenants will produce a tenant family population which will differ in important respects from the Kangan norm, and, in fact, from any natural community in the country. In selecting household heads of between 25 and 45 years the tenant family population will have an abnormally high proportion of young, dependent children. The requirement that each family be able to muster four adult equivalents of labour excludes families with low fertility or with a poor capacity to raise children, and in fact will favour those with the highest fertility.

It may be expected therefore that a tenant family population of relatively young adults, with numerous small children, and a correspondingly high rate of reproduction will result. Mortality may also be expected to be low on account of the youthfulness, and the good public health facilities available, which would reduce infant mortality. This is expected to result in a very high natural growth rate in the tenant population.

An average tenant household size of seven or eight has been assumed for planning purposes. This is, in fact, higher than the size of rural households in the region recorded over the past eight years by the University of Malaya and the International Labour Office. Studies in numerous studies of various parts of Malaya have shown that the average size of rural households is about 5.5. The probability average size for tenant families on arrival.

PART 2

POPULATION GROWTH ASSOCIATED WITH THE DEVELOPMENT OF BURA

4.2 Population Growth

The population of the project will grow both by natural increase and the arrival of informal settlers attracted by the economic opportunities of the project.

Informal Migration

Two kinds of informal migration are likely to occur. The first is by close relatives, probably in most cases through kinship or marriage, to the households of authorized tenants. It is assumed that the majority of such people will live with their relatives on the household plot they have been allocated in a village. They will swell the numbers of the household but will not establish new economically and socially independent households, for which very little provision has been made. The other kind of informal worker is expected to squat in the vicinity of the rural centre or on the periphery of the project where no provision at all for settlement has been made.

Expansion of households within the project is both predictable and unavoidable. It is virtually impossible to control the influx of relatives or visitors to tenant households, and experience with family planning methods to date in Malaya gives no ground for the view that tenants will soon apply a rational means to control the number of children they have.

Population Projections

It is assumed, conservatively, that the project tenant family population will increase at an annual rate in the first year of settlement of 3.5 per cent. The natural increase and that thereafter the rate will rise by 0.1 per cent each year with a maximum of 4.2 per cent per annum if attained at

CHAPTER 4 THE TENANT FAMILY POPULATION

4.1 Characteristics of the Population

The size and composition of the incoming tenant population, and its tendency to grow due to natural increase and informal immigration, have so far received little attention. In this section certain assumptions concerning the demographic characteristics of the settlement population are discussed and tentative projections are made for the first ten years of implementation. The results of these calculations have influenced the planning for social services, public health, education and village water supplies.

The criteria used for selecting tenants will produce a tenant family population which will differ in important respects from the Kenyan norm, and, in fact, from any natural community in the country. In selecting household heads of between 25 and 45 years the tenant family population will have an abnormally high proportion of young, dependent, children. The requirement that each family be able to muster four adult equivalents of labour excludes families with low fertility or with a poor capacity to raise children, and in fact will favour those with the highest fertility.

It may be expected therefore that a tenant family population of relatively young adults, with numerous small children, and a potentially high rate of reproduction will result. Mortality may also be expected to be low on account of the youthfulness, and the good public health facilities available, which would reduce infant mortality. This is expected to result in a very high natural growth rate in the tenant population.

An average tenant household size of seven on entry has been assumed for planning purposes. This is marginally higher than the size of rural households reported over the past eight years by the University of Nairobi and the International Development Studies in numerous studies of various parts of Kenya. Most studies found households averaging between six and seven members actually present. Seven is therefore an acceptable figure, and moreover was adopted by ILACO as the probably average size for tenant families on arrival.

4.2 Population Growth

The population of the project will grow both by natural increase and the arrival of informal settlers attracted by the economic opportunities of the project.

Informal Migration

Two kinds of informal migration are likely to occur. The first is by close relations, probably in most cases through kinship or marriage, to the households of authorised tenants. It is assumed that the majority of such people will live with their relatives on the household plot they have been allocated in a village. They will swell the numbers of the household but will not establish new, economically and territorially independent households, for which very little provision has been made. The other kind of informal settler is expected to squat in the vicinity of the rural centre or on the periphery of the project where no provision at all for settlement has been made.

Expansion of households within the project is both predictable and unavoidable. It is virtually impossible to control the influx of relatives as 'visitors' to tenant households, and experience with family planning methods to date in Kenya gives no ground for the view that tenants will soon apply artificial means to curtail the number of children they have.

Population Projection

It is assumed, conservatively, that the project tenant family population will increase at an annual rate, in the first year of settlement, of 3.5 per cent (the national average) and that thereafter the rate will rise by 0.1 per cent each year until a maximum of 4.2 per cent per annum is attained as

shown in Table 4.1. It is assumed that this rate will be maintained until at least year 10. If 4.2 per cent is considered high it should be remembered that in many rural areas of Kenya, the natural rate of increase exceeds 4 per cent, and that immigration may account for a further 5 per cent per annum increase. The projection of the tenant population for the ten year period from 1979 to 1989 is given in Table 4.1.

Table 4.1 - Tenant Family Population Projection¹

Year	Incoming ² Tenants	Total incoming tenant population (AX7)	Cumulative total of tenant population (static)	Annual tenant population increase	Estimated total tenant population
1979-80	640	4 480	4 480	157 (3.5%)	4 637
1980-81	1 200	8 400	3 037	469 (3.6%)	13 506
1981-82	2 200	15 400	28 906	1 070 (3.7%)	29 976
1982-83	1 110	7 770	37 746	1 434 (3.8%)	39 180
1983-84	(5 150)	-	39 180	1 528 (3.9%)	40 708
1984-85	-	-	40 708	1 628 (4.0%)	42 336
1985-86	-	-	42 336	1 736 (4.1%)	44 072
1986-87	-	-	45 923	1 929 (4.2%)	47 852
1987-88	-	-	47 852	2 010 (4.2%)	49 862

Notes: ¹ This table includes only the authorised tenants who will have been allocated plots and residential sites on the project.

² Numbers of tenants on the project at the mid-point of fiscal years i.e. the end of each calendar year.

4.3 Age Structure of the Tenant Family Population

The project population will have an age distribution different from that in the remainder of the country although the differences are likely to diminish as the project and its population mature.

Table 4.2 shows the national age distribution, that of Tana River District, and the projections for the Bura Project. In general terms more than 40 per cent of the tenant family population will be under 10 years of age, and more than 50 per cent under 14 years of age.

Table 4.2 - Projected Age Distribution of the Tenant Family Population

Age group Years	Kenya	Tana River District	Bura Irrigation Project
0 - 4	19.4%	18.8%	23.6%
5 - 9	16.6%	17.6%	17.6%
10-14	12.6%	12.6%	11.1%
15-19	10.1%	8.6%	7.2%
20-24	8.0%	7.3%	6.9%
25-29	6.9%	7.2%	10.6%
30-34	5.25%	10.9%	8.6%
35-39	4.7%		6.7%
40-44	6.6%	6.7%	6.0%
50-59	4.6%	4.9%	0.5%
60	5.4%	5.5%	0.9%

The bias towards a young population on the project has several practical implications, briefly these are the following:

- (a) A high rate of natural population increase.
- (b) A high proportion of children too young to work, and therefore a relatively wide ratio of dependants to providers.
- (c) An especially heavy demand on public health facilities and staff by the large child population.
- (d) An unusually large proportion of the population at school age.
- (e) A low death rate, both because of the small number of old people and the provisions for child health care.
- (f) A shortage of mature men experienced in the duties of 'elders' in the village community, and a resulting need for special attention to developing suitable forms of internal village administration, and a sense of public responsibility, among family heads.

A small business complex is proposed for each ward of 25 households at Bura. This would comprise one dukka, one hotel and one butcher, each operated by a full-time tradesman which should suffice for each neighbourhood. Some tenants could be expected to carry on small part-time businesses from their houses, in addition to those licensed and relatively large-scale operations. But it is expected that these side-line businesses will only develop slowly as money becomes available from cotton sales, and it will be necessary to ensure that the community is adequately provided with the basic economic services from the outset.

For every hundred agricultural tenant households provision should be made for four suitably experienced and financially-backed petty merchant-business holdings in the village, and if possible 500 square metres gardens as well. They should be regarded as a part of the official settlement programme, and brought in on a private basis to the agricultural tenants. The average household size of this group is assumed to be six, and their rate of growth would remain stable at 2.5 per cent per annum. Total numbers and the natural increase of these non-agricultural families is given in Table 5.1.

Table 5.1 - Non-agricultural Population Projection

Year	Incoming Borers	Incoming Families	Cumulative Total Over 10	Natural Increase	Total
1	27	152	162	6	168
2	48	263	455	18	572
3	58	528	1,100	39	1,139
4	44	264	1,402	48	1,450
5			1,462	61	1,523
6			1,533	82	1,615
7			1,620	94	1,714
8			1,670	98	1,768
9			1,696	98	1,794
10			1,724	98	1,822

CHAPTER 5 NON-AGRICULTURAL SETTLEMENT POPULATION

5.1 Commercial Population

The population of the project will need a range of commercial services similar to those found on the Hola Scheme at present. These services are offered from a variety of shops, most of which occupy a portion of a tenant's house. Recently, as more money has become available for investment at Hola, more purpose-built trading premises are being erected. Most are operated as a side-line to agriculture by the tenants themselves, sometimes with the help of relatives assimilated into the household to run the business.

In one village on the Hola scheme 97 households are served by 9 small general stores (dukas), 3 cafes (hoteli) where food and drink can be had, 1 bar (for liquor only), 1 beer stall (where beer as well as other goods may be bought), and three butcheries.

On the Mwea Scheme this proliferation of petty trading is discouraged and licences are granted only to those who can erect buildings which satisfy the county council's regulations. In the case of tenants licences are granted to those who, in the opinion of the scheme management, are sufficiently well established to be able to run both an irrigated holding and a business. Most licenses are granted to applicants from outside the scheme.

A small business complex is proposed for each ward of 75 households at Bura. This would comprise one duka, one hoteli and one butcher, each operated by a full-time tradesman which should suffice for such a neighbourhood. Some tenants could be expected to carry on small part-time businesses from their houses, in addition to these licensed and relatively large scale operations. But it is expected that these side-line businesses will only develop slowly as money becomes available from cotton sales, and it will be necessary to ensure that the community is adequately provided with the basic commercial services from the outset.

For every hundred agricultural tenant households provision should be made for four suitably experienced and financed tradesmen be granted residential-cum-business holdings in the villages, and if possible 500 square metres gardens as well. They should be regarded as a part of the official settlement programme, and brought in on a pro-rata basis to the agricultural tenants. The average household size of this group is assumed to be six, and their rate of growth would remain stable at 3.5 per cent per annum. Total numbers and the natural increase of these non-agricultural families is given in Table 5.1.

Table 5.1 - Non-agricultural Population Projection

Year	Incoming Settlers	Incoming Families	Cumulative Total (Static)	Natural Increase	Total
1	27	162	162	6	168
2	48	288	456	16	572
3	88	528	1 100	39	1 139
4	44	264	1 403	49	1 452
5	-	-	1 452	51	1 503
6	-	-	1 503	53	1 556
7	-	-	1 556	54	1 610
8	-	-	1 610	56	1 666
9	-	-	1 666	58	1 724
10	-	-	1 724	60	1 784

5.2 Informal Settlement

The IBRD Appraisal Report (1976) estimated that informal settlement would amount to approximately 2 500 families over the implementation period. No account was given of how this figure was reached, where settlement would occur, or what relationship it would have to tenant population.

There are examples of large scale informal settlement and squatting around various urban centres in Kenya, including Isiolo where arid environment, and seemingly limited economic opportunities, have nevertheless attracted a sizeable population. Whether this will occur at Bura on the scale suggested, of one informal settler to every two formal tenants, is open to doubt. The scale of informal settlement around the Hola Scheme lends no support to the IBRD prediction. In 1976, 108 households containing 589 people, mainly Orma, were enumerated on the periphery of the Hola Scheme. All these people live in portable dwellings and there are no signs of a peri-urban type squatter settlement arising. Garissa also has its spontaneous settlement in the form of a Somali encampment of fluctuating size.

On the Mwea Scheme the management issued the following information on informal settlement in 1971 (2).

Tenants	14 497
Labour employed by the Scheme	108
Labour employed by tenants	2 915
Others	1 000

The proportion of labourers and 'others' living on the Scheme, to tenants, was thus about 28 per cent. Because tenants at Bura will be more or less self-sufficient in labour, while Mwea tenants are not, it seems likely that Bura would attract fewer informal settlers.

The Bura Project will certainly attract a fringe of semi-sedentary ex-nomads mainly Orma, and some people from further afield, but by their nature such settlements cannot be planned for or against. Unless they expand to the size anticipated by IBRD they are unlikely to exert any adverse influences on the project which are beyond the powers of the management and the divisional administration to handle.

It is expected that most informal settlement on the project will occur near the rural centre and space has been allocated for this purpose in the town plan. Because the nature and scale of this immigration to the project cannot be foreseen, it will be the responsibility of the District Officer to ensure that a reasonable standard of housing and hygiene is maintained and that slums do not develop. In this the community development officers' cooperation will be needed.

Informal settlement on the periphery of the project cannot be the direct responsibility of the project management but in dealing with such matters there would be close cooperation between the project management, the county council and the district administration.

CHAPTER 5 - OVERALL PROJECT POPULATION PROJECTION

5.1 - Overall

The various elements of the projected population discussed previously are summarized in Table 5.1 below. During the settlement period of the project the estimated overall population will grow from about 7 000 at the end of 1970 to over 45 000 by the end of 1982. Thereafter growth of the population will be largely by natural increase reaching just under 80 000 by end of 1983.

Table 5.1 - Overall Project Population Projections¹

Year	Tenants ²	Traders ³	Staff ⁴	Total Project ⁵	Settlement workers and servants	Overall Total
1970/71	4 007	188	1 080	5 800	1 200	7 100
1980/81	12 506	672	2 062	18 100	1 900	20 000
1981/82	29 987 settlement period	1 130	1 762	34 900	4 300	39 200
1982/83	39 180 period	1 452	4 452	46 100	2 300	48 400
1983/84	40 708	1 533	4 607	46 800	3 300	50 100
1984/85	42 336	1 599	4 708	50 700	3 200	53 900
1985/86	44 072	1 670	4 835	50 500	3 100	53 700
1986/87	45 923	1 669	5 108	52 700	2 900	55 700
1987/88	47 882	1 721	5 397	54 900	2 800	57 700
1988/89	48 962	1 724	5 702	57 100	2 700	59 800

PART 3

SETTLEMENT PROCEDURES AND PROGRAMME

- Notes:
- ¹ Population at mid-point of each three year (i.e. end of) period year.
 - ² Awaral tenent population increase starting at 3.5 per cent per annum and rising by 0.3 per cent per annum to maximum 4.2 per cent.
 - ³ Traders at 1.25 tenants families, family of six assumed, growing at 3.5 per cent per annum.
 - ⁴ Project staff increasing according to staff schedules, family of 6 assumed growing at 3.5 per cent per annum.
 - ⁵ Figures rounded up nearest hundred.

CHAPTER 6 OVERALL PROJECT POPULATION PROJECTION

6.1 General

The various elements of the projected population discussed previously are summarised in Table 6.1 below. During the settlement period of the project the estimated overall population will grow from about 7 000 at the end of 1979 to over 48 000 by the end of 1982. Thereafter growth of the population will be largely by natural increase reaching just under 60 000 by end of 1988.

Table 6.1 - Overall Project Population Projections¹

Year	Tenants ²	Traders ³	Staff ⁴	Total Project ⁵	Itinerant workers and servants	Overall Total
1979/80	4 637	168	1 080	5 900	1 200	7 100
1980/81	13 506	572	2 052	16 100	4 800	20 900
1981/82	29 967 settlement	1 139	3 762	34 900	4 400	39 300
1982/83	39 180 period	1 452	4 452	45 100	3 300	48 400
1983/84	40 708	1 503	4 607	46 800	3 300	50 100
1984/85	42 336	1 556	4 768	48 700	3 200	51 900
1985/86	44 072	1 610	4 935	50 600	3 100	53 700
1986/87	45 923	1 666	5 108	52 700	3 000	55 700
1987/88	47 852	1 724	5 287	54 900	2 800	57 700
1988/89	49 862	1 784	5 472	57 100	2 700	59 800

- Notes:
- Population at mid-point of each fiscal year i.e. end of calendar year.
 - Annual tenant population increase starting at 3.5 per cent per annum and rising by 0.1 per cent per annum to maximum 4.2 per cent.
 - Traders at 1:25 tenant families, family of six assumed, growing at 3.5 per cent per annum.
 - Project staff increasing according to staff schedules. Family of 6 assumed growing at 3.5 per cent per annum.
 - Figures rounded to nearest hundred.

CHAPTER 7 THE RECRUITMENT OF TENANTS

7.1 The Criteria for Selection

ILACO (1975), NIB (1976) and IBRD (1977) have each proposed somewhat different criteria for the selection of settlers. These criteria are reviewed here, using the IBRD proposals as a basis for discussion.

Males, aged 25-45 years

The IBRD Appraisal Report (1976) stated that "women could not be considered even if they are heads of households". This could be taken as an act of sexual discrimination. There are numerous female heads of rural households in Kenya, and women often supply up to 75 per cent of the labour for agriculture. Moreover studies on Mwea show that women tend to be far worse off on a scheme, where cash crops are the main product, than they are in their traditional homesteads. It is men who are the registered holders of land on the scheme and who receive the payment for the crop, and men who exercise sole responsibility for determining how the money is to be spent. Traditionally women often have their own garden whose produce is their own, and they also exert a strong influence over the disposal of the crops from their husband's land. The diminished influence of women over the use of crops on cash cropping schemes has been held responsible for the remarkably high rate of malnutrition, especially among children on such schemes (2).

This would constitute a cogent argument against sexual discrimination in the selection of tenants for Bura, were it not for their initial responsibility to build their own houses. This can only be considered as a man's job, especially on account of the construction methods envisaged. The "men only" criteria will therefore have to remain.

The project management might nevertheless wish to experiment with a few female tenants, say one group of six initially, to see if masculine prejudice against female heads of households who could fulfill the other selection criteria can be justified or not.

The age criteria extends the ILACO proposal of 25-40 years. The inclusion of 40-45 year old men appears sound. Men of this age are still close to their physical peak and may be expected to have several older children who would be a great asset in working the holdings - unless they were to spend most of their time away at secondary school off the project. Mature men are also necessary for the development of social and cultural life in the project villages. Younger men lack the experience of carrying public responsibility and depend on their elders to provide the institutional stability which is vitally necessary for an evolving community.

Medically fit

This criteria is presumably meant to exclude the chronically ill and incurably feeble, but not those who are temporarily, indisposed or suffering from readily curable afflictions. Since medical fitness is intended as a test of labour effectiveness, it would be logical to have all the working members of the household examined.

In practice this is not feasible before selection because of the great numbers of people involved, and the shortage of staff to conduct examinations. The most appropriate procedure would be a simple screening process conducted by the District Selection Committee to sift the basically fit from the chronically ailing. It is suggested that the proposal for a full medical examination by each candidate be dropped.

Those who are suffering from readily curable ills should be treated before their departure and if the cure is not complete, they should carry a note to the Bura health officer, who would be separately informed of the arrival of the patient on the scheme by the Divisional medical officer.

Unemployed or under-employed

To this criterion may be added the ILACO 'landlessness'. The main social and economic objectives of the Bura Project are to provide a livelihood for as many poor and landless people as possible, by producing cotton on a profitable basis.

It could be argued that since most of the tenants will be 'agricultural dropouts', perhaps through no fault of their own, the second aspect of this objective is not compatible with the first. However, experience on other irrigation schemes, notably Mwea and Hola, suggests that this argument is invalid and that it is quite possible to recruit tenants who are both poor and capable.

This aspect should be stressed to District Selection Committees. The project is not intended for people who have adequate alternative livelihoods, nor for those who are so poverty-stricken as to be incapable of successful farming.

Married and able to provide two adult equivalents of labour besides himself and his wife

The requirement that the tenant be married is reasonable in view of the finding that on Mwea unmarried tenants are likely to have low crop yields. It is also unlikely that unmarried people could muster the necessary work force.

It was not possible to check the ILACO (1975) manpower requirements for a 1.25 ha farm. ILACO state that "...Per family three persons are considered to work full time during the harvest period; that a maximum of 28 man-days of labour per 10 day period will be required to cope with the peak harvest, and that the average household of seven persons should be able to cope with the workload without hiring additional labour". (Annexe E). These statements imply that a family comprising a man and his wife plus one adult equivalent of labour will suffice to run the farm.

The NIB and IBRD presumably consider this labour force inadequate as both considered that an extra adult equivalent would be required.

There are, however, important consequences following on the selection of larger families. Many otherwise eligible families will be excluded. Older families will more easily meet the requirement for four adult equivalents. Each holding will therefore have to support more people than if three adults were required.

The arguments supporting three and four labour unit families respectively are inconclusive. Neither Hola nor Mwea are reliable precedents for Bura in this respect. The consultants suggest that the NIB/IBRD proposal for a four labour unit family be retained but that especially promising or deserving applicants with three labour units should also be considered for selection. With careful monitoring of the labour requirements and the availability of non-family labour at peak times, it may well be possible to refine the labour criterion in due course.

District Selection Committees will need to know what kind of people, besides a man and his wife, constitute an adult equivalent of labour. In making the following recommendations it is assumed that the man and wife will cope with the labour demands of their holding and garden throughout the year except for about 20 to 30 days during the peak harvesting season. At this time they will need the help of their children, whose school holidays are assumed to cover this period. Children will assist, but are not so essential at other times of year, notably for planting and weeding operations.

It is accordingly suggested that anyone over 14 years of age be regarded as an adult (for cotton picking purposes) and that each child between 7 and 14 years be considered as half an adult equivalent. This should be subject to constant review in the light of practical experience on the project.

Experienced in rural agriculture

The evidence from Mwea (2) does not support the conclusion that previous agricultural experience is a prerequisite for successful tenancy on an irrigation scheme. In fact ex-traders were among the most successful groups in terms of agricultural performance at Mwea. Ex-white collar workers and students were, however, somewhat less successful as a group. The authors of the study referred to considered that these findings "do not provide a very strong case for changing selection policy", which at Mwea did not favour candidates from other occupation groups.

Ilaco stressed that 'the Bura Project is more in need of plot-holders with a rural, if not an agricultural, background than any other NIB scheme undertaken so far (except for the Tana Pilot Scheme), notably in the first years of project implementation as the project is located far away from any urban centre and will continue to consist of mainly rural settlements...' (ILACO, 1975 Annexe G).

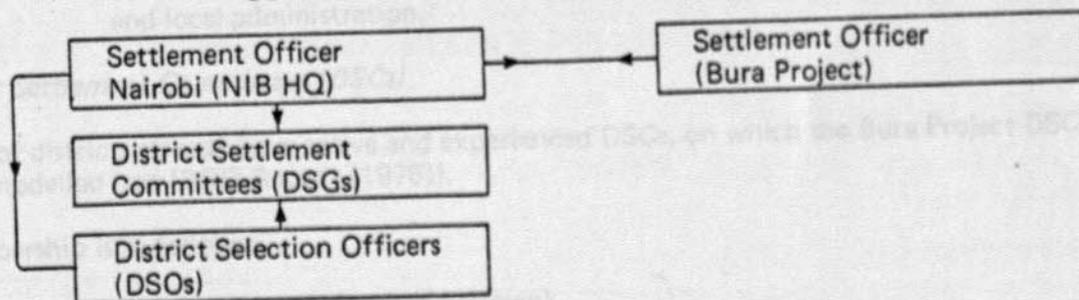
The consultants agree with Ilaco that a rural, if not an agricultural, background is the most important requirement and this would conform to the Mwea experience.

7.2 The Recruitment Organisation

The NIB and the Ministry of Lands and Settlement have considerable experience of settlement schemes, but the scale and complexity of the Bura Project is unprecedented. On previous schemes, most settlers have been recruited from the locality of the scheme, or if they came from afar they originated in the same or neighbouring districts. A national settlement scheme, in which every district has a quota of tenants, has no antecedent in Kenya.

A framework for the selection procedure is proposed here commencing with the first publicity and going on to the arrival at Bura of the first tenants. An outline of the organisation suggested is given below.

SETTLEMENT ORGANISATION



The Settlement Officers

The complexity and scope of the settlement procedure necessitates two Settlement Officers. One would be in the Bura Project Coordinator's Office (BPCO) in Nairobi, and the other at the Bura Project. The national programme of tenant selection would be organised from Nairobi, while at Bura the immigrants would be received and settled on the project. The Nairobi Settlement Officers' responsibilities would include:

- (a) Finalising the allocation of quotas to all districts according to an agreed formula.
- (b) Establishing or mobilising District Selection Officers and informing them of their duties.
- (c) Providing DSCs with publicity materials and technical information (supplied by the Project Information Officer).
- (d) Providing DSCs with budgets.

- (e) Convening NIB meetings to consider candidates selected by DSCs.
- (f) Supervising DSCs in carrying out their duties.
- (g) Arranging remittances to families from family heads already at Bura.
- (h) Arranging transport between districts and Bura.
- (i) Arranging transit camps for long distance migrants.
- (j) Coordinating Bura Project readiness for families with DSC dispatches of families.

The Bura Project Settlement Officers' duties would include:-

- (a) Receiving the tenants on their arrival at Bura.
- (b) Ensuring that accommodation, meals, health care, instruction in agriculture, building, use of village amenities, etc. are all adequately provided for.
- (c) Paying tenants their wages or subsistence allowances and making remittances as necessary to families needing support (via Nairobi Settlement Officer).
- (d) Working with Community development staff to instil tenants with a sense of public responsibility and to prepare them for the kind of village life explained later in this report.
- (e) Liaising with the settlement staff in the BPCO Nairobi for the transport of families when tenants houses are nearly complete.
- (f) Receiving and inducting families at Bura.
- (g) Ensuring that an adequate supply of all essential foods is available on the project and properly distributed.
- (h) Supervising local traders to ensure that they are stocking adequate supplies and selling them at controlled prices (or if they are not controlled, at reasonable prices).
- (i) Receiving and attending to tenants' complaints and suggestions on the one hand and their discipline on the other.
- (j) Coordinating the project social, technical and administrative services at the level of the village to ensure that they serve the tenants' interests to the greatest extent possible.
- (k) Assisting the Deputy Project Manager to establish a system of village committees and councils to represent the tenants to the project management and local administration.

The District Settlement Committees (DSCs)

A number of districts already have active and experienced DSCs, on which the Bura Project DSCs have been modelled (see IBRD Report (1976)).

Their membership is as follows:

District Commissioner (Chairman)	}	ex officio members
District Agricultural Officer		
District Community Development Officer		
Chairman/Clerk of the County Council		
Ministry of Health Representative		

Two other members would be of special service to the DSC, they would be persons with long personal involvement in the affairs of the local community. This would ensure that a close knowledge of the background of each applicant would be available.

The DSCs should be set up or mobilised early in 1978 to start their local publicity programmes for the project and should visit both Hola and Bura. They should immediately appoint a District Selection Officer (DSO) who would become the DSC's executive.

The functions of the DSC are given below:

- (a) Devise a district publicity programme if required, using materials obtained from the Settlement Officer (and prepared by the Information Officer in Nairobi).
- (b) Prepare a detailed schedule of operations with deadlines, based on the crucial dates of (1) applications open, (2) applications close, (3) initial selection made, (4) first tenants depart for Bura.
- (c) Provide Settlement Officer (Nairobi) with quarterly progress reports.
- (d) Keep accurate accounts of expenditure under the budget provided by the BPCO.
- (e) Supervise and periodically assess the progress and coverage of the district publicity programme.
- (f) Issue application forms and announce closing date for their submission.
- (g) Receive and consider applications, drawing up a short list for submission to the NIB.
- (h) Notify successful candidates and receive from each K Sh 20 commitment fee.
- (i) Brief accepted candidates.
- (j) Marshal candidates for transport to Bura.
- (k) Marshal families for transport to Bura.
- (l) Check on families welfare while its household head is away at Bura during the tenant house construction period.

7.3 Selection Procedures

The proposed procedure for tenant selection programme is elaborated below. The operations are timed on the assumption that the first tenants depart for Bura at the beginning of the second half of 1979. (In some districts the first tenants might however leave much later). The programme of selection is shown in Figure 7.1.

4th Quarter 1977

1st Quarter 1978

Operation 1 – Bura Information Officer prepares publicity material and detailed instructions for DSCs. BPCO briefs Steering Committee on all aspects of tenant selection. NIB General Manager writes to all District Commissioners.

1st Quarter 1978

Operation 2 – Settlement Officer Nairobi allocates working budgets to DSCs, proportional to the number of tenants to be recruited.

1st Quarter 1978

Operation 3 – Settlement Officer Nairobi visits all District Commissioners, explaining (where necessary) the function of DSCs, providing publicity material for local distribution by DSCs, authorising the use of DSC budget (D.C. to account) and providing a schedule of DSC activities.

1st Quarter 1978

Operation 4 – District Commissioners appoint members and convene DSCs. If possible the Settlement Officer, or his designate from Nairobi, should attend the inaugural meetings of DSCs.

Agenda:

- (a) Give outline of Bura Project using material provided by Information Officer
- (b) Explain duties and functions of DSC, again using material from Information Officer.
- (c) Explain selection criteria and procedure.
- (d) Break down the district quota into location quotas, using the same formula as that used for the national quota allocations, or as near to it as available information permits.

- (e) Devise a 6 month district publicity programme (based on outline supplied by 1 above) and designate responsibility for execution of each item.
- (f) Discuss DSC schedule (provided in 3 above) and decide on exact timing of each operation, fix deadlines, and assign responsibility, with report-back to committee.
- (g) Appoint an District Selection Officer, (DSO) preferably from existing staff of DCs office, or from County Council (his duties outlined in 5 below). DSO is henceforth the executive officer of the DSC, though not a voting member.
- (h) Designate two DSC members to visit Hola and Bura. Preferably non-officials i.e. the two 'other members' at the bottom of the DSC list.
- (i) Confirm future meetings of DSC on specific dates, to handle specific tasks. This to be drawn from item (f) above.

2nd Quarter 1978

Operation 5 — DSCs commence pre-application publicity programme: District Selection Officer (DSO) to visit each location chief (or equivalent) to explain Bura Project, the selection criteria, the location quota of tenants and the chief's duties to bring this information to his people through meetings, posters, and other publicity material provided by the DSO (originally from 1 above).

Arrange a schedule of meetings and barazas with each chief and a revisit after two months to inspect progress. (DSO's transport provided by DC or County Council and funded from DSC budget).

Operation 6 — DSO to report bi-monthly to BPCO on progress of publicity campaign in each location.

(Publicity campaign and visits to locations will involve DSO full time for the six months of its duration. Other work peaks will occur at application collection time, selection time, and departure times.)

2nd Quarter 1978

Operation 7 — DSC meet to discuss results of publicity campaign and to make detailed plans for application procedure.

Agenda:

- (a) Summary of DSO's reports on publicity programme coverage and effectiveness in each location.
- (b) If coverage adequate procedure for distribution of application forms.
- (c) If coverage not adequate in certain areas discuss appropriate measures.
- (d) Fix closing date two/three months after issue of application forms and at least six months before departure of first tenants to Bura.

2nd/3rd Quarter 1978

Operation 8 — Issue of holding application forms (see Appendix A) to location chiefs with instructions to chiefs and their clerks on:

- (a) How to complete Section A, for the applicant and Section B, for the chief's comments on the eligibility of the applicant.
- (b) How to inform the public that applications have opened, where forms are available, and latest date application should be submitted and to whom.

3rd/4th Quarter 1978

Operation 9 — DSO collects the application forms from location chiefs.

4th Quarter 1978

Operation 10 — DSC meets to consider the applications and prepares a short list of interviewees. This should contain double the number of tenants in the quota for each location giving the DSC the opportunity to select one out of every two applicants. This short list would cover the whole settlement period.

4th Quarter 1978

Operation 11 – Short listed applicants are called to an interview at the district HQ, where the DSC enquires further into their background and eligibility. If possible applicants' wives should also attend the interview.

4th Quarter 1978

Operation 12 – DSC selects candidates to fill the district quota plus a 10 per cent margin of standbys.¹

4th Quarter 1978

1st Quarter 1979

Operation 13 – DSC sends its selection list to Settlement Officer Nairobi for review by BPCO/NIB.

1st Quarter 1979

Operation 14 – BPCO returns selection list to DSC indicating acceptance, rejection, or need for further information on candidates.

1st Quarter 1979

Operation 15 – DSC complies with NIB requests for information and the BPCO prepares final list of tenants from the district together with a departure schedule.

Example: District X has a quota of 36 settlers total. There are 9 locations in the district. On the basis of the natural quota allocation formula each location is to be allocated between two and six tenants, as follows:

Location:	a	b	c	d	e	f	g	h	i
Quota:	4	3	5	3	4	2	6	4	5 (4 standbys)
	6		12 (2x6)			12 (2x6)		6	
Year mobilised:	1979		1980			1981		1982	

To facilitate mobilisation, transport and communications, each batch of six tenants should come from neighbouring locations.

2nd Quarter 1979

Operation 16 – DSO informs location chiefs of selection results. Chiefs to inform 1979 migrants of date for briefing session and later migrants of their departure dates. (Wives should also attend). K Sh 20 commitment fee (not refundable) to be collected at these meetings.

2nd Quarter 1979

Operation 17 – Meeting of 1979 tenants and families at District HQ, to discuss in detail pre-settlement preparations. These would include:

- Minimum personal belongings required at Bura by man alone, and by his family.
- Establishing a communication line between the man and his family while he is away.
Man → Settlement Officer (Bura) → Settlement Officer (Nairobi) → DSO → family.
It is important that messages be able to pass each way with minimum delay.
- Provision for maintenance of family while man is away. If no adequate provision can be made, DSO to arrange with Settlement Officer (Bura) for man to receive half his wage or subsistence allowance on the project and to remit the other half to his family as long as they are separated.
- Tenant Personal Information Forms (TPIF) to be filled in by DSO.

- (e) Arrangements for disposing of assets and possessions which cannot be taken to Bura.
- (f) Final arrangements for migrants' embarkation.

3rd Quarter 1979

Operation 18 — First tenants leave for Bura. Each tenant supplied by DSO with a copy of his TPIF.

3rd Quarter 1979

Operation 19 — DSO attends to welfare of families waiting to leave, pays remittances where necessary, and expedites communications between families and tenants on site.

4th Quarter 1979

Operation 20 — DSO is informed by Settlement Officer (Bura) that the houses of the tenants from his district, who left about six weeks earlier, are nearing completion and that a bus will be sent on a specific date to bring the families to Bura. DSO informs families of departure date and takes necessary steps to ensure that all are present, with baggage, at the appointed time.

4th Quarter 1980

Operation 21 - Families checked against TPIFs and embark for Bura.

Note: ¹ This 10% should be reviewed periodically in the light of experience. It should be sufficient to cater for NIB rejections and withdrawals by applicants, but not so large that many disappointed standbys are left at the end of the settlement period.

7.4 Pre-settlement Publicity

For most Kenyans the Bura Project area is remote and little known. For some it may carry connotations of heat, drought, a detention camp, and skirmishing with the Somali Shifta. Among the more politically aware there may be queries as to who the main beneficiaries of this expensive national project are to be. This is a fertile field for uninformed speculation and rumour.

Publicity concerning the project should accordingly have two principal objectives. First, to inform prospective tenants of what they could expect from a life at Bura. Second, to explain the background to the project and the principles on which it will be operated.

From the time when the decision to implement the project is taken, an intelligently conducted publicity programme should be mounted. Thus from the start the opportunities for contradictory statements by officials should be minimised. This can most effectively be done by appointing an information officer within NIB to handle all publicity concerning the project. Initially, publicity would be the responsibility of the Bura Project Co-ordination Office (BPCO) in NIB. Press releases would be prepared and requests for information by other bodies dealt with. In the early stages publicity would be concerned with the second of the objectives mentioned above: to satisfy the demand of the press and general public for information about the project. The first tenants, would arrive at the Bura Project in about July, 1979 and would have been selected by April 1979. Pre-selection publicity should precede this event by approximately 12 months. Therefore the release of publicity on the project should be scheduled for the beginning of 1978, and to meet this target date the information officer would have to be seconded from the Ministry of Information as soon after the release of funds for the project as possible. He would be responsible directly to the Bura Project Co-ordinator in Nairobi.

From the start the Information Officer, having taken over his duties from the Bura Project Co-ordinator, would design his programme to fulfil the two objectives given above. He should make a specific effort to inform the public through appropriate press and other media, of the background to the project, its objectives, its social and economic implications, and the criteria to

be used in selecting applicants. He should expect a certain amount of controversy on these issues, but it is essential to explain them clearly and fully from the outset to counter any allegations of bias in the selection and quota allocation procedures.

Publicity for the settlement programme per se should be addressed to two principal audiences. First, the District Settlement Committees, whose function and composition are explained earlier in this chapter, will need guidance as to the salient features of the project, the selection procedure, and their own local publicity programme needs. Second, the potential applicants for holdings will need information. It could be expected that these people would be among the poorest, least literate and least cosmopolitan groups in rural society. Newspaper articles and brochures are unlikely to reach them. Even radio may be less effective as a means of communication than among the more affluent strata of society. Impersonal sources of information tend to play a minor part in influencing their decisions. Personal sources, such as elders and Chiefs and neighbours, are far more important as credible and authoritative sources. One might expect that where such a momentous decision as a move to Bura is being weighed, many people would not commit themselves without having had the opportunity to talk to someone known to them, or at least well known in the locality, who had actually been there.

The availability, credibility and the means of dissemination of information on the project, will have an important influence on the number and the type of applicants. If the nature of the information is such as to be credible and influential only to relatively educated and cosmopolitan people, the poor and the illiterate will be excluded from the start, and the number of applications may remain small.

This could have two important implications. A type of tenant could be produced whose chances of success and stability on the project are less than optimal. And it may even prove difficult to recruit enough tenants to fill the quotas, especially in the early years.

To achieve broad coverage it is proposed that the following methods of disseminating information be explored:

(a) Radio:

This has the advantage of wide coverage although it tends to miss the poorer and more socially marginal people. It can provide first hand, and therefore accurate, information to a very large audience quickly.

(b) Barazas:

Chiefs and village leaders or elders throughout the country must in any case be informed of the project and the selection criteria, because they must advise the District Settlement Committee on the suitability of applicants. These local authorities should therefore hold barazas to inform their people of the prospects at Bura. To perform this function they should be provided with full information themselves (see (c) and (d) below).

(c) Printed descriptive information:

This should be a non-technical and non-legal outline of the future tenants' life at Bura, with some reference, if appropriate, to the conditions at Hola. Pictures of the various aspects of life and work on the Hola and other NIB schemes would help people to visualise the prospects for themselves. The documents would contain information on radio programmes and their times for those interested as well as local sources of information.

At the village level it is impossible to provide full information on the project to those who are genuinely interested. The documentation should serve only to provide basic information, to raise interest, and to announce the application procedure.

(d) Visits of local dignitaries to Bura:

To provide a local source of first hand information to prospective tenants, it is proposed that from each district, and in the districts with high quotas, from each location, a local and well respected person be taken for a visit to Bura and Hola. An elder or chief rather than an official or politician would be preferable. The purpose of this visit would be to provide prospective applicants with a source of first hand information, and the District Selection Committee with one or more members with personal experience of Bura.

(e) Printed technical information:

This is necessary to provide working documents for the District Selection Committees. A basic fact sheet is required. It should contain information on the topics set out in the IBRD Appraisal report (1976). A paper on the selection criteria is needed to elaborate the IBRD proposals.

7.5 Allocation of Tenant Quotas to Provinces and Districts

It is generally agreed that tenants will be drawn from all provinces and districts of Kenya and that local (Tana River District) applicants should be granted a certain degree of priority over others.

The draft IDA Credit Agreement gives a preliminary allocation of tenants to provinces, shown in Table 7.1, and this has to be further broken down to districts. The formula which is eventually used to determine the tenants quotas, and the weighting given to the various factors, are likely to be controversial. It is recommended that the NIB convene a specialist panel¹ to discuss the matter from all aspects and to arrive at a method of allocating quotas to districts which is objective, equitable, and follows the government's policy on settlement schemes. This method should be applicable not only to Bura Phase I, but to subsequent phases and to other projects.

The question of 'local' applications was discussed earlier and although a definition of the term 'local' was suggested, this is a matter upon which the NIB and the panel should decide. One suggestion that is made here concerns the priority of local applications. In the first year of settlement the consultants propose that 50 per cent of the total number of tenants for that year be 'local' people. This will serve three purposes. One it will demonstrate to the local population that they are in fact being given priority in their applications. Two, it will provide a relatively stable and well adapted tenant population in that first crucial year, because since tenants coming from afar will be mingled with people who are accustomed to the area, and who through their own agricultural background and the proximity of Hola, will quickly become accustomed to conditions on the project. Three, communications would be simpler and the problems of organising long distance travel and transit camps would not be added to the initial difficulties of early organisation.

Note:

¹ Two useful members of such a panel would be Prof. P. Mbithi of the Dept. of Sociology, and Prof. Ominde of the Dept. of Geography, at the University of Nairobi.

Table 7.1 : Allocation of Tenants by Province

Province	Total number of tenants	Percentage allocated
Central	700	14
Coast ¹	1 290	25
Eastern	1 290	25
North Eastern	130	3
Nyanza	700	14
Rift Valley	240	5
Western	700	14

Note: ¹Approximately 75 per cent of the Coast Province allocation would come from the Tana River District.

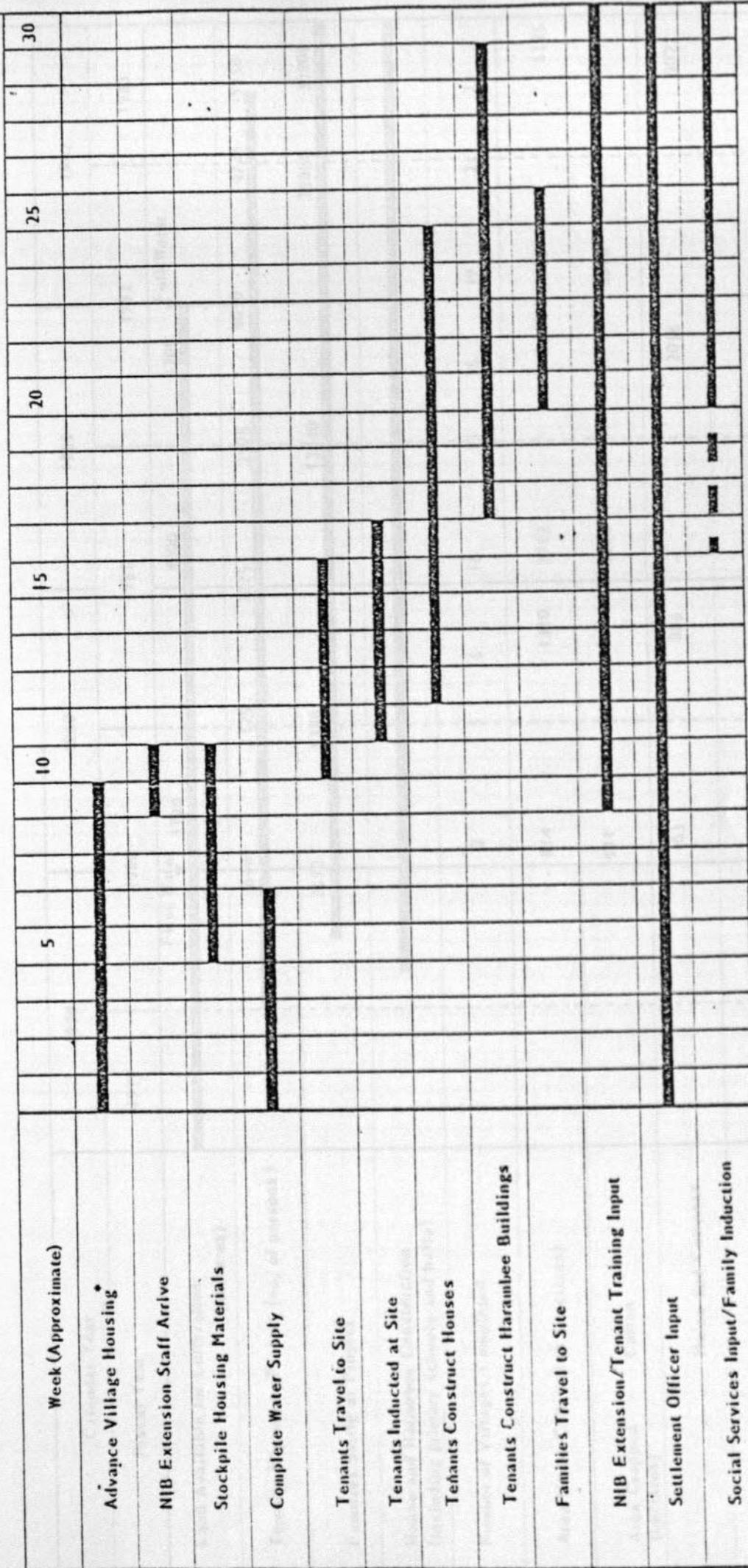
The basic migration and transportation programme by provinces has been computed as shown in Table 7.2.

Table 7.2 - Migration and Transportation Programme (Fiscal years)

Detail	Number of bus loads transported*							
	1979/80		1980/81		1981/82		1982/83	
Number of tenants	1 125		1 800		1 800		425	
Number of family members	6 750		10 800		10 800		2 550	
Province	Tenants		Families		Tenants		Families	
	Tenants	Families	Tenants	Families	Tenants	Families	Tenants	Families
Central	5	20	7	32	7	32	2	8
Coast	8	35	13	56	13	56	3	13
Eastern	8	35	13	57	13	56	3	14
Nyanza	5	20	7	32	7	32	2	8
Western	5	20	7	32	7	32	2	8
North East	1	5	2	7	2	7	—	—
Rift Valley	2	7	3	11	3	11	1	4
TOTAL	34	132	52	226	52	226	13	55

Note: * Tenants transported in loads of 36 per bus. Families transported in loads of 48 persons per bus with one 7 ton lorry per bus for belongings.

TYPICAL OUTLINE DEVELOPMENT OF A VILLAGE



* Comprises NIB staff housing, compound and stores, and 12 - 18 tenant houses for temporary accommodation

RATE OF SETTLEMENT AND CULTIVATION

Calendar Year	1979		1980		1981		1982	
	1979	1980	1980	1981	1981	1982	1982	1983
Fiscal Year								
Land Available for Cultivation (hectares)		First Water 1790 640	1725	2075	4000	6700	Full Water 4725	5150
Tenants Migrate to Project (no. of persons)		2690	5380		13440		26880	30900
Families Settle at Project								
House and Harambee Construction (including primary schools and halts)								
Number of Villages Completed		3	5	6	10	15	19	23
Area Under Cultivation (hectares)		874		1310	2912	3640	5533	6115
Area Cropped (hectares) - Cotton		434			2800		5320	
- Maize and Cowpeas		403		806		2016		3023
- Groundnuts								67
- Vegetables		34		67	112	168	213	258

CHAPTER 8 THE MIGRATION OF TENANTS TO THE PROJECT AND THEIR RECEPTION REQUIREMENTS

8.1 The Rate of Settlement

The programme proposed for tenant migration is based on that contained in the IBRD Appraisal Report (1976) and is as follows:

Fiscal Year	1979/80	1980/81	1981/82	1982/83
Number of new tenants arriving	1 125	1 800	1 800	425

From a sociological and administrative point of view, it would have been preferable to smooth the flow, and extend it over five or six years. Economic and other considerations preclude this, however, and the project staff will have to expand and adapt to cope with an influx of over 10 000 people in Years 2 and 3.

Given the overall rate at which new tenants arrive on the project each year, it remains to determine the rate at which tenants and their families should arrive on the project during the course of each year. ILACO has proposed a schedule in which two groups of tenants and their families arrive on the project each year. The first group arrives in February and March, followed by their families in May, June, July and August. The second group arrives in July and August, followed by their families in October, November, December and January.

In support of this schedule, ILACO argue that tenants arrive six to seven months before their first cropping season and thus have time to build their houses, settle their families, become accustomed to the project and prepared for an entirely new style of life. The first group of tenants and their families are settled in time for the September to January food crop season while the second group are settled in time for the February to August cotton season. Thus each group has the shortest possible time between arrival and commencing agricultural production consistent with building their own houses, overcoming the initial trauma of removal to a new environment, learning something about irrigation and cotton (both probably unfamiliar to most tenants) and installing their families.

The IBRD Appraisal Report (1976) favours an alternative programme (1). The report states:

'First, in order to minimise confusion and reduce delays, the transport of settlers should, as far as possible, be spread over a year. Secondly, heads of families should be transferred to the project area in advance of their dependents so that they can familiarise themselves with the obligations they would be agreeing to assume, and so that they could begin construction of housing. These two considerations dictate that family heads should be transported to the Bura area in May - August of each year, while the remaining members of their families would follow in September to December of the same year.'

Note (1): This may be derived from Table A4 of NIB's Paper, "Tenant Selection, Settlement and Housing", which gives the same schedule for settlers as the IBRD Appraisal Report (1976), but does not include a schedule for families.

The reasons for the IBRD preference of this schedule to ILACO's are not given. If the transport of tenants should be spread over a year, as stated above, ILACO's schedule achieves a greater spread than the Bank's. It is not clear from the passage quoted above why the conditions that tenant transport be spread over a year, and that household heads precede their dependents, should 'dictate' the schedule given. For ILACO the same conditions suggested numerous alternatives, of which the one mentioned here was offered as only one possibility.

The Bank schedule appears to have the further disadvantage over ILACO's that many tenants would be without their families during the food crop season and so would have to wait until the following February for the cotton season before they were able to plant subsistence crops.

The previous planners of settlement schedules for Bura have apparently tried to avoid too much overlap between tenants' arrivals and family arrivals. The Bank has achieved total separation, while ILACO have permitted a mere two months overlap per year. As long as tenants do not have their families arriving too close on their heels, the consultants propose that the flow of tenants and families be as smooth as possible throughout the year.

It will take approximately six weeks to build a tenant house (see Implementation Annexe). Another two to three weeks might be provided to allow for any hitches in the building programme and for a measure of instruction of the tenants in the arts of irrigation and other useful branches of learning. We do not recommend longer than this because no advantage in terms of better orientation to the project is to be achieved by delaying the union of families. If there is some time between the arrival of the family and the beginning of the new season, it can be usefully employed in getting the whole family orientated to the project; the household head will probably learn his job faster and more thoroughly with his family there to support and feed him than he would if he were alone.

The main disadvantage of bringing families to Bura in an almost steady flow is that some will just miss a crop season and will require financial support until their first crops are harvested. However, a subsistence allowance could be paid, recoverable after the first cotton cash crop is harvested.

This is a problem which confronts any settlement operation, other than one concentrating all arrivals into the period immediately before each cropping season. Such an arrangement would be physically impossible at Bura.

There are at least five major factors to be considered in preparing the settlement schedule, as follows:

- (a) The rate at which tenants arrive on the scheme should not exceed the availability of prepared land or the capacity of the house building operation.
- (b) The logistics of transport and the requirements of an orderly settlement process favour a regular rather than a discontinuous flow of incoming tenants and families.
- (c) There should be as little delay as possible between the arrival of the household head and that of his family.
- (d) There should be as little delay as possible between the arrival of a tenant's family and the harvest of their first cash crop.
- (e) A settlement programme must have flexibility built into it, and must be flexibly applied, to meet the real (and largely unforeseeable) needs of the people and the situation it serves.

The programme for the settlement and development of a typical project village is shown in Figure 7.2. This shows that the time from the first tenants' arrival to completion of their houses and arrival of their families would be 8 weeks. The complete village settlement operation will take some 15 weeks. The settlement schedule proposed for Bura has taken these factors into account, and was formulated considering that the contingencies likely to be encountered may be better met by a range of strategies than by one alone. The schedule allows for tenant migration at a rate which would complete a village every six weeks (this would be possible if a bus carrying 36 tenants arrived each week). A break of 4 to 6 weeks was allowed at each of the two rainy periods during the year.

Figure 7.3 shows the programme and the timing of tenant arrivals in relation to crop planting seasons and first irrigation water availability.

In the first year, factor (a) above is violated because tenants begin to arrive on the project before there is any water available on the land or the village sites. Water during this period will need to be brought in by tanker. This is unavoidable unless settlement is delayed until water begins to flow in January 1980. But it would then be impossible to plant cotton in that first season and the early tenants would have to wait a full year before they could plant cotton. They would have been on the project 18 months before they reaped a cash crop harvest which would be most undesirable.

It may be possible to alleviate some of the water supply problems of the first year by compressing the settlement schedule towards the end of 1979. The advantages would be that the period when water would have to be trucked to the site would be reduced and the period between the first tenants' arrival and their first cash crop harvest would be reduced. The decision to compress the first year's schedule or not must rest with the settlement officer and the project management. They would have to be confident that their organisation was sufficiently effective to be able to assume that all the first year's tenants would indeed be on the project before the first planting in 1980. The schedule is therefore left in its present form because it gives more room for manoeuvre in the first year which will undoubtedly be the most crucial to the success of the project.

In accordance with factor (b), the flow of tenants and families over the year is as smooth as possible. There may be two breaks in the flow of tenants during the wet seasons to provide some slack in the system. It may not be found necessary in practice to have the breaks as shown, involving a total break in the flow. No break is allowed in family flow because the problems associated with bringing and settling men on the one hand and their families on the other are very different. The exception may be when rains render roads impassable or if flooding brings building operations to a halt. But it is not expected that this will happen often, and when it does the slack in the two processes can be taken up.

Factor (c) has led to a three month gap between the arrival of the men and that of their families being allowed in the programme. ILACO and the IBRD both considered that a four month gap would be required. Against this, it is reasoned that the type of family most eligible for entry to the project will be poor and heavily dependent on its head of household. While he is away from them at Bura, building the family house, he will have little left from his subsistence pay to send to his family. The longer the delay in their joining him the greater is their hardship likely to be. It is estimated that the six tenant houses built by a six-man unit may take some 60 days to build. During this period there will be opportunities for the new tenants to learn about the project and their role on it. It is in fact essential that during the building period tenants are continually being introduced to irrigated agriculture through demonstrations after work, evening and weekend talks, and demonstrations. In the absence of this, many may come to consider themselves as building labourers employed by the project. A further month is allowed to account for possible delays in getting started with the building, delays during the building programme (e.g. when supplies of poles, nails or door frames are temporarily delayed) and delays in mustering and transporting the family and their belongings to the project. Tenants would not derive any special benefit from undergoing instruction or preparation in the absence of their families.

When a tenant's house is nearing completion and there is no delay anticipated, his District Settlement Officer should be notified by the Project Settlement Office so that the family can be mustered, along with other families from the same district, or en route to Bura. The period of separation of families and their heads will therefore vary from a minimum of two months to a maximum of four.

Because six men would be building their houses on a group basis, it would be convenient if all six families could be brought to the project as a group. This would mean that the six-man work group would have to consist of men from the same district. This would probably improve the morale and efficiency of the work group and would certainly facilitate the mustering and transport of the families.'

8.2 The Logistics of Transport

In this section five aspects of the procedure for transporting tenants to Bura are considered; they are the following:-

- (a) Who provides and operates the transport?
- (b) How to organise the actual migration of the tenants.
- (c) How to organise the migration of families.
- (d) Transit camps.
- (e) The scale of the operation.

Since quotas have not yet been allocated down to the district level, the final transport operation has not been planned in any detail, nor is this necessary at this stage.

Three ways of bringing people to Bura have been discussed in the literature on the project. People could simply be informed of the time they are expected to arrive and could use public transport or any method they chose to get there. ILACO have pointed out that this would probably lead to chaos as the project settlement staff would have no way of knowing when, or even if, people were going to arrive. Moreover, as the tenants are to be chosen for their poverty, many could hardly afford the bus fares for a journey of several hundred kilometres for the whole family. It will therefore be necessary for NIB to arrange transport and meet its cost.

There appear to be three main possibilities open to NIB. It could equip itself, or the project, with sufficient vehicles and staff to conduct the whole transport operation. It could negotiate with NYS to provide the same service, or it could charter vehicles from commercial operators to supplement its own fleet.

The main difficulty with either of the first two alternatives is that the rate of migration and the demand on transport reach a peak in the second and third years then fall away rapidly. Unless it is quite certain that some use for a large fleet of NIB or NYS vehicles could be found after Year 3, the costs of this method would be high. The last alternative is likely to be more satisfactory because it offers greatest flexibility. Buses and lorries can generally be chartered at short notice to cater for unexpected demands. If one company does not provide an adequate service there are numerous competitors. Repair, maintenance, replacement, as well as most of the staff and administration of the actual transport operation, would be carried by the transport company, leaving the settlement officer to concentrate on other aspects of the tenants' welfare. Perhaps most important, the transport demand can be accommodated by the transport companies far more economically than by the NIB or NYS.

The organisation of the actual migration operation will be complex, because tenants will be recruited from all over the country, and yet they should arrive on the project in groups of mixed ethnic origin. Large numbers of people from a single district arriving simultaneously should be avoided.

Tenants would be transported from their home districts in units of six men each. This unit of six will be a fundamental component of the work groups and later of the social organisation of the project. If a bus can take six such units (36 passengers) it would be ideal, from the point of view of ethnic mixing, to route the bus through six districts so that the party discharged at the project would be heterogeneous. But a formidable organisation would be required to have six groups of six men, in widely separated places, all waiting on the same day to catch a bus. It would also involve a great deal of travelling. Two or three six-man units from two districts per bus load would probably be as much as the settlement organisation could achieve.

Some journeys to Bura cannot be accomplished in a day, so that transit camps may have to be established at strategic points. Because the allocations of holdings on the project to the various districts have not yet been made, we cannot discuss location, size or number of the transit camps. Their basic requirements are:-

- (a) Adequate dormitory space
- (b) Latrines
- (c) Water points
- (d) Kitchens, where simple but adequate hot meals are prepared by camp staff and served to the migrants
- (e) A camp supervisor and staff
- (f) Communications with NIB HQ in Nairobi

These arrangements need careful planning by the BPCO before the implementation programme gets under way.

8.3 Induction and Orientation of Tenants and Their Families

In this chapter the arrival of tenants and their families are discussed under separate headings.

Tenant Programme

The following are the main components of the tenant reception programme, required:

- (a) Temporary accommodation for the tenants while they build their houses to be provided by the project.
- (b) Settlement Officer (Bura) to be notified from districts (via Settlement Officer in Nairobi) that a specific number of tenants are due to arrive on a certain date.
- (c) Settlement Officer receives a copy of each tenant's TPIF.
- (d) In collaboration with the Sociologist, settlement officer arranges TPIFs into groups of six, which represent the initial house building teams. Each six-man unit should preferably consist of men from the same or neighbouring locations, and will be chosen so as to maximise co-operation and harmony within the group (in so far as this can be predetermined).
- (e) Settlement Officer assigns each six-man unit to a 'nucleus' (1) of six building plots in the village they are to occupy. The ethnic composition of their village components is extremely important. The general principles to be observed are as follows:
 - (i) Each six-man unit (nucleus) should be ethnically homogenous (or at least compatible)
 - (ii) Cells, composed of two nuclei, may consist of different but compatible ethnic groups.
 - (iii) Modules should contain no more than two nuclei of the same tribe, and preferably not more than one of each.
 - (iv) Wards should have no obvious ethnic characteristics to distinguish them from others.
 - (v) The same remarks apply to villages as to wards.
 - (vi) In certain cases, it will be difficult to reconcile the requirements of ethnic mixing with those of harmony between groups and it may be unavoidable that certain villages have a relatively high preponderance of a certain ethnic or cultural group, e.g. ex-pastoralist. These are important practical issues which will occupy the Sociologist.
- (f) The Settlement Officer assigns the six-man units who are shortly to arrive to the temporary housing, observing the same general principles as in (e) above.

- (g) The Settlement Officer checks food supplies and confirms with the building foreman that the necessary materials are available for construction to commence on schedule.
- (h) The Settlement Officer notifies Nairobi HQ that he is prepared for the next group of tenants.
- (i) If some of the migrants have to use the transit camps the settlement officer (Nairobi) incorporates the necessary instructions in the bus drivers' schedules and notifies the camp supervisors.
- (j) Tenants arrive and are checked against the list sent from Nairobi.

After their arrival, the programme of induction can best be explained on a week by week basis, and reference should be made to Figure 7.2.

- WEEK 1 (a) Tenants shown to temporary accommodation; eating arrangements (2), washing facilities and latrines are explained and demonstrated, as necessary.
- (b) The new tenants need careful orientation to the project and their own place in it. In the first few days they should receive:-
- (i) A welcoming address by the Settlement Officer/Project Manager.
 - (ii) Information on the social services - health, community development, schools, adult education, etc.
 - (iii) Medical inspection and specific instructions on health hazards of the project and methods of health care, together with prophylactic medicine.
 - (iv) Explanation of the functions of the six-man unit in regard to temporary accommodation, building, forming a neighbourhood nucleus, agricultural and domestic co-operation, etc.
 - (v) Method and rate of pay and the system whereby remittances can be made.
 - (vi) Means of communicating with family - via settlement officer.
 - (vii) Where to lodge complaints and enquiries.
 - (viii) A visual inspection of specimen tenant house and instruction on method of construction, including practical demonstration and involving the tenants themselves.
- (c) Tenants shown their own building plots.
- (d) The allocation of holdings and gardens. Because some soils are better than others and some fields will be further from the village than others, it is essential to adopt an impartial and publicly conducted system of allocation. As soon after allocation as possible tenants should be taken to see their holdings and gardens.
- WEEK 2 (a) Work on tenant houses begins. For the actual organisation of the work see the Implementation Annexe.
- (b) Regular talks and demonstrations on agriculture and irrigation are given to the tenants during the period they are building their houses from Week 2 onwards. Afternoon, evening and weekend instruction will be arranged. This is necessary to remind the tenants that they have come to Bura to farm and not primarily to earn a wage as building labourers, as well as to prepare them for the first crop season (see Training Annexe).
- WEEK 3 (a) In the case of tenants other than those arriving in 1979 (who will have no

irrigation water) they should be directed to start work on their gardens immediately after work and at weekends. Vegetables, bananas and fruit tree seedlings could be planted.

(b) From this time onwards there should be regular talks by project staff on various aspects of life and work on the project, including:-

- (i) Agriculture and horticulture (see Week 2 above)
- (ii) Literacy classes
- (iii) Advice on health hazards and preventative measures
- (iv) How the villages are to be organised: nuclei, cells, modules, wards, etc., and the need for participation of family heads in public affairs
- (v) Rules and regulations of the project and penalties for infringements
- (vi) Details of the tenants' livelihood derived from the project: wages, subsistence crops from gardens and holdings; cotton sales, advance payments, deductions, etc., repayment of housing loans and cash advances, etc.

WEEK 5 (a)

Tenants' houses should be nearing completion. If no delays in completion are expected the Settlement Officer (Bura) informs the men in each six-man unit concerned that he is arranging for the transport of their families to the project.

(b)

Tenants may send messages or instructions through him to their families. He relays these through Nairobi to the DSCs, who instruct their DSOs to mobilise the families and convey the messages from Bura to them. Before the first families arrive the villages must be equipped with or served by the following basic facilities and staff:-

- (i) Piped water to each cell
- (ii) Village bathing pond
- (iii) Health sub-centre
- (iv) Teachers' houses
- (v) Community development staff
- (vi) Extension staff
- (vii) Sources of firewood

The primary school and community hall will start being built by the tenants as a harambee effort three weeks before the arrival of the first families. Adequate classroom accommodation should be available in good time for first classes to begin one or two weeks after children first arrive. The NIB through the Department of Social Services (see Institutions and Services Annexe) will ensure that food is available for purchase: simple retail items such as soap and toilet articles would also be available (see Section 8.4). The establishment of shops will be by the private sector subject to licence.

Notes:

(1) The terminology used for the various components in the village design are as follows:-

- Nucleus — 6 family dwellings
- Cell — 2 nuclei (12 dwellings)
- Module — 2 cells (24 dwellings)
- Ward — 3 modules (72 dwellings)
- Village - 3/4 wards
- (see Village Planning and Design Annexe).

(2)

There are various alternative feeding arrangements:

- (a) A canteen where all cooking is done in a reasonably professional manner and tenants are charged for meals.
 - (b) The project provides a cook, shelter, firewood, pots, etc. and a group of tenants pool funds to buy food for the cook to prepare.
 - (c) Each six-man unit buys and arranges to cook their own food.
- This is an important and complex subject which needs careful investigation and planning by the BPCO.

Family Programme

The timing of the induction programme for families will have to be much more flexible than that of the tenants themselves. Some families will arrive at the beginning of a crop season and will start planting immediately. Others will arrive too late to plant and will have to wait until the following cropping season before starting work on their main holding.

Nevertheless, all families must be introduced to the project and its amenities as soon as possible. The following programme is not arranged according to a set timetable, but gives the approximate order in which the various activities should occur:-

- (a) The DSOs who are sending families to Bura, having checked that all the families concerned are ready to come on the appointed date, prepare and send lists showing all the members of each family to the settlement officer (Bura) via Nairobi.
- (b) The Nairobi Settlement Officer confirms, both with the DSOs and with the Settlement Officer (Bura) the dates and approximate expected times of departure from the district headquarters and arrival at Bura.
- (c) The same procedure would be followed for transit camps.
- (d) The families arrive at Bura and are checked against the list by the Settlement Officer. The bus they came on delivers them to their homes in the village, together with their belongings from the accompanying lorry.
- (e) The community development staff should visit families very soon after their arrival to advise them on domestic problems, e.g. where to get firewood, the use of the communal water and washing facilities, where to buy food, etc. Community development staff should also promote neighbourliness and co-operation in the cells, modules and wards of the village.
- (f) All family members will be medically examined to provide baseline public health data on nutrition and health and to determine any treatment required. Prophylactic medicine will be provided and instructions given (see Public Health Annexe).
- (g) Meetings for tenants and families should be arranged in the villages to explain the following aspects of child and domestic welfare:
 - (i) Enrolment at schols
 - (ii) Use of bathing ponds and the danger of bilharzia to children
 - (iii) Malaria and its prevention and cure
 - (iv) Public health facilities
 - (v) The role of children and women in agriculture on the project
 - (vi) The tenant's livelihood from subsistence and cash crops
 - (vii) Special problems of nutrition on the project

The meetings should be attended by husbands and wives wherever possible.

(h) The community development and home economics staff should promote numerous groups for the purposes of:

- (i) Saving money (thrift and loan societies)
- (ii) Baby care and child minding facilities *
- (iii) Co-operation in fields and gardens
- (iv) Improving standards of family nutrition
- (v) Fulfilling the need of women (inter alia) for company and mutual support

Note: *It is proposed, in the Institutions and Services Annexe, that creches and day-care nurseries be operated on a ward (72 families) basis and, as far as possible, be organised and run by parents, especially mothers.

8.4 Food Supplies for Tenants

During the initial settlement period, while tenants are growing their first crop, fairly large quantities of basic staple foods, mainly maize, will need to be imported to the project. It would be risky to entrust the importation of such essential supplies to private traders, and it is therefore necessary for the project management to ensure that adequate supplies are always available, particularly during the initial deficit periods.

Table 8.1 shows the estimated quantities of maize consumed, produced and to be imported. The assumptions used in the calculations are:

- (a) Each family consumes 100 kg of maize per month
- (b) Cropping patterns and yields as given in the Agricultural Planning Annexe
- (c) Only those families whose household heads arrive before the season begins plant maize

Table 8.1 - Estimated Maize Consumption and Production Balance

Period	Consumption (tons)	Production (tons)	Balance (tons)	
			Per period	Annual
1979/80				
July 1979 - July 1980	730	—	-730	—
1980/81				
August 1980 - January 1981	960	805 (Aug 80)	-155	-155
1981/82				
February 1981 - July 1981	1 705	1 815 (Jan 81)	+110	-920
August 1981 - January 1982	2 105	1 075 (Aug 81)	-1 030	
1982/83				
February 1982 - July 1982	3 095	4 825 (Jan 82)	+1 730	+95
August 1982 - January 1983	2 710	1 075 (Aug 82)	-1 635	
1983/84				
February 1983 - February 1984	6 180	7 980 (Jan 83)	+1 800	+1 800
1984/85				
February 1984 - February 1985	6 180	9 015 (Jan 84)	+2 835	+2 835

8.5 Tenants' Pay and Advances

Various minima for the tenants' daily allowance, prior to their receiving their first farming income, have been proposed. Five to six shillings per day is the current rate suggested. It is suggested in the IBRD Appraisal Report (1976) that tenants receive a ration of maize meal, in addition to K Sh 5 per day with which to buy other foods and necessities. Such a rationing operation would be inherently difficult and costly to run, and it would therefore be preferable to pay tenants enough for them to buy all they need from the shops on the project at which the prices of essentials would be strictly controlled.

Such an arrangement is preferred because rations are associated with famine relief, destitution and dependency in most people's minds. Wages, earned through work on building and other aspects of village construction, are conducive to an independent attitude among tenants. Again rations, like most handouts, would tend to engender suspicion and resentment against the authorities and other recipients who may be thought to be getting more. Even low wages, as long as they are uniform, tend to be less emotionally charged than rations.

The decision on the actual level of wages to be paid should be deferred until shortly before the tenants are due to arrive. For the purposes of estimating costs in 1977, it is proposed that a minimum of K Sh 6 per day per tenant be paid and that this be paid from the day of departure from their home district. Deductions for food provided during the house building period, when the tenant is living in temporary accommodation and before the arrival of his family, should be made from his basic wage.

The payment of one rate while the tenant is alone on the project and another rate when his family arrives would not be desirable, because this is not in accord with the principle of paying a rate for the job. Tenants would be paid a daily wage up to the point of first planting. At that point their status would alter from that of tenants still in the employ of the project to that of tenants with their own source of income. It will, of course, be several months before the crop is harvested, so that an advance will have to be paid to keep the tenant and his family over this period. This alteration of status would apply whether the first crop planted were cotton or maize and cowpeas. The 'advance' during the maize and cowpea season would not be on the sale of that crop, but on the sale of the cotton crop.

This proposal would involve the tenant in a fairly heavy burden of loan repayments, which would have to be deducted over a period of several years' cotton sales. The evidence from Mwea shows that many tenants are unable to budget wisely when they receive large sums of money at infrequent intervals. The tendency to spend heavily while the money lasts is exacerbated by a scarcity of local banks or other institutions where money can be deposited and withdrawn as it is needed and without having to travel long distances. The setting up of savings banks on a co-operative basis is discussed in the Institutions and Services Annexe.

The frequency of payment is therefore closely related to family welfare. The method of payment is also important in this respect because, as it was argued in Chapter 6, the exclusive right of the man to the proceeds of the cash crop deprives the wife of any legal claim on the fruits of her labour. There appears to be no provision in Kenyan law to modify this situation, but it would be desirable to arrange some means of making payments to the tenant's wife if necessary.

CHAPTER 9 THE SOCIAL ORGANISATION AND DEVELOPMENT OF SETTLEMENT VILLAGE COMMUNITIES

9.1 Introduction

There are two ways of looking at the settlement village: either it is seen as a kind of dormitory or repository of agricultural labourers, or it is regarded as a community in which people live reasonably fulfilled lives. The latter alternative is clearly favoured by all reports on the project so far, yet very little has been said on the means whereby this result is to be achieved.

The reticence of previous commentators on this subject may be due to the assumption that the tenants, even though they are thoroughly mixed to discourage ethnic affiliations, will spontaneously generate communities and social structures appropriate to their needs.

There seems to be little or no grounds for such optimism. On the contrary, the methods and the criteria of tenant selection can hardly fail to produce an assembly of alienated and discontented families with relatively few grounds for social cohesion or co-operation. By selecting individuals from all over Kenya, the most fundamental of social bonds - those of kinship and close residence over a long period - would be broken. Further, the criteria of poverty, landlessness and joblessness favour those who are in any case economically and therefore usually socially marginal in their own communities. In addition, tenants will tend to lack the experience of carrying public responsibilities because this is often the duty and prerogative of firmly established and well-to-do men who themselves would have little incentive to abandon what they have for the sake of a holding at Bura. The age criterion favours men who are on the whole younger than those who wield most influence in rural community affairs. Finally, because the tenants are likely to be less literate and less educated than most rural populations, they will therefore tend to be less experienced or capable in the affairs of modern rural society.

In view of the above, it will be essential that both the physical planning and the social structure of the villages on the project provide the most conducive conditions possible for the evolution of self-regulating communities. These processes cannot be left to chance or to natural gregariousness. If this is done the most obvious basis for social cohesion among the tenants would be based on common tribal origins, the danger of which has been amply stressed in previous reports.

In normal circumstances, ethnic affiliations provide a weak basis for genuine day-to-day co-operation. It is only as a means of articulating fairly widespread dissatisfaction that ethnic loyalties form a basis for concerted action. It is not a sufficiently powerful bond to ensure continuing harmony and mutual existence among neighbours.

The following proposals are intended to promote a basis for the social organisation and internal administration of the village, from which it can develop into a self-regulating and self-reliant community. Such a structure, properly functioning, should enable the tenants to participate increasingly with the management in the operation of the project.

This seems especially important on the Bura Project to counteract the probable tendency of the tenants to become dependent on the management for virtually everything. People selected according to the given criteria would be likely to have a propensity for dependency, especially when they are removed from their familiar surroundings and brought to a completely new and strange, but highly organised, situation. Secondly, if there is no real organisation at the village level, able to deal with local problems and articulate local needs to the management (and vice versa), the project staff are liable to be kept constantly busy by trivial and individual matters which, in a more organised community, would be handled internally as a matter of course.

The use of the six-man unit, recruited from a single district, is recommended as a basic component of the settlement programme and also of the village social structures. This proposal will be elaborated below.

There is, however, the valid objection to this proposal that it introduces ethnicity at the very outset of the settlement programme, and that complete ethnic mixing should, as far as possible, be achieved from the beginning. This argument is considered too. The decision to adopt either model or some other method of constituting the six-man units, rests with NIB and we suggest that the same panel convened to determine district settlement quotas should consider the alternatives.

9.2 Basic Units Established on a Uniform Ethnic Basis

Earlier in this Annexe it was suggested that:

- the six-man building team, comprised of family heads, build a nucleus of six adjacent houses and occupy them with their families;
- these six men be brought from the same district at the same time to Bura;
- their six families be brought to Bura on the same bus;
- the result would be a small neighbourhood group of six families from the same district who would find it relatively easy to adapt to the new conditions because of their common origins and the mutual support they could offer one another.

The main advantages of this proposal are as follows:

- (a) It provides a reasonably firm starting point for the development of a social structure. There is a fair chance that six people from the same area, with similar language, culture, domestic habits and agricultural experience will find a basis for co-operation and mutual moral support. This chance is considerably diminished if work mates in the six-man building team and neighbours in the six families have widely differing origins and customs.
- (b) The basic unit of six families could, with the management of community development workers and women's group organisers, provide many of the functions of a local descent or extended family group in a village. These include mutual borrowing and lending of food, utensils, firewood, money, etc; mutual help in the fields and gardens; baby minding; cooking food for men in the fields, etc. These and many other similar functions are very time-consuming and if each household has to perform them alone, some members, often wives and the older daughters, are engaged most of the time doing work which is not generating an income.
- (c) For the purposes of village administration and agricultural management, it is more efficient to deal with groups of people than with individuals. Good communication within the group is then a prerequisite for this type of relationship between tenants and management.

The six-man unit which becomes the six family nucleus therefore serves the personal, domestic and agricultural needs of the tenants, and also the wider requirements of the village community and the project management. How effectively it does so depends very largely on the internal cohesiveness and degree of co-operation in the nucleus.

9.3 Basic Units Established on a Mixed Ethnic Basis

The arguments that by drawing the members of the six-man unit and the six family nucleus from a single district one is improving the chances of its internal cohesiveness, can be turned round to support an opposite view. The very cohesiveness and relative self-sufficiency, and the inner-lookingness of the nucleus, reduces the need of its members to look outwards towards other people of different origins for assistance and co-operation.

At its worst, the village community could develop into a loose agglomeration of ethnic groups, each six families strong. Instead of the 12 family cells, the 24 family modules and the 72 family wards forming a hierarchy in a widening sphere of neighbourhood relationships, there is a danger that nuclei would make their primary allegiances to other nuclei of the same ethnic origin when co-operation on a larger scale than that of the nucleus itself was needed.

If this argument is considered stronger than that for a uniform ethnic grouping, it would be necessary to mix arriving tenants in multi-ethnic groups of six to form the building teams. This would result in ethnically mixed six family nuclei. The advantages of this alternative would be:

- (a) From the start ethnic origins and ties would receive no recognition by the project management.
- (b) Having to work and live with people of different ethnic origins, tenants would have the opportunity to unlearn any ethnic biases they may have had.
- (c) If the six family nucleus lacks ethnic unity, its members are more likely to adopt the social structure designed for them.
- (d) People from some districts may have little experience of building or of living in closely settled villages. It would therefore be an advantage to have them living and working next to people with more experience in these matters.

The main disadvantage of abandoning common origins as a basis for the formation of six-man units is the relative lack of cohesion and mutual understanding which is likely to result, especially in the months immediately after tenants and families arrive on the project. At its worst, this lack of cohesion and co-operation could result in a relatively slow start to the project and a high level of general dissatisfaction and frustration.

9.4 Social Structure

Regardless of how it is comprised, the six family nucleus provides a basic unit of the social structure of a project village. By the time their families arrive, the six men who built their houses in a crescent will know each other well, having lived and worked together for two to three months.

The 12 Family Cell

While they are building their houses, another team will be similarly engaged nearby completing between them one half of a figure of eight, or an almost complete circle (or ellipse) of houses. In the centre of this ring of 12 houses will be a water point: taps, washing and showering facilities.

The 12 households using this facility are known as a cell in this report. During the house construction period, the 12 men will be using the same water point, and it will soon be obvious that they are to become neighbours. When the families arrive the women will meet one another at the central water point.

The efforts of the community workers should be directed primarily at the cell. If it consists of two nuclei from the same district, and assuming each has achieved some internal cohesion, efforts should be directed towards achieving a closer relationship between the two sides of the cell. If the cell is multi-ethnic the main effort should be to promote closer co-operation between all 12 families.

The maintenance of the water point and its fittings and structures should be the responsibility of the 12 families who use it. This will give them a specific common concern and will give every member of the cell an interest in the proper use and care of the facility, thus reducing repair costs.

The 24 Family Module

This is the smallest unit of formal village administration. Two or three months after the houses of the module have been built and occupied, when the residents have had time to settle down and meet one another (in which community and women's group workers will play an important role), the community development officer will convene a meeting of all adults in the module to nominate a representative to sit on the village committee. He would hold office for one year, and his duties would include:

- (a) To articulate the needs and wishes of his constituency to the ward head and to the village committee.
- (b) To provide leadership and initiative in his neighbourhood, fostering co-operation within and beyond the module, fostering communal action to improve local conditions, e.g. tree planting and maintenance, cleanliness of the communal areas and amenities, proper upkeep and cleanliness of residential plots and houses, promoting individual and informal co-operation among households (1) and collaborating in this with community development and women's group workers.
- (c) To hear disputes arising in his module and to try to settle them without recourse to higher authorities. Because his constituents will have many, or at least several, different ethnic backgrounds, a solomonian wisdom will be needed to resolve some conflicts. If the module head fails or if the case is too grave for him, he should refer it to his Ward Head.

Note: (1) A creche for infants might be best organised at the module level.

The module also corresponds to one irrigation, or watercourse, unit of 30 hectares and would therefore nominate a head cultivator. Because the agricultural capabilities of the tenants will only become evident during the first crop season, the selection of the head cultivator had best wait until the field assistant in charge of that irrigation unit is satisfied that several likely candidates have emerged. The field assistant and the module head would then convene a meeting of all adults in the module to elect three nominees for the post of Head Cultivator. The Field Officer would then select one from these three (see Organisation and Management and Training Annex).

The Ward

This is the intermediate unit of village administration, between the module and the village committee.

Each ward contains 3 modules and comprises some 72 families. About four weeks after the module heads have been elected, the adult members of the ward, under the guidance of the village community worker, would elect a ward head who may or may not be one of the module heads. The elected representative would sit on the headman's council as well as on the village committee; his tenure would be for one year.

The ward head would sit with his two or three module heads as a ward council with administrative and executive responsibility for the affairs of the whole ward, including:

- (a) Upkeep and development of public facilities in the ward
- (b) The ward nursery school
- (c) Holding public meetings of ward residents to discuss matters of public or common concern
- (d) Dealing with disputes brought from the modules
- (e) Monitoring the service to the ward of the shops and businesses and immediately reporting serious deficiencies to the management
- (f) Considering improvements to the services and amenities of the whole village, and representing these to the village committee.

The Village

Each village would consist of two to four wards. The village committee would include all ward heads and all module heads and they would elect a village headman for a term of one year. It is not feasible, at least in the early stages of village development, for the headman to be elected by a popular vote. The tenants would not be sufficiently known to one another, except on a very local basis, for everyone to make an informed choice of village headman. Therefore the ward and module heads would elect one of their number as headman, and decide whether or not he was able to fulfil both roles as village and ward or module head. If not, another local election would be held.

At the village level two bodies are required, because the village committee would be too large to act as an executive, while the headman alone could not be expected to bear the full responsibility of carrying out village committee decisions and representing the village to the management. The functions of the village committee would be as follows:

- (a) To consider the matters brought to it by ward heads relating to public welfare, development of amenities, management/tenant relations, etc.
- (b) To hear cases involving disputes between villagers and to pass them on to the DC when the issues exceed the committee's competence.
- (c) To mediate between tenants and management and to work towards mutual understanding.
- (d) To administer village development funds and to promote 'Harambee' projects.

The village committee should have a treasurer (probably co-opted from among the staff or traders) and a secretary. There will be many technical and administrative matters which the village committee cannot handle alone and the appropriate personnel should be co-opted. For major projects and undertakings the village committee should appoint a sub-committee to plan and implement (or supervise) the work.

Smaller or more routine activities should be passed to the headmen's council for action. The headmen's council is intended as an executive and an advisory body to the headman and the village committee, but would be subject in all things to the authority of the village committee. The headmen's council should also attend to routine village affairs for which the headman was unwilling to assume responsibility alone, and for which it was necessary, and too cumbersome, to summon the whole village committee. Many relatively small and uncontroversial issues could be decided by the headmen's council, who could be mobilised rapidly, and ratified at the next village committee meeting.

This proposal for a social and administrative structure of a project village is necessarily tentative and incomplete. The project Sociologist, in close collaboration with the community services staff and the settlement section, should refine this outline and, once the villages are actually established, should monitor the functioning of the various levels and bodies in the structure with a view to continuous services and improvement.

The development of local administration above village level is discussed in the Institutions and Services Annexe.

9.5 Livestock on the Project

There is ample evidence from Hola and Mwea to show that many tenants on the Bura Project will keep livestock. This experience indicates that any attempt to exclude animals would not be successful. It is concluded that their presence will have to be allowed and that the best that can be hoped for is that their numbers and movements might be regulated so as to cause as little damage as possible.

In settlement villages at Hola the following rough observations were made, on the basis of stock counted early in the morning before going to pasture, in the pens built next to their owners' homes.

Table 9.1 - Hola Tenants' Livestock

Village	Households with stock	Total households	Total cattle	Total sheep & goats
Kiarukungu	26 (27%)	97	240	320
Maendeleo	15 (21%)	72	160	300
Matanya	12 (12%)	103	62	220
Bahati	18 (15%)	118	138	152
Umoja	9 (7%)	121	110	144

Stock owners normally prefer to keep their animals as close to home as possible. Stock theft is rife at Hola and there is no reason to think that it will not be so at Bura. In spite of a prevailing atmosphere of mutual co-operation and goodwill between the Hola tenants and the Orma, the former are not always willing to entrust their dry cows to the nomads because accounts of accidental deaths or theft en route to grazing are generally unverifiable. In any case, the same degree of co-operation between the Orma and the heterogeneous Bura tenants cannot be expected.

The keeping of cows and goats by the tenants may not meet all the milk needs of the project, but it will provide some families with a valuable addition to their diet, as well as fulfilling a deeply felt cultural need.

Some form of communal facility will be required for holding the animals, in addition to some provision for personal supervision by the household head of his stock. Most tenants would probably prefer to keep a few goats and cows close to home for their milk, while the rest could be held on a communal lot adjacent to the village, or on a group ranch close to the project.

For health reasons it would probably be preferable for each ward to have its own lot on the periphery of the residential area, and for tenants not to keep any stock but poultry on their house plots. According to the proposed village layout, the walking distance from the furthest house to the communal stock yard of the ward would be sufficiently short to permit any householder to milk each morning and to inspect his stock as often as he wished.

Hola tenants said that the three main economic reasons for keeping livestock are:

- (a) for the milk and meat;
- (b) that an investment in livestock is an accumulating asset, and
- (c) that there is not much else to invest in at Hola.

It appears that only in recent years have livestock numbers on the scheme increased rapidly suggesting that tenants are beginning to overcome their earlier poverty and to build up working capital.

It seems reasonable to expect that Bura tenants will spend several years paying off their initial loans and providing themselves with basic domestic articles which they could not previously afford. In these early years, there will be some livestock on the project but not many. This would serve as a breathing space for the project livestock officer to develop a system of stock control which is a compromise between the tenants' and management's requirements.

Further proposals for livestock on the project are given in the Livestock Annexe.

9.6 The Position of Women on the Project

The disadvantages suffered by women at Mwea was mentioned earlier and the discussion is resumed here with the aim of isolating some of the main problems likely to be experienced by women at Bura.

On the Bura Project, as on Mwea, men will be the registered tenants and presumably the proceeds from the sale of crops will be paid to them as such. One of the main shortcomings of the Mwea scheme is seen by its biographers as the reduced influence of women over household income, as compared with their off-scheme status. Thus one author has written: "It is essential that spouses acquire a legal right to at least a proportion of each tenant's gross cash income. A possible system would be to reserve a third of each tenant's received income to be paid directly to his wife in monthly instalments." Feasible or not, the suggestion emphasises the gravity of the woman's plight when she has no recognised claim on the major part of the household's income or even on the fruits of her own labour.

It is expected that the situation on Bura will be somewhat better, because each family will have a garden and the main holding will also produce crops of maize, cowpeas and groundnuts, primarily for subsistence. It would be worth considering the possibility of allocating the garden to the wife and the main holding to the husband, to ensure that the wife has some income of her own and some protection against the possibility of profligate spending by her husband after the annual cotton payment. This needs careful investigation by the BPCO Sociologist. At the same time, it may be that the suggestion above for regular payments to the wife is both necessary and practical, and this too needs the Sociologist's attention.

One of the problems at Mwea has been the payment, in a single large sum, of the money for a whole rice crop. Beer shops, stalls and itinerant merchants are said to appear suddenly just before the big payout and cluster around the exit to the paymaster's office. Huge sums were then spent by the men on drink and various extravagances while their women looked on helplessly.

This kind of situation could be alleviated, if not prevented, by the following measures being adopted at Bura:

- (a) Regular payments against the harvest to be made to the wives.
- (b) Register wives as legal tenants of the vegetable gardens.
- (c) Phase payments to men against the cotton crop over the year, say quarterly.
- (d) Provide convenient local banking facilities so that tenants can transfer money from their accounts with the project straight into a bank and withdraw it simply from a mobile unit touring the villages.
- (e) Encourage joint, husband/wife accounts.
- (f) Encourage women to open their own accounts.
- (g) Encourage local (ward level) thrift and loan societies.

CHAPTER 10 THE SETTLEMENT ORGANISATION

10.1 General Organisation Requirements

Two main spheres of activity which need staffing are envisaged. The first is the settlement programme itself. The second is the publicity relating to the project which would be closely linked with the tenant selection process.

Both settlement and publicity components are vital to the success of the project and will require very experienced and capable staff. Since they are required for relatively short periods, it is recommended that they be seconded from the Ministry of Lands and Settlement and Ministry of Information, respectively. Brief job descriptions for the senior staff involved are given in Appendix 9.

ILMO (1975) proposed that tenant welfare should be the responsibility of the project management. However, it is now proposed that community development and other activities concerning, with tenant welfare, should be carried out by the Department of Social Services (see Institutions and Services Annex) who have expressed a keen interest in doing so. The overall structure of the organisation proposed is given in Figure 10.1.

10.2 Ministry of Lands and Settlement

The Department of Settlement of the Ministry has for many years now been concerned in housing settlement developments in Kenya and its officers have acquired a great deal of experience in organising District Settlement **PART 4** units, in refining the criteria for selection and in handling the complicated logistics of the movement of people. Several different concepts of settlement have been **ORGANISATION OF THE SETTLEMENT PROGRAMME**

- (a) The Million-Acre and Harambee Schemes under which some 25 000 families were settled on former large farms in scheduled areas.
- (b) The Shiraka Schemes which involved co-operative or group farming of large marginal farm units.

In all the schemes the settlers in one way or another obtain a firm freehold or leasehold title to the land they occupy. The Bura Project will therefore differ in that the tenants will be brought in and will be selected from all parts of the country, on a quota system to be determined by NIB.

These features will require the adoption of specific settlement procedures and will certainly need unusually careful preparation. Thus the experience and adaptability of the settlement officers will be of paramount importance. It would be wasteful for NIB to seek to employ its own settlement staff because the need for them would be for only the relatively short period during the period of selection, movement and settlement. This might cover in all some five years at most.

The solution is therefore that with the co-operation of the Department of Settlement, and the agreement of Government, staff be seconded to the NIB. From preliminary discussions with the Department of Settlement, it was apparent that this co-operation could be arranged. NIB would assume full financial responsibility for the staff under the project budget. Figure 10.2 shows the staffing programme and Table 10.1 sets out estimates of the costs likely to be incurred in the settlement activities. Job descriptions for the Settlement Officers in Nairobi and at Bura are given in Appendix 8.

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The Department of Settlement of the Ministry has for many years now been concerned in handling settlement developments in Kenya, and its officers have acquired a great deal of experience in organising District Settlement Committees, in refining the criteria for selection and in handling the complicated logistics of the movement of people. Several different concepts of settlement have been adopted as follows:

- (a) The Million-Acre and Harambee Schemes under which some 35 000 families were settled on former large farms in scheduled areas.
- (b) The Shiraka Schemes which involved co-operative or group farming of large marginal farm units.

In all the schemes the settlers in one way or another obtain a firm freehold or leasehold title to the land they occupy. The Bura Project will therefore differ in that the tenants will be brought in and will be selected from all parts of the country, on a quota system to be determined by NIB.

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STAFFING PROGRAMME FOR SETTLEMENT ACTIVITIES

CALENDAR YEAR FISCAL YEAR	1977	1978	1979	1980	1981	1982	1983	1984
	1978	1979	1980	1981	1982	1983	1984	1984
BPCO (Nairobi)								
Settlement Officer (Grade 1)								
Assistant Settlement Officer (Grade 3) (DS Committees)								
Assistant Settlement Officer (Grade 3) (Migration)								
Assistant Settlement Officer (Grade 3) (Liaison)								
BURA PROJECT MANAGEMENT								
Settlement Officer (Grade 1)								
Assistant Settlement Officer (Grade 3)								
Settlement Assistants No. 1								
No. 2								
No. 3								
No. 4								

All Staff Would be seconded from the Department of Settlement

Table 10.1 - Settlement Programme Budget
(K Sh 1 000)

Item	Unit Cost	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
Capital:								
Transit camp				87				
Transport - tenants and families				1 033	1 624	1 624	389	
District Committees	no tenants			1 125	1 800	1 800	425	
Running costs	10			52				
Feeding in transit camps	10			11	18	18	4	
Feeding at Bura	350			400	617	617	169	
Publicity materials, etc.				70	30			
Total Base Cost				1 653	2 289	2 259	562	
Contingencies	10%			165	229	226	56	
TOTAL CAPITAL				1 818	2 518	2 485	618	
Recurrent:								
Salaries	No.	0.5	2	2	2	2	2	2
Settlement Officer (Grade G/H)	40	20	80	80	80	80	80	80
Assistant Settlement Officer (Grade G)	23	0.5x2	4	4	4	4	4	1
Settlement Assistants (Grade F)	No.	23	92	92	92	92	92	23
	No.		4	4	4	4	4	2
	17		68	68	68	68	68	34
Total Base Cost		43	172	240	240	240	240	137
Contingencies		4	17	24	24	24	24	14
TOTAL RECURRENT		47	189	264	264	264	264	151

10.3 Ministry of Information

Because the project will be a national undertaking of considerable interest to people not directly involved in it, as well as to those who will be involved, and that all participants will have no previous projects of the same nature to compare it with, there will be a need for skilfully handled public relations campaigns and information service. The latter will involve all forms of prepared information, hand-outs, radio talks and visual aids.

In the national context, there will be many people who will want to know about progress, tenant reactions, the effect upon the environment, the commercial opportunities and the social problems of the project. In the more limited context of the tenant-settlers' experience, information about what to expect before arrival, and advice and guidance on how best to settle after arrival will need to be available in a suitable form.

With regard to the last mentioned, the method whereby the prospective tenants are presented to their new life, and the way in which their hopes and expectations are engaged without being over stimulated, are tasks for professionals.

It is proposed that, as with settlement staff, the NIB should approach the Ministry of Information with a view to obtaining experienced officers on secondment for the period shown in Figure 10.3. These staff would be provided by the NIB with the necessary funds to mount an appropriate publicity campaign directed at the areas from which the tenants will be drawn. At the same time, senior information officers should ensure that the policy and intentions of the NIB are represented fairly, and widely and regularly through the press and radio.

The information officers would, it is suggested, have full access to the use of the facilities in the parent ministry, but should be fully supported in other respects by the NIB. Table 10.2 gives estimates of costs of the information staff.

Table 10.2 - Ministry of Information Staff Costs

Detail	Salary Grade	Unit Cost	1977/78	1978/79	1979/80	1980/81	1981/82
Information Officer	I, J/K	35	17	35	35	35	35
Information Assistant	F	No.	0.5 x 2	2	2	1	1
		14	14	28	28	14	14
Total Base Cost			31	63	63	49	49
Contingencies		10%	3	6	6	5	5
TOTAL COST			34	69	69	54	54

10.4 The Project Sociologist

There is a general agreement that an experienced rural sociologist will be required for the project to undertake three main areas of investigation:-

- (a) Sociological factors influencing the selection procedure and the allocation of tenant quotas to districts (Study 1).
- (b) The rural economies which will be directly influenced by the project (Study 2).
- (c) The sociology of tenant life on the project itself. This has two aspects:
 - (i) The process of settlement, lasting some four years (Study 3).
 - (ii) The established community of tenants once Phase I is completed (Study 4).

Sociological factors influencing the selection procedure (Study 1)

It is proposed in this report, as in previous reports on Bura, to use the basic criteria of tenant selection which NIB and the Department of Settlement have evolved through previous experience of settlement schemes.

The Bura Project, however, is different in several important respects from previous irrigation settlement schemes. It is considerably more remote, the rate of settlement is much higher, and the sources from which tenants are to be recruited are more dispersed.

Tenants from some areas may be relatively well adapted to the conditions they will meet at Bura. Some residents of the Tana River District, for example, will be accustomed to the climate and the environment, and will have practised an indigenous type of irrigation. Others, however, will be recruited from areas where arable agriculture of any kind is rare, where livestock are the principal standard of social and economic value, and where occupancy of a permanent dwelling is unusual. Can the same criteria be used to select people of equivalent potential from such culturally diverse areas? Should the criteria be made as flexible as possible to cater for cultural diversity or should the criteria be standardised as far as possible in the interests of selecting a uniform type of tenant regardless of cultural consideration? If so, could a standard aptitude test be derived for use by all District Settlement Committees?

The allocation of quotas of tenants to districts may have been fixed before the sociologist arrives, but if it has not, he could assist in the development of an objective and equitable formula. As explained earlier, the means whereby quotas are allocated are likely to be politically contentious.

The rural economies of the Lower Tana Area (Study 2)

Elsewhere in this Annexe the relationship of the project to the existing societies and rural economies in its vicinity is discussed. It is argued, as strongly as available evidence allows, that the project has the capacity to exert a benevolent and stimulating influence on its neighbours; but if positive measures are not taken to realise this developmental potential it may have an erosive and degenerative influence on its environment.

Using the sparse information that is available regarding the pastoral and riverine economies, an attempt has been made to show how their development in relation to the project might progress. But far more knowledge of the populations, the communities, the economies and their present trends, is required before functional plans can be drawn up.

The sociology of tenant life

(a) The process of settlement (Study 3)

The process of settlement, from the management's point of view, is a large and logistically complex operation. From the tenant's point of view, it is a major trauma. Management and tenant each have their distinct problems, and each could benefit from the sociologist's attention. But there is also a considerable area of overlap between the interests of tenant and management which the sociologist should study, with the purpose of mediating between the two points of view. Without this mediation, the personal problems of the tenant and the administrative problems of management will tend naturally to polarise. The sociologist would collaborate in this undertaking with the various social services providing support on the project.

(b) The established community (Study 4)

The problems of large numbers of people, living together for the first time under unfamiliar conditions, will give way to those of a maturing community of tenants whose aspirations and frustrations have changed since their arrival. The report by Chambers & Morris on Mwea (2) document a variety of problems, peculiar to a scheme at this maturing phase, sufficient to daunt the most intrepid sociologists. It may be confidently expected that the Bura Project would experience similar difficulties, and because they are often hidden from the management, sociological monitoring and study of the more serious problems is an essential precursor to effective remedial action.

The development of various forms of social organisations within the project villages would be an important subject of investigation at this stage. If an informal settler population of any size had evolved, this too should be studied.

Phasing of studies

The main areas of sociological investigations fall into three well defined phases. Study 1 must be complete before the end of 1978 because District Settlement Committees need guidance on these points for their publicity programme. Study 2 should commence as soon as possible because it should be conducted over more than one season and because development of the pastoral and riverine economies should not be behind that of the scheme.

Study 3 begins with the first tenants' arrival in early 1979 and continues until settlement is complete in 1983.

Study 4 is to be undertaken from about two years after first settlement and should last at least one year and preferably two, with periodic monitoring thereafter.

This is an unusually long assignment for a single sociologist, and in practice it is unlikely that one person would conduct the whole study. Because continuity in the work is essential, the consultants recommend, as did ILACO, that the Institute for Development Studies (IDS), University of Nairobi, be approached to conduct the study, and that external funding be sought for the support of the programme.

Ideally, the studies should commence in 1977 and continue until 1984 - a period of six to seven years. It is highly desirable to achieve continuity in the research, if not of the researchers themselves, then at least of the supervision and of the programme. The programme suggested would probably engage three sociologists serially, as shown in Figure 10.4.

The areas of investigation connected with the Bura Project offers a rich field of academic research. The nature of sociological problems associated with the project is such, however, that they cannot easily be combined with purely academic objectives. None of the topics recommended for the attention of the sociologist constitute suitable material for a thesis, because (a) there is no time for extensive research and (b) the immediate aim of the work is to produce operational plans directed towards specific practical ends, not dissertations.

For these reasons, it will be advisable to recruit an experienced sociologist who has worked on project planning teams before. The IDS has considerable experience of this kind of work and could advise on the details of the appointment.

APPENDICES

APPENDIX A

APPLICATION FOR A HOLDING ON THE DUBA IRRIGATION PROJECT *

Section 1 - Personal Information:

Name:			Age:	
Home District:	Location:	Contact Address:		
Education:				
Work History:	(1)			
	(2)			
	(3)			
	(4)			
Special Skills:	(1)			
	(2)			
	(3)			

Land Rights: Page: Area in acres:

APPENDICES

Is there any possibility you will inherit rights to land?

Specify:

Landmarks: Number of such lands:

Where kept:

By whom:

Is there any possibility you will inherit rights to livestock?

Specify:

Cases: To whom: When incurred:

Amount:

Residence: Where were you born:

How long have you lived in this district:

* Copies of this form can be found as a Tenant Personal Information Form (TPIF) by the project settlement section records.

APPENDIX A

APPLICATION FOR A HOLDING ON THE BURA IRRIGATION PROJECT *

Section A: Household Head/Applicant

Name: _____ Age: _____

Home District: _____ Location: _____ Contact Address: _____

Education: _____

Work History: (1) _____
(2) _____
(3) _____
(4) _____

Special Skills: (1) _____
(2) _____
(3) _____

Land Rights: _____ Place: _____ Area in acres: _____

Nature of rights: _____

Is there any possibility you will inherit rights to land?

Specify: _____

Livestock: _____ Number of each kind: _____

Where kept: _____

By whom: _____

Is there any possibility you will inherit rights to livestock?

Specify: _____

Debts: _____ To whom: _____ When incurred: _____

Amount: _____

Residence: _____ Where were you born: _____

How long have you lived in this district: _____

* Copies of this form can be used as a Tenant Personal Information Form (TPIF) for the project settlement section's records.

Section B: Household Members (who are to accompany head to Bura)

Relationship to head:

Name:

Sex:

Age:

Education:

Present Occupation:

Special Skills:

Health Status:

Section C: Chief's Comments on this Application

1. Please check all the applicant's responses and indicate where, and why, you believe the information given to be false.
 - (a) In particular please confirm that information on land rights is true.
 - (b) Please confirm the information on livestock.
 - (c) Please enquire about the applicant's other sources of income.
 - (d) Please check that the applicant's information on debt is correct.
2. You have seen the criteria used for selecting applicants, do you think this applicant meets all the criteria?
3. Do you know of any reasons why this applicant would not be suitable as a settler on Bura?

APPENDIX B

SETTLEMENT STAFF JOB DESCRIPTIONS

- B.1 Post:** Settlement Officer (Nairobi)
- Appointment:** On secondment from Ministry of Lands and Settlement for six years.
- Qualification:** Experienced in all aspects of settlement procedures and organisation.
- Job Description:** He would be responsible under the Bura Project Co-ordinator, for the setting up and operation of the tenant selection organisation and all aspects of transporting recruits to Bura. He would have three assistants who would deal with district selection committees, migration and liaison aspects of the programme.
-
- B.2 Post:** Settlement Officer (Bura)
- Appointment:** On secondment from the Ministry of Lands and Settlement for six years.
- Qualification:** Experienced in all aspects of settlement, particularly the reception and welfare of new arrivals on schemes.
- Job Description:** He would be responsible, under the Bura Project Manager, for all aspects of the reception, induction and orientation of tenants and their families on the project. He would be concerned with the social development of the new community and would ensure that the necessities required are available. He would also have an assistant.
-
- B.3 Post:** Information Officer
- Appointment:** On secondment from the Ministry of Information for three years.
- Qualification:** Experienced in all aspects of public relations and dissemination of information relevant to setting up development projects.
- Job Description:** He would be responsible, under the Bura Project Co-ordinator, for preparing a comprehensive publicity programme for the project. This would include:
- (a) General publicity about the project
 - (b) Specific information for prospective tenants to be used in the selection programme
 - (c) Information for new tenant arrivals on the project
- He would arrange for all aspects of the publicity material production and its dissemination. He would have two assistants.

REFERENCES

- (1) FAO; Range Development in the Tana River District, Rome, 1973.
- (2) Chambers and Moriss; Mwea Irrigation Scheme, 1973.

BURA IRRIGATION SETTLEMENT PROJECT
PROJECT PLANNING REPORT
PUBLIC HEALTH ANNEXE

BURA IRRIGATION SETTLEMENT PROJECT

PROJECT PLANNING REPORT

PUBLIC HEALTH ANNEXE

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SUMMARY AND RECOMMENDATIONS

A detailed knowledge of the type and magnitude of the health problems likely to arise in the proposed project area (Stage I, Phase I) is essential to determine appropriate health facilities. Fortunately, extensive studies in the area were undertaken between 1974 and 1976 by the Medical Research Council Team (1), and the results of earlier surveys carried out by Teesdale (2) were also available. These studies have provided comprehensive information on the existing disease status and disease epidemiology in the area, the effect of irrigation development on disease-vector populations and the existing health care facilities. In addition, statistical analyses of population census figures provided valuable information on likely tenant family composition and age groupings.

From this considerable volume of information, various criteria have been derived which were used to establish the health care proposals summarised below:

- (a) Health care facilities should be integrated into a Health Unit comprising a Health Centre at the town or rural centre and three Health Sub-centres located at market centres. The Unit would provide curative and preventative facilities, maternity and acute admission beds, and serve as a base for surveillance and control services, training facilities.
- (b) The Health Unit would be strengthened at village level by the introduction of village health workers, providing initially limited curative and preventative services. The innovative nature of such workers stipulates careful training and supervision.
- (c) Two-fifths of the project population are expected to be children under ten years of age, and the health care facilities must provide adequate maternity, child health and nutritional services.
- (d) The development of specific disease control programmes should be considered an integral part of the health service, rather than as an isolated service operating independently. Disease control programmes, especially in the absence of national programmes, should aim at reducing the morbidity from disease and increasing case direction and treatment rather than attempting eradication.
- (e) The extent of the development proposals and the complexity of the proposed ecological change strongly indicate that the health services should be augmented by the introduction of surveillance and control programmes, so that changing patterns of disease can be identified and appropriate control programmes instituted.
- (f) The future health care services for the Bura Project population would be greatly simplified by introducing surveillance and control programmes on the existing Hola Irrigation Scheme and neighbouring communities, in advance of the development of the Bura Project. In addition to reducing disease prevalence in the area, this would permit the development of appropriate techniques and provide training for future staff of the Bura Project.
- (g) Project design and construction should take full account of the health implication of the development. Particular emphasis is placed upon village planning and design. The villages should be as far as possible from irrigation facilities, untreated irrigation water should not enter the village and snail-free bathing areas should be available for children. The provision of treated water supplies as close to the individual homesteads as is economically feasible would be a major contribution to better health in future. Finally, good management of the project should reduce the potential for mosquito and snail breeding.

- (h) Health screening of tenants and their families should be carried out on arrival rather than in their place of origin. This recommendation will not only prevent the tenants considering health screening as an obstacle to their selection, which might result in evasion and corruption, but would demonstrate to them that health care on the project is a major consideration and, at the same time, provide the necessary basic information upon which to establish the health care service.
- (i) Health care services to the staff and labour force of the construction works should, where possible, be provided by the developing project facilities. Mobile services will be required for the diversion structure labour force, but other labour should use the Health Centre which should be constructed by late 1978.
- (j) The development programme will also need to take account of the health care facilities for people outside the project area. This will include any informal sector settlement and the remaining groups of the riverine Pokomo and nomadic Orma, who might be adversely affected by the development programme unless adequate precautions are taken.
- (k) Considerable importance is attached to the organisation and management of the health care services. It is strongly recommended that the services are administered locally by a senior public health officer and a clinical officer, who would liaise closely with the project management and the local administration through the proposed Development Council. It is also suggested that a committee be formed in the Ministry of Health to take ultimate responsibility both for this project development and other land development programmes, in close co-operation with the National Irrigation Board and the Tana River Development Authority.

The capital costs of providing the public health care service to Stage I, Phase I, of the Bura Project are estimated to be K Sh 4.57 million, of which K Sh 3.32 million (80 per cent) is attributable to buildings.

The recurrent costs for the first six years commencing in 1977/78 is K Sh 7.16 million, of which K Sh 0.4 million is for predevelopment costs at the Hola Irrigation Scheme in the first two years, and K Sh 3.03 million for staff salaries.

INTRODUCTION

The substantial developments taking place in the Tana River catchment area will have a complex and profound impact on the health of populations in the area. The Bura Irrigation Settlement Project, in particular, will be associated with substantial changes in ecology leading to alterations in the epidemiology of important communicable and vector-borne diseases. In addition, the assimilation of large immigrant populations with variable immunity to locally endemic diseases will further affect the epidemiological situation leading to alterations in disease endemicity and possible introduction of exotic disease.

The introduction of immigrant populations into an area, previously sparsely populated and with little existing infrastructure, requires an integrated programme to provide expanding facilities which are both adequate and appropriate to the needs of the community. The development of health care programmes and public health facilities should be based on the existing health status of the people and existing disease epidemiology, as well as a consideration of the probable impact of the development of irrigated agriculture.

Consideration is also required of the populations of the area not directly related to the development programme. The Bura Project and Upper Reservoir developments are likely to have an increasing effect on existing rural populations remote from the development projects. Health care programmes are required for these populations both to avert a deterioration in community health and to permit the growth of an integrated community health programme throughout the area.

Responsibility for the administration of health care in large scale developments such as the Bura Project requires careful definition, if long-term promotive, preventative and curative services are to be effectively implemented, within the existing financial and logistic constraints. In addition to providing a satisfactory community care programme, the system should be capable of monitoring and evaluating the epidemiological consequences of the project and the impact of health care and control measures introduced.

CHAPTER 4 EXISTING DISEASE STATUS AND DISEASE EPIDEMIOLOGY

1.1 Introduction

The logical development of health services is dependent upon the prevalence and importance of various diseases present in the area. Existing information for the Tana River District is provided by epidemiological studies carried out by the Medical Research Council Team between 1974 and 1976 (1) and earlier surveys by Trigg (2). Surveys have also been carried out in existing rural Pokomo and Orma populations and the inhabitants of the Hoiia Irrigation Scheme, which serves as many elements of a pilot population for the Bura Irrigation Settlement Project.

The following sections describe briefly the epidemiology of diseases considered to be of importance, in view of the anticipated ecological changes, emphasis is placed on communicable and vector-borne diseases.

1.2 Malaria

Malaria is endemic throughout the area, as illustrated in Figure 1.1. *Plasmodium falciparum* is the predominant species through both *P. vivax* and *P. ovale* occur. Transmission is essentially stable without impact by seasonal fluctuations, corresponding to the two periods of rain. Parasite rates in early childhood to a maximum of 50 per cent in children of 5 to 8 years, declining in later childhood, with sporadic cases showing a similar pattern. These findings are similar in both Pokomo villages and non-rural Orma, whilst on the Hoiia Irrigation Scheme parasite and sporadic rates are substantially lower. A voluntary prophylaxis scheme is operated in the children on the Hoiia Scheme.

PART 1

Transmission of malaria in these areas is caused by *Anopheles gambiae*. Chromosome studies have demonstrated that *A. gambiae* is a *A. funestus* hybrid. *A. funestus* has not been identified in the area, but *A. gambiae* forms available are unlikely to be significant vectors. Explosive outbreaks are associated with substantial rainfall and stream flooding.

EXISTING CONDITIONS AND THE INFLUENCE OF IRRIGATION DEVELOPMENT ON DISEASE PROPAGATION

During dry periods, vector populations are extremely low except on the Hoiia Scheme, where dry season cultivation of secondary crops provide suitable breeding habitats. During continuous land reclamation it was observed that wet season populations of *A. gambiae* were virtually eliminated by the regular use of insecticides by aerial application at two-week intervals, to the cotton crop.

The epidemiology of malaria will be affected in a variety of ways by the introduction of the Bura Project. Of these the following are considered the most important:

(a) The rapid introduction of immigrant populations with low immunity to malaria.

Immigrant groups introduced onto the project will come predominantly from areas of Kenya which are either not endemic for malaria or subjected only to epidemic malaria. A high proportion will consequently be susceptible to severe attacks of malaria at all ages. There will be a liability to epidemic outbreaks which will raise the index of transmission of malaria and the endemicity.

(b) Effects of ecological change on malaria vectors.

The introduction of irrigated agriculture will increase the available breeding sites for vector species especially at occasional sites. This will be limited by the widespread use of aerial spraying of cotton crops. The emergence of resistance to insecticides however should be anticipated and will have a profound effect on malaria transmission.

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Transmission of malaria in these areas is effected by *Anopheles gambiae*. Chromosome studies have demonstrated that the species is almost exclusively *A. gambiae* type 'b'. *A. funestus* has not been identified in the area, whilst the other anopheline mosquito species available are unlikely to be significant vectors. Explosive bursts of vector populations are associated with substantial rainfall and riverine flooding.

During dry periods, vector populations are extremely low except on the Hola Scheme, where dry-season cultivation of secondary crops provides suitable breeding habitats. During continuous larval habitat sampling it was observed that wet season populations of *A. gambiae* were virtually eliminated by the regular use of insecticides by aerial application at two-week intervals, to the cotton crop.

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A. gambiae type 'b' preferentially feeds on cattle. The reduction or diversion of cattle and other domestic animals will cause an increasing anthropophily which will increase the transmission potential for malaria and other anopheline transmitted diseases.

(c) Populations peripheral to the project.

The Bura Project, like the Hola Scheme will doubtless attract settlement on the perimeter of the project from existing rural communities. The availability of water will attract nomadic Orma groups while any requirements for cotton picking and other casual work will induce peripheral settlement.

Orma groups around the Hola Scheme have been shown to maintain high parasite rates and their proximity to the scheme provides an important source of infection.

1.3 Schistosomiasis

Human schistosomiasis in the lower Tana basin and coastal areas is limited to infection with *Schistosoma haematobium*. Host snails for transmission of *S. mansoni* are not available, although schistosomiasis mansoni is prevalent in Machakos District and on the Mwea Tebere Scheme.

The prevalence of *S. haematobium* infection is high in the area of the project, see Figure 1.2. Transmission in rural Pokomo villages is seasonal, being dependent upon seasonal flooding of ox-bow lakes and seasonal depressions. The host snail, *Bulinus globosus*, appears to be an efficient host, maintaining high infection rates and being capable of aestivation allowing it to survive considerable periods of dry conditions. Orma communities also maintain high prevalence rates of infection despite their distance from the floodplain. Infection rates of over 90 per cent have been observed in Pokomo children of 5 to 9 years, whilst similar prevalences are seen in Orma groups, but at a later age.

The Hola Irrigation Scheme shows the highest prevalence of infection of any group in the area with virtually 100 per cent infection rates by the age of 5 or 6 years. The intensity of infection, assessed by quantitative egg counts, was some five or six times that found in Pokomo children living in riverine villages (see Figure 1.3). Such a degree of infection occurs despite reasonably sophisticated environmental sanitation and a regular mollusciciding programme.

Extension of both snail hosts and infected individuals would appear inevitable on the Bura Project, requiring little time to establish transmission. Repetition of comparable control measures as utilised in Hola cannot be expected materially to affect transmission, and will not result in control of the disease.

1.4 Filariasis

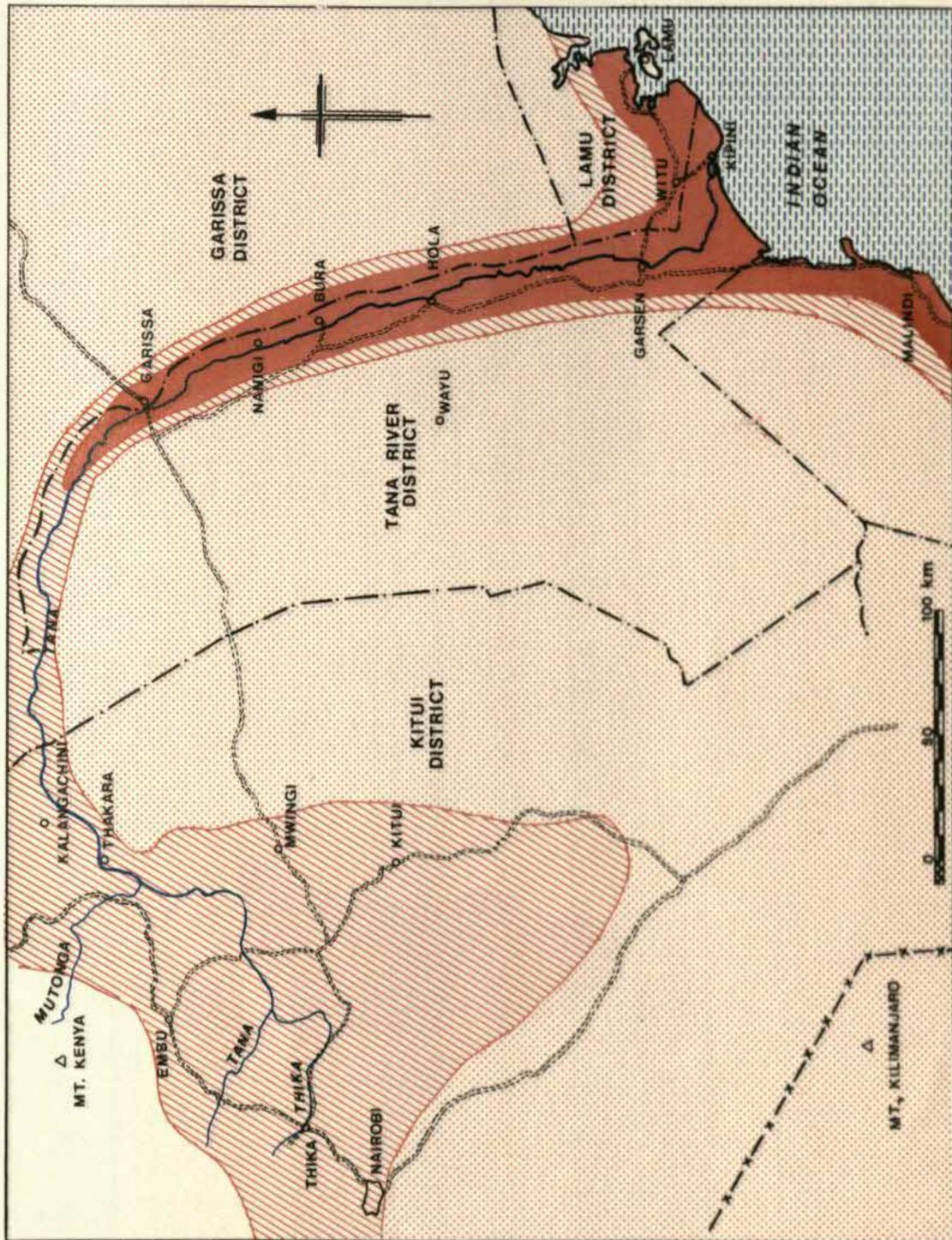
Filariasis is endemic throughout the coastal belt of Kenya and extends up the riverine margin of the Tana River, see Figure 1.4. Infection is due to the parasite *Wuchereria bancrofti*. In Kenya, vector mosquito species are *A. gambiae* and *A. funestus* and *Culex fatigans*. These mosquitoes are irrigation related with *C. fatigans*, breeding prolifically in polluted water, especially pit-latrines. Considerable populations of *C. fatigans* are found on the Hola Scheme.

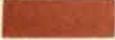
Preliminary surveys of human populations demonstrate that filariasis is endemic through the project area in riverine Pokomo populations. The prevalence of microfilaraemia in adults following a single blood examination was found to be 20 per cent.

Clinically both hydrocoele and elephantiasis occur. Limited surveys on the Hola Scheme do not indicate any increase of filariasis transmission. However, the increasing vector populations and considerable increases in human population density, suggest that transmission might become established on the Bura Project.

DISTRIBUTION OF MALARIA ENDEMICITY 1977

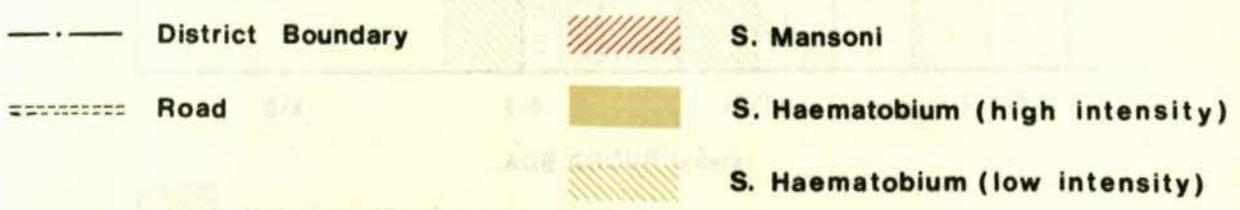
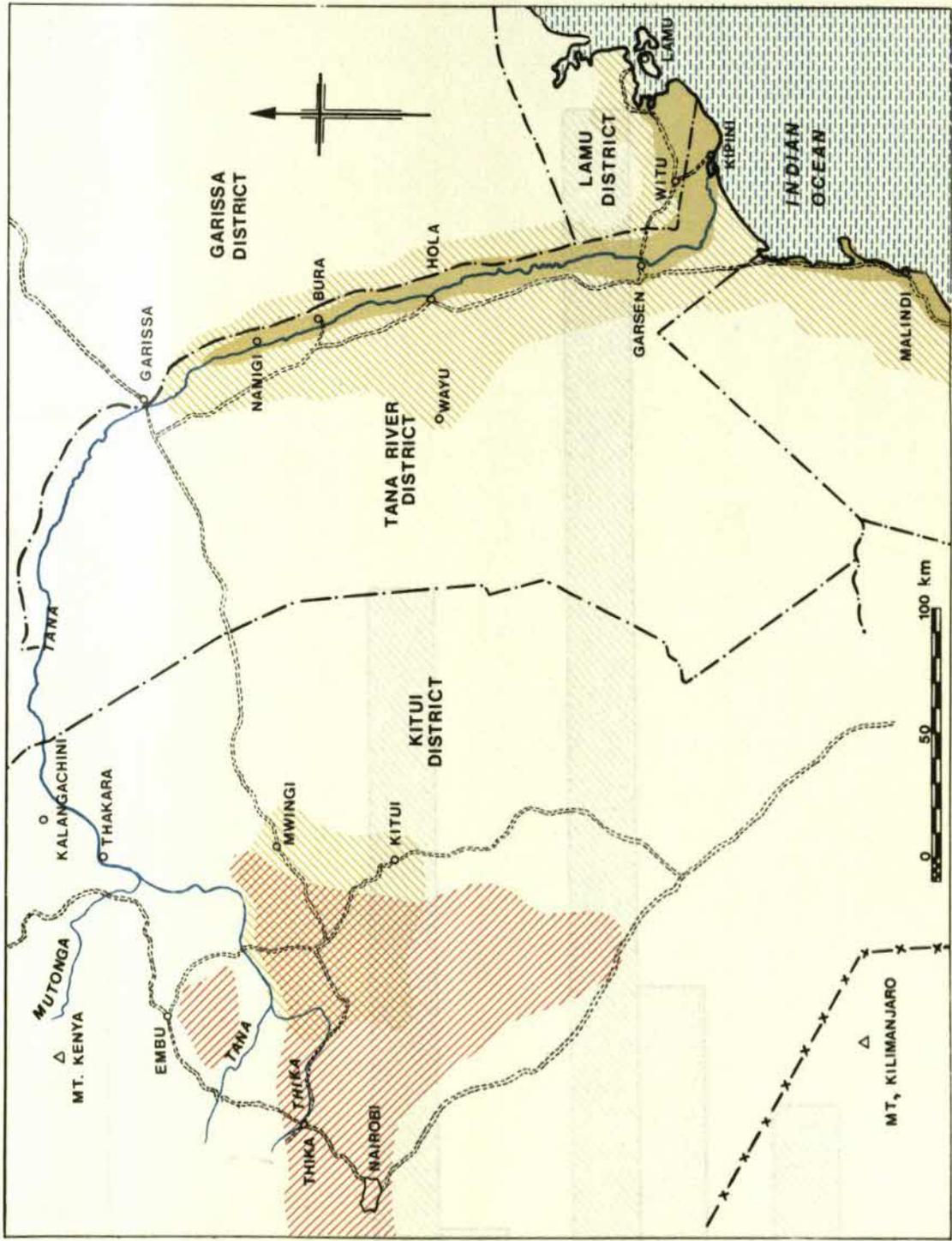
DISTRIBUTION OF SCHISTOSOMIASIS



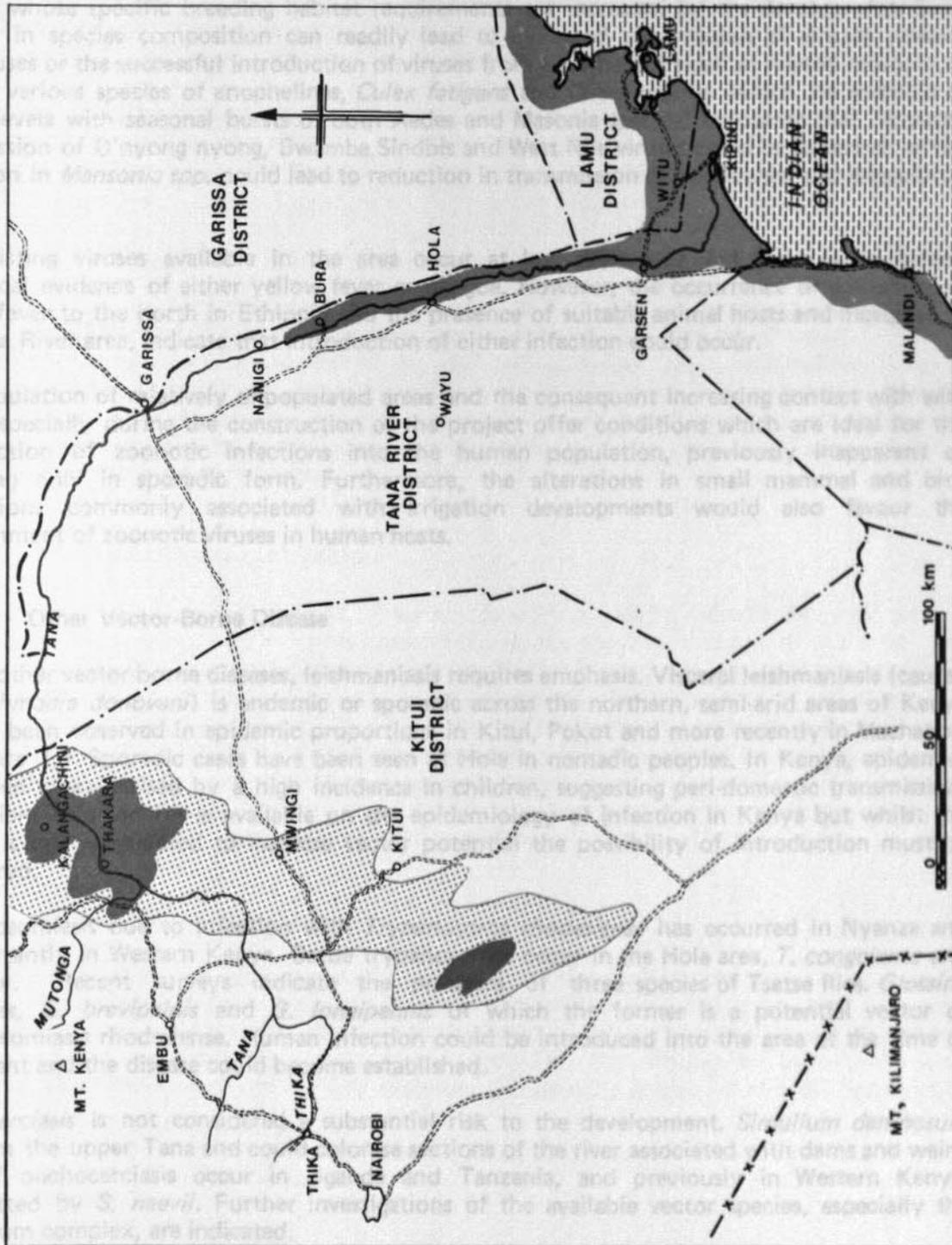
- | | | | |
|---|---|--|---------------------------------------|
|  | Very low endemicity
infrequent epidemics |  | District Boundary |
|  | Low endemicity or epidemics |  | Road |
|  | Moderate endemicity |  | <i>S. Haematobium</i> (low intensity) |
|  | High endemicity (Stable Malaria) | | |

DISTRIBUTION OF SCHISTOSOMIASIS

IRRIGATION SCHEME AND RURAL POKOKO VILLAGES
 (Average egg concentration per 10 millilitres of water)

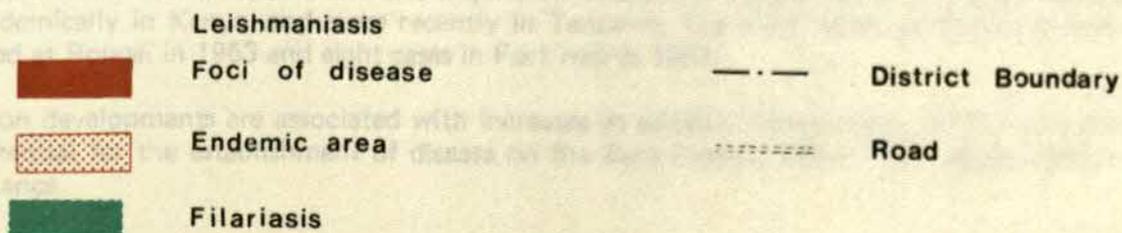
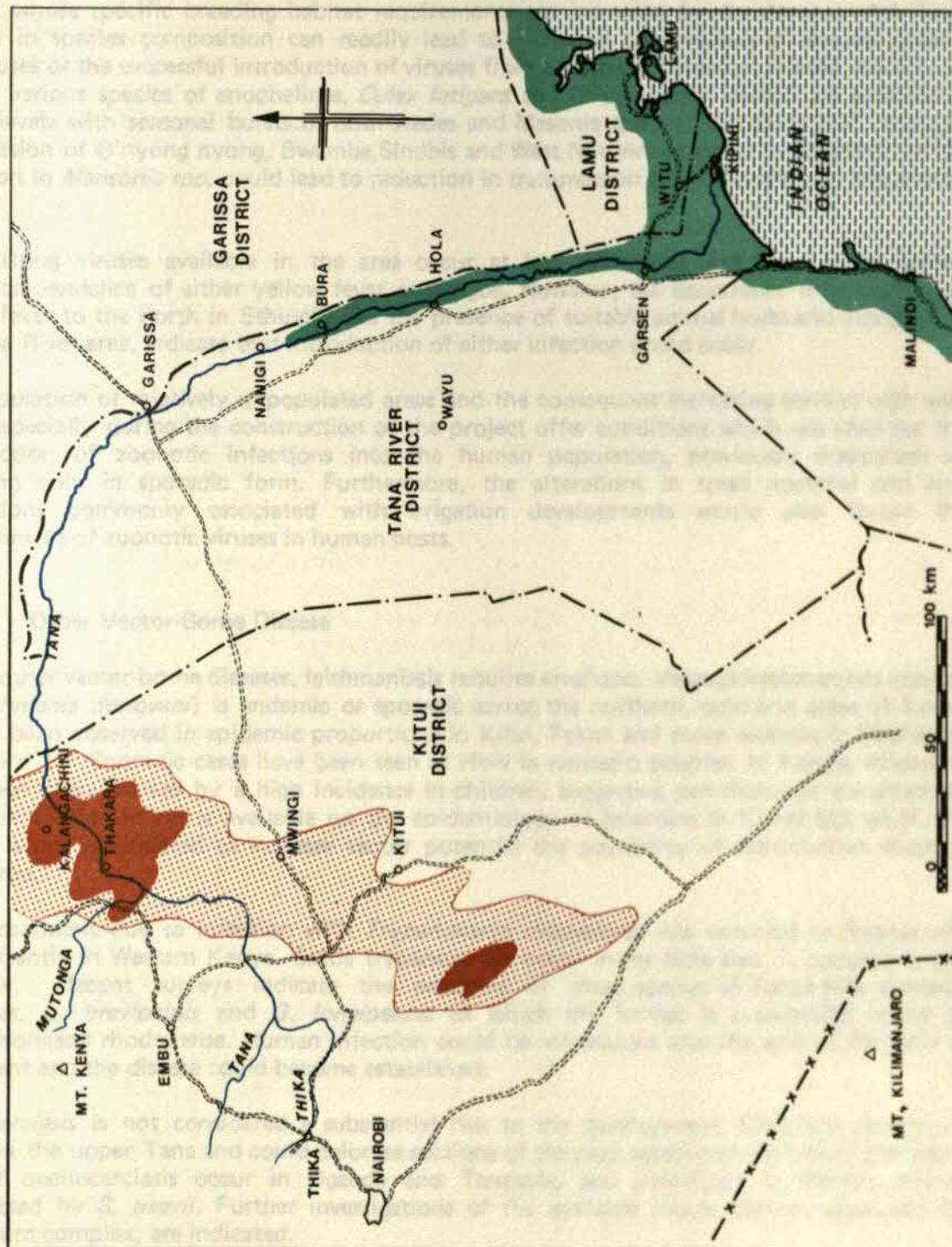


DISEASE DISTRIBUTION OF FILARIASIS & LEISHMANIASIS 1977



Leishmaniasis
Foci of disease
Endemic area
Filariasis
District Boundary
Road

DISEASE DISTRIBUTION OF FILARIASIS & LEISHMANIASIS 1977



1.5 Arthropod-Borne Virus Infections

Irrigation and settlement schemes of this type can cause substantial changes both in the ecology of the area and in the behaviour of the population and its environment. The simplification of the ecology imposed by irrigation schemes leads to a reduction in the available mosquito species as specific habitats are removed and an increase in population densities of particular mosquito species, whose specific breeding habitat requirements are increased by the development. Such changes in species composition can readily lead to increased transmission of already present arboviruses or the successful introduction of viruses from elsewhere. Irrigation related mosquitoes include various species of anophelines, *Culex fatigans* and *C. univittatus* (which are endemic at higher levels with seasonal bursts of both *Aedes* and *Mansonia* species) indicating that increased transmission of O'nyong nyong, Bwamba, Sindbis and West Nile viruses could be expected, whilst reduction in *Mansonia* spp. could lead to reduction in transmission of Spondweni and Wesselbron viruses.

The existing viruses available in the area occur at low prevalence and there is no human serological evidence of either yellow fever or dengue. However, the occurrence of epidemics of yellow fever to the north in Ethiopia and the presence of suitable animal hosts and mosquito in the Tana River area, indicate that introduction of either infection could occur.

The population of relatively unpopulated areas and the consequent increasing contact with wild fauna especially during the construction of the project offer conditions which are ideal for the introduction of zoonotic infections into the human population, previously inapparent or occurring only in sporadic form. Furthermore, the alterations in small mammal and bird populations commonly associated with irrigation developments would also favour the establishment of zoonotic viruses in human hosts.

1.6 Other Vector-Borne Disease

Of the other vector-borne diseases, leishmaniasis requires emphasis. Visceral leishmaniasis (caused by *Leishmania donovani*) is endemic or sporadic across the northern, semi-arid areas of Kenya and has been observed in epidemic proportions in Kitui, Pokot and more recently in Machakos, see Figure 1.4. Sporadic cases have been seen at Hola in nomadic peoples. In Kenya, epidemics have been characterised by a high incidence in children, suggesting peri-domestic transmission. Insufficient information is available on the epidemiology of infection in Kenya but whilst the project is not anticipated to increase vector potential the possibility of introduction must be considered.

Trypanosomiasis due to infection with *Trypanosoma rhodesiense* has occurred in Nyanza and intermittently in Western Kenya. Cattle trypanosomes occur in the Hola area, *T. congolense* and *T. Vivax*. Recent surveys indicate the presence of three species of Tsetse flies, *Glossina pallidipes*, *G. brevipalpis* and *G. longipennis* of which the former is a potential vector of trypanosomiasis rhodesiense. Human infection could be introduced into the area at the time of settlement and the disease could become established.

Onchocerciasis is not considered a substantial risk to the development. *Simulium damnosum* occurs in the upper Tana and could colonise sections of the river associated with dams and weirs. Foci of onchocerciasis occur in Uganda and Tanzania, and previously in Western Kenya, transmitted by *S. naevii*. Further investigations of the available vector species, especially the damnosum complex, are indicated.

Plague and other rodent related diseases require consideration. Plague has occurred sporadically and endemically in Kenya, and more recently in Tanzania. The most recent outbreaks in Kenya occurred at Rongai in 1953 and eight cases in Fort Hall in 1963.

Irrigation developments are associated with increases in suitable rodent hosts. There is therefore the potential for the establishment of disease on the Bura Project, which may require adequate surveillance.

1.7 Water-Borne and Water-Related Diseases

The relationship of water impoundment schemes and water-borne infections requires little emphasis. Infantile gastroenteritis is the commonest single cause of morbidity and mortality in many rural communities. In addition to the organisms causing gastroenteritis in infants and children predominantly, both the shigella and salmonella organisms are important causes of morbidity in all age groups. Furthermore the introduction of cholera into Kenya in 1970 with outbreaks in northern Kenya (including Hola), and more recently in Nyanza and Western Kenya, raises the possibility of introduction into the project population.

Considerable emphasis is therefore placed upon the provision of the best possible water supplies to project tenant families and adequate sewage disposal facilities. These aspects are considered amongst the highest priorities for the satisfactory provision of health care to the population.

1.8 Intestinal Parasites

Of the numerous intestinal parasites specific mention of hookworm is necessary. This parasite is common throughout the area and contributes to the high prevalence of anaemia in the population. Transmission of hookworm is favoured by population density and available water in areas with inadequate sanitation. Other parasites promoted by similar environmental conditions cause ascariasis, strongyloidiasis and the protozoa causing amoebiasis and giardiasis. The transmission of these diseases should be considerably reduced by the provision of adequate water supplies and sewage disposal systems.

1.9 Infectious Diseases of Childhood

The important childhood infections, measles, whooping cough, diphtheria and tetanus neonatorum, in common with infantile gastroenteritis, are the major causes of morbidity and mortality in children in rural tropical communities. Neonatal tetanus is also endemic, especially in Orma communities. Whilst not directly irrigation related, the programme of settlement and progressive urbanisation in project villages will promote disease transmission, augmenting the epidemic features compared to more traditional rural areas of Kenya, where people tend to live in scattered family groups rather than formal villages. Prevalence of malnutrition and malaria will contribute to the morbidity. The promotion of immunization programmes and the promotion of child health services are considered of the highest priority.

1.10 Sexually Transmitted Diseases

The importance of the sexually transmitted diseases is being increasingly appreciated in many developing countries, including Kenya. In part this reflects the increasing and improving diagnostic facilities available but, also, a real increase in disease associated with progressive urbanisation and changes from traditional customs. The Bura Project by introducing large immigrant populations and labour, will probably increase the spread of sexually transmitted diseases.

1.11 Tuberculosis

No community based information is available to determine the incidence of tuberculosis in existing populations. However, clinical tuberculosis is common in nomadic Orma and Somali groups. Surveys of BCG scars indicate a high immunisation status in riverine Pokomo and Hola Scheme families, with over 90 per cent rates over the age of 6 years, whilst Orma populations have considerably lower rates (45 per cent in children from 5 to 9 years of age). The introduction of immigrant groups, many originating from poor landless families can be anticipated to promote the problems of tuberculosis. High priority should be given to the institution of tuberculosis

programmes, especially in nomadic groups prior to the introduction of the project, and to the development of adequate tuberculosis services to the project population. Leprosy services can be conveniently combined with tuberculosis control programmes.

1.12 Other Communicable Diseases

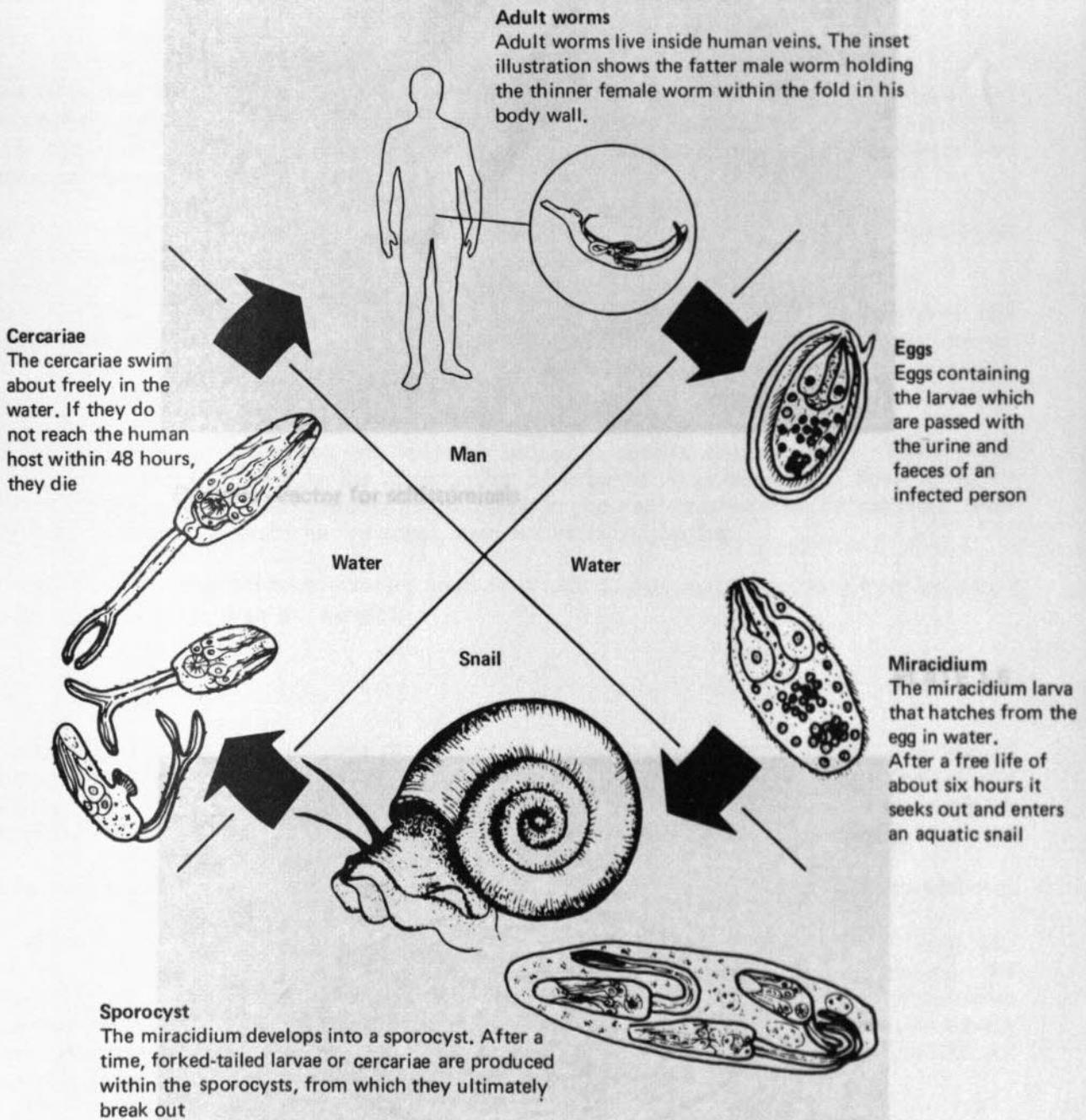
A number of other diseases are considered important in relation to the development of irrigated agriculture.

Leptospirosis has been associated with the introduction of irrigation in various parts of the world. (Leptospirosis refers to a group of acute illnesses with variable symptomatology including fever caused by organisms of the genus *Leptospira*.) The organisms require available surface water, preferably alkaline, and are maintained in a variety of vertebrate hosts, notably rodents. Man is infected from organisms in water following urinary excretion from reservoir hosts. Conditions on the Bura Project would appear suitable for disease transmission. Preliminary serological surveys indicate the presence of leptospiral disease in existing human populations. It is becoming increasingly apparent that leptospirosis is especially associated with the introduction of ecological change.

Anthrax and brucellosis are cattle and domestic animal diseases occurring in the area. The development of ranching, dairy production, or hide and skin marketing must take account of these diseases. Serological surveys indicate that some 10 per cent of domestic animals in the Coast Province including the Tana River have evidence of previous brucellosis. Tetanus, in addition to neonatal tetanus, occurs in both Pokomo and Orma populations. Rabies has recently become increasingly prevalent in Coast Province in common with many other countries. The infrequency of dogs in a predominantly Moslem community doubtless explains the virtual absence at present. Introduction of dogs with immigrant populations could introduce rabies as well as other 'dog related' diseases such as hydatidosis, common in some nomadic groups in Kenya.



River landscape - mosquito and snail (A. stagnalis) breeding areas



Vector cycle for schistosomiasis

Flag of cercaria - vector for schistosomiasis

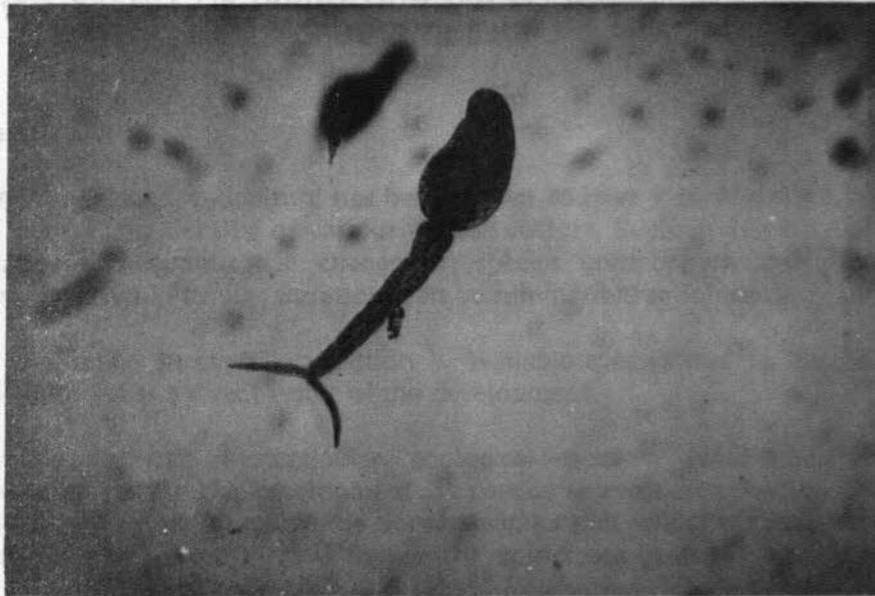
2.1 *Cercaria*

The introduction of irrigation systems has altered the distribution and abundance of many aquatic organisms, both the quality and quantity of the water and the ecological changes that have resulted.

(a) There is a significant increase in the abundance of certain species.

(b) The development of new habitats, such as irrigation canals, has provided a new environment for many species.

(c) The abundance observed in most mosquito species under natural conditions is frequently exceeded by the abundance of irrigated agriculture, with a loss of seasonal fluctuations in populations which may be associated with local changes in the environment, such as temporary pooling.



Cercaria - vector for schistomiasis

Plates 2.1 to 2.4 show increased breeding areas of various disease vectors resulting from irrigation development without adequate control.

2.2 *Mosquito Populations*

Studies at Hala Bala have demonstrated the influence of irrigation on mosquito populations, including the species *Culex fatigans* and *Culex quinquefasciatus*.

In riverine pools, *C. fatigans* is the dominant species throughout the year, breeding in supporting pools.

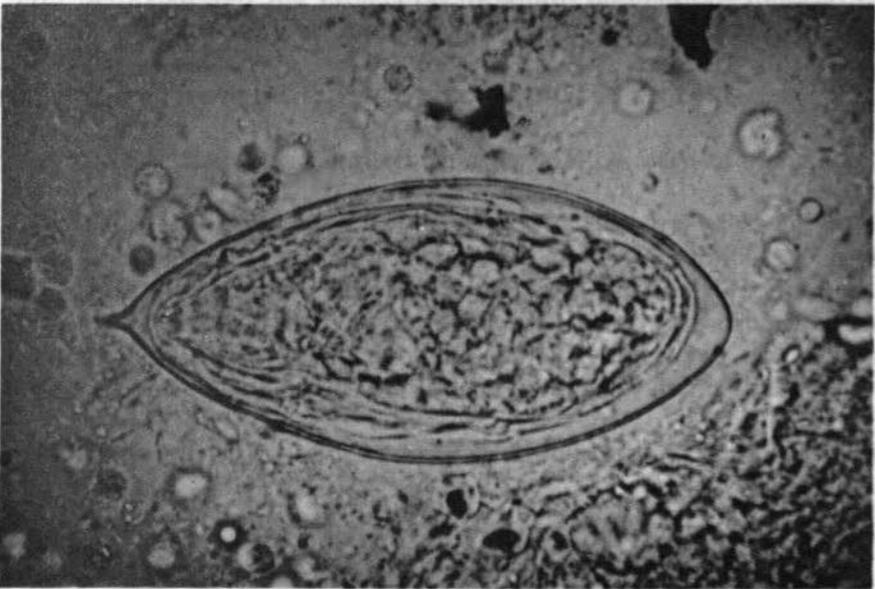
During the dry season, *C. quinquefasciatus* occurred in the dam. The use of domestic water for irrigation has increased the abundance of *C. quinquefasciatus* in the area.

The changes in mosquito populations are shown in Figure 2.1.

2.3 *Snail*

Conventional methods for sampling snail populations were unsuccessful in the area, except on the Hala Irrigation. Snails were readily found, especially around concrete dams and structures. Seasonal ox-bow lakes were generally unrewarding. Dry season searches were made by digging trenches across ox-bow lakes and examining the soil removed for snails. Most species found in the area were recovered by this method but practically no *B. glaberrima* were recovered.

Snail population studies were therefore devised using standard palm leaf mats floated on the water surfaces and examined at regular intervals. This method was found to attract *B. glaberrima*.



Egg of cercaria - vector for schistomiasis

Microscopic image of a mosquito larva, showing its segmented body and legs.

Microscopic image of a mosquito pupa, showing its characteristic shape and structure.

Microscopic image of a mosquito adult, showing its wings and body.

Microscopic image of a mosquito egg, showing its characteristic shape and structure.

CHAPTER 2 THE EFFECT OF IRRIGATION DEVELOPMENT ON DISEASE-VECTOR POPULATIONS

2.1 General

The introduction of irrigated agriculture has been shown to have a considerable impact on the distribution and population density of various disease vectors. Such studies have demonstrated both the qualitative and quantitative changes in species composition and abundance. The ecological changes observed in similar situations can be summarised as follows:-

- (a) There is usually an overall reduction in available species due to the destruction of specific habitats as a direct result of the development.
- (b) The establishment of particular ecological systems (ecosystems) within the development favour the development of particular mosquito species. These species, frequently anthropophilic, assume dominance, so that whilst the number of available species is often reduced there is frequently an increase in total mosquito populations.
- (c) The seasonality observed in most mosquito species under natural conditions is frequently altered by the introduction of irrigated agriculture, with either a loss of seasonal variations or unseasonal increases in populations which may be associated with local changes in the environment, such as temporary pooling.

Plates 2.1 to 2.4 show increased breeding areas of various disease vectors resulting from irrigation development without adequate control.

2.2 Mosquito Populations

Studies at Hola have demonstrated the effects on mosquito populations induced by ecological changes which may be expected on the Bura Project. Three species *Anopheles gambiae*, *Culex fatigans* and *C.univittatus*, constitute approximately 93 per cent of the total mosquito population: the peri-domestic mosquito *C. fatigans* comprising 58 per cent.

In riverine Pokomo villages *C. fatigans* accounted for only 0.04 per cent of mosquito populations.

C. univittatus usually a swamp breeder was recovered on the Hola Irrigation Scheme throughout the year, breeding preferentially in drains and night storage dams. *Mansonia* species favour waters supporting papyrus, pistia (water hyacinth) and sedges and seasonal increases in populations occurred on the Hola Scheme associated with pistia growth in larger canals and night storage dams. The tree axil breeding *Aedes* species are, in general, reduced by such developments but domestic water storage around houses could well induce peri-urban *Aedes* breeding.

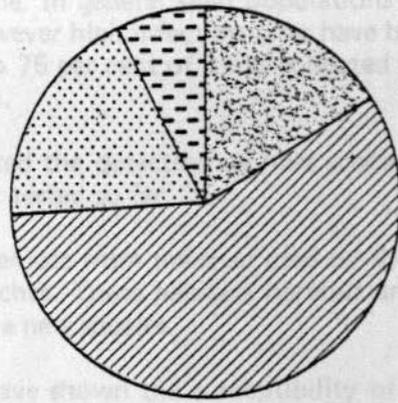
The changes in species composition in various indoor sampling studies are shown in Figure 2.1.

2.3 Snail Populations

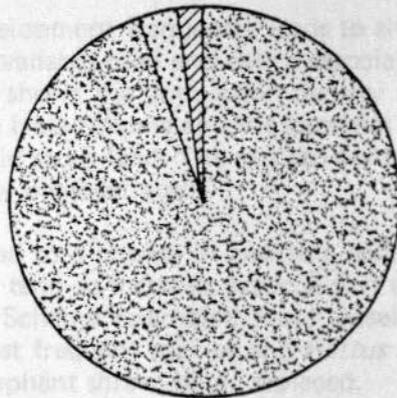
Conventional methods for sampling snail populations were unsuccessful in the area, except on the Hola Irrigation Scheme where *Bulinus globosus* was readily found, especially around concrete dams and structures and in seepages. Searches in seasonal ox-bow lakes were generally unrewarding. Dry season searches were made by digging trenches across ox-bow lakes and examining the soil removed for snails. Most species found in the area were recovered by this method but practically no *B. globosus* were recovered.

Snail population studies were therefore devised using standard palm leaf mats floated on the water surfaces and examined at regular intervals. This method was found to attract *B. globosus*

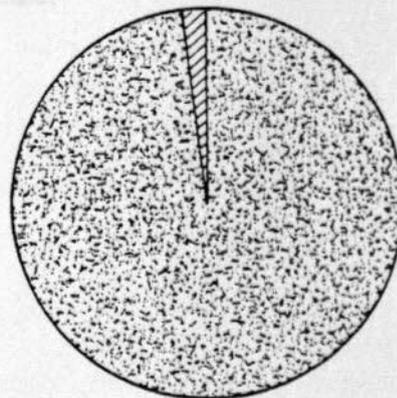
COMPOSITION OF INDOOR MOSQUITO CATCHES (1977)



HOLA IRRIGATION VILLAGE
(some insecticide spraying)



POKOMO RIVERINE VILLAGE



ORMA CAMP

LEGEND



A. gambiae
(malaria and filaria
transmitter)



C. fatigans
(filaria transmitter)



C. univittatus



other species

and counts of up to 200 snails were obtained. Specimens collected in Tana River District are considerably smaller than snails collected from most other areas, although they morphologically resemble *B. globosus*. Palm leaf mats have therefore been used to assess snail populations both in natural habitats and on the Scheme. In general snail populations are remarkably low despite the high intensity of transmission. However high infection rates have been observed in snails collected throughout the period, with up to 75 per cent of snails collected shedding schistome cercariae in the two weeks following collection.

Use of palm leaf mats has permitted the detection of host species in all seasonal and permanent water sources along the Tana River tested so far.

Searches for snails in depressions remote from the river used by the Orma have so far not revealed *B. globosus* despite intensive searches. These habitats harbour another bulinid snail, resembling *Bulinus obtusus* although possibly a new species.

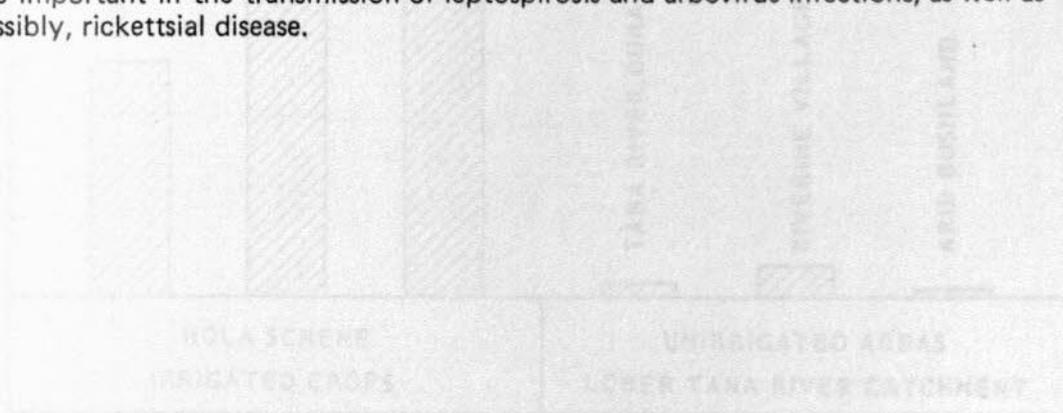
Laboratory transmission studies have shown the susceptibility of the local *B. globosus* to human schistosome haematobium infection, whilst *B. forskali* has proved insusceptible.

2.4 Rodent Populations

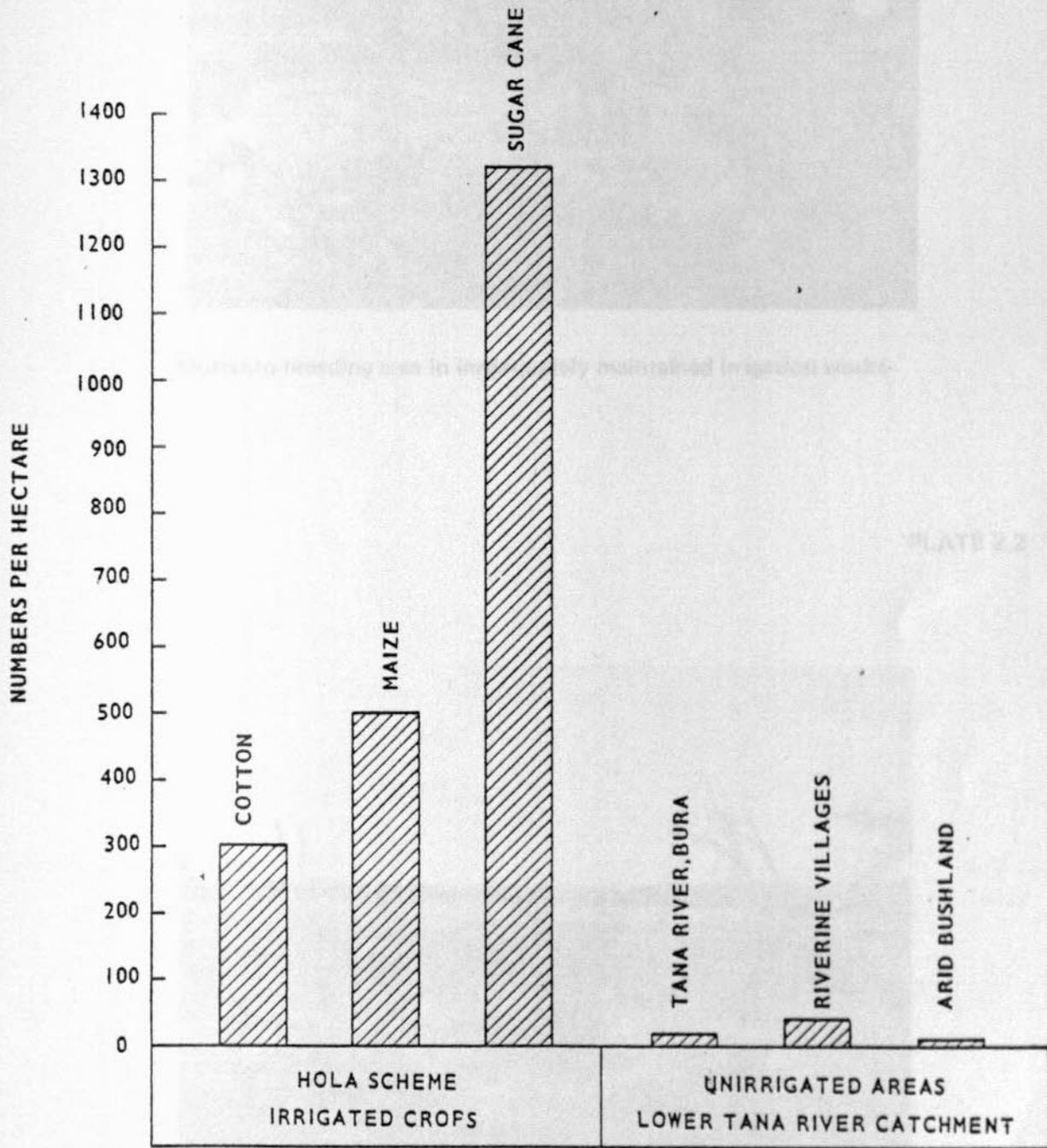
The introduction of irrigation development frequently leads to alterations of rodent populations in association with the increased available food and debris associated with the development. This is illustrated in Figure 2.2 which shows the population density of rodents and small mammals associated with various parts of the Hola Scheme and the densities obtained in rural environments along the Tana River and on the arid scrub land. The marked contrast between the developed and undeveloped environments is clearly demonstrated.

The alterations in ecology also lead to a change in available rodent species, as demonstrated in Figure 2.3. Man-associated species tend to increase, especially in the peri-domestic situation. The species composition on the Hola Scheme resembled more closely the riverine village situation, with *Mastomys natalensis* the most frequent species and *Rattus rattus*: arid scrub land species, such as *Acomys spp*, *Tatera* and elephant shrew, being replaced.

The quantitative and qualitative changes occurring in rodent populations could permit the introduction of disease or an increase in transmission of currently endemic diseases. Rodent populations are important in the transmission of leptospirosis and arbovirus infections, as well as plague and, possibly, rickettsial disease.



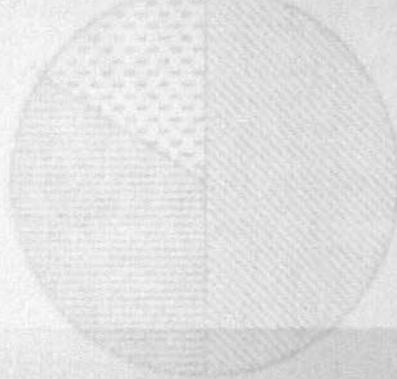
POPULATION DENSITY OF RODENTS.
 IN IRRIGATED AND NATURAL ENVIRONMENTS
 LOWER TANA RIVER CATCHMENT 1977



SPECIES COMPOSITION OF ROHENT POPULATION
 LOWER TANA RIVER CATCHMENT 1973



Mosquito breeding area in inadequately maintained irrigation works



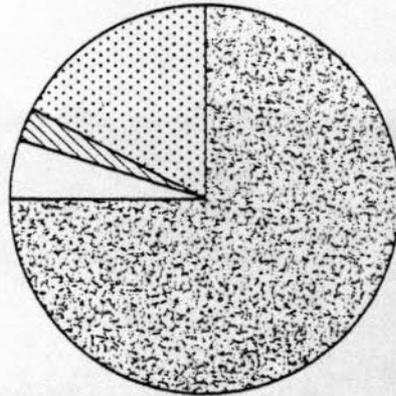
Mosquito and snail breeding habitat in inadequately drained area

(c) HOLA IRRIGATION SCHEME

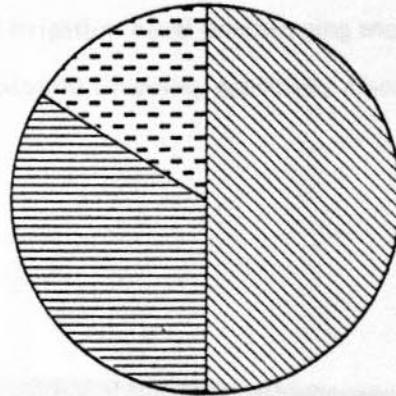
LEGEND

	<i>manisuris mauritensis</i>		<i>elephantus caryus</i>
	<i>reduis rectoris</i>		<i>talara</i>
	<i>acomya sgg.</i>		<i>creudaria</i>

SPECIES COMPOSITION OF RODENT POPULATION
LOWER TANA RIVER CATCHMENT 1977

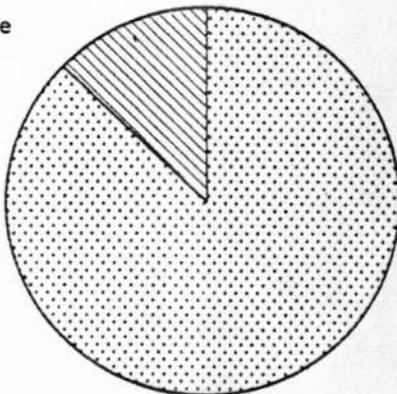


(a) RIVERINE VILLAGE

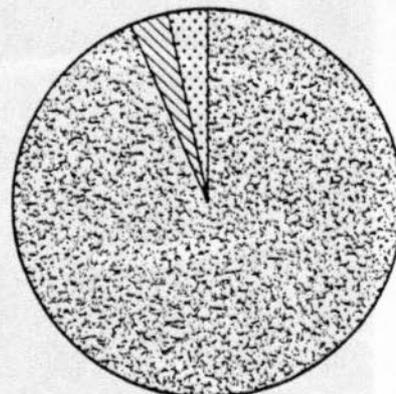


(b) ARID SCRUB LAND

Home



Irrigation Fields



(c) HOLA IRRIGATION SCHEME

LEGEND



mastomys natalensis



elephant shrew



rattus rattus



tatera



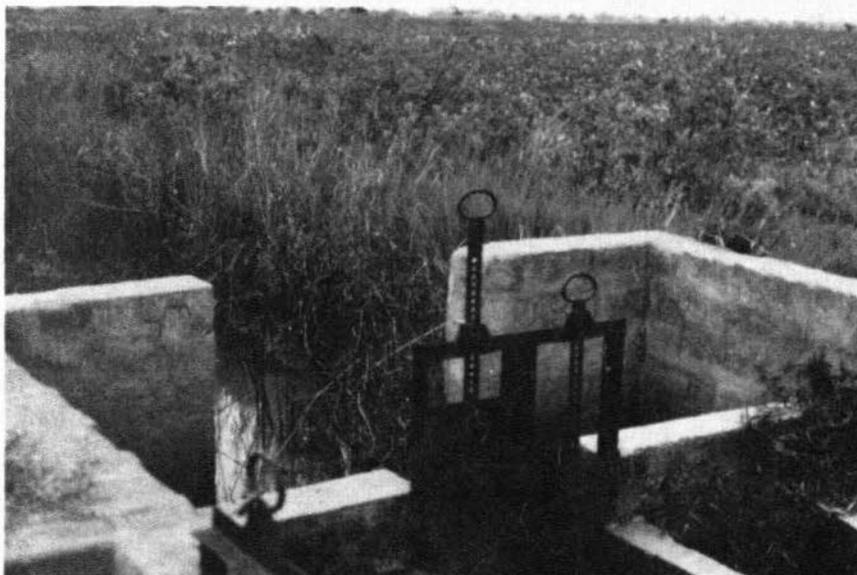
acomys spp.



crouduria



Weed-infested irrigation canal encouraging snail breeding and suitable habitat for mosquito breeding, especially *Mosonia* spp.



Minor irrigation structure - a focus for snail population

CHAPTER 3 EXISTING HEALTH CARE FACILITIES

3.1 General

The existing health care facilities are poorly developed in comparison with many other parts of Kenya. This is in part owing to the low population density in the area and the low level of basic infrastructure, especially roads. The nomadic life of a considerable proportion of the population further adds to the difficulties of health care delivery.

Figure 3.1 shows the distribution of existing health care facilities in relation to development in the Tana River catchment.

3.2 Existing Facilities

The Hola hospital, within Hola township, operates 50 beds and an active outpatients department. During the past four years the hospital has either been run by an experienced clinical assistant or a medical officer on a short-term posting. Staffing, at senior levels especially, has proved difficult, both owing to the remoteness of the area and the lack of facilities at the hospital.

Relatively minor surgery and obstetric surgery is carried out when a medical officer is available. At other times surgical care is undertaken by the flying doctor service either from regular surgical visits or as a result of requests for emergency treatment. The one-roomed laboratory can only cope with basic 'side room' techniques. There are no radiological services: patients requiring X-Rays are transferred to Mombasa. The hospital also houses basic community care services including an immunization service and a malaria microscopist.

Existing health centres and dispensaries are listed in Table 3.1, together with the available staffing in late 1975. Most facilities are staffed by ungraded personnel, whilst the staff of the hospital attempt to carry out regular clinics throughout the area. Despite the paucity of services acceptance of health care by the population, especially the riverine Pokomo, is high.

The public health department is also based at the hospital and supervised by a district public health officer. District staff consists of two public health officers (one at Hola and another at Kipini) and eight public health technicians (based at Hola, Kipini, Mororo, Mnazini, Ngau and Tarasa).

Health care facilities to the existing Hola Scheme are also provided by the Hola Hospital. The scheme tenants utilise the hospital as their primary source of medical care, attending the outpatient department when sick.

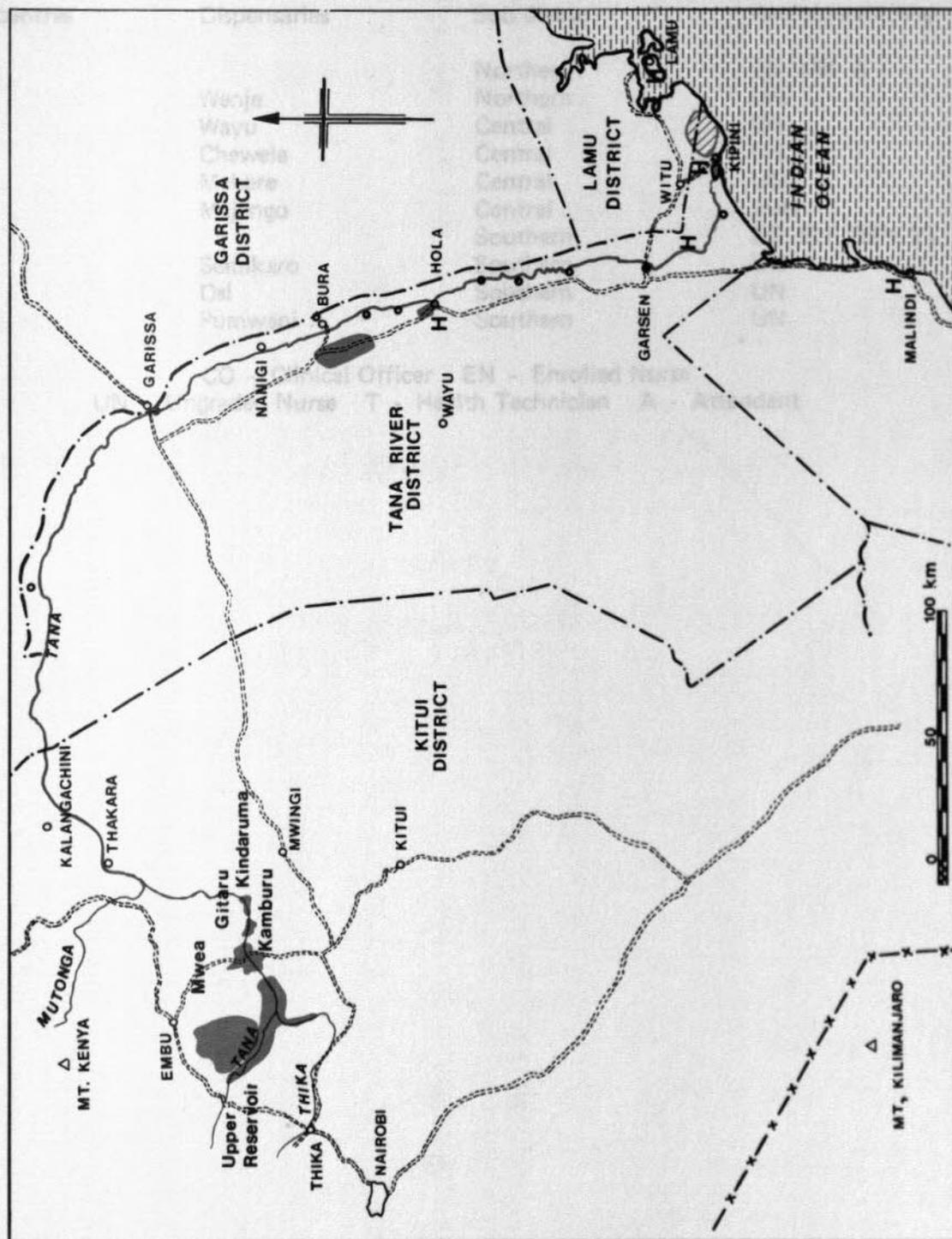
Disease control programmes on the Hola Scheme are operated by staff of the National Irrigation Board. Activities include the application of molluscicide to the scheme's canals, on a focal basis, and the operation of a voluntary prophylaxis programme to children, using chloroquine every two weeks.



—	District Boundary	■	Irrigation Schemes
—	Road	■	Kariakoo Salween Scheme
H	Hospital	■	Reservoirs
+	Health Centre		
*	Dispensary		

DEVELOPMENTS IN THE TANA RIVER CATCHMENT & HEALTH FACILITIES IN TANA RIVER DISTRICT 1977

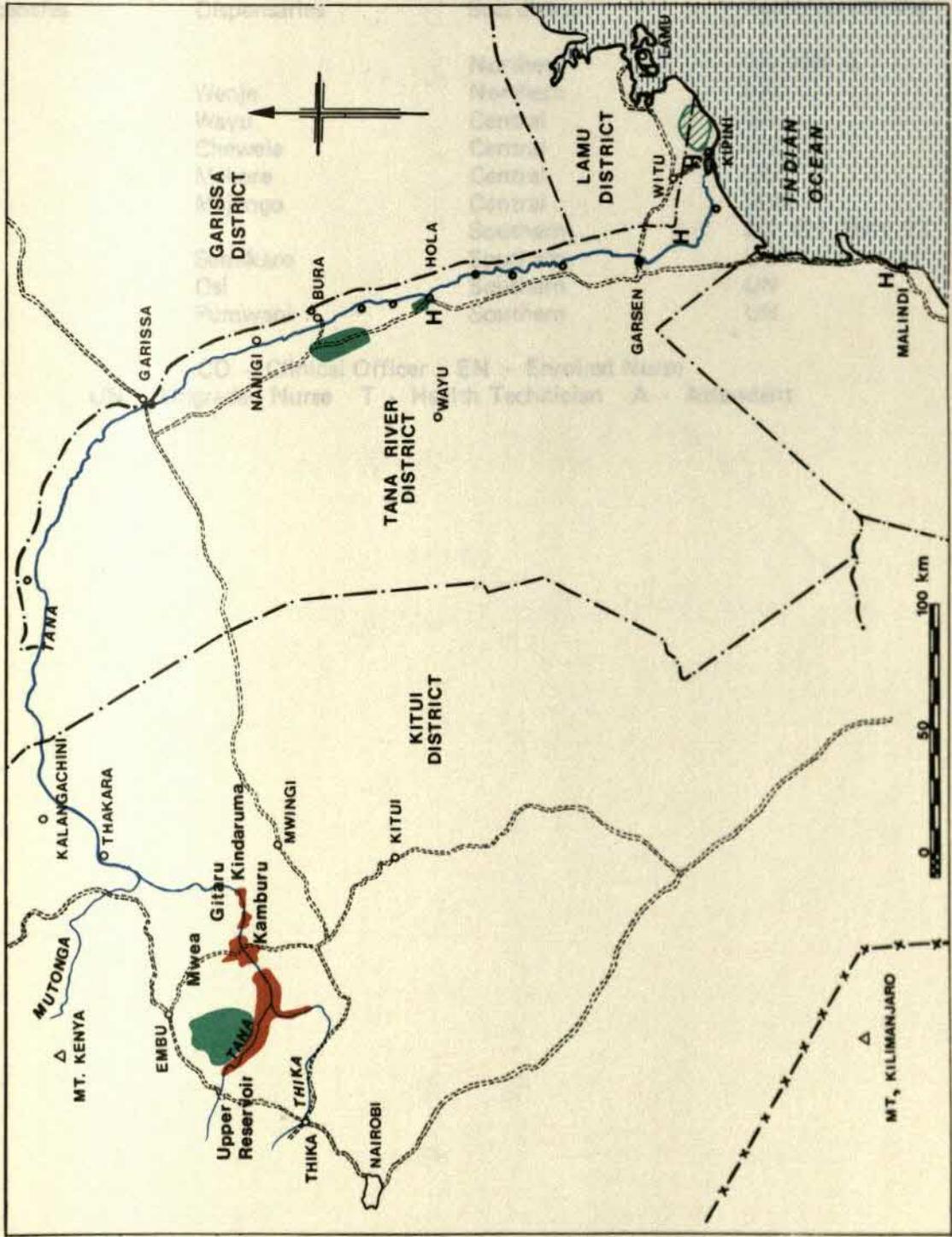
Tana River District, 1977
(Population 80 000)



- | | | | |
|-----------|-------------------|---|----------------------------|
| — — — — — | District Boundary | ■ | Irrigation Schemes |
| | Road | ▨ | Kenyatta Settlement Scheme |
| H | Hospital | ■ | Reservoirs |
| • | Health Centre | | |
| • | Dispensary | | |

DEVELOPMENTS IN THE TANA RIVER CATCHMENT & HEALTH FACILITIES IN TANA RIVER DISTRICT 1977

Tana River District 1977
(Population 60 000)



- | | | | |
|-------------|-------------------|--|----------------------------|
| — · — · — · | District Boundary | | Irrigation Schemes |
| | Road | | Kenyatta Settlement Scheme |
| H | Hospital | | Reservoirs |
| • | Health Centre | | |
| • | Dispensary | | |

Table 3.1 - Existing Health Centres,
Dispensaries, and Available staffing,
Tana River District, late 1975
(Population 60 000)

Health centres	Dispensaries	Sub district	Available staffing
Mororo		Northern	EN UN A
	Wenje	Northern	UN
	Wayu	Central	UN
	Chewele	Central	UN
	Makere	Central	UN
	Majengo	Central	2UN
Garsen		Southern	CO EN 2UN 2T
	Semikaro	Southern	UN
	Osi	Southern	UN
	Pumwani	Southern	UN

CO - Clinical Officer EN - Enrolled Nurse
UN - Ungraded Nurse T - Health Technician A - Attendant

PART 2

THE INFLUENCE OF VILLAGE DESIGN ON HEALTH

CHAPTER 4 LAND USE AND HOUSING

4.1 Introduction

Various aspects of land use design and physical planning have important implications for the future environment and health of project tenants and their families. Considerable emphasis has been placed on these aspects during planning of the project. The following matters are considered in detail in particular sections.

4.2 Village Design and Size

Many factors will be taken into account in the planning of project villages. Conflicting requirements arise, for example, in the need to place villages close to irrigation areas, for ease of access, whilst attempting to locate villages distant from canals and irrigation systems to avoid exposure to agricultural sprays. Where possible villages should be sited away from major irrigation systems, particularly canals and night storage reservoirs. Village siting in this project is largely dependent upon local characteristics, with villages located on soils of relatively low irrigation potential, and also sited tend to be towards the periphery of irrigation blocks.

Villages are being sited large enough to support the necessary village infrastructure but not too large, to allow for accessibility and economic development. An initial village size of between about 2 000 and 2 200 persons appears to provide a satisfactory unit of population, which would permit the development of village extension services, such as the village health worker, whilst developing a strong sense of community.

PART 2

4.3 Housing **THE INFLUENCE OF VILLAGE DESIGN ON HEALTH**

Good housing is a fundamental requirement for the promotion of physical and mental health. The suggested arrangement of homesteads into nuclei units of two clusters of twelve houses is strongly supported, as it should promote the development of community participation and lead to improvements in various environmental aspects of village life.

The provision of adequate space and ventilation are of considerable importance in the control of various communicable diseases. Provision is required for cooking with open fires, especially for groups who traditionally cook in the main living area, and adequate arrangements are needed for ventilating houses to prevent them becoming permanently smoke filled. Kitchen areas also need to have facilities to meet high standards of food hygiene, with facilities for washing utensils and the protection of food.

Houses need to provide a sense of privacy and must take full consideration of the social systems of tenants, especially with regard to polygamy and extended families. The housing of domestic animals outside spaces close to the family is of the greatest importance. Domestic animals will undoubtedly be kept within the homestead and therefore provision must be made for such animals to be housed under hygienic conditions away from the main family nuclei.

Facilities for storage of foods by the family should take account of the habits of local farmers, who appear to be accustomed to raising such stores when located outside the house. This has prompted the storage of bulky staple foods in the roofs of houses rather than in separate outside storage buildings.

The screening of houses against vector insects, whilst of benefit both in terms of reducing disease transmission and reducing value of mosquitoes must be considered against the need to provide adequate ventilation in a hot climate. Similar considerations pertain to the provision of ceilings and attempts to shelter eaves spaces. The majority of inhabitants of the Pilot Scheme sleep outside their houses during the hotter periods.

CHAPTER 4 LAYOUTS AND HOUSING

4.1 Introduction

Various aspects of project design and physical planning have important implications for the future environment and health of project tenants and their families. Considerable emphasis has been placed on these aspects during planning of the project. The following matters are considered to be of particular importance.

4.2 Village Siting and Size

Many factors must be taken into account in the planning of project villages. Conflicting requirements arise, for example, in the need to place villages close to irrigation areas, for ease of access, whilst attempting to locate villages distant from canals and irrigation systems to lessen exposure to schistosomiasis. Where possible villages should be sited away from major irrigation systems, especially larger canals and night storage reservoirs. Village siting in this project is largely dependent upon soil characteristics, with villages located on soils of relatively low irrigation potential, and such areas tend to be towards the periphery of irrigation blocks.

Village size needs to be large enough to support the necessary village infrastructure but not too large, to allow for community and economic development. An initial village size of between about 2 000 and 2 500 persons appears to provide a satisfactory unit of population, which would permit the development of village extension services, such as the village health worker, whilst developing a distinct cultural integrity.

4.3 Housing

Good housing is a fundamental requirement for the promotion of physical and mental health. The suggested clustering of homesteads into nodule units of two clusters of twelve houses is strongly supported, and should promote the development of community participation and lead to improvements of various environmental aspects of village life.

The provision of adequate space and ventilation are of considerable importance in the control of various communicable diseases. Provision is required for cooking with open fires, especially for groups who traditionally cook in the main living area, and adequate arrangements are needed for ventilating houses to prevent them becoming permanently smoke filled. Kitchen areas also need to have facilities to maintain standards of food hygiene, with facilities for washing utensils and the protection of food.

Houses need to create a sense of privacy and must take full consideration of the social customs of tenants, especially with regard to polygamy and extended families. The housing of domestic animals separate from the family is of the greatest importance. Domestic animals will undoubtedly be kept within the homestead and therefore provision must be made for such animals to be housed under hygienic conditions away from the main family home.

Facilities for storage of foods by the family should take account of the habits of local baboons, who appear to be experienced at raiding such stores when located outside the house. This has promoted the storage of bulk staple foods in the roofs of homes rather than in separate outside storage buildings.

The screening of homes against vector ingress, whilst of benefit both in terms of reducing disease transmission and nuisance value of mosquitos must be considered against the need to provide adequate ventilation in a hot climate. Similar considerations pertain to the provision of ceilings and attempts to eliminate eaves spaces. The majority of inhabitants of the Hola Scheme sleep outside their houses during the hotter periods.

4.4 PTB Gardens and Amenity Trees D HYGIENE

The five-hundred square metre vegetable garden for each tenant family will be located in a common area outside the village precincts, thus ensuring that untreated irrigation water does not enter the housing area. Even intermittent irrigation would ensure the presence of host snails of schistosomiasis within a village. Every encouragement should be given to the tenant to grow vegetables, and possibly fruit trees, to improve his family's diet.

Whilst there is some objection to the use of trees within the village area - because many varieties encourage insects - this is far outweighed by the social and psychological benefits of shade trees. Where possible varieties of trees which do not encourage insects, such as eucalyptus, should be planted. Planting should be carried out as a community enterprise in conjunction with the Forestry Department. To accelerate growth of the trees they could be planted near the watering points of the neighbourhood modules, thus utilizing any waste water and preventing waterlogged ground. Where feasible the molluscicide-treated water from the village bathing pool could be used to irrigate amenity trees by gravity, when the pool is regularly drained and refilled.

The main irrigation module is conceptually a self-contained unit which will be responsible for the watering and will be more inclined to enclose the water supply area. The watering pipes will be provided with two hand pipes (usually fixed with wooden taps) and an additional laundry and showering facilities. Attention to the drainage of excess water around these areas is of considerable importance, because they present an important mosquito-breeding hazard, unless regularly drained.

The provision of a piped system allowing an individual tenant to have a direct connection to his home at his convenience is also strongly supported. A provision of this sort, however, requires extensive over-ground drainage facilities, and may require the installation of a septic tank.

5.2 Bathing Facilities

The use of unimproved ponds for bathing especially by small children, is considered to be the most important factor in spreading or increasing schistosomiasis transmission. Especially in hot climates the use of unimproved ponds for play in water is likely to prevent any health education programme which would otherwise reduce the incidence of natural water, unless alternative facilities are provided.

It is therefore recommended that each village be provided with a small free bathing area and that its utilization is promoted by an intensive health education programme. Pools should be sited as centrally as possible in the village, and at least closer to homes than the nearest irrigation canal. The pools should become a prominent feature of the village ground which trees could be grown, providing a facility for families in their free time and a suitable place for village meetings and recreation.

The area would need to be about 0.5 acre, probably oval with sloping sides and a maximum depth of 1.5 metres. Sand lying to the pool would improve the appearance and would help to maintain its margin. A concrete coping to the pool would improve the design and would help to prevent the growth of vegetation. The pool would be fed from a feeder canal. Molluscicide would be applied by trickle at each refilling, which would need to be approximately once each week. Water discharged from the pond could be used for the irrigation of trees within the village, if topography permits.

Considerable importance is attached to the regular maintenance of these pools, especially the regular application of molluscicide and surveillance of possible snail concentrations. This should be the responsibility of the village health worker under the supervision of the surveillance staff.

CHAPTER 5 WATER SUPPLIES AND HYGIENE

5.1 Domestic Water

Adequate treated water supplies are considered perhaps the single most important factor in determining the future health of the settlement population. Ideally, each household should be provided with an individual water point, providing adequate quantities of clean, potable water. The benefits of a clean water supply rapidly diminish with increasing distance from the supply point to the home, essentially because of unhygienic storage. The closer the supply to the family, the more frequently water is collected and the shorter the storage time.

Supplies based on individual villages, as at the Hola Scheme, tend to be unreliable. In particular supplies are often limited and untreated, mechanical failure of the pumps is frequent and village staff are not usually competent to carry out repairs. It is therefore recommended that a single reticulated supply system should be introduced to the Bura Project, taking its raw supply from the main irrigation canal. Initially the provision of water to the twelve house neighbourhood module is acceptable, especially as each unit will assume responsibility for its facilities and will be more inclined to maintain the water supply area. The watering point should be provided with two stand pipes (preferably fitted with deadman taps) and, in addition, laundry and showering facilities. Attention to the drainage of excess water around these areas is of considerable importance, because they present an important mosquito-breeding hazard, unless adequately drained.

The provision of a reticulated system allowing an individual tenant to have a direct connection to his home at his own expense is also strongly supported. A provision of this sort, however, requires attention to household drainage facilities, and may require the installation of a septic tank.

5.2 Bathing Facilities

The use of irrigation canals for bathing especially by small children, is considered to be the most important factor in continuing or increasing schistosomiasis transmission. Especially in hot climates the desire to bathe and play in water is likely to outweigh any health education programme which promotes the avoidance of natural water, unless alternative facilities are provided.

It is therefore recommended that each village be provided with a snail-free bathing area and that its utilisation is promoted by an intensive health-education programme. Pools should be sited as centrally as possible in the village, and at least closer to homesteads than the nearest irrigation canals. The pool could become a prominent feature of the village around which trees could be grown, providing a facility for families in their free time and a suitable place for village meetings and recreation.

The area would need to be about 0.5 acre, probably oval with sloping sides and a maximum depth of 1.5 metres. Sand lining to the pool would improve the appearance and would help to maintain its margins. A concrete edging to the pool would improve the design and would help to prevent the growth of vegetation. The pool would be fed from a feeder canal. Molluscicides would be applied by drip feed at each refilling, which would need to be approximately once each week. Water discharged from the pond could be used for the irrigation of trees within the village, if topography permits.

Considerable importance is attached to the regular maintenance of these pools, especially the regular application of molluscicides and surveillance of possible snail colonisation. This should be the responsibility of the village health worker under the supervision of the surveillance staff.

5.3 Food Hygiene

The safeguarding of food for human consumption would be the responsibility of the public health department and would include the construction of sanitary slaughter houses and market places, with routine inspection of meat and other foodstuffs. Inspection will also be required at hotels, shops and restaurants, where food is provided.

Adequate attention should be given to the hygienic storage of food within the home. Attempts should be made to demonstrate hygienic food storage facilities through health education programmes.

5.4 Disposal of Excreta

Various methods of excreta disposal have been considered. No single method is ideal for the Bura Project. Stress is placed on the provision of separate facilities for each household. Waterborne sewage systems require considerable maintenance and failure of the system can have serious effects. Shallow pit latrines as used at the Hola Scheme are unsatisfactory, tending to subsidence and providing a suitable site for mosquito breeding, especially *Culex fatigans*. Augered pit latrines about 7 metres deep and 0.25 metre diameter would appear to offer the most satisfactory compromise for villages, with an individual latrine for each household, situated in the household compound, but as distant from the house as is practicable. Local trials are indicated to determine the ideal size of bore and the available depth above the water-table.

The use of similar augered bore holes should also be considered as a means of draining excess domestic water either from communal water point areas or in the homestead, if no natural drainage is available.

5.5 Disposal of Refuse

The project area will require satisfactory systems of refuse collection and disposal both to maintain the environment and to deter excessive fly breeding and rodent populations. Consideration should be given to the composting of organic waste and regular collection of residual waste. Refuse disposal should be by sanitary landfill: especially on development projects where depressions may be left by the construction works. Refuse with soil covering can be used to level out such areas.

CHAPTER 5 - THE POPULATION

5.1 - Introduction

The organization of health care can be planned with greater precision if the demographic characteristics of the recipient population are known. Such populations are often noted to be relatively young with increased numbers of young fertile women and small children. The age and sex distribution of the population will determine the future rate of population growth and will affect the requirements of various parts of the health care delivery system. Increased numbers of young fertile women as well as younger children place increasing burdens on maternal and child health services, thereby comprising a significant section of all rural health services.

5.2 - Criteria for Tenant Selection

When reasonably accurate estimates of the total population can be determined by the available censuses and knowledge of the family size, the criteria for selection into the project might well alter the characteristics of the population both in terms of mass family size and in consequence, total population, and in terms of population structure. These criteria suggest that tenants should be male between 20 and 40 years and have at least four adult equivalents of labour within the family unit. An adult male over 12 years provides one unit of labour and that children from 5 to 11 years provide half an adult unit.

Using these preliminary criteria have been made to examine Kenyan population data available at the Central Bureau of Statistics. The following preliminary results are indicated:

- (a) The age range of the project population will be significantly higher by confining selection to those males between 20 and 40 years of age. The population will have an excess of 10 per cent of the population up to the age of 10 years and a relative deficiency of over 20 per cent in the 15 to 20 years age group. Forty per cent of the population will be under 10 years of age compared to 26 per cent for Kenya generally.
- (b) The average number of adult equivalents per family in Kenya is only 3.2. The male equivalent of 4.0 is required for the heads of household are 25 to 29 years of age, to 4.0 in fact for those aged 44 or 45 years of age (see Table 5.3).

These results indicate that the Duta Project tenant population will not be representative of the population of Kenya as a whole. Tenant selection criteria are based upon the family household size and it is hoped there will be an excess of adults in their most productive years and an increase in younger children.

CHAPTER 6 PROJECT POPULATION

6.1 Introduction

The organisation of health care can be planned with greater precision if the demographic characteristics of the settlement population are known. Such populations are often noted to be relatively young with increased numbers of young fertile women and small children. The age and sex distribution of the population will determine the future rate of population growth and also affect the requirements of various parts of the health care delivery service. Increased numbers of young fertile women as well as younger children place increasing burdens on maternal and child health services, already a high demand section of all rural health services.

6.2 Criteria for Tenant Selection

Whilst reasonably accurate estimates of the total population can be determined by the available tenancies and knowledge of the family size, the criteria for selection into the project might well alter the characteristics of the population both in terms of mean family size, and in consequence total population, and in terms of population structure. These criteria suggest that tenants should be males between 25 and 45 years and have at least four adult equivalents of labour within the family unit. (it is assumed that children over 12 years provide one unit of labour and that children from 6 to 11 years provide half an adult unit).

Using these premises attempts have been made to examine Kenyan population data available at the Central Bureau of Statistics. The following preliminary results are indicated:

- (a) The structure of the project population will alter significantly by confining settlement to adult males between 25 and 45 years of age. The population will have an excess of adults between 25 and 45 years of age as well as an excess of young children up to the age of about 10 years (see Tables 6.1 and 6.2 and Figure 6.1). There will be a relative deficiency of older age groups as well as a marked reduction in young people between 10 and 24 years of age. Forty per cent of the population will be under 10 years of age compared to 34 per cent for Kenya generally.
- (b) The mean number of 'adult equivalents' per family in Kenya is only 3.2. The value rises from 2.6 in families whose heads of household are 25 to 29 years of age, to 4.5 in families with heads of 44 or 45 years of age (see Table 6.3).

These results indicate that the Bura Project tenant population will not be representative of the population of Kenya as a whole. Tenant selection criteria are biased against sub-fertile families: household size will be larger, there will be an excess of adults in their most productive period and an increase in younger children.

KENYA POPULATION STRUCTURE AND STRUCTURE OF POPULATION FROM HOUSEHOLDS WITH MALE HEADS BETWEEN 25 AND 45 YEARS (KENYA CENSUS DATA)

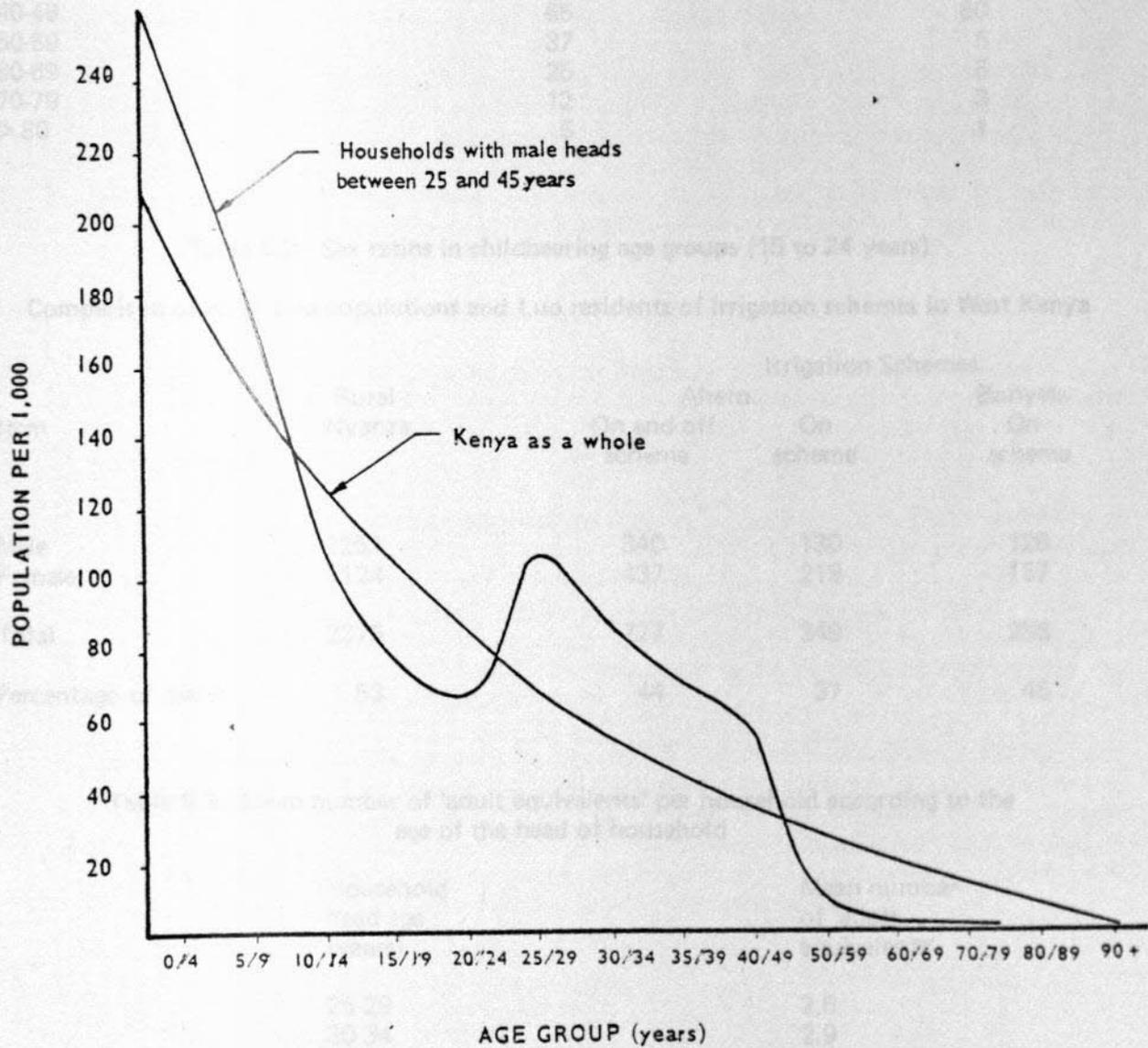


Table 6.1 - Age specific population rates for Kenya and the population whose household heads are males aged between 25 and 45 years (Population per 1000)

Age group (years)	All Kenya	Households with male heads between 25-45 years
0-4	192	236
5-9	159	176
10-14	125	111
15-19	102	72
20-24	92	69
25-29	74	106
30-34	56	86
35-39	44	67
40-49	65	60
50-59	37	5
60-69	25	5
70-79	12	3
> 80	5	1

Table 6.2 - Sex ratios in childbearing age groups (15 to 24 years)

Comparison of rural Luo populations and Luo residents of irrigation schemes in West Kenya

Item	Rural Nyanza	Irrigation Schemes		
		Ahero On and off scheme	On scheme	Bunyala On scheme
Male	1251	340	130	129
Female	1124	437	219	157
Total	2375	777	349	286
Percentage of males	53	44	37	45

Table 6.3 - Mean number of 'adult equivalents' per household according to the age of the head of household

Household head age (years)	Mean number of 'adult equivalents'
25-29	2.6
30-34	2.9
35-39	3.5
40-43	4.0
44-45	4.5

6.3 Population Changes after Initial Settlement

Demographic studies carried out by the Medical Research Council team on existing irrigation developments in Kenya are possibly of relevance to the future population trends in the Bura Project. Population studies have been carried out at Ahero, Bunyala and Hola as well as in rural Luo communities in Nyanza Province. Population census was followed by monthly demographic surveillance. The following findings are considered of particular importance:

- (a) In all scheme populations studied there has been an excess of young women especially between 15 and 24 years due apparently to the tenant's increased capability to acquire a wife or additional wives than his rural counterpart (see Table 6.2). This increase in women at their highest period of fertility is reflected in an increased birth rate. The results for West Kenya are shown in Table 6.4, whilst Figure 6.2 shows the mean family structure for Kenya compared to that of the Hola Irrigation Scheme tenants. It can be seen that the ratio of heads of households to total wives is approximately 0.75 for Kenya, this rises to over 1.5 on the Hola Irrigation Scheme.
- (b) In all irrigation associated populations studied an increased birth rate has been observed. Whilst the rates have been estimated in relatively small populations, regular surveillance over the past three years has indicated that these results are significant. Thus the birth rate in both Ahero and Bunyala is substantially higher than in neighbouring rural populations. To some extent, increased early mortality has offset this, so that growth rates are not substantially affected although at Ahero the annual growth rate is of the order of 4.8 per cent.

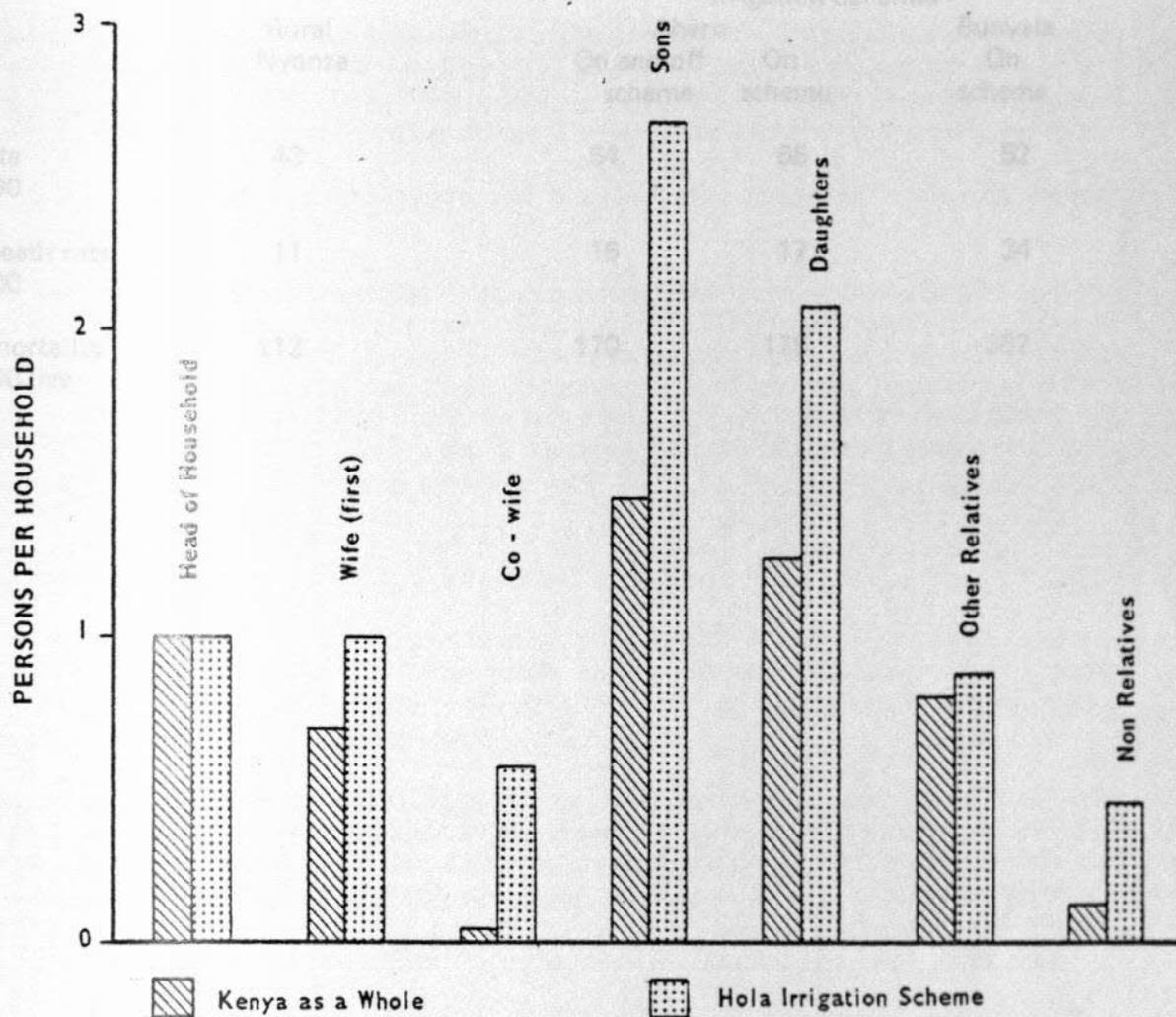
The following implications for the Bura Project would appear relevant:

- (a) Family size will start relatively high. A figure of 7.0 would appear a conservative estimate. Family size will increase over the early years of settlement to an extent depending upon the success of the project. The inability for families to 'divide' will accentuate this trend.
- (b) The population will exhibit high fertility both as a result of the selection criteria and the capability of households to attract wives. A birth rate of the order of 55 per thousand can be anticipated and this will increase the proportion of young children in the project settler population, already high as a result of selection criteria. This high birth rate, apart from its impact on the natural growth rate in the community, will impose increasing constraints upon the education facilities required and increase the requirements for maternal and child health services.

It is recommended that population studies be included in the Project Plan so that projections of populations can be examined during the period of early settlement to test their validity. The registration of settlers on first arrival should include demographic data collection, whilst vital statistics data collection could become part of the work of the village health worker and provide important information on birth rates and mortality upon which accurate predictions would be possible.

Spouse	1.00	0.50
Sons	1.40	2.67
Daughters	1.20	2.50
Other Relatives	0.40	0.80
Non-Relatives	0.10	0.40
Total Dependents	4.10	7.67

AVERAGE FAMILY STRUCTURE OF KENYA POPULATION
 COMPARED WITH HOLA IRRIGATION SCHEME



Average Household	Kenya	Hola
Head	1.00	1.00
Wife (first)	0.70	1.00
Co-wife	0.05	0.58
Sons	1.45	2.67
Daughters	1.25	2.08
Other Relatives	0.80	0.88
Non Relatives	0.13	0.45
Total Dependants	4.38	7.66

Table 6.4 - Birth rates and mortalities in rural Luo communities and Luo residents of irrigation schemes

Item	Rural Nyanza	Irrigation Schemes		
		Ahero On and off scheme	Ahero On scheme	Bunyala On scheme
Birth rate per 1 000	43	54	65	52
Crude death rate per 1 000	11	16	17	34
Infant mortality per 1 000 live births	112	170	175	367

CHAPTER 7 CONCLUSIONS

7.1 Population Growth and Structure

The implications for the Bura Project are considerable. In both the irrigation schemes studied families were living near to their original homes. Population pressure in such situations can be dissipated into surrounding rural areas. This is unlikely to be the case for the Bura Project where families will be migrating from their original homes. The following conclusions can be drawn:-

- (a) The natural population growth rate will be greater than the projected rate for Kenya generally of 3.2 per cent;
- (b) the population structure would increasingly tend towards a younger population with increasing numbers of children below 5 years of age. This would occur not only as a result of tenancy selection but also, if other schemes provide an accurate indication, by the high birth rate occasioned by the excess young fertile women. Assuming an infant mortality of 120 per 1 000 live births and a toddler mortality of 20 per 1 000, then with a birth rate of 50, 20 per cent of the population will be below 5 years of age, and at a birth rate of 60, almost 25 per cent.

7.2 Health Implications

From the foregoing it is clear that tenant families on the Bura Project would increase more rapidly than in Kenya as a whole. The initial family size would need to be about seven to meet the settler selection criterion of four adult units to serve a holding. Thus provision must be made for an increase of tenant family above this size.

It is generally considered that a family size of ten would be adequate, allowing for wastage with older children marrying and moving out of the project. Planning considerations require the provision of 23 villages of different levels. These could absorb the increase of family size without exceeding a maximum population of 2 500 per village, and the water supply and other facilities provided for the villages would not be overloaded. However more emphasis must be laid on maternal and child health and nutrition, to cope with the anticipated large proportion of children.

INTRODUCTION

It is becoming increasingly recognized that adequate systems of epidemiological surveillance are important components of health care programmes. Surveillance is required to establish the occurrence of defined diseases in the community and to measure changes occurring either naturally or as a result of major health care input. The importance of surveillance increases in a situation like the Bura Project with the inherent tendency to instability of disease transmission and the potential for introduction of exotic disease. The value of surveillance programmes is dependent upon both the quality of field data collection and the collection and presentation of results so that appropriate health care programmes can be developed and evaluated.

Surveillance techniques could be applied to the overall health care programme rather than restricted to specific aspects of health care. Emphasis is essential on diseases of existing or potential importance especially where control programmes are operative. Emphasis must also be placed on the development of simple techniques of surveillance readily quantitated in the field situation.

Health care programmes in existing irrigation schemes in Kenya are operated both by the Ministry of Health and the National Irrigation Board, the Ministry providing health care facilities such as health centres and dispensaries, whilst NIB has the responsibility for operating wellstocking and fertilizer and insecticide programmes. No systematic evaluation of these features on human disease prevalence is carried out. Existing schemes however are relatively small and not sufficient to serve a considerable population settlement component as in the Bura Project. The Bura Project will require a single controlling authority, with responsibility for all aspects of health care, to provide an integrated programme with effective evaluation.

PART 4

DISEASE SURVEILLANCE AND CONTROL PROGRAMMES

INTRODUCTION

It is becoming increasingly recognised that adequate systems of epidemiological surveillance are important components of health care programmes. Surveillance is required to establish the importance of various diseases in the community and to measure changes occurring either naturally or as a result of specific health care input. The importance of surveillance increases in a situation like the Bura Project with the inherent tendency to instability of disease transmission and the potential for introduction of exotic disease. The value of surveillance programmes is dependent upon both the quality of field data collection and the collation and presentation of results so that appropriate health care programmes can be developed and evaluated.

Surveillance techniques should be applied to the overall health care programme rather than restricted to specific diseases. Emphasis is essential on diseases of existing or potential importance especially where control programmes are operative. Emphasis must also be placed on the development of simple techniques of surveillance, readily quantitated in the field situation.

Health care programmes in existing irrigation schemes in Kenya are operated both by the Ministry of Health and the National Irrigation Board: the Ministry providing health care facilities such as health centres and dispensaries, whilst NIB has the responsibility for operating mollusciciding programmes and malaria chemoprophylaxis. No systematic evaluation of these measures on human disease prevalence is carried out. Existing schemes however are relatively small and not associated with a considerable population settlement component as in the Bura Project. The Bura Project will require a single controlling authority, with responsibility for all aspects of health care delivery to provide an integrated programme with effective evaluation.

An important factor in selecting the introduction of large health staff is the need to monitor disease epidemics in the communities. Identification of disease outbreaks needs to be as rapid as possible so that they can be mobilised effectively. Surveillance based on routine notifications is often ineffective and distorted by various factors. The community based surveillance system must be supplemented by specific epidemiological surveys and would provide information on malaria, schistosomiasis, nutritional status, and other infectious diseases.

3.4 Laboratory Support Services

Laboratory facilities are required to improve the quality of epidemiological investigations. Some facilities are available on the project at the proposed Health Centre and will be used for the examination of parasitological material concerned with the diagnosis of malaria, schistosomiasis, and intestinal parasites and flukes; simple serological examination of human and animal reservoirs and basic bacteriology.

National facilities will be required especially for serological studies and periodic international facilities for epidemiological studies such as entomology.

3.5 Statistical Facilities

The introduction of new research techniques and the evaluation of control programmes will utilize considerable computerising and computing facilities. Facilities are available within the Division of Communicable Disease Control in cooperation with the Central Bureau of Statistics for the data processing requirements although statistical assistance would be necessary during the establishment of the programme.

CHAPTER 8 REQUIREMENTS OF DISEASE SURVEILLANCE

8.1 Disease Notification

The Ministry of Health is in the process of setting up a national disease surveillance programme utilising notifications from static health care facilities throughout the country. The importance of developments in the Tana River area has prompted the Ministry to initiate this system in the Tana River District (established in February 1977) ahead of other areas. This will provide the basis for surveillance of the area expanded to provide more detailed surveillance for diseases of particular importance and to evaluate disease control programmes.

8.2 Demographic Definition

The value of surveillance systems can be greatly improved when data are collected from clearly defined populations. The Bura Project population will be registered as tenants arrive in the area, allowing the collection of demographic information with little effort, providing a sound population base on which to interpret epidemiological findings. The village workers would then be responsible for maintaining these records and notification of births and deaths within their communities. Such community registers would provide the basis for population sampling as well as providing mortality data and permitting accurate assessments of population growth in the scheme population.

8.3 Disease Surveillance

An important reason for suggesting the introduction of village health staff is the need to monitor disease endemicity in project communities. Identification of disease outbreaks needs to be as rapid as possible if facilities are to be mobilised effectively. Surveillance based on hospital notifications is commonly ineffective and distorted by various factors. The community based surveillance system would be supplemented by specific epidemiological surveys and would provide surveillance of malaria, febrile disease, schistosomiasis, nutritional status, and childhood infectious diseases.

8.4 Supportive Laboratory Services

Laboratory facilities are required to improve the quality of epidemiological data collected. Local facilities are required within the project at the proposed Health Centre and Hola hospital for the examination of simple parasitological material concerned with the diagnosis of malaria, schistosomiasis and intestinal parasites and filariasis; simple haematological examination; examination of disease vectors and animal reservoirs and basic bacteriology.

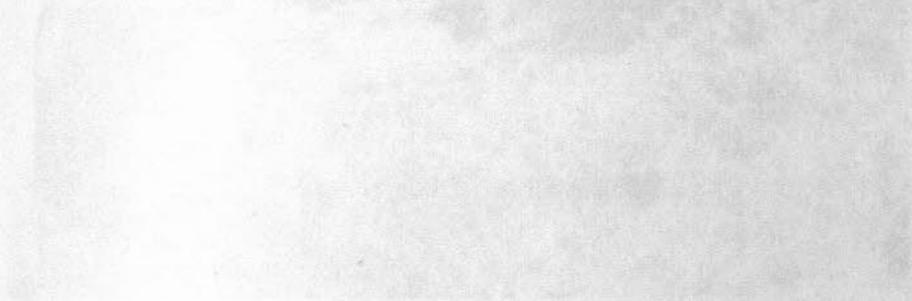
National facilities will be required especially for serological studies and perhaps international facilities for specialised techniques such as virology.

8.5 Statistical Facilities

The introduction of surveillance techniques and the evaluation of control programmes will utilise considerable data processing and computer facilities. Facilities are available within the Division of Communicable Disease Control in association with the Central Bureau of Statistics for the data processing requirements, although statistical assistance would be necessary during the establishment of the programme.

8.6 Data Reporting

As previously stressed surveillance systems depend on the development of effective reporting and subsequent action if they are to achieve worthwhile impact on community health. All levels of staff within the health care programme should be kept informed of the results of surveillance and information needs to be concise and rapidly disseminated to maintain the interest and motivation of health personnel. Specific responsibility within the Ministry of Health should be determined so that resources can be mobilised to implement control programmes when dictated by the epidemiological circumstances.





Surveillance and control-testing for water-borne diseases



Collecting specimens from villagers for disease assessment

CHAPTER 9 MALARIA SURVEILLANCE AND CONTROL

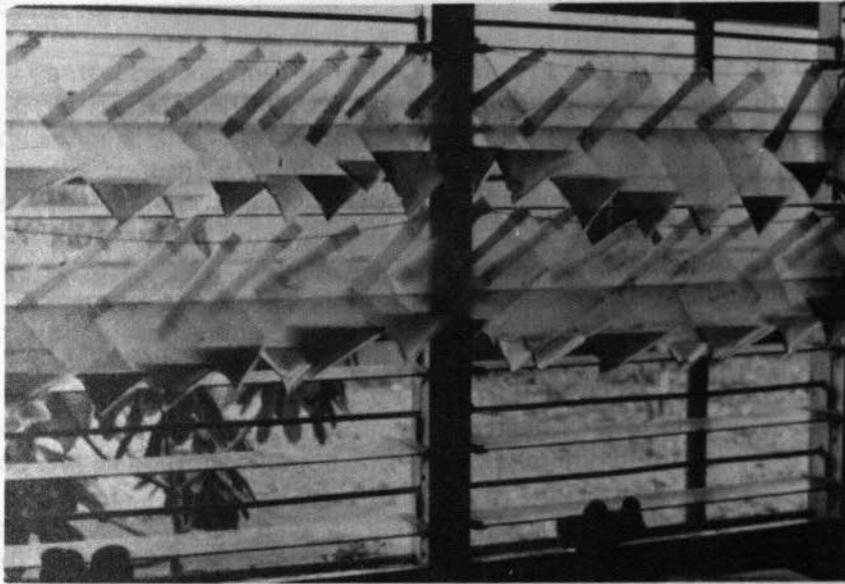
9.1 Introduction

Undoubtedly malaria is one of the most important and threatening disease problems facing our development programmes. Epidemiological surveys have defined the existing patterns of transmission in the area. However the complexity of the development field has that continued epidemiological assessment will be required during the introduction of the project to ensure satisfactory control programmes to be developed. Water improvement will undoubtedly lead to an increase in available vector breeding sites especially at unregulated sites. The introduction of a substantially non-immune population will increase the transmission potential, a situation comparable to MacDonnell's reference to "Malaria of tropical regions of labour" (4). The widespread use of insecticides in cotton cultivation has a demonstrable effect on vector populations on the field scheme although such a situation would also dramatically with the introduction of insecticides.

The failure of malaria control programmes in the Organisation to control the problem (5). The programme has been replaced by improvements in rural health care and high economic and social development.

Especially in the case of a high proportion of the population means could cause the progress of the disease to a stable pattern as the morbidity in children.

The Kenya Government in the foreseeable future; the distribution of malaria and the vector control measures in large urban conurbations.



Cheap and effective method of testing for schistomiasis infection

Curative facilities would be provided at the village level by the village health worker. It is therefore imperative that village staff are selected and trained in advance. The Neta Irrigation Scheme would provide a suitable environment where field training programmes could be established. Village staff would also be trained to take blood films for parasitological diagnosis. Work programmes would be supervised both by the community nurse from the local static facility and disease surveillance staff.

Health education would be promoted by all levels of the health care staff. Emphasis would be placed on the effects of malaria and the simpler preventative methods that can be developed by the family and the community. Health staff should hold village discussions and attend schools for health education talks.

Preventative measures have been considered for village infrastructure design and agricultural practices. This is discussed more fully in the section concerned with vector control. Apart from these environmental measures aimed at reducing vector populations, preventative measures available consist of measures designed to control vector populations either at the larval or adult stage, the provision of prophylaxis to the population, and the promotion of personal measures which can be taken by the community.

Initially it is recommended that chemoprophylaxis is distributed to all settlement families while they are settling in and building their homes. Following this however, curative treatment at the village level will replace total population chemoprophylaxis, with continuing twice monthly

CHAPTER 9 MALARIA SURVEILLANCE AND CONTROL

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The failure of malaria control programmes in tropical Africa has recently led the World Health Organisation to issue a policy statement concerned with the organisation's inability to tackle the problem (5). The enthusiasm of the last decade for malaria control and eradication programmes has been replaced with the concept of limiting the mortality and morbidity from malaria by improvements in rural health care programmes. However, the Bura Project must be considered of high economic and social priority.

Especially in the early years of settlement malaria will be unstable and unpredictable whilst a high proportion of the population remain virtually non-immune. In consequence epidemics of malaria could cause a high morbidity and mortality in all age groups, possibly jeopardizing the progress of the development. However, in time, the epidemiology of malaria would revert to a stable pattern as the immune status of the community changes, with high infection rates and morbidity in childhood and an adult population with substantial immunity.

The Kenya Government does not envisage time-limited eradication programmes within the foreseeable future; neither are there any malaria control programmes in operation apart from the distribution of malaria chemoprophylaxis on small irrigation and land development schemes, and vector control measures in larger urban conurbations.

Curative facilities would be provided at the village level by the village health worker. It is therefore imperative that village staff are selected and trained in advance. The Hola Irrigation Scheme would provide a suitable environment where field training programmes could be established. Village staff would also be trained to take blood films for parasitological diagnosis. Work programmes would be supervised both by the community nurse from the local static facility and disease surveillance staff.

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prophylaxis only to young children from birth to five years, pregnant women and high risk groups.

Other malaria measures should be utilised only as dictated by the epidemiological circumstances. Surveillance will indicate high risk situations with epidemic potential, when mass treatments or limited prophylaxis may be indicated.

The use of insecticides in this situation with extensive agricultural use is not recommended, apart from limited larvicidal measures in the vicinity of villages. However stocks of insecticides and applicators must be kept available in case such measures are required either for malaria control or the control of other mosquito transmitted disease, especially arboviruses.

Strategies for malaria control should consider three separate aspects of the development:

- (a) The period of construction
- (b) The early period of settlement
- (c) The established irrigation project

9.2 The Period of Construction

The construction of the works will extend over several years with main camp sites at the head weir and the irrigation project area. This construction will increase vector breeding sites and both labourers and senior staff will be exposed to malaria.

All levels of staff should receive regular malaria chemoprophylaxis with an adult dose of 300 mg of chloroquine base every two weeks. Families of staff resident in the area will also require prophylaxis, and, in all groups, this should be continued for four weeks after leaving the area. Curative facilities will be required both at the project camp site and at the Nanigi weir site.

Environmental measures include the use of screening of sleeping accommodation and the use of bed nets. Established camp sites should be situated as far as possible away from breeding sites, and attention to drainage around the camp site will reduce the potential breeding situations.

9.3 The Early Period of Settlement

During this period there will be considerable risk of epidemics of malaria as non-immunes are introduced into the area. Many families will be unfamiliar with malaria and in consequence take inappropriate action. Widespread uncontrolled outbreaks could well adversely affect the settlement programme, whilst high sickness rates during this early period, when tenants construct homes, learn to farm their holdings and adapt to a new way of life, could be disastrous.

Malaria programmes during this period must therefore aim at providing the maximum available protection from infection and provide adequate curative facilities. Both preventative and curative services must be well understood by the community, and an intensive health education programme will be essential.

CHAPTER 10 SCHISTOSOMIASIS SURVEILLANCE AND CONTROL

10.1 Introduction

Schistosomiasis is perhaps the most familiar irrigation-related disease in tropical Africa. Almost without exception, the impoundment of water in arid areas has led either to an increase in disease transmission or to the introduction of schistosomiasis. Despite often heroic measures control programmes have had unimpressive results.

The evidence available for the Hola Scheme suggests that despite the provision of village water supplies including showers and laundry facilities, pit latrines for each family, and a regular mollusciciding programme, schistosomiasis transmission has increased considerably. It is considered improbable that similar measures would have any greater effect on the transmission of schistosomiasis on the Bura Project.

Strategies for schistosomiasis control should consider three separate aspects of the problem:

- (a) The presence of infection in existing, rural communities and the Hola Irrigation Scheme and the prospects of introducing control programmes prior to project development.
- (b) The design of the irrigation project to minimise future schistosomiasis transmission.
- (c) The development of a schistosomiasis control programme in the Bura Project.

10.2 Control Prior to Development

The presence of high levels of endemicity on the Hola Scheme and in neighbouring populations will promote the early introduction of infection and transmission on the Bura Project. In particular the Hola Scheme will provide an important focus for both snails and parasites. It is strongly recommended that control programmes be initiated at Hola at the earliest opportunity and that programmes should be extended into neighbouring rural communities in a determined attempt to reduce transmission before development commences. The existing low population density would render such programmes relatively cheap compared with the future benefit to the Bura Project. Control programmes would be based upon (a) case detection and treatment with metrifonate (a cheap effective orally administered antischistosomal drug), and (b) mollusciciding the irrigation scheme and seasonally-filled ox-bow lakes and depressions associated with rural transmission.

10.3 Irrigation Design to Minimise Transmission

The design of irrigation projects both in terms of water management and the provision of satisfactory environmental infrastructure is considered of great importance to minimise schistosomiasis transmission. In particular, the provision of adequate drainage, where seepage and stagnant pools provide ideal habitats for snails; night-storage reservoirs can also provide suitable snail habitats and where these are essential to the design of a project they should be sited remote from human settlement.

Village design and siting will also have an important effect on future schistosomiasis transmission. Planning of villages in the Bura Project has attempted to promote the utilisation of clean water supplies and facilities by: (a) providing a fully reticulated water system to project villages, a water point would be supplied for each group of 12 homes and the facility for household water to individual houses at the tenants expense; (b) by clustering homesteads in 'inward looking' clusters

with watering facilities placed centrally; (c) by creating village vegetable gardens away from housing areas rather than within the village, and (d) by the introduction of a bathing area within the village which it is hoped will provide a focus for children to play. These bathing areas will be provided with pretreated water and with adequate health education in parallel, will divert children from the irrigation canals. It is appreciated that such areas if neglected, could lead to intensified transmission if snail populations became established. Health personnel, including the village health worker, would play an important role in surveillance of these areas.

10.4 Schistosomiasis Control

Schistosomiasis control on the established project will need to be developed and reviewed in the light of epidemiological findings. Emphasis is placed here on the predevelopment aspects and the environmental aspects of scheme design.

Molluscicides have been used extensively on many tropical irrigation schemes, either alone or in association with chemotherapy. Costs are difficult to estimate although WHO in 1973 estimated the cost per caput in existing control programmes ranged from \$US 0.4 to 12.0. Cost estimates for mollusciciding programmes in Kenya for the same year varied from 4 to 10 K sh per acre.

Chemotherapy to infected populations has also been shown to have beneficial effects in terms of prevalence of infection. A substantial obstacle has been the toxicity of available treatments. Metrifonate would appear to offer a suitable treatment at the community level, being a cheap oral preparation with little toxicity. It is ineffective against *S. mansoni* and so whilst of limited use in many irrigation developments with both parasites present, offers a satisfactory chemotherapeutic agent in the Bura Project. Attention will have to be directed towards assessing the drug whilst organophosphorus aerial spraying is being carried out although existing evidence does not suggest that this represents a substantial hazard. Monitoring of cholinesterase activity should be carried out during preliminary drug trials. It is possible that this drug offers a method of population treatment on a regular basis utilising low dose schedules costing less than K sh 2.00 per caput.

The place of mollusciciding on the Bura Project requires further evaluation. Trials are urgently needed on the Hola Scheme to assess the efficiency of various mollusciciding techniques with Frescon and Bayloscide. Such trials should be carried out during the initiation of control programmes at Hola and in rural communities. Molluscicide dosages to irrigation canals will be inactivated before entering the drainage systems owing to the irrigation methods practised, and molluscicides would have to be applied on a focal basis, apart from general application to the project.

The approach to control is therefore to institute an integrated control programme on the Hola Scheme and in rural communities throughout the project area. When settlement on the Bura Project begins, infected tenant farmers and their families should be treated on arrival and a system of surveillance established to monitor both snail populations and disease transmission. Mollusciciding will be required initially for the village facilities and vegetable gardens. Diagnosis and treatment services will be required at health facilities and an intensive programme of health education should be carried out in the project villages. The nature and extent of future mollusciciding programmes can only be determined after trials in the area, although costing has assumed the application of Frescon to the main branch canals at a concentration of 0.1 ppm for 10 hours by drip feed on a two-monthly application cycle. Molluscicides will be applied using a drip feed to the bathing area on a weekly basis, overnight.

Attention should be given to the extension of schistosomiasis control programmes beyond the project area. The infection is very prevalent and available control programmes could be applied to rural communities at relatively low cost compared to alternative control techniques. The anticipated resulting reduction in infection should not only reduce the prevalence but also the intensity of infection, and could be of substantial benefit in decreasing the morbidity of the disease at the community level. Preliminary trials using metrifonate at a single dose treatment of 10 mg per kg have been received with enthusiasm by the population, although evaluation has not yet been completed.

CHAPTER 11 DISEASE VECTOR SURVEILLANCE AND CONTROL

11.1 Vector Surveillance

In recent years, increasingly precise techniques have been developed for sampling mosquito populations, thus providing quantitative information on populations. The use of standardised light trap systems provides a method of sampling populations in various situations which is not dependent upon the skill or enthusiasm of the staff, and is economic in terms of manpower requirements.

Vector surveillance should therefore be carried out in the Bura area with standard CDC light traps, initially in three clusters of homesteads, randomly selected. Four night-sampling cycles each month would provide information on house haunting mosquitoes and indicate seasonal trends or the introduction of unusual species.

Such routine adult mosquito sampling would require to be supplemented by additional techniques following epidemiological findings, and would include 'knock down' house sprays, hand catches and animal-baited catches to detect mosquito species not being sampled by light trap methods. These surveys would be required both on the project and in the surrounding areas to detect the availability of important species, such as *Aedes spp.*

Laboratory assessment would include determining the sporozoite rate, examination of mosquito pools for arbovirus infections and determination of the chromosome type of *A. gambiae* on the project.

Regular examination will be required of *C. fatigans* and *A. gambiae* for the emergence of insecticide resistance both in adults and larvae.

11.2 Vector Control

Successful vector control is dependent upon elimination of available breeding habitats as a result of good irrigation design and management. Borrow pits and depressions should be filled and levelled to avoid rainfall pooling, especially in the vicinity of villages. Roadside drains, especially in the vicinity of the administrative/rural centre should be constructed to avoid pooling, and rainwater drains must be adequate to cater for heavy rainfall. Irrigation canals will require regular vegetal cleaning and good water management. Particular emphasis is placed on the construction of properly designed, constructed and maintained drainage systems to ensure disposal without pooling.

Subject to satisfactory irrigation management and scheme design, mosquito control would be limited to the application of larvicidal measures in the vicinity of villages and habitation. Particular attention will be given to stagnant water collections around communal water points and facilities as well as soakaway pits, roadside drains and irrigation seepages.

Trials are required at the Hola Scheme to devise suitable larvicidal techniques, which, whilst providing maximum effectiveness, do not require extensive insecticide application.

11.3 Snail Control

The principles that apply to the control of vector populations in terms of project design and management also apply to the control of snail populations. Fundamental importance is attached to project design and the efficient utilisation of water and effective drainage systems. The intermediate host snail *B. globosus* is present throughout the area. On the Hola Scheme it appears to favour concrete weirs and seepages. Emphasis is placed on the development of environmental control programmes aimed at limiting human exposure to infection.

Total Bura Project mollusciciding would require the application of molluscicides at eight to ten week intervals to the branch canals immediately below the night-storage reservoirs, and additional 'blanket' treatment to all drainage systems and any stagnant pools in the vicinity of villages. Water for the village bathing pools will be fed by molluscicide-treated water.

The value of various fish species should be investigated to determine the effect on snail populations, growth of vegetation and mosquito breeding.

Snail surveillance at Hoiia has indicated the ability of *Bulinus globosus* to maintain high infection rates both on the irrigation scheme and in rural communities, despite low snail population densities. Improved catches of snails have been collected using standard sized palm leaf mats in both situations. This method appears to offer a satisfactory means of assessing snail populations. Regular collection of snails should be carried out at 6 selected sites in each of the block feeder canal systems, supplemented by 'scooping' randomly at a further 30 sites. Particular attention will be required in bathing areas and in the village vegetable gardens or other peri-domestic situations. Vector snails collected will be examined for cercarial shedding.

12.2 The Impact of Settlement

The introduction of a large settlement community into the area will pose considerable problems in the provision of services, food to these groups prior to the development of aquaculture, especially in an area with poor communications and lack of infrastructure.

The most vulnerable members of the settlement community will be the younger children and pregnant and lactating women. Many families will have come from poor situations, and many will have been landless. It is anticipated that these groups will arrive in a poor nutritional state. The dietary needs of these immigrant groups will require assessment.

Nutritional Assessment

Tenant agreements should include an assessment of nutritional status including, as a minimum, height, weight and measurement of infants and small children and clinical assessment of nutritional status. Sampling would define groups, families and individuals in need of supplementation and rehabilitation.

Food Requirements of the Settlement

In the situation of a rapidly expanding population, acute shortages of food could readily occur if the community is dependent on supplies from local production from terraced home gardens.

The possibility of the provision of food and maintenance of nutrition during the early settlement period has been considered. The first is to distribute food for consumption and conservation of home stocks. The alternative is to provide dietary meals for the infants until home produced crops are available.

Clearly there is a conflict between making adequate provision for nutrition, particularly for women and children, and the very establishment of a sense of independence and self-reliance in

CHAPTER 12 NUTRITION AND NUTRITIONAL SURVEILLANCE

12.1 General

The introduction of irrigation and settlement in the Bura area will pose considerable problems in relation to the provision of food and maintenance of nutritional status of the tenants and their families. Initial nutritional status of tenants can be anticipated to be poor, because many will come from the poorer sectors and many will be landless. The most critical period will be the early settlement period before crops are grown on household gardens at a time when tenants are facing a variety of other stresses.

Nutritional studies in existing populations show moderate levels of sub-nutrition, especially in nomadic groups, and further indicate that the nutritional status of tenants on the Hola Scheme is no better than in neighbouring Pokomo villages. In addition to protein energy malnutrition - marasmus and kwashiorkor, anaemia is prevalent, especially in children and adult women.

The development of adequate nutritional programmes is complicated by the need to integrate a wide variety of community services and expertise, involving various ministries and agencies. The interaction of nutrition and infection also plays an important role; whilst malnutrition contributes to the morbidity of a variety of infectious diseases, these diseases may adversely affect nutritional status. Nutrition cannot therefore be viewed in isolation, but must be tackled within the overall health care framework.

Programmes will require further planning when the settlement programme is more clearly defined.

12.2 The Initial Period of Settlement

The introduction of a large settlement community into the area will pose considerable problems in the provision of adequate food to these groups, prior to the development of agriculture, especially in an area with poor communications and lack of infrastructure.

The most vulnerable groups of the settlement community will be the younger children and pregnant and lactating women. Many families will have come from poor situations, and many will have been landless. It can be anticipated that these tenants will arrive in a poor nutritional state. The dietary habits of the various immigrant groups will require assessment.

Nutritional screening on arrival

Tenant screening on arrival should include an assessment of nutritional status including, as a minimum, height and weight measurement of infants and small children and clinical assessment of nutritional disease. Screening would define groups, families and individuals in need of supplemented feeding and rehabilitation.

Food supplies during early settlement

In the situation with a rapidly expanding population, acute shortages of food could readily occur if the community were dependent on supplies from local production from tenants' home gardens.

Two approaches to the provision of food and maintenance of nutrition during the early settlement period have been considered. The first is to distribute food for preparation and consumption at home; the alternative is to provide cooked meals for the tenants until home produced crops are available.

Clearly there is a conflict between making adequate provision for nutrition, particularly for women and children, and the early establishment of a sense of independence and self-reliance in

tenant families. Moreover, the sociological effects, notably the elimination of the basic family activities of food preparation, cannot be disregarded. These problems could not be studied in depth in the time available and must be a prior task of the Sociologist and the ODM nutritional specialists.

The supply of food must take account of the dietary habits of the various settlement groups, nutritional values of various foods and their storage characteristics. Maize will be the staple for most tenants, but will require supplementation with pulses, vegetables and animal protein.

The provision of food to the population during this early settlement period could beneficially include the introduction of fortified staple foods which might include the addition of iron, niacin or lysine.

12.3 Nutritional Surveillance

Once agriculture is established on the project, a programme of nutritional surveillance will be required. Studies on other irrigation schemes in Kenya suggest that such developments are not associated with improved nutritional status of the community; indeed evidence suggests that the families of tenants growing cash crops may be at a disadvantage compared to their rural counterparts. The provision of kitchen gardens should improve this situation.

The surveillance programme would be operated through the proposed health care facilities and could utilise the village health worker to carry out simple population-based nutritional surveys, indicating the nutritional status of the community as well as defining individuals at high risk.

12.4 Food Supplementation

In addition to fortification of staple foods, consideration could be given to the introduction of special supplementation for infants and young children. Possibilities such as the introduction of soya flour oil for addition to maize and millet gruels should be thoroughly investigated. Supplementation to young children and pregnant women, especially when associated with sub-nutrition, should be provided free of charge, possibly subsidised from the sale of distributed food.

INTRODUCTION

These documents will be reviewed as the Eura Project requires separate consideration in view of their importance:

- (a) ... programmes in the period before development
- (b) ... in relation to ...
- (c) ... including tenant populations

PART 5

PROPOSED PRECOMMISSIONING HEALTH CARE

INTRODUCTION

PHILOSOPHY TO DEVELOPMENT

Three aspects of health care in the Bura Project require separate consideration in view of their importance:

- (a) Health care programmes in the period before development
- (b) Health care in labour forces
- (c) Health in intending tenant populations

It is therefore proposed that a disease surveillance and control unit be established at Hala Bole as a pre-development activity. This unit would be supervised by the members of the DDA Technical Co-operation Group, with assistance from the relevant departments of the Ministry of Health. During this period, the staff for the posts of senior clinical officer (SCO) and public health officer (PHO) for the Bura Project would be appointed, and join the team at Hala.

In addition to the SCOs and PHOs the team would consist of a programme supervisor, two field technicians, two laboratory technicians, two nutritional field assistants, two drivers and two attendants. The team would operate two mobile vans which would carry out basic epidemiological, laboratory and disease control programmes both on the Hala Scheme and in rural populations. Further details of the proposed unit.

Equipment and consumables will be provided from the existing Medical Research Council project equipment in Kenya. The programme would be directed and supervised by the DDA Technical Co-operation Group. The programme would be introduced following final funding decisions by the Ministry of Health, subject to an application to the British DDA from the Kenya Government and continuing technical co-operation.

Table 1.1 - Proposed Surveillance and Control Unit

Staff	Pre-development Team at Hala	Control Programme Team, Bura Project
Supervisor (Disease Surveillance)	1	1
Technical (Microbiology and Laboratory)	4	4
Nutritional (Field)	1	1
Small animal	1	1
Vector control	1	1
Attendants	2	2
Drivers	2	1

1.1.2 - Functions of the Unit

The functions of the disease surveillance and control unit would be:

- (a) To continue the collection of relevant epidemiological data on the Hala Scheme and neighbouring communities.
- (b) To institute disease control programmes for schistosomiasis and malaria on the Hala Scheme and identify communities between Hala and Murosani to reduce schistosomiasis transmission in the proposed project area.

CHAPTER 13 HEALTH CARE PRIOR TO DEVELOPMENT

13.1 Disease Surveillance and Control Unit, Hola

Existing epidemiological studies indicate that substantial improvements in community health could be instituted prior to the development of the Bura Project which would substantially facilitate the subsequent initiation of disease control programmes in the completed project. Furthermore the provision of adequate health care to the future Bura population is dependent upon the development of adequate systems of health care delivery and establishment of disease surveillance and control techniques to suit the local situation. Disease control programmes instituted on the Bura Project require to be developed and evaluated on the existing Hola Irrigation Scheme prior to widespread use on the Bura Project.

It is therefore recommended that a disease surveillance and control unit be established at Hola as soon as possible. The unit could be supervised by the members of the ODM Technical Co-operation team, with assistance from the relevant departments of the Ministry of Health. During this pre-development period staff for the posts of senior clinical officer (SCO) and public health officer (PHO) for the Bura Project would be appointed, and join the team at Hola.

In addition to the SCO and PHO the team would consist of a programme supervisor, two field technicians, two entomology technicians, two nutritional field assistants, two drivers and four attendant staff. The unit would operate two mobile teams which would carry out basic epidemiological data collection and institute control programmes both on the Hola Scheme and in rural populations. Table 13.1 gives details of the proposed unit.

Equipment and transport would be provided from the existing Medical Research Council project equipment in Kisumu, whilst the programme would be directed and supervised by the ODM Technical Co-operation team. The programme would be introduced following final funding decisions by the IBRD and other interested donors subject to an application to the British ODM from the Kenya Government for continuing technical co-operation.

Table 13.1 - Proposed Surveillance and Control Unit

Staff	Pre-development Team at Hola	Control Programme Team, Bura Project
Supervisor (Laboratory Technician)	1	1
Technical staff (Field and Laboratory)	4	4
Statistical clerk	1	1
Snail control	-	6
Vector control	-	4
Assistants	6	6
Drivers	2	1

13.2 Functions of the Unit

The functions of the Hola disease surveillance and control unit would be:

- (a) To continue the collection of relevant epidemiological data on the Hola Scheme and neighbouring communities.
- (b) To institute disease control programmes for schistosomiasis and malaria on the Hola Scheme and riverine communities between Nanigi and Pumwani to reduce schistosomiasis transmission in the proposed project area.

- (c) To initiate a disease surveillance system in the area.
- (d) To introduce a health care programme using village health workers in the Hota Scheme and neighbouring communities, and to develop a training programme prior to settlement at the Bura Project to provide a nucleus team of village health workers.

In addition to carrying out the predevelopment epidemiological studies and developing appropriate control programmes the ODM team would advise the Bura Health Planning Committee and institute epidemiological studies as indicated by the circumstances.

The unit would change function as the Bura Project was implemented. The staff would have received training and experience in the techniques of disease surveillance and monitoring. As development progressed they would increasingly be introduced into the Bura situation to establish the evaluation of the health care programme and to evaluate independently the epidemiological situation and impact of control programmes applied.

A system of mobile health units visiting all areas from time to time would be drawn up. Alternatively health workers could be stationed throughout the settlement to be responsible to particular families. It is preferred that both methods would be used in a flexible and open to change.

It is therefore proposed that health screening should be introduced at the time of settlement. In the period immediately following arrival tenants will be required to register with the health inspection board and complete a number of forms. Health evaluation could conveniently be carried out at the initial formalities. Where tenants arrive with families they can be seen at the same time and for advice arising in advance of their family arrangements for resettlement. Care should be taken to ensure that original selection for tenancy will have taken account of the health status of the family and in consequence severe disabling disease should be avoided.

The main purpose of the health checks is to examine the population for important transmissible disease, to instruct and counsel for important diseases which carry a high risk to the population, where control programmes are available, and provide immunisation as appropriate.

The following procedures should be carried out:

- (a) General health and simple clinical examination
- (b) Tuberculin test, chest x-ray and sputum examination (if necessary)
- (c) Serological test for syphilis and gonorrhoea
- (d) Serological test for hepatitis B virus (if available)
- (e) Serological test for malaria (if available)
- (f) Serological test for typhoid (if available)
- (g) Serological test for dengue (if available)
- (h) Serological test for leptospirosis (if available)
- (i) Serological test for brucellosis (if available)
- (j) Serological test for toxoplasmosis (if available)
- (k) Serological test for toxocara (if available)
- (l) Serological test for hookworm (if available)
- (m) Serological test for schistosomiasis (if available)
- (n) Serological test for giardiasis (if available)
- (o) Serological test for cryptosporidiosis (if available)
- (p) Serological test for amoebiasis (if available)
- (q) Serological test for trichinellosis (if available)
- (r) Serological test for echinococcosis (if available)
- (s) Serological test for toxocara (if available)
- (t) Serological test for toxoplasmosis (if available)
- (u) Serological test for toxocara (if available)
- (v) Serological test for toxoplasmosis (if available)
- (w) Serological test for toxocara (if available)
- (x) Serological test for toxoplasmosis (if available)
- (y) Serological test for toxocara (if available)
- (z) Serological test for toxoplasmosis (if available)

The proposed tests should be arranged to be as simple as possible to administer, as well as providing a uniform level of accuracy. The tests should be available from the start of the settlement and included in the health care package. The tests should be carried out in the settlement, wherever health screening is being carried out, or wherever it is necessary to be carried out or avoided if possible.

The opportunity could be taken at the time of settlement to provide health education to tenants and the health care facilities available and the importance of disease prevention in simple terms.

Ordering procedures would be operative during the time of settlement at a time when populations are relatively small and would therefore be easier to handle and facilities set up in advance of the settlement programme.

14.1 Health Screening

The introduction of tenant farmers from various areas of Kenya, many of whom will be poor and landless, raises many problems concerned with the need to screen tenants proposing to settle on the scheme. The risk of disease introduction by such groups has been stressed previously, as was the need to protect such groups from locally endemic diseases to which they were unfamiliar.

It is apparent that health screening is important at some stage prior to settlement. Two alternative approaches have been considered: the first being to carry out medical examination of tenants and their families prior to their move to the Bura Project, and the second to organise medical examination after their arrival.

Despite some obvious advantages, the proposal to screen tenant families in their places of origin would impose considerable financial and logistic constraints. Such a system would either require a system of mobile medical teams visiting all areas from which tenants would be drawn or alternatively health centres and hospitals throughout the country would have to be responsible for processing families. It is considered that both methods would be impracticable, expensive and open to abuse.

It is therefore proposed that health screening should be introduced at the site of settlement. In the period immediately following arrival tenants will be required to register with the National Irrigation Board at the Bura Project and complete various formalities. Health examination could conveniently be included in these initial formalities. Where tenants arrive with families these can be seen at the same time, and for those arriving in advance of their families arrangements for re-attendance can be made. It is assumed that original selection for tenancy will have taken account of the tenant's ability to farm his holding and in consequence severe disabling disease should be unusual.

The main purpose of such health checks is to examine the population for important transmissible disease, to institute treatment for important diseases (which carry a high risk to the population or where control programmes are in operation) and provide immunisations as appropriate.

The following procedures would be carried out:

- (a) Registration: simple clinical examination
- (b) Haemoglobin: stool examination and urine examination, blood film
- (c) Mantoux test followed by BCG as appropriate
- (d) Other immunisation procedures: including tetanus, DPT, measles, smallpox
- (e) Anthropometry as appropriate: simple techniques, such as QUACK stick for nutritional assessment
- (f) Arrangements for treatment

The proposed system has the advantage of being relatively easy to administer, as well as providing a uniform level of expertise. The tenant would appreciate at an early stage that health care was included in the new life he had chosen and would introduce him to the system, whereas health screening at his place of origin would be viewed as an obstacle to be overcome or avoided if possible.

The opportunity could be taken at this stage to distribute health education booklets setting out the health care facilities available and the important aspects of preventative medicine in simple terms.

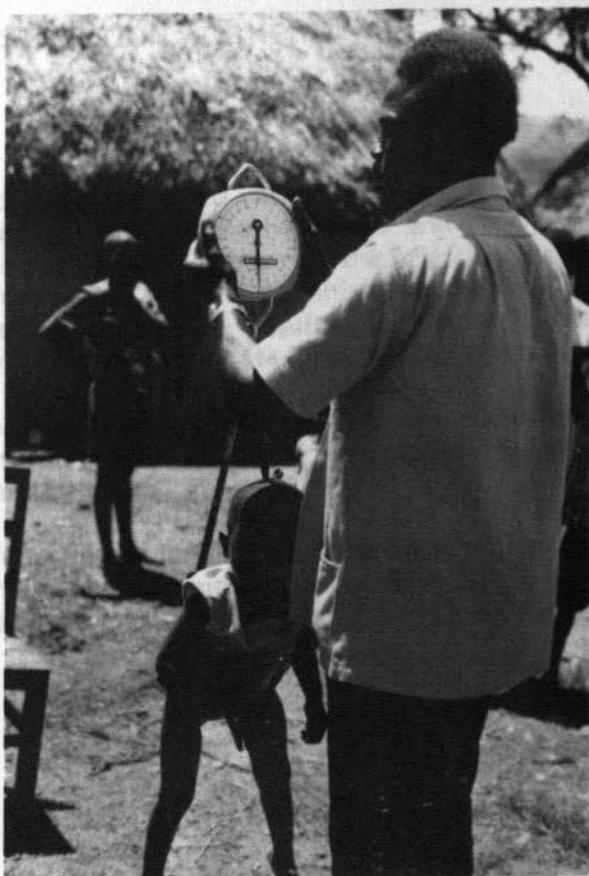
Screening procedures would be operative mainly during the early years of settlement at a time when populations are relatively small and would therefore utilise the staff and facilities set up in advance of the settlement programme.

15.1 General

The early growth of the project was in the health components. Work would be carried out in health facilities which will be required for the developing health care facilities at the Health Subcentres. Separate health facilities are probably

The labour force should receive special procedures can be implemented. In tropical areas can be dealt with at the

Facilities will be required to transfer patients to hospital or by air to Nairobi, depending on the new Homa Hospital, transport facilities



Weighing village children to assess nutritional status



Arm circumference measurement provides a simple measure of nutritional status

CHAPTER 15 HEALTH OF CONSTRUCTION WORKERS

15.1 General

The early growth of the project would be associated with the introduction of substantial labour components. Work would be carried out both at the head weir and on the irrigation system. Health facilities will be required for both groups. Labour on the irrigation scheme will make use of the developing health care facilities within the project initially in the Health Centre and later at the Health Subcentres. Separate facilities will be required for the weir construction force; mobile health facilities are probably the most appropriate, organised by a nursing sister.

The labour force should receive prior medical examination at which time immunisation procedures can be implemented. Instructions on aspects of preventative medicine such as malaria prophylaxis can be dealt with at the same time.

Facilities will be required to transfer seriously ill staff from the construction site either to Hola hospital or by air to Nairobi, depending upon the circumstances. Especially before completion of the new Hola hospital, transport facilities must be available for seriously ill and traumatic cases.

PART 9

REORGANISATION AND MANAGEMENT OF
PROJECT HEALTH CARE SERVICE

10.1 Introduction

Planning of health services for a development population of this type needs to consider the basic needs of the population to be served. Immigrant populations from various areas of Kenya will be introduced into the developing project changing an arid, sparsely populated area into a densely populated one. Associated with this rapid increase in population density there will be a variety of social changes caused by the introduction of irrigated agriculture, affecting the epidemiology of disease transmission in the area to a remarkably predictable extent.

Developing health services will have to be planned with these changes clearly understood.

10.2 Principles of service

The proposed health service for the Kura Project is essentially aimed at preventive and curative medicine at village level, supported by a two-tiered preventative, promotive and curative service. Diagnostic services and curative health care can be obtained at village level through simple health, hygiene and nutrition education coupled with simple prophylactic and curative medication. This can be achieved by modest training and at a modest cost, leaving more sophisticated curative services to be done with fewer resources. The basis of health care delivery is envisaged at village level.

- (a) ... health care facilities at village level from a village health worker,
- (b) ... to the project
- (c) ... curative facilities, including specialist medical ... and diagnostic laboratory and diagnostic facilities, from local

**PART 6
PROPOSED ORGANISATION AND MANAGEMENT OF
THE PROJECT HEALTH CARE SERVICE**

Figure 16.1 shows the proposed health service in diagrammatic form.

In addition to the village level health care system, a surveillance and control unit will provide early control against disease epidemics.

It is essential that the proposed health care service be flexible, so that it can adjust rapidly to any major problems which may arise, either in a particular geographical area or health field.

CHAPTER 16 BASIC PHILOSOPHY

16.1 Introduction

Planning of health care facilities for a development population of this type needs to consider the unique nature of the communities to be served. Immigrant populations from various areas of Kenya will be introduced into the developing project changing an arid, sparsely populated area into a densely populated 'island'. Associated with this rapid increase in population density there will be a variety of ecological changes caused by the introduction of irrigated agriculture, affecting the epidemiology of disease transmission in the area to a variably predictable extent.

Developing health care services require to be planned with these changes clearly understood.

16.2 Principles and Criteria

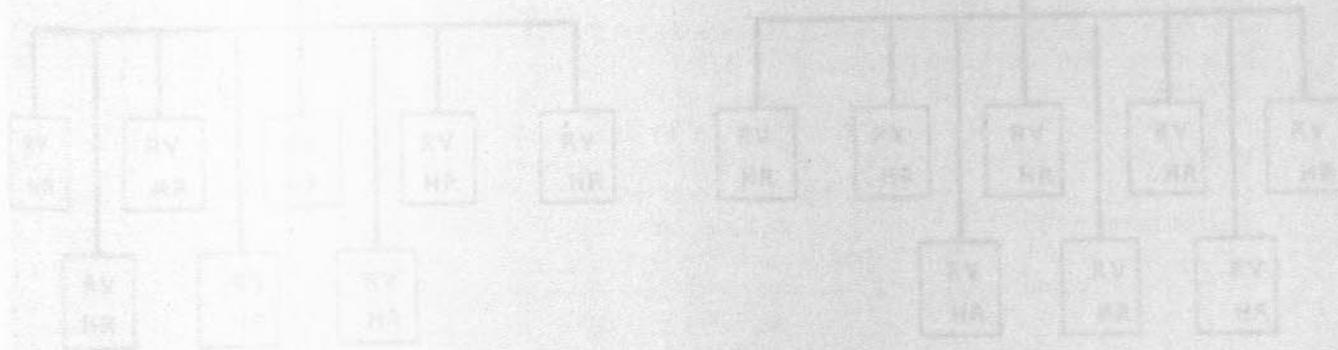
The proposed health care for the Bura Project is essentially aimed at preventative and control measures at village level, supported by a two-tiered preventative, promotive and curative service. Considerable preventative and control health care can be attained at village level through simple health, hygiene and nutrition education coupled with simple prophylactic and control medication. This could be achieved by modest training and at a modest cost, leaving more sophisticated curative facilities to cope with fewer serious cases. The basis of health care delivery is envisaged at three levels:

- (a) Simple health care facilities at village level from a village health worker.
- (b) Immediate curative, promotive and preventative services to the project communities from a Health Centre or Subcentre.
- (c) Relatively sophisticated curative facilities, including specialist medical services and supportive laboratory and diagnostic facilities, from Hola hospital.

Figure 16.1 shows the proposed health service in diagrammatic form.

In addition to the three-level health care system, a surveillance and control unit will provide vector control and a warning system against epidemics.

It is essential that the project health care service be flexible, so that it can adjust rapidly to any major problem which might arise, either in a particular geographical area or health field.



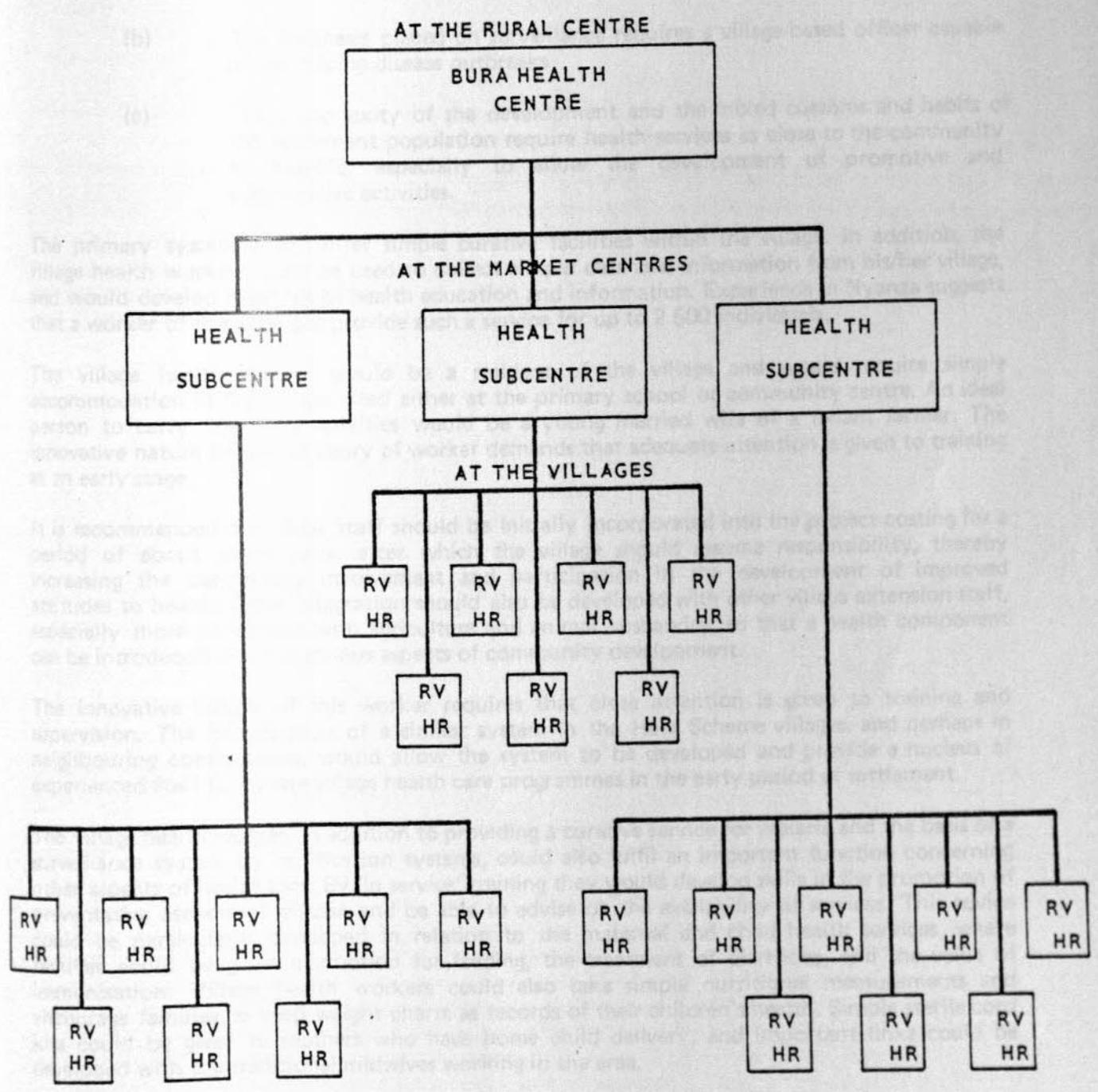
THE BURA HEALTH CARE SERVICE ORGANISATION

CHAPTER 17 ORGANISATIONAL STRUCTURE

17.1 Village Health

The introduction of a system of primary health care operative at the village level, whilst unusual in Kenya, is strongly recommended for the following reasons:

- (a) The prevention of the impact of malarial requires a village level surveillance and control system.
- (b) The village based approach to health care is more effective than the hospital based approach.
- (c) The village based approach is more economical than the hospital based approach.
- (d) The village based approach is more acceptable to the community.
- (e) The village based approach is more flexible than the hospital based approach.
- (f) The village based approach is more sustainable than the hospital based approach.



RVHR - RURAL VILLAGE HEALTH WORKER

The scope and limitations however of such work must receive careful consideration. The development of such a system in the Hala Bora Scheme as proposed in the report would enable an evaluation of this type of organization.

CHAPTER 17 ORGANISATIONAL STRUCTURE

17.1 Village System

The introduction of a system of primary health care operative at the village level, whilst unusual in Kenya, is strongly recommended for the following reasons:

- (a) Containment of the impact of malaria requires a village level surveillance and treatment system
- (b) The emphasis placed on surveillance requires a village-based officer capable of identifying disease outbreaks
- (c) The complexity of the development and the mixed customs and habits of the settlement population require health services as close to the community as feasible, especially to allow the development of promotive and preventative activities.

The primary system would offer simple curative facilities within the village. In addition, the village health worker would be used to collect simple data and information from his/her village, and would develop methods of health education and information. Experience in Nyanza suggests that a worker of this type can provide such a service for up to 2 500 individuals.

The village health worker would be a resident of the village and would require simple accommodation in the village, sited either at the primary school or community centre. An ideal person to carry out such activities would be a young married wife of a tenant farmer. The innovative nature of this category of worker demands that adequate attention is given to training at an early stage.

It is recommended that these staff should be initially incorporated into the project costing for a period of about three years, after which the village should assume responsibility, thereby increasing the community involvement and participation in the development of improved attitudes to health. Close integration should also be developed with other village extension staff, especially those concerned with agriculture and animal husbandry, so that a health component can be introduced into the various aspects of community development.

The innovative nature of this worker requires that close attention is given to training and supervision. The introduction of a similar system in the Hola Scheme villages, and perhaps in neighbouring communities, would allow the system to be developed and provide a nucleus of experienced staff to initiate village health care programmes in the early period of settlement.

The village health worker, in addition to providing a curative service for malaria and the basis of a surveillance system by notification systems, could also fulfil an important function concerning other aspects of health care. By 'in service' training they would develop skills in the promotion of preventative aspects of disease and be able to advise on the availability of services. This advice could be particularly developed in relation to the maternal and child health services, where families could be given instruction for feeding, the treatment of diarrhoea, and the value of immunisation. Village health workers could also take simple nutritional measurements and encourage families to keep weight charts as records of their children's health. Simple sterile cord kits could be given to mothers who have home child delivery, and important links could be developed with the traditional midwives working in the area.

The scope and limitations however of such work must receive careful consideration. The development of such a system on the Hola Scheme, as proposed earlier in this report, would enable an evaluation of this type of community service.

Table 17.1 indicates the possible work load of a village health worker.

Table 17.1 - Village Health Worker, Possible Work Load

Item	Incidence rate	Remarks
Maximum village population		2 500 persons
Vital statistics:		
Births	113 per year	Cord kits to mothers, postnatal visit, immunisation schedule
Deaths	42 per year	Notification
Infant deaths	17 per year	Notification
Pregnancy	113 per year	Antenatal clinic registration
Household visits	357 per month	At one visit per month
Malaria:		
(a) Assuming immune population (0-4 years morbidity predominant)	4 cases per month 22 cases per month 45 cases per month	1% incidence 5% incidence 10% incidence
(b) Assuming non-immune population (All age groups susceptible)	25 per month 125 per month 250 per month	1% incidence 5% incidence 10% incidence
(c) Fever (all cases in infants and toddlers 0-4)	23 per month 45 per month 112 per month	5% incidence 10% incidence 25% incidence
Schistosomiasis: (Assuming initially unexposed population)	125 per month 250 per month	5% incidence 10% incidence
Nutritional surveillance (Infants and toddlers)	150 per month	Weight and arm circumference measurements every three months
Diarrhoea (0-4 years population)	23 per month	5% incidence

17.2 Health Centre Services

In Kenya, secondary facilities are usually the most proximal to the communities they serve, there being very few programmes utilising primary health care workers.

The optimum unit, the Health Centre, can be considered the cornerstone of rural health care in Kenya, providing an integrated curative, promotive and preventative service, when fully equipped and staffed. The Kenya Government's development programme for rural health services visualises increasing input into health centres over the coming years with the development of integrated health units. Each of these would comprise a health centre and subsidiary units serving a population of approximately 50 000 people, with the introduction of community - trained nurses with a broader training, more relevant to the needs of rural health care. The major constraint in development of health care services in the Tana River area is the difficulty in maintaining adequate staffing of rural facilities.

The planning of static health care facilities for the Bura Project must therefore take account of the need to provide facilities within reasonable distance of all the project's inhabitants; and also, the need to provide a satisfactory work situation for health staff, with adequate housing, sanitation and water supplies, as well as the need for social and professional development in a remote, presently unpopular area.

It is proposed that the project population should be provided with one full Health Centre and three subsidiary units (termed Health Subcentres). The Health Centre should be located with the rural centre, which although to one side of the project is otherwise centrally placed. Each of the Health Subcentres should be located in one of the three market centres and would serve about 20 000 people. The Subcentres would not have mobile facilities but would be visited by the Health Centre staff on a regular basis to assist with clinical activities.

This service would provide a curative facility within six kilometres of all project population and within three kilometres for 50 per cent of the population, see Table 17.2.

Table 17.2 - Proximity of Communities to Proposed Health Care Facilities

Facility		Distance (kilometres)											
		<2	2	3	4	5	6	7	8	9	10	11	12
Health Centre	Number of communities	1	2	3	6	6	7	7	11	11	22	22	24
	Population (1 000's)	6	8	10	16	16	18	18	26	26	48	48	52
Health Subcentre	Number of Communities	7	11	15	18	23	24						
	Population (1 000's)	18	26	34	40	50	52						

Table 17.3 - Bura Health Care Service: Possible Work Load

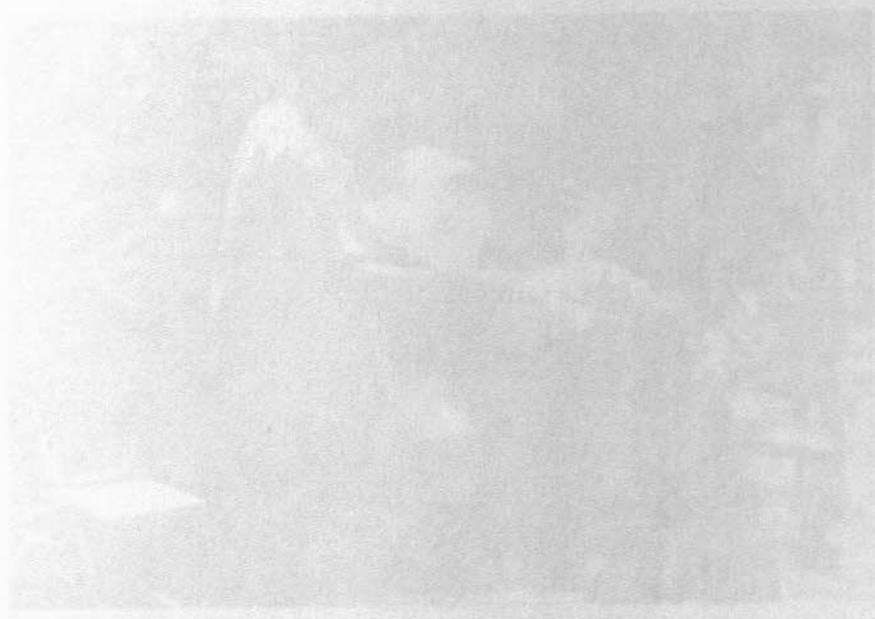
Item	Visits per month	Remarks
Inpatient births		150 per month or 75 bed days per month
Maternal and child health services (0-4 years)	3 000	i.e. 7 200 toddlers at 5 visits per year per child
Immunisation programme	360 (90 per weekly clinic)	i.e. 3 visits per child per year, and 100% coverage for BCG, SP and DPT
Antenatal clinics (1 800 pregnancies per year)	150 (38 per weekly clinic)	1 visit per pregnancy
	450 (112 per weekly clinic)	3 visits per pregnancy
Family planning (3 500-4 500 women in childbearing period)	300 (83 per weekly clinic)	1 visit per year
	1 320 (330 per weekly clinic)	4 visits per year
Total outpatient attendance (Assuming each member of population attends)	6 000 (300 per day)	2 visits each per year
	10 000 (500 per day)	3 visits each per year
Mobile team		MCH, ANC, NUT and investigation of disease out-breaks with additional staff from surveillance system

17.3 Hospital

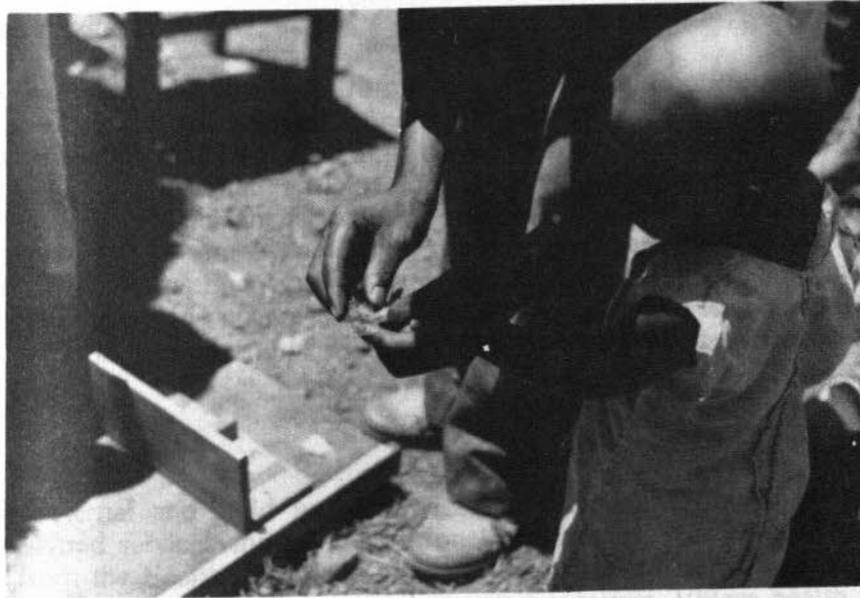
The existing hospital at Hola is inadequate both in quantitative and qualitative terms. Situated in the existing administrative headquarters for Tana River District in Hola, it is considered that future hospital expansion in the area should utilise the existing site. The re-developed hospital will provide facilities both for the Bura population and retain its role as district hospital. This will permit the greatest chance of maintaining an adequate staffing situation and also allow the development of the hospital to precede the Bura Project development.

The alternative plan suggested and considered was the construction of a new hospital at Bura within the development area, either with or without retaining the existing hospital at Hola. The proximity of Hola to Bura (approximately 15 miles), especially with the anticipated improvement of roads; the need for hospital development in advance of irrigation and settlement; the requirement for basic infrastructure services in the hospital area; and the overriding importance of maintaining future staffing in the hospital at a satisfactory level; lead us strongly to support the view that expansion of the Hola hospital at the earliest opportunity will best serve the needs of the future settlement population.

Provision however is also made for the eventual upgrading of the Bura Health Centre to a hospital by the provision of adequate land and by utilising construction designs for the health centre permitting eventual replacement either with a training health centre or a district hospital. Consideration has been given to the possible future extension from Phase I to Phase II of the Bura Project and development on the east bank of the Tana River, when projected population size would require an additional hospital.



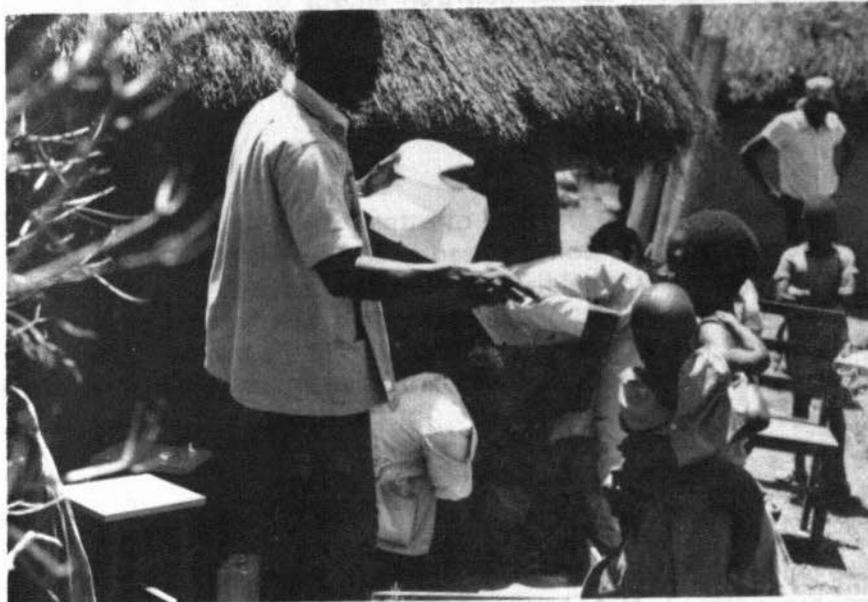
Children's village water



Taking blood smears from village children for malaria diagnosis

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Children's village clinic

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CHAPTER 18 FUNCTIONS OF HEALTH CARE SERVICE

18.1 Immunisation Programmes

All immunisation programmes will be organised from the Health Centre. Continuous programmes will be carried out as part of the maternity and child health services with schedules of immunisation procedures for all children attending clinics. Whilst this method does not yet provide sufficient population coverage it is anticipated that the village health worker will play an increasing role in promoting this important service. The immunisation procedures used would be; measles, whooping cough, neonatal tetanus, polio, tuberculosis, diphtheria tetanus and smallpox; and would follow the Kenya Government principles of administration. Mass campaigns will be required either to increase population coverage or to deal with specific disease outbreaks. During the early period of settlement, immunisations will be required for incoming tenants and families.

18.2 Maternal and Child Health

The establishment of maternal and child health services remains one of the most important features of community-based services and is of additional importance in the Bura population. Services are organised from the Health Centre, where daily clinics should be held. Staff from the Health Centre will also assist with clinics in the market centre subunits. Village health workers will work in close liaison with these activities, both as part of their inservice training programme, and to promote available services amongst their populations, and by detecting high risk individuals and families for home visiting. The MCH clinic will also form the basis of other family health service activities. In particular, immunisation, family planning, nutrition and maternity services.

18.3 Nutrition

Nutritional activities form part of the maternal and child health services. Families with poor nutritional standards should be referred to special nutrition clinics. Integrated programmes of nutrition are suggested, involving primary health care workers and agricultural extension workers, and should include demonstration vegetable gardens and food preparation demonstrations.

18.4 Environmental Health

The health technician is available in the Health Centre to promote environmental improvement. It is strongly recommended that in addition, a public health officer be appointed to the project and based at the Health Centre. In particular, staff are responsible for water supplies, sanitation, refuse collection, meat hygiene, vector and pest control, and all matters pertaining to the environment. These important functions are also promoted by other Health Centre staff. There should be a close integration of these services with the activities of other social services, notably educational staff and agricultural extension workers.

18.5 Curative Services

These are carried out by all levels of the service, the extent of available facilities being determined by the type of facility provided and the availability of trained staff. Curative services at the village level must be restricted to a small range of drugs.

Differentiate curative facilities will be provided at the various levels of the service. The Ministry of Health intends to produce a health care document for use by health care personnel, defining their role and providing a manual for practical application. This document will carefully define the extent of available curative facilities and will be revised as the project develops.

18.6 Health Education

This should be a function of all Health Centre staff. The importance of health education in the Bura Project indicates that a mobile education unit should be established, which can visit schools, villages and institutions. The team should have access to modern techniques including visual aids and should concentrate on the promotive and preventative aspects of health.

18.7 Family Planning

Family planning programmes should be integral parts of the health service facilities and introduced through maternal and child health services. Activities should be developed from concepts of family spacing to family planning techniques.

18.8 Communicable Disease Surveillance

The Bura Health Centre should have a separate communicable disease section. The Health Centre in combination with this special section will play an important role, especially for the notification of communicable disease seen during clinical activities. Close liaison is necessary between the two services. The communicable disease surveillance system will carry out field-based programmes from the Health Centre and will issue regular surveillance reports.

18.9 Mobile Component

Mobile teams will operate from the Health Centre to various points throughout the project. They will run regular clinics in Health Subcentres in the market centres, and supervise home visiting. They will also be available to assist the surveillance section in the investigation of reported disease outbreaks, especially where clinical assistance is required.

18.10 Records and Statistics

All activities of the health care service should be recorded, utilising simple methods. These health records being integrated into the statistical evaluation services being developed for the area.

18.11 Teaching

The Health Centre will be provided with a small teaching unit, where a variety of training programmes can be organised. It is expected that hospital-based staff would be available to take part in such teaching programmes. The teaching unit would also be utilised to train the village health workers, both initially and for periods of inservice training.

CHAPTER 19 FACILITIES FOR HEALTH CARE SERVICE

19.1 Village Health Units

The village health worker would be accommodated in a section of the community centre in each village. In addition to the use of multi-purpose rooms for promotive and health education activities the health worker would require a small, secure room for individual treatment and the storage of equipment and medicine. Where possible, this room should be provided with a piped treated water supply and a sink draining into a deep-augered soakaway pit.

This room could also house the records of the village.

19.2 The Health Sub-centres

Sub-centre facilities are proposed for the three market centres. The design for the Sub-centres would be based upon that for the Health Centre, but omitting a four-roomed unit. However, each Sub-centre should be sited so that the four-roomed unit would be added at some future date. Each Health Sub-centre would contain accommodation for a community nurse, a health assistant and a statistical clerk.

The Ministry of Works is currently preparing designs for these health facilities: these designs will permit more exact cost estimates.

19.3 The Bura Health Centre

Several designs are available for the construction of Health Centres in Kenya. It is proposed that the Bura Health Centre design should provide for the possibility of future expansion to a district hospital. The Kenyan District Hospital design permits selection of basic units to comprise a Health Centre with minimal alteration of existing plans. Site allocation should be 4.5 hectares to allow for future development.

The Health Centre would comprise a basic outpatient unit with facilities for routine attendances, maternal and child health clinics, nutrition, family planning and immunisation clinics. Facilities should also be provided for treatments, dressings and a pharmacy.

Inpatient services would provide twelve beds for maternity and acute illnesses, and a delivery unit. Laboratory facilities would also be provided.

Two additional components are proposed to provide facilities for a disease surveillance and control programme (one laboratory and an office), and accommodation for teaching.

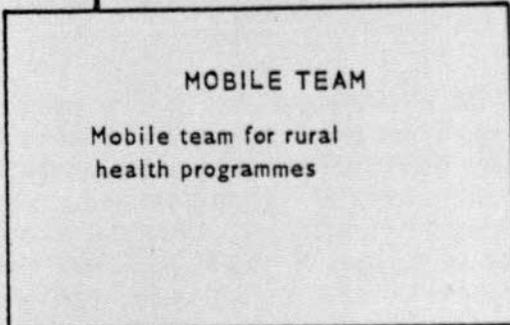
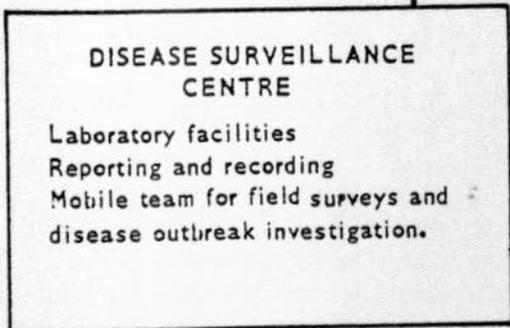
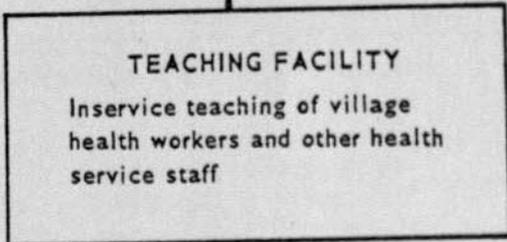
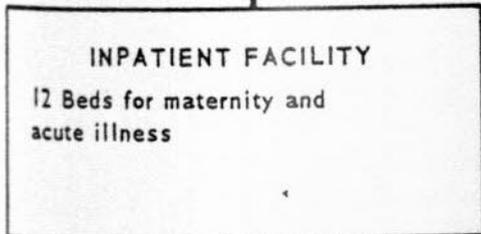
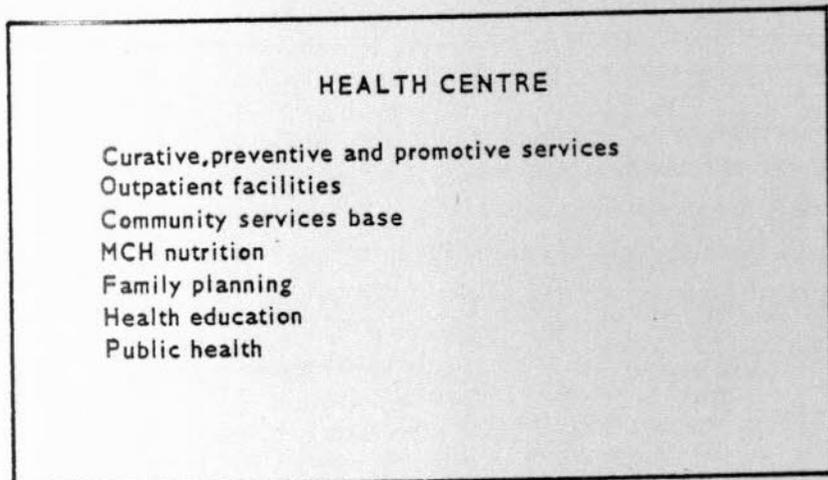
The facilities of the Health Centre are shown diagrammatically in Figure 19.1.

19.4 Hospital Facilities

Designs for the new Hola Hospital were completed in January 1977. Whilst not an integral part of the Bura Project, the hospital will provide the hospital facility for the project settlement population, and will play an important role in the predevelopment period. The hospital will have 150 beds and conform to a Phase I District Hospital. After the introduction of some 50 000 settlers the hospital will provide 1.5 beds per 1 000 population in the district.

Proposed inpatient facilities include five ward units to cater for male and female medical and surgical patients, as well as obstetrics, paediatrics, and an isolation unit for infectious disease.

THE BURA HEALTH CENTRE FACILITIES



The outpatient department will provide 200 persons each day, providing services in the areas of general medicine, surgery and dental clinics. Diagnostic facilities could include a pathology laboratory and radiology department. Additional services will be provided for the laboratory examination of communicable and zoonotic disease material. Facilities will include a theatre area and intensive care unit.

The allocation of 700 beds provides room for expansion from a Phase I hospital to Phase II, with an increased bed capacity of 320 beds. The cost of this development project, K Sh 18.3 million, is being financed through bilateral aid programmes.

The outpatient department will allow the examination of up to 1 000 persons each day, providing medical, surgical, maternity and child health, gynaecological, casualty and dental clinics. Diagnostic and laboratory facilities would include a pathology laboratory and radiology department. Additional facilities will be provided for the laboratory examination of communicable and vector-borne disease material. Facilities will include a theatre suite and intensive-care unit.

Site allocation of 4.5 hectares provides room for expansion from a Phase I hospital to Phase II, with an increased bed facility of 320 beds. The cost of this development project, K Sh 16.3 million, is being met under a Dutch bilateral aid programme.

It is therefore of great importance that immediate provisions be made for future staffing requirements, recruitment, training, and that training should begin as soon as possible.

The staffing of the health facilities will be particularly difficult as the development and early development of the project is partially operational and facilities may be only partly needed.

2.2.2. Staffing

The following staffing needs are suggested:

(a) Existing staff working in the district should be given the opportunity for further training at the Medical Centre, Nairobi. This may be done by the rotation of staff to assess their potential for further training.

(b) Training should be increased urgently to promote the entry into health service programmes of suitably educated local inhabitants.

(c) The Health Scheme should be urged to develop a long training programme for village health workers under the direction of a senior clinical officer. This would permit the establishment of a group of staff capable of running village facilities both at Hala and in rural populations, as part of the development programme, and would provide a nucleus of staff for the growing rural settlement population, before such training facilities are available at Hala.

(d) The possibility of developing a training programme for village health workers, either at an existing Health Centre with adequate facilities, or in conjunction with the Flying Doctor Service, should be fully investigated.

(e) During the initial stages of development, the Bura Health Centre should be developed as a training centre for village health workers and in-service training courses should be begun to be held there.

The importance of quality supervision of health care staff is of particular importance in this project. It is recommended that the supervision of the health care service should be provided by two senior staff posts, a Senior Clinical Officer (SCO) based at the Bura Health Centre and an appropriate Rural Health Officer (PHO), based in the rural centre. The unique nature of the development and the need for health care input at an early stage, indicate that these posts should be filled by 1977 and that the individuals appointed should be allowed to receive special training during the development stages. This should include the opportunity to visit and study health care programmes associated with land development projects and should also include further training in performance in communicable and vector-borne disease epidemiology.

The approximate staffing of the health care service for the Health Centre, Health Sub-centre and Village Health Unit, is given in Table 2(1). Generally, the standard of staffing conforms with

CHAPTER 20 HEALTH CARE SERVICE STAFFING AND TRAINING

20.1 General

The staffing of the health services for this project would appear to be subjected to two major constraints:-

- (a) The existing lack of trained staff in the project area
- (b) The unpopularity of the district, especially with senior medical staff

It is therefore of the greatest importance that immediate provisions be made for future staffing requirements including housing, and that training should begin as soon as possible.

The staffing of health care facilities will be particularly difficult in the predevelopment and early development periods, when the project is partially operational and facilities may be only partially developed.

20.2 Staffing Proposals

The following staffing proposals are suggested:-

- (a) Existing ungraded staff working in the district should be given the opportunity for further training at the Medical Centre, Nairobi. This may require evaluation of staff to assess their potential for further training.
- (b) Efforts should be increased urgently to promote the entry into health service training programmes of suitably educated local inhabitants.
- (c) The Hola Scheme should be utilised to develop a field training programme for potential village health workers under the direction of a senior clinical officer. This would permit the establishment of a group of staff capable of operating village facilities both at Hola and in rural populations, as part of the predevelopment programme, and would provide a nucleus of staff for the developing Bura settlement population, before local training facilities are available at Bura.
- (d) The possibility of developing a training programme for village health workers, either at an existing Health Centre with adequate facilities, or in association with the Flying Doctor Service, should be fully investigated.

After construction of the initial stages of development, the Bura Health Centre should be developed as a training centre for village health workers and inservice training courses should be evolved for all cadres of staff.

The importance of high quality supervision of health care staff is of particular importance in this project. It is recommended that the supervision of the health care service should be provided by two additional senior staff posts, a Senior Clinical officer (SCO) based at the Bura Health Centre and an experienced Public Health Officer (PHO), based in the rural centre. The unique nature of the development and the need for health care input at an early stage, indicate that these posts should be filled in late 1977 and that the individuals appointed should be allowed to receive further training before the development begins. This should include the opportunity to visit and study health care programmes associated with land development projects and should also include further training and experience in communicable and vector-borne disease epidemiology.

The recommended staffing of the health care service for the Health Centre, Health Sub-centre and Village Health Unit, is given in Table 20.1. Generally, the standard of staffing conforms with

Kenyan standards, except where indicated. Apart from the additional SCO mentioned above, who would be based at the Health Centre and be responsible for all the curative services for the Bura Project, an additional community nurse based at the Bura Health Centre is recommended. She would supervise the community nurses in the Health Sub-centres and the village workers, and also organise inservice training programmes.

Close liaison between health subunits is essential. The Health Centre staff would supervise the Sub-centres and provide additional facilities such as immunisation and family planning clinics. It is recommended that staff for these static facilities be rotated through the various centres and should spend a proportion of their time working in the health centre. This will familiarise staff with all aspects of the work and the area, and will also prevent peripherally-based staff from becoming discontent with managing a small unit, remote from their colleagues.

Table 20.1 - Staffing for Bura Project Health Care Service Facilities

Grade	Health Centre	Each Health Sub-centre	Each Village Health Unit
Clinical Officer	2(1)		
Community Nurse	5(4)	1	
Health Technicians	2	1	
Family Planning Motivator	1		
Statistical Clerk	1	1	
Laboratory technician	1		
Others	6	2	1
Total per unit	17	5	
Total for project	17	15	23

Figures in brackets indicate normal staffing standards established by the Government of Kenya.

CHAPTER 21 MANAGEMENT

21.1 Introduction

The successful integration of health care programmes in the Bura Project will require a clearly defined management system. The existing health care input in irrigation and land development systems in Kenya involves input both from the Ministry of Health and the National Irrigation Board. There would appear to be insufficient integration of these activities, and an absence of evaluation techniques attempting to measure the benefit of health care input.

It is suggested that the health care programmes in Bura should be integrated so that the curative and preventative services develop into an integrated programme, regardless of the nature of the input. Especially with regard to disease control programmes, the application of molluscicides or distribution of chemoprophylaxis should not be separated from the curative services and alternative preventative procedures.

It is appreciated however that the application of control measures on irrigation projects must be regular and therefore effectively administered. The duality of control has perhaps led to a situation where, apart from the application of specific control measures such as mollusciciding and chemoprophylaxis distribution, little attention to overall health care has been given, in an area of considerable economic and social importance.

21.2 Management Proposals

It is proposed that the management of health care programmes in the Bura Project, and possibly in other existing land development schemes, should be directed by a committee established in the Ministry of Health and comprised of representatives from the relevant departments. These would include - Rural Health Services - Communicable Disease Control and Vector-Borne Control - Public Health Services, and be supplemented as necessary by the introduction of additional expertise. This group would also be supported by representation from the National Irrigation Board (NIB) and possibly the Tana River Development Authority (TRDA). The proposed arrangement is shown in Figure 21.1.

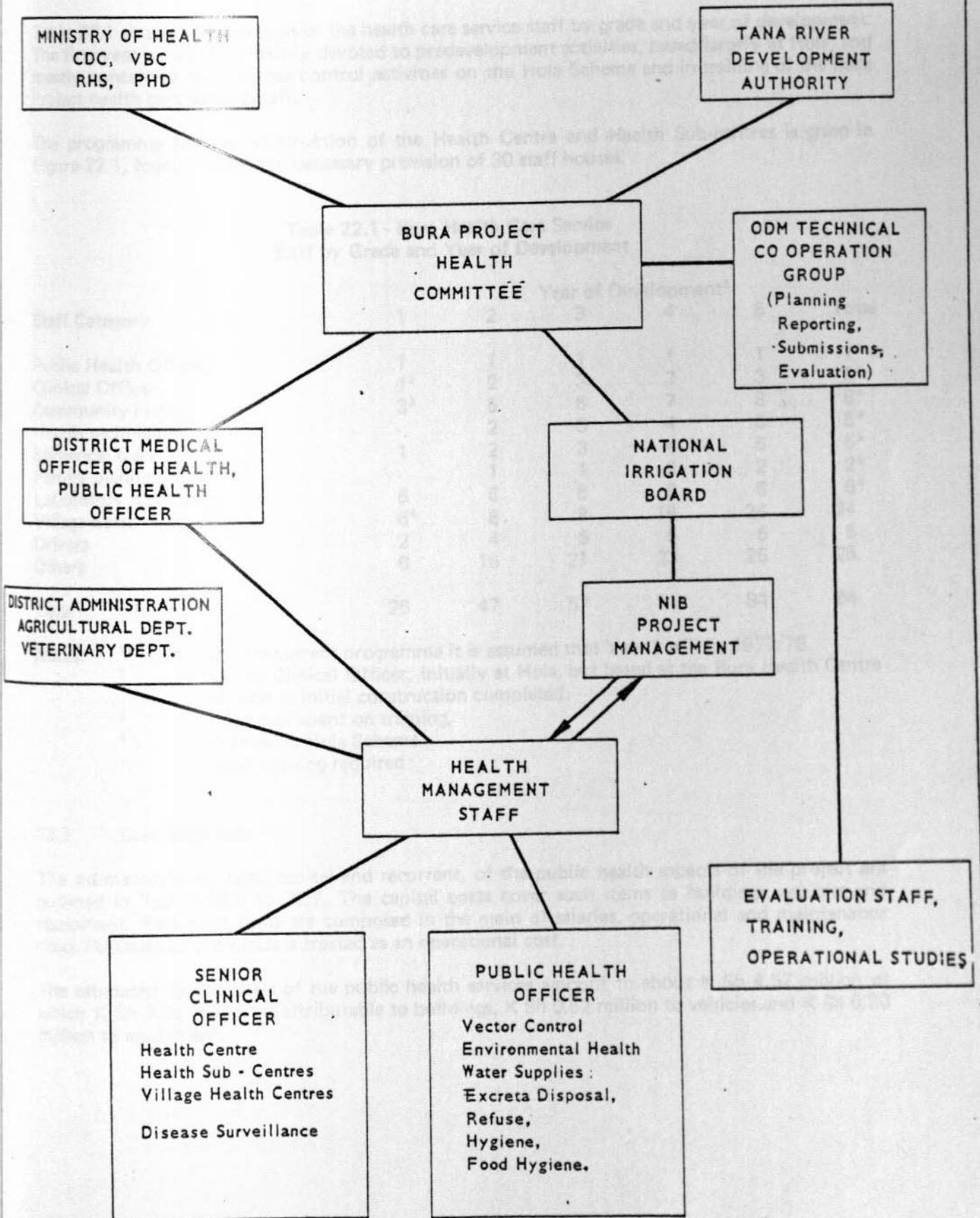
The proposed ODM Technical Co-operation group would assist the committee in evaluating health care systems introduced into irrigation and land development projects. The group would report the results of epidemiological studies and would implement the recommendations of the committee. The proposed group would comprise an epidemiologist, a biologist, and a nutritionist. This team would be supplemented by a statistician once the Bura Project was assured. The introduction of Kenyan staff at the start of the project would ensure that expertise was developed within the available resources. This would enable the development of techniques to expand to provide the future expertise necessary if the extensive land development projects, visualised in Kenya over the next twenty years, are to have a satisfactory health component.

It is also strongly suggested that local management of the Bura Project is strengthened at the health level beyond the normal health care administration, in rural areas. Two posts should be created. An experienced Public Health Officer (PHO) and a Senior Clinical Officer (SCO) should be appointed to the project to work in close co-operation with the Project Manager.

The Public Health Officer should be located within the NIB project office and should be responsible for all aspects of environmental health, including vector control. The project, through its local head office, should continue to be responsible for the provision of equipment and chemicals for mollusciciding programmes and insecticides. The Public Health Officer would be responsible to the District Public Health Officer and would work in close collaboration both with him and the Project Management.

The Senior Clinical Officer would be responsible for the supervision of the basic health care

PROPOSED MANAGEMENT OF BURA
HEALTH CARE SERVICE



CHAPTER 22 IMPLEMENTATION

22.1 Programme

Table 22.1 shows the provision of the health care service staff by grade and year of development. The first year would be primarily devoted to predevelopment activities, based largely at Hola, and mostly concerned with disease control activities on the Hola Scheme and in training of the Bura Project health care service staff.

The programme for the construction of the Health Centre and Health Sub-centres is given in Figure 22.1, together with the necessary provision of 30 staff houses.

Table 22.1 - Bura Health Care Service Staff by Grade and Year of Development

Staff Category	Year of Development ¹					Total
	1	2	3	4	5	
Public Health Officer	1	1	1	1	1	1*
Clinical Officer	1 ²	2	3	3	3	3*
Community nurse	3 ³	5	6	7	8	8*
Health technicians	-	2	3	4	5	5*
Statistical clerk	1	2	3	4	5	5*
Family planning	-	1	1	2	2	2*
Laboratory technician	5	6	6	6	6	6*
Village health worker	6 ⁴	8	8	16	24	24
Drivers	2	4	5	5	5	5
Others	6	16	21	23	25	25
Total	25	47	57	71	84	84

- Notes:
- 1 On the current programme it is assumed that Year 1 will be 1977/78.
 - 2 Senior Clinical Officer, initially at Hola, but based at the Bura Health Centre as soon as initial construction completed.
 - 3 First year spent on training.
 - 4 Trained at Hola Scheme
 - * Staff housing required

22.2 Cost Estimates

The estimated costs, both capital and recurrent, of the public health aspects of the project are outlined in Tables 22.2 to 22.7. The capital costs cover such items as buildings, vehicles and equipment. Recurrent costs are composed in the main of salaries, operational and maintenance costs. Purchase of chemicals is treated as an operational cost.

The estimated capital costs of the public health services amount to about K Sh 4.57 million of which K Sh 3.32 million is attributable to buildings, K Sh 0.52 million to vehicles and K Sh 0.30 million to equipment.

PROPOSED CONSTRUCTION PROGRAMME FOR
BURA HEALTH CARE SERVICE FACILITIES

Calendar Year	1977	1978	1979	1980	1981	1982
Fiscal Year	1978	1979	1980	1981	1982	1982
BUILDINGS						
Health Centre						
Health Sub - Centres						
Village 1 - 3						
Village 1 - 10						
Village 1 - 19				7		
Housing						
STAFFING						
* Public Health Officer	1					
* Clinical Officers	1	2	3			
* Community Nurses	3	6	8			
* Health Assistants <i>for health centres</i>	2	4	5			
* Statistical Clerks	1	2	4	5		
* Family Planning Officers	1	2				
* Laboratory Technicians	5	6				
Village Health Workers				20	24	
Drivers	2	4	5			
Casual Labour	6	16	21	25		

* Denotes Housing Provided

Table 22.2 - Budgetted Expenditure - Public Health Capital Costs
(1 000 Kenya Shillings)

Item	Unit Cost	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
(a) Buildings †							
Health Centre	No. Cost	— —	1 1 350	— —	— —	— —	— —
Health Subcentre	No. Cost	— —	1 195	1 195	— —	1 195	— —
Housing Type D	No. Cost	2 200	1 100	1 100	— —	— —	— —
Housing Type E	No. Cost	— —	7 406	2 116	2 116	2 116	— —
Housing Type F	No. Cost	8 112	5 70	2 28	2 28	1 14	— —
Sub Total (a):		312	2 116	439	144	325	—
(b) Vehicles							
4 wheel drive	No. Cost	2 174	3 261	1 87	— —	— —	— —
(c) Equipment							
		65	180	30	—	25	—
Total Base Cost:		551	2 557	556	144	350	—
Physical Contingencies:		55	256	56	14	35	—
Total Cost:		606	2 813	612	158	385	—

Note: † Village health centres are incorporated in the multi-purpose village halls and excluded from this budget.

Table 22.3 - Budgetted Expenditure - Public Health Recurrent Costs Summary
(1 000 Kenya Shillings)

Item	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
(a) Salaries †	205	406	511	602	685	685
(b) Operation and Maintenance *	187	354	335	475	517	523
(c) Operation of Vehicles *	27	95	150	162	162	162
(d) Materials *	-	-	26	67	119	122
Total Base Recurrent Cost :	419	855	1 022	1 306	1 483	1 492
Physical Contingencies:	42	85	102	131	148	149
Total Recurrent Cost:	461	940	1 124	1 437	1 631	1 641

Notes: † For details see Table 22.4

* For details see Table 22.5

Table 22.4 - Budgetted Expenditure - Public Health Recurrent Costs - Salaries
(1 000 Kenya Shillings)

Item	Unit Cost	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
(a) Salaries							
Public Health Officer	No. Cost	1 22.5	1 30	1 30	1 30	1 30	1 30
Clinical Officer	No. Cost	1 22.5	2 52.5	3 90	3 90	3 90	3 90
Community Nurses	No. Cost	3 31.5	5 70	6 84	7 98	8 112	8 112
Health Technicians	No. Cost	- -	2 34	3 51	4 68	5 85	5 85
Statistical Clerks	No. Cost	1 11	2 22	3 33	4 44	5 55	5 55
Family Planning Officers	No. Cost	- -	1 8	1 8	2 16	2 16	2 16
Laboratory Technicians	No. Cost	5 55	6 66	6 66	6 66	6 66	6 66
Village Health Workers	No. Cost	6 25.2	8 33.6	8 33.6	16 67.2	24 100.8	24 100.8
Drivers	No. Cost	2 16	4 32	5 40	5 40	5 40	5 40
Others	No. Cost	6 21.6	16 57.6	21 75.6	23 82.8	25 90	25 90
Sub Total (a):		205.3	405.7	511.2	602.0	684.8	684.8

Table 22.5 - Budgetted Expenditure - Public Health Recurrent Costs -
Operation and Materials
(1 000 Kenya Shillings)

Item	Unit Cost	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
(b) Operation and Maintenance							
Building Maintenance		—	6	48	57	60	66
Pre-Development Costs ¹		187	208	—	—	—	—
Drugs and Supplies ²		—	87	190	278	296	296
Miscellaneous		—	53	97	140	161	161
Sub Total (b) :		187	354	335	475	517	523
(c) Operation of Vehicles	No. Cost	2 27	5 95	6 150	6 162	6 162	6 162
(d) Materials ³							
Molluscicides ⁴		—	—	15	40	71	71
Malaria Control		—	—	9	23	41	41
Insecticides		—	—	2	4	7	10
Sub Total (d) :		—	—	26	67	119	122

Notes: ¹ Pre-development costs are detailed in Table 22.6

² Drugs and supplies include K Sh 28 000 for the Health Centre, K Sh 14 500 for each Health Subcentre and K Sh 11 200 for each Village Health Unit

³ Materials costs are detailed in Table 22.7

⁴ Based upon the use of Frescon at 0.1 ppm: use of Bayluscide would substantially increase costs

Table 22.6 - Itemised Pre-Development Costs
(1 000 Kenya Shillings)

Year		1977-78	1978-79
		Health Centre	Health Sub-centre
			Village Health Unit
<i>Schistosomiasis</i>			
		28 000	14 500
Molluscicides:	Hola	2 800	7.5
	Rural	4 200	7.5
Miscellaneous		14 000	2 000
Mass treatment:	Hola	18.8	25.0
	Rural	15.0	20.0
Equipment		40.0	20.0
	Sub Total:	88.8	85.0
<i>Malaria</i>			
Treatment		4.8	4.8
Infant and child prophylaxis		3.0	3.0
	Sub Total:	7.8	7.8
<i>Immunisation</i>			
Tuberculosis		40.0	60.0
Others		25.0	25.0
Vector surveillance and control		15.0	20.0
Trial insecticides, etc.		10.0	10.0
	Sub Total:	90.0	115.0
	TOTAL	186.6	207.8

**Table 22.7 - Itemised Public Health Recurrent Costs
of Chemicals
(Kenya Shillings)**

(a) Running Costs	Health Centre	Health Sub-centre	Village Health Unit
Drugs and stores	28 000	14 500	11 200
Clothing	2 800	1 400	—
Subsistence	4 200	2 100	—
Miscellaneous	14 000	7 000	5 500
Sub Total:			16 700
(b) Molluscicides			
1. 0.1 ppm for 10 hours every two months (unit cost K Sh 55/ litre)			36 000
2. Focal mollusciciding at villages			10 000
3. Chemotherapy treatment at 10% incidence with Metrifonate (50 000 population) (unit cost K Sh 5 per treatment)			25 000
Sub Total:			71 000
(c) Malaria Control Costs			
Prophylaxis: 1. Total 0-4 years		10 000	
pregnant women		4 000	
(½ tablet x 2 monthly 0-4, 2 tablets/month pregnant women)			14 000
2. Care treatment			
0-9 years, 3 per year (25 000)			
average 3 tablets		14 000	
≥ 20 2 per year (25 000)			
average 4 tablets		13 000	
			27 000
3. Insecticides (Malathion sprays)			10 000
Sub Total:			51 000
TOTAL			138 700

22.3 Monitoring and Evaluation

The importance of the Bura Project and the proposals to extend irrigated agriculture in the Tana River basin indicate that a system of evaluation is required to monitor health care input and evaluate the implications of ecological and environmental change. The results of such studies would provide a basis for future health care programmes in the project area and indicate the input required in future development projects.

The establishment of an evaluation unit, initially to institute disease surveillance and control programmes in the predevelopment period, and, later, to evaluate the Bura Project provides the foundation of a group which could be utilised both in the continuing Bura Project area and in the assessment of other potential and existing land development programmes. It is of considerable importance that Kenyan expertise is incorporated into the supervision of this unit at an early stage, to encourage the development of trained and experienced staff to advise on future development programmes.

The extensive developments taking place in the Tana River catchment area further suggests that the epidemiological unit established for the Bura Project should assist in the evaluation of other land development projects such as the reservoir developments and extensive resettlement programmes in the delta region.

The evaluation unit would develop from the team used in the predevelopment health care programme for the project area, described in Chapter 13. Registration and notification systems would be developed and supplemented with regular epidemiological data collection to provide a comprehensive evaluation of the health status of communities and assess the value of introduced preventative programmes.

PART 2

THE BURA PROJECT AREA OUTSIDE THE PROJECT AREA

CHAPTER 23 THE INFORMAL SECTOR

23.1 General

The development population of the Bura Project closely approximates to the existing total population of the Tana River District, and the fully developed project will become the most urbanised area in the district, with a level of infrastructure development well beyond that existing throughout the district. The Hola Scheme already demonstrates the attraction of readily available water to surrounding populations, with increasing settlements of nomadic Orma around the periphery of the scheme; this progressive settlement being increased during excessively dry periods where water can then be readily obtained for domestic use and watering cattle.

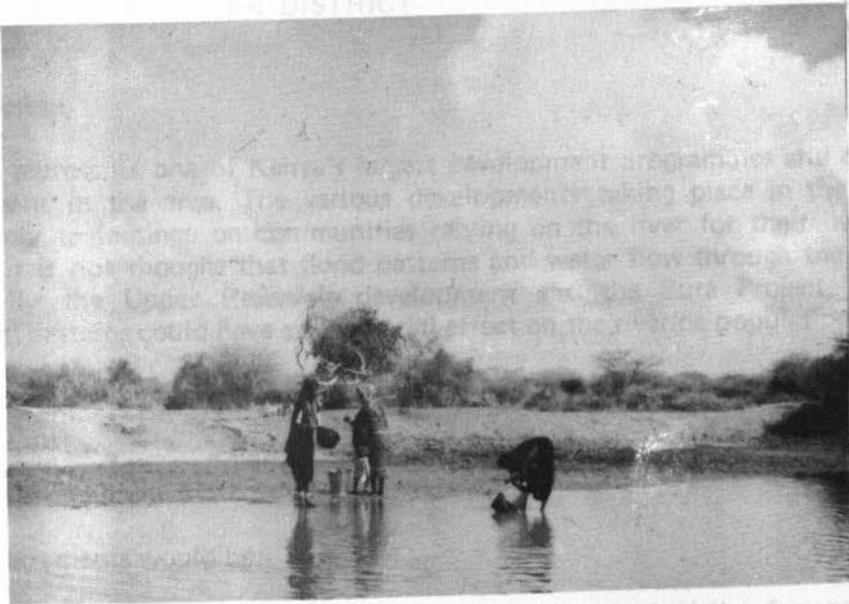
It can therefore be anticipated that the Bura development will increase this tendency to settlement. The entire Tana River development could have demonstrable impact on downstream river communities relying on seasonal flooding for subsistence cultivation, and even if only minor changes occur in flooding patterns further development may be promoted around the project.

Consideration must therefore be given in the planning of health and other social services to these possible developments. Large shifting and casual settlements around the project could readily disturb the emerging disease patterns of the settlement communities and impose considerable burdens on the health facilities being provided for the project.

23.2 Proposals

Health services must take account of these possibilities by:-

- (a) Providing essential health care services throughout the district and increasing service to neighbouring populations to the project.
- (b) Attempting to define minimum standards for settlement around the project. Areas need to be selected where such settlement is possible, and the minimum environmental health standards for settled groups need to be established.
- (c) Providing curative facilities, probably through the development of mobile services from established health care units. These services must emphasise the important communicable and vector-borne diseases. Programmes must include prevention of those conditions which would pose increasing threats to the management of health services throughout the project.



Nomadic Orma gathering water from an irrigated area



Orma cattle grazing on irrigation canal bank

CHAPTER 24 THE TANA RIVER DISTRICT

24.1 Introduction

The Bura Project represents one of Kenya's largest development programmes and certainly the greatest development in the area. The various developments taking place in the Tana River catchment are likely to impinge on communities relying on the river for their livelihood and existence. Whilst it is not thought that flood patterns and water flow through the area will be greatly affected by the Upper Reservoir development and the Bura Project, even minor alterations of flood patterns could have a substantial effect on the riverine populations.

These populations should therefore receive attention as part of the overall development plan.

24.2 Suggested Requirements

The minimum requirements would be:-

- (a) Definition of the existing health status, especially for communicable vector-borne diseases and nutrition, in the predevelopment period.
- (b) Surveillance during the period of development to identify changes in disease epidemiology, linked with agricultural studies to determine the impact of development on these groups.
- (c) Investigate the possibilities of introducing small-scale village irrigation systems adjacent to the Bura Project, to assess their value and economic viability and to provide a model in the event of more widespread measures being needed should subsistence agriculture prove untenable in the future. Some such programmes should be developed early, with a health component to measure their impact in terms of nutritional status and community health.

Programmes should ideally be incorporated into an overall health study of the Tana River catchment area, providing vital information, not only to assist in the future planning of development in the area, but in planning future land developments in many parts of the world.

Preliminary discussions with the International Development and Research Committee (IDRC) indicated its interest in supporting the development of health care programmes to nomadic groups in the area.

CHAPTER 25 IMPLICATIONS OF DEVELOPMENT PROGRAMMES IN THE TANA RIVER CATCHMENT

25.1 General

The Tana River is Kenya's largest water resource. The development of the Bura Project is viewed as a precursor to further extension of irrigated agriculture, both on the west and, later, the east banks of the Tana in the Bura area. In the upper Tana River catchment a series of hydroelectric dams has been constructed and it is anticipated that the Upper Reservoir will be completed early in the next decade. Settlement schemes are also being introduced in the Tana River delta area to settle landless families from other areas of Kenya and refugees.

The Tana River catchment area therefore presents Kenya's largest rural development programme over the next ten years or more. The health impact of such various environmental changes has been shown to be considerable. The impoundment of water increases problems of schistosomiasis and other water-related disease; alterations occur in populations of mosquitoes and other disease vectors with the ever present threat of epidemic outbreaks. Land resettlement and population movements increase a variety of health-related problems both by introducing disease into new areas or subjecting populations to endemic diseases when they have little immunity.

These developments are taking place predominantly in areas which are sparsely populated, remote and lacking in basic infrastructure facilities. It is strongly recommended that any future health input into the river catchment area must attempt to integrate these development components and should aim at introducing evaluation procedures to assess the impact of a variety of environmental and ecological changes, as well as to determine the effects of control programmes. Such information is urgently needed if deterioration in health of communities is to be prevented in such development programmes in Kenya and elsewhere.

BURA IRRIGATION SETTLEMENT PROJECT
PROJECT PLANNING REPORT
INSTITUTIONS AND SERVICES ANNEXE

BURA IRRIGATION SETTLEMENT PROJECT
PROJECT PLANNING REPORT
INSTITUTIONS AND SERVICES ANNEXE

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SUMMARY

The project area is at present devoid of the services which would make it productive and habitable. Its future productivity will depend upon the introduction of irrigation and mechanical facilities, along with the agricultural skills to use them. The successful settlement and development of the area will depend upon the introduction of the institutional framework within which the social, technical and administrative services can operate. It will be necessary to ensure that the Bura Project does not become an 'island of development'. Agricultural extension to the surrounding areas, particularly the riverine Pokomo settlements, should be intensified to encourage increased production of crops and livestock which the settlement population will need.

The Administrative Services

These are concerned with regulating the relationship between communities and institutions, guiding development, and maintaining the integrity of the legal and political fabric of the State in accordance with the policy of Government. These services are considered under five separate headings.

(a) Sub District Administration

This will co-ordinate and advise the government agencies which provide service in the project area. It will be responsible for maintaining a reasonable balance between the interests of the project tenants, the Pokomo and Orma, government staff, NIB staff and the informal sector. A Bura Development Council, supported by five Standing District Commissioners will be established as the co-ordinating agency, under the Chairmanship of the District Commissioner. The Council will in turn co-ordinate with the Tana River District Development Committee.

The Bura Administrative Office staff would consist of:

- 1 Senior District Officer
- 1 Administrative Assistant
- 15 Supporting Staff and Administrative Police

(b) Local Administration

Initially there will be a lack of social cohesion in the project villages, and an above average number of chiefs is therefore recommended. This is partly for administrative purposes, and partly as an additional means of stimulating an early sense of community responsibility. Each chief would be responsible for two villages each of which would elect a Committee under a Headman, usually in the person of an elected and approved Head Cultivator. The staff requirement would be:

- 4 Chiefs (one at each Market Centre)
- 8 Sub chiefs (one at each Local Centre)
- 28 Supporting Staff and Administrative Police

(c) Police

Special problems may be anticipated because of the diverse origin and social status of the tenants. These will be exacerbated by the presence of contractors and squatters and the temptations for poaching game. It is recommended that a full Police Station be established at the Rural Centre, independent of Hola, fully staffed and equipped. Staffing would be as follows:

- 1 Inspector of Police
- 5 Sergeants and corporals
- 34 Constables, signals and supporting staff

(d) Prisons

Provision is made in the 1974/78 Development Plan for a modern prison to be built at Bura. If this is given a priority rating by Government, it could perform a useful supporting role to the project. 150 hectares of irrigated land could be made available for a prison farm, which could provide seed production and forestry nursery services. The prison proposed by the Government would accommodate 600 to 1 000 prisoners.

(e) Local Council

Government policy favours the development of effective local authorities with a positive role in urban and rural development. Constraints arise from lack of revenue, leadership and staff. Self-financing services which should devolve on to local councils include markets, licensing, nursery schools; supported services include refuse collection, property rating and the like. As an interim measure, it is proposed that these services be run by an Executive Officer under the administrative and financial authority of the Bura District Officer. Staffing requirements would be:

- 1 Executive Officer
- 1 Licensing Officer
- 1 Meat Inspector
- 28 Supporting Staff and labour

Education Services

The present selection criteria will lead to a number of social education problems at Bura, arising from the unusually high proportion of school age children mainly in the younger groups. These, considered in the light of Government policy objectives, lead to the conclusion that one double stream Primary School will be needed for each of the 23 project villages, with a further two at the Rural Centre. The education requirements will be reviewed after tenants have been selected when details of their family composition are known.

The Primary School building programme will proceed in phase with the arrival of tenants, whose first assignment will be to build their own houses. School buildings (excluding teachers houses) and the community centre would then be erected under a Harambee construction programme. The programme for constructing the schools would be as follows:

Fiscal Year	Number of Schools Constructed	
	Villages	Rural Centre
1980	5	1
1981	8	-
1982	8	-
1983	2	1

The Primary School teaching staff will be required as follows:

Fiscal Year	Headmaster	Deputy Heads and Teachers	Supporting Staff
1980	6	84	6
1981	8	112	8
1982	8	112	8
1983	3	42	3
Total at full development	25	350	25

One Secondary Boarding School would be built in 1981, ready to accept pupils in 1982. It would have triple stream forms I to III, and double streams forms IV to VI, and these would have provision for teaching applied subjects. The requirements for staff in 1982 would be:

- 1 Headmaster
- 1 Deputy Head
- 15 Teachers
- 7 Supporting Staff

Social Services

The active involvement from a very early stage of the Department of Social Services will be essential to the development of cohesive village communities. An experienced Senior Community Development Officer will be required to take charge.

Social Services would be village based, and will include the provision of day care centres, creches, adult literacy, village polytechnics, women's clubs and youth clubs. Staff requirements would be as follows:

- 1 Senior Community Development Officer
- 5 Assistant Community Development Officers
- 23 Community Development Assistants (one in each village)
- 52 Local workers and supporting staff

Co-operative Services

Economic self-help activities based on co-operative principles will be promoted by the encouragement of Co-operative societies in all villages. These would provide a suitable channel for organising marketing, including seed cotton storing and delivery services. A programme of member education, bookkeeping, management and cotton-handling training will be required with the collaboration and support of the NIB project management.

Co-operative activities will expand as the capability of the societies develop, and could include:

- Primary collecting and marketing of all crops
- Accountancy and member records
- Savings and Credit
- Fuelwood supply

Co-operative staff for the programme will initially be:

- 1 Co-operative Officer
- 2 Assistant Co-operative Officers
- 6 Co-operative Assistants
- 3 Supporting Staff

Technical and Specialist Staff

(a) Agricultural Extension

The promotion of agricultural activities, particularly among the riverine Pokomo, will require additional staff from the Ministry of Agriculture. The development of minor irrigation schemes, improved crop production, soil conservation, and livestock improvement would be encouraged and home economics advice provided.

The livestock activity in the project area will consist of a low key programme of animal husbandry based on the stock each tenant is permitted to keep. These programmes will be

supervised by a Ministry of Agriculture Livestock Officer and village based Agricultural Assistants (Animal Husbandry). Overall staff requirements will be:-

- 2 Agricultural Officers
- 2 Assistant Agricultural Officers
- 16 Agricultural Assistants
- 2 Supporting Staff

(b) Posts and Telecommunications

These services will be provided by the Posts and Telecommunications Agency in accordance with their standard development programme. A 'minimum development unit' Post Office and Telephone Exchange would be provided at the Rural Centre, with a local post office at each Market Centre and a sub post office at each Local Centre. The latter would be on an agency basis. Overall staff requirements would be:-

- 1 Post Superintendent
- 4 Senior Post Officers
- 4 Post Officers
- 2 Telephone Assistants
- 8 Assistant Postmasters
- 8 Telephonists
- 11 Supporting Staff

(c) Ministry of Labour

At a very early stage the services of a Labour Office will be required to deal with possible labour disputes during the construction phases. They will also be needed throughout the project operations to advise on NGSF problems, factory regulations and industrial relations.

A fully staffed Labour Office is proposed for Garissa, and the Bura Project Area would be handled from there. Although it will be outside the project area, it is essential that this development be given a top priority rating.

CHAPTER 1 INTRODUCTION

There is no permanent resident population living in the Bura project area at present. The Orma tribe living in the area are nomadic pastoralists while the Pokomo and Malakote tribes, who have established permanent settlements along the banks of the Tana river, derive a living from agriculture. The area has a low, irregular rainfall, is windy and subject to high temperatures; in addition, tenants arriving in the area will probably be exposed to a number of diseases for the first time when they take occupation of their holdings on the Project.

The selection criteria for prospective tenants are such that the eventual population will have a high proportion of young children, and very few experienced elders. They will come from diverse cultural backgrounds, will be landless, and probably inexperienced in the management of the crops which are proposed should be grown and few will have any knowledge or previous experience of irrigated agriculture.

There do not, however, appear to be reasons why tenants should not establish integrated communities if they are given suitable assistance, encouragement and support. This cannot be done on an individual basis, but rather through an institutional framework within which the tenants would be encouraged to orientate themselves toward a new set of social relationships and a way of life which is adjusted to the conditions prevailing at Bura.

Kenya has a wide range of institutions in both the public and private sectors. In the public sector there are government agencies with responsibilities which range throughout all the aspects of rural, urban and civic life, while the private sector is encouraged to provide comprehensive consumer services and a sound industrial base. The introduction of these institutions into Bura, in phase with preparation of the land for irrigation and the arrival of the tenants, is a challenge to the management of the National Irrigation Board (NIB) which is the agency, under the Minister of Agriculture, directly responsible for the implementation of the project.

Recommendations concerning the NIB's capacity to carry the greatly increased and more complex set of responsibilities, which the Bura Project will involve, are made in the Organisation, Management and Training Annexe. The chapters which follow in this Annexe identify those institutions which have particular importance for the successful construction and operation of the proposed project, and the establishment of viable linkages relating to other minor communities in its immediate surroundings as well as in the Tana River District generally.

2.2 The National Irrigation Board, Bura Project Management and the Tenant

These three elements fall into two general groups, illustrated in Figures 2.1 and 2.2. In the first group is the relationship between the National Irrigation Board (NIB), the project management and tenant.

The NIB has certain statutory obligations and powers as defined in the irrigation Act. These include to: (a) coordinate and plan settlement on irrigated schemes, to determine the number of people who can be settled on land for public purposes, to provide marketing and to provide technical assistance; (b) to provide that the Minister of Agriculture may, subject to the approval of the Board, make regulations for the better carrying out of the purposes of the Act.

Each of the various schemes or projects developed by NIB is an entity in its own right and is managed under a scheme management structure with its own objectives. These objectives

CHAPTER 2 BURA DEVELOPMENT IN ITS CONTEXT

2.1 Special Features of Bura

The Bura Project has a number of unique features including the following:

- (a) The sociological problems stemming from the very nature of the area and of the tenants' diverse backgrounds.
- (b) The problems of determining how to involve the Pokomo and the Orma in the benefits which will flow from the development of the project.
- (c) The environmental problems connected with conservation of wildlife and of the riverine forests.
- (d) The technical and organisational problems of providing health, education and agricultural production services and facilities.
- (e) The problems of introducing a satisfactory infrastructure, sufficiently effective to attract and retain management and government staff.

The project will need to develop solutions to these problems through a series of independent but interrelated and largely institutionalised activities. The majority of these activities will be directed at the tenants who will arrive on the project without any institutional identity beyond their own family, and whose need to identify with some group or entity will be acute.

Some of the activities, however, will also be directed at NIB project staff, at government officials and at the peripheral inhabitants from the riverine areas. These activities are likely to attract considerable numbers of 'informal' settlers as well as squatters, whose propensity for establishing themselves on the outskirts of any centre where wealth is being generated must be accepted and taken into consideration.

There are thus a series of relationships, not in themselves unique, which must be understood and interpreted in what is a unique context for Kenya. There have been many settlement schemes started in the country, and much experience has been gained in the movement of people and their dispersal through successful - and unsuccessful - cooperative schemes, shirika, harambee and conventional settlements. Similarly, there have been a number of tenancy based irrigation schemes, including the one at Hola. But the Bura project is unique in that it is the first irrigation scheme in Kenya to be tackled from the beginning as an integrated development project, in an area devoid of institutions, facilities and infrastructure and drawing the future inhabitants from all provinces in the country.

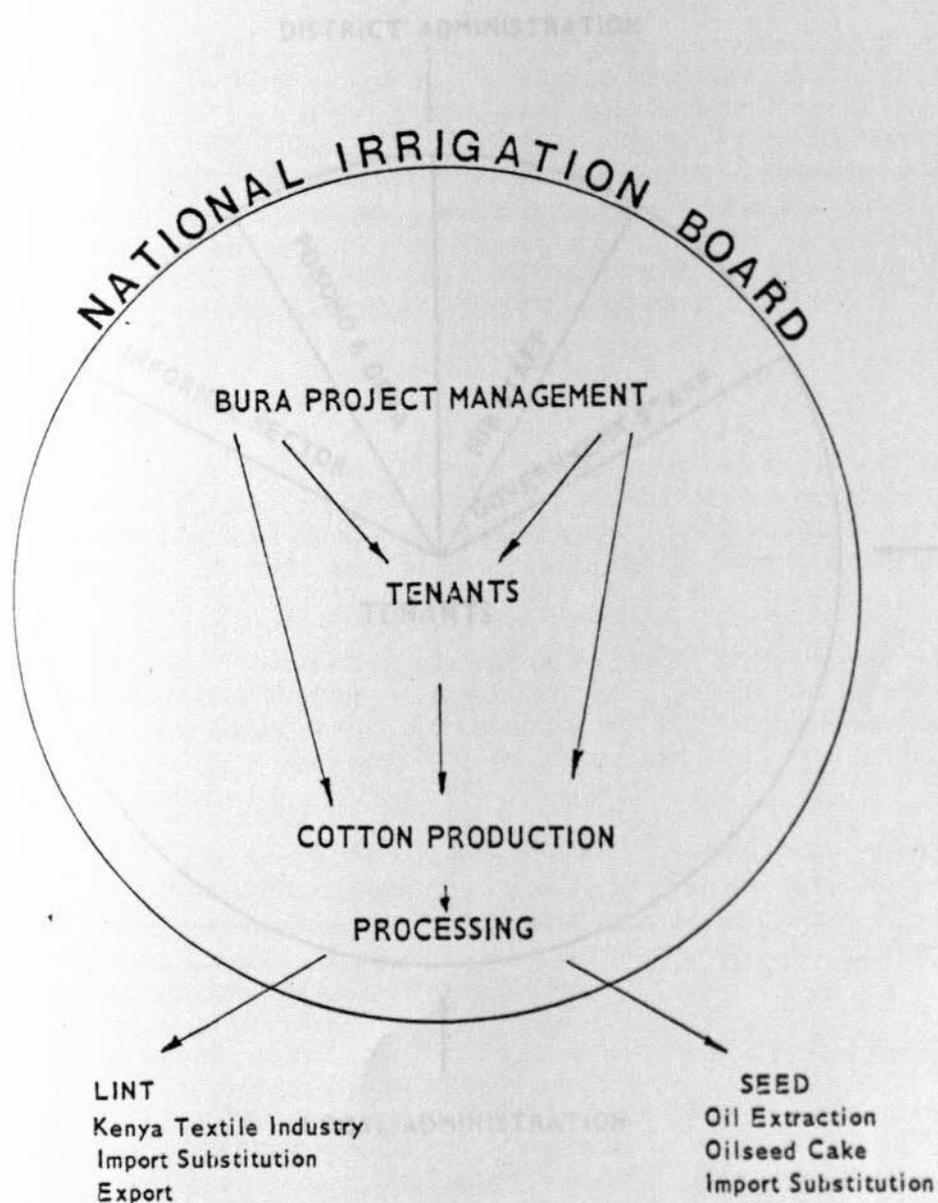
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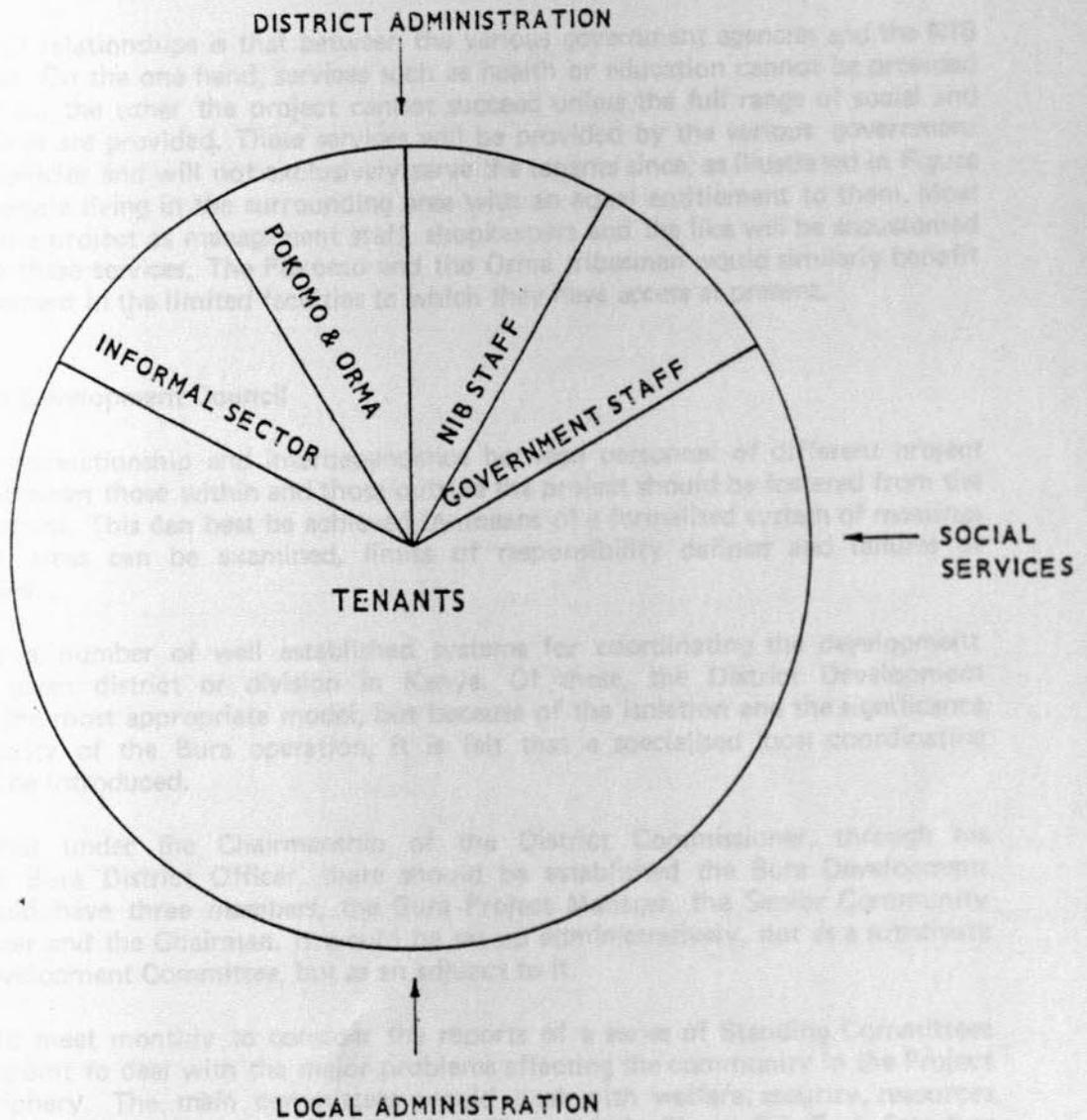
The NIB has certain statutory obligations and powers as defined in the Irrigation Act. These include powers to coordinate and plan settlement on irrigation schemes, to determine the number of tenants, to provide land for public purposes, to promote marketing and to provide for processing. The Act also provides that the Minister of Agriculture, after consultation with the Board, may make regulations "for the better carrying out of the purposes" of the Act.

Each of the various schemes or projects developed by NIB is an entity in its own right and functioning under a scheme management structure and with its own objectives. These objectives

RELATIONSHIP BETWEEN NIB HEADQUARTERS PROJECT MANAGEMENT
TENANTS AND PROJECT OUTPUT



RELATIONSHIP OF GOVERNMENT AGENCIES TO THE PROJECT



are achieved.
 system and
 relationship
 2.1
 2.2
 2.3
 2.4

the growth of this relationship will depend on the ultimate success of the project. The... investment in any settlement project must be justified by the benefits... tenant income, export earnings, income tax and local production. It is thus clearly important to study the relationship and in a way that... The relationship is illustrated in Figure 2.2.

The second group of relationships is that between the various agencies and the full project management. On the one hand, services such as health or education cannot be provided by the NIB, whereas on the other the project cannot proceed unless the full range of social and administrative services are provided. These services are provided by the various government departments and bodies and will be discussed in detail in Chapter 3. The diagram in Figure 2.2 shows the various agencies providing services to the tenants. The diagram also shows the various agencies providing services to the tenants. The diagram also shows the various agencies providing services to the tenants.

are achieved through the effort and co-operation of the tenants, the efficacy of the marketing system and attendant processing arrangements instituted by the NIB.

The relationship between NIB, its scheme management and the tenant needs to be defined and carefully regulated. On the growth of this relationship will depend the ultimate success of the project. The initial high investment in any settlement project must be justified by the benefits accruing, valued in terms of tenant income, export earnings, import substitution and food production. It is thus clearly important to study this relationship and to ensure that communication between its elements is satisfactory. The relationship is illustrated in Figure 2.1.

2.3 Project Management and Government Services

The second group of relationships is that between the various government agencies and the NIB project management. On the one hand, services such as health or education cannot be provided by the NIB, while on the other the project cannot succeed unless the full range of social and administrative services are provided. These services will be provided by the various government departments and agencies and will not exclusively serve the tenants since, as illustrated in Figure 2.2, there will be people living in the surrounding area with an equal entitlement to them. Most people coming to the project as management staff, shopkeepers and the like will be accustomed to having access to these services. The Pokomo and the Orma tribesmen would similarly benefit from every improvement in the limited facilities to which they have access at present.

2.4 The Bura Development Council

The concept of interrelationship and interdependence between personnel of different project components and between those within and those outside the project should be fostered from the beginning of settlement. This can best be achieved by means of a formalised system of meetings at which problem areas can be examined, limits of responsibility defined and failures or constraints identified.

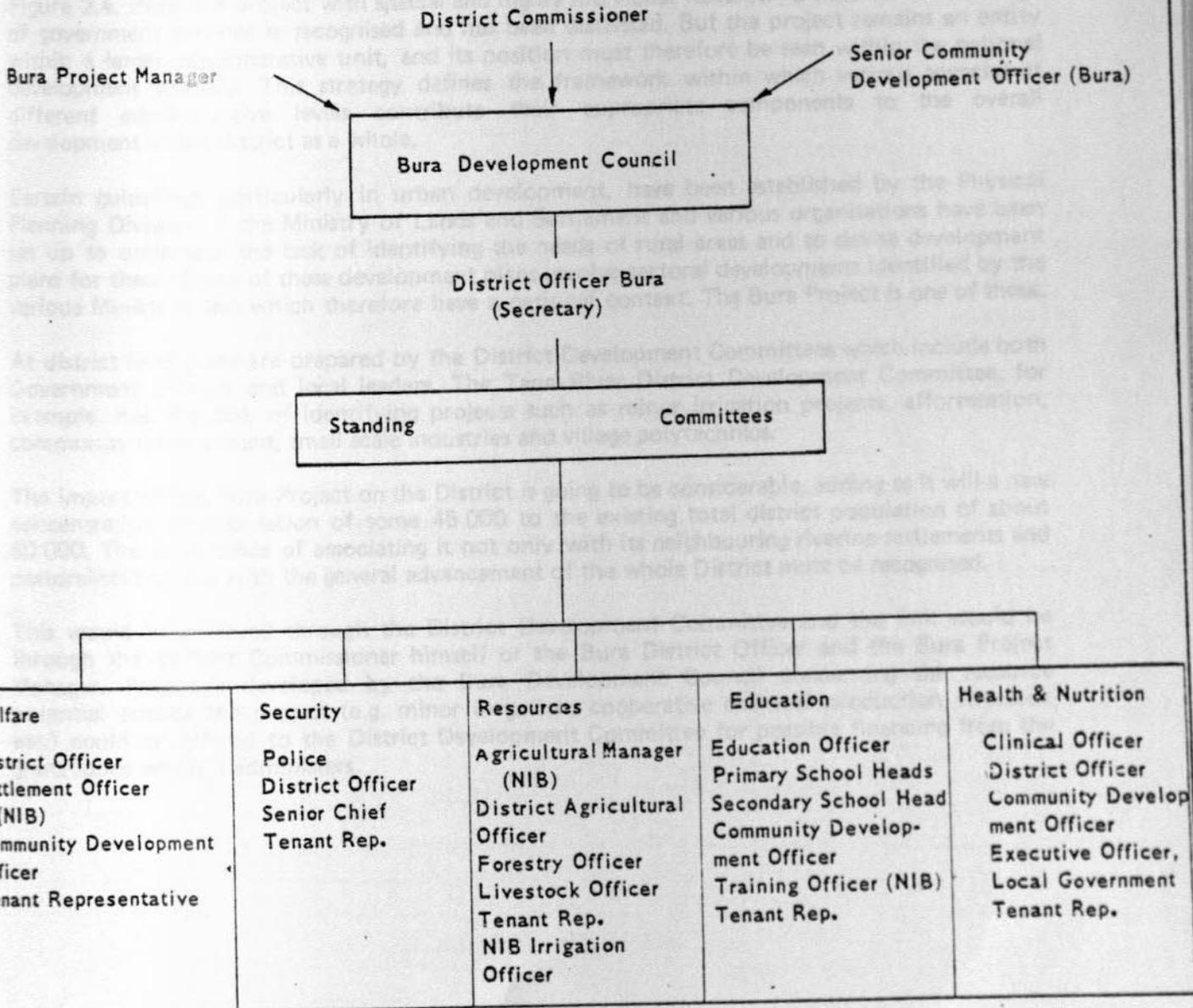
There are already a number of well established systems for coordinating the development activities in any given district or division in Kenya. Of these, the District Development Committees offer the most appropriate model, but because of the isolation and the significance and social complexity of the Bura operation, it is felt that a specialised local coordinating mechanism should be introduced.

It is proposed that under the Chairmanship of the District Commissioner, through his representative, the Bura District Officer, there should be established the Bura Development Council. This would have three members, the Bura Project Manager, the Senior Community Development Officer and the Chairman. It would be set up administratively, not as a substitute for the District Development Committee, but as an adjunct to it.

The Council would meet monthly to consider the reports of a series of Standing Committees which it would appoint to deal with the major problems affecting the community in the Project Area and its periphery. The main committees would deal with welfare, security, resources, education and health. The structure of the Council is illustrated in Figure 2.3. Each Standing Committee would have a tenant representative, elected from the village committees (see the Sociology and Settlement Annex).

This Council will not be concerned with the coordination of the project construction phase operations involving engineering works, roads, buildings and the like, because these aspects of the project construction phase will be dealt with directly by the NIB under the Bura Project Coordinator in Nairobi linked to the site operations through the Chief Resident Engineer and the Site Coordinator. The Project Coordinator and the Site Coordinator would ensure that each Ministry concerned makes its contribution in accordance with the requirements of the project as it progresses. The Bura Development Council would be formed when tenants begin to arrive and

THE BURA DEVELOPMENT COUNCIL ORGANISATION



are settled and the project begins to operate. There will thus be parallel coordination exercises during the three year construction period and during this time the Bura Project Manager will be the link between the Chief Resident Engineer and local Ministry organisations.

2.5 The Bura Project and the Tana River District

There remains a further relationship between the project and the Tana River District illustrated in Figure 2.4. Bura is a project with special and highly individual features. Its need for a wide range of government services is recognised and has been discussed. But the project remains an entity within a larger administrative unit, and its position must therefore be seen within the national development strategy. This strategy defines the framework within which various agencies at different administrative levels contribute their appropriate components to the overall development of the district as a whole.

Certain guidelines, particularly in urban development, have been established by the Physical Planning Division of the Ministry of Lands and Settlement and various organisations have been set up to undertake the task of identifying the needs of rural areas and to devise development plans for them. Some of these development plans involve sectoral developments identified by the various Ministries and which therefore have a national context. The Bura Project is one of these.

At district level plans are prepared by the District Development Committees which include both Government officers and local leaders. The Tana River District Development Committee, for example, has the task of identifying projects such as minor irrigation projects, afforestation, community development, small scale industries and village polytechnics.

The impact of the Bura Project on the District is going to be considerable, adding as it will a new concentration of population of some 45 000 to the existing total district population of about 60 000. The importance of associating it not only with its neighbouring riverine settlements and pastoralists but also with the general advancement of the whole District must be recognised.

This would be achieved through the District Development Committee and the link would be through the District Commissioner himself or the Bura District Officer and the Bura Project Manager. Proposals developed by the Bura Development Council concerning the resource potential outside the project (e.g. minor irrigation, cooperative charcoal production, livestock etc.) could be offered to the District Development Committee for possible financing from the grant funds which it administers.

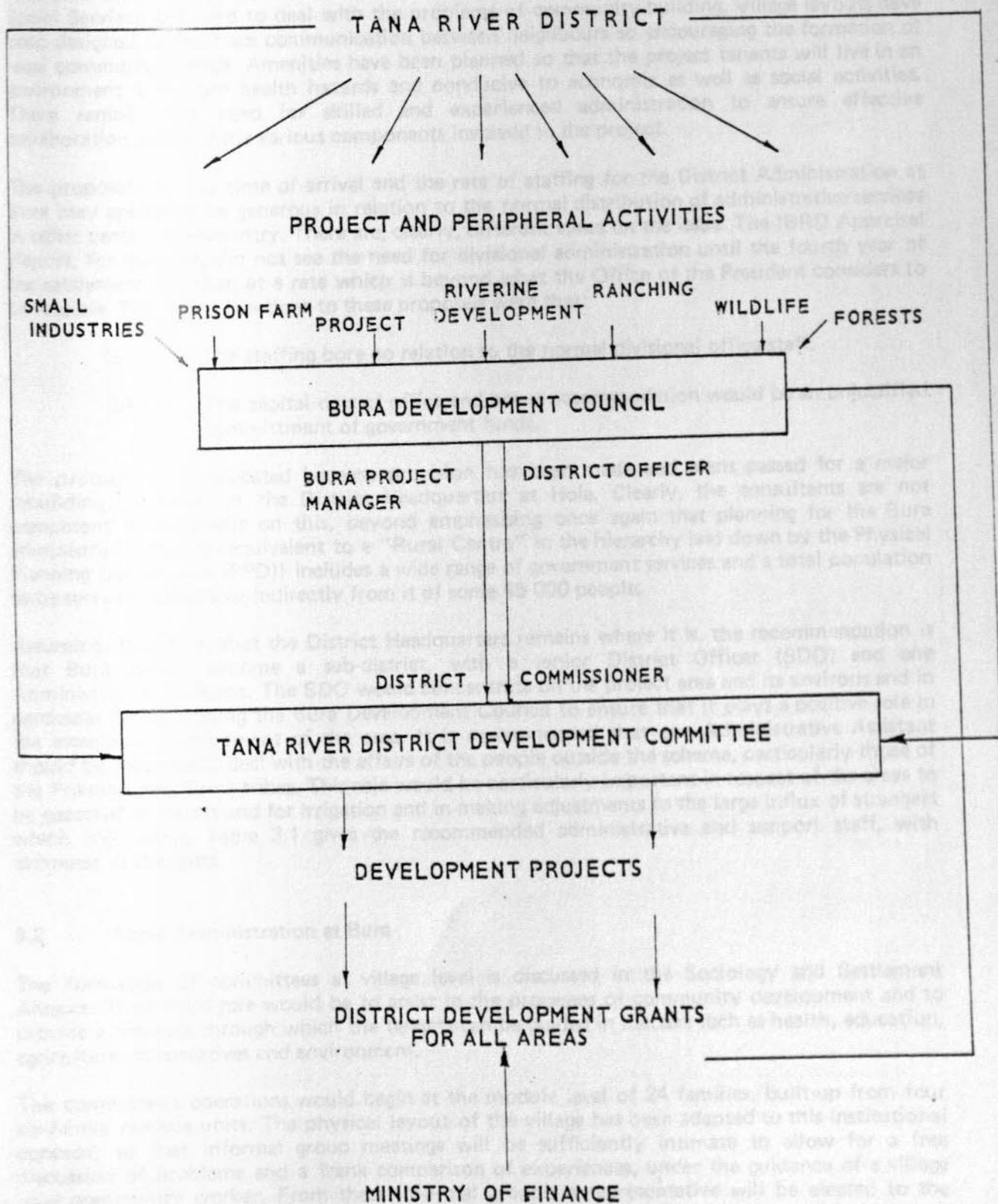
TANA RIVER DISTRICT DEVELOPMENT COMMITTEE

DEVELOPMENT PROJECTS

DISTRICT DEVELOPMENT GRANTS
FOR ALL AREAS

MINISTRY OF FINANCE

RELATIONSHIP OF THE PROJECT TO THE DISTRICT DEVELOPMENT



CHAPTER 3 ADMINISTRATIVE SERVICES

3.1 District Administration at Bura

From the foregoing chapter, it is clear that the administrative services of the Office of the President will have a crucial role in the development of the Bura Project. The Department of Social Services will need to deal with the problems of community building. Village layouts have been designed to facilitate communication between neighbours so encouraging the formation of local community bonds. Amenities have been planned so that the project tenants will live in an environment free from health hazards and conducive to economic as well as social activities. There remains the need for skilled and experienced administration to ensure effective collaboration between the various components involved in the project.

The proposals for the time of arrival and the rate of staffing for the District Administration at Bura may appear to be generous in relation to the normal distribution of administrative services in other parts of the country. There are, clearly, different views on the issue. The IBRD Appraisal Report, for instance, did not see the need for divisional administration until the fourth year of the settlement and then at a rate which is beyond what the Office of the President considers to be feasible. The main objections to these proposals were that:

- (a) The staffing bore no relation to the normal divisional office staff.
- (b) The capital cost of office and house accommodation would be an unjustified commitment of government funds.

The problem is complicated because provision has been made and plans passed for a major rebuilding operation at the District Headquarters at Hola. Clearly, the consultants are not competent to comment on this, beyond emphasising once again that planning for the Bura administrative centre (equivalent to a "Rural Centre" in the hierarchy laid down by the Physical Planning Department (PPD)) includes a wide range of government services and a total population to be serviced directly or indirectly from it of some 45 000 people.

Assuming, therefore, that the District Headquarters remains where it is, the recommendation is that Bura should become a sub-district, with a senior District Officer (SDO) and one Administrative Assistant. The SDO would concentrate on the project area and its environs and in particular on developing the Bura Development Council to ensure that it plays a positive role in the integrated development of the area. It is recommended that one Administrative Assistant should be provided to deal with the affairs of the people outside the scheme, particularly those of the Pokomo and Orma tribes. This role would be particularly important in respect of the areas to be gazetted as forests and for irrigation and in making adjustments to the large influx of strangers which will occur. Table 3.1 gives the recommended administrative and support staff, with estimates of the costs.

3.2 Local Administration at Bura

The formation of committees at village level is discussed in the Sociology and Settlement Annexe. Their main role would be to assist in the processes of community development and to provide a medium through which the tenants can be guided in matters such as health, education, agriculture, cooperatives and environment.

The committee's operations would begin at the module level of 24 families, built-up from four six-family nucleus units. The physical layout of the village has been adapted to this institutional concept, so that informal group meetings will be sufficiently intimate to allow for a free discussion of problems and a frank comparison of experiences, under the guidance of a village level community worker. From these informal groups, a representative will be elected to the village committee. He would also be a point of contact for the NIB Field Assistant, for the health worker and so on. The module also represents one irrigation unit of 30 hectares.

The next layer of this village institution, the ward of 72 families consists of three modules and would select a ward representative to the village committee which would then consist of 12 module delegates and 4 ward representatives. The committee would nominate individuals for the position of village headman, with the advice of the chief or sub-chief.

The 23 village committee chairman would constitute an ad hoc project tenants committee, the composition changing annually as village committees have their annual meetings and elections. This committee, joining with the rural centre committee chairman, would eventually develop into a local council, with an executive officer, and responsibilities for activities such as refuse disposal, meat inspection and licensing traders.

Table 3.1 - District and Local Administration Budget Requirements (K Sh 1000)

Item	1978-79	1979-80	1980-81	1981-82	1982-83
Capital:					
Offices		500			
Housing	366	880	170	254	142
Vehicles		160	9	12	9
Contingencies	37	154	18	27	15
Total Capital	403	1 694	197	293	166
Recurrent:					
Salaries	10	174	287	385	490
Building Maintenance		41	181	302	402
Vehicles Operation		55.5	57	58.5	60
Contingencies	1	27.5	53	74.5	95
Total Recurrent	11	298	578	820	1 047
Total Capital + Recurrent	414	1 992	775	1 113	1 213

Each Market Centre, it is proposed, should be assigned a Chief, and each Local Centre a sub-chief. The four chiefs would be responsible to the Bura District Officer for the range of activities laid down in the Chief's Act. Each Chief would have two sub-chiefs at the Local Centres in the irrigation block under his control. The chiefs and sub-chiefs would not be directly involved in the village committees, although they might attend by invitation, together with other government or NIB officials to advise and assist the village level staff. Table 3.1 includes provision for the recommended local administration staffing.

3.3 Police

Previous reports suggested that security requirements in the area could be met by police posts located at selected Market Centres, under the control of the police station at Hola. This is not now considered to be sufficient. Although there is no reason to suppose that the crime rate would be higher than elsewhere, due cognisance must be given to the diverse origins and social status of the tenants, however carefully screened they have been. The presence of contractors' gangs, squatters, the temptations of poaching, and the isolation of the area will all have an effect on the behaviour pattern of the new inhabitants.

The presence of the Chiefs and their administrative police in the Market Centres will be sufficient to keep order at the village level. The Rural Centre with its relative wealth and its varied and considerable population will require more than the relatively immobile administrative police. It is

therefore proposed that provision should be made for a Police Station at Bura, fully equipped with facilities such as Land Rovers and radio communication, independent of Hola, and with authority over the entire project area as well as the riverine areas and gazetted forests up to the Nanigi diversion structure site. This would provide a service superior to that suggested by the PPD guidelines. However it is felt that the special problems and the national importance of the project justify the staff levels and costs shown in Table 3.2.

Table 3.2 - Police Budget Requirements (K Sh 1 000)

Item	1979-80	1980-81	1981-82	1982-83
Capital:				
Offices				
Housing	957	168	86	84
Vehicles	163	1	2	135
Contingencies	112	17	9	22
Total Capital	1 232	186	97	241
Recurrent:				
Salaries	85	212	268	330
Building Maintenance		25	28	30
Vehicles Operation	54	54	54	99
Contingencies	14	29	35	46
Total Recurrent	153	320	385	505
Total Capital + Recurrent	1 385	506	482	746

3.4 Prisons

It is recommended that special consideration be given to the construction of a modern prison at Bura catering for the category of criminal upon whom remedial treatment, training and productive occupation could produce beneficial results. The 1974/78 Development Plan makes specific provision for prison facilities at Bura, which is supported on the grounds that a prison adjacent to the project could perform services of value to it.

There are some 150 hectares of irrigation land separated from the main irrigation blocks which could be developed as a prison farm to produce forestry seedlings and serve as a seed multiplication area, particularly for cotton seed.

In addition to the irrigable area, some 150 hectares of land would be required for housing, workshops and barracks. The main problem planning the prison will be to determine the appropriate capacity for it. Two options appear to be relevant. The first is to build a unit accommodating 600 prisoners which would cater for the needs of the 150 hectare farm and would be entirely relevant to the irrigation project and would provide valuable services to it. The second option is for a larger, 1000 inmate prison which would have a wider national significance and purpose. Table 3.3 presents the budget necessary to support a 600 prisoner unit which might be commenced in 1982.

Table 3.3 - Estimated Staff Budget for Bura Prison (600 inmates)

Staff Category	Annual Cost (1 000 K Sh)
Disciplinary staff	1 473
Administrative	196
Prison farm	207
Total Cost per annum	1 876

3.5 Local Council Services

Government policy clearly favours the development of effective local authorities which play a positive role in rural and urban development. There are, however, a number of impediments to the successful pursuit of this policy. The first constraint to effective local authority activities is the lack of revenue and of possible sources of revenue. Graduated personal tax was withdrawn in 1974, and primary school fees are progressively being removed. Agricultural cesses are being, or have been, abolished. The second constraint is the lack of local office bearers and staff with the requisite leadership and executive ability.

The local authority structure has five separate components: Municipal, Town, County, Urban and Divisional Councils. The first three have a specific range of services for which they are responsible, while the last two are expected to advise their County Councils and District Development Committees on the needs and expectations of the people in their area in respect of the services which the County Councils should be supplying. In addition to advising them of these needs, they should assist in organising, managing and maintaining these services, particularly those which are based upon self-help activities.

The services which the County Councils should be providing progressively as their revenue and executive capabilities improve are as follows:

- (a) Self-supporting services:
 - Markets and beer halls
 - Nursery schools
 - Licensing services
 - Land-use planning and allocation
 - Game parks
- (b) Supported services:
 - Cemeteries
 - Agricultural, Forestry and Veterinary services, in association with Central Government agencies
 - Community services
 - Administrative and Financial Control; County rating and Representation on the District Development Committee.

The Divisional Council - which is the level relevant to the Bura Project would be administered by the Bura District Officer. There is an obvious need for such a council and it would fit into the proposed organisational structure for the Bura Development Council and its links with the District Development Committee.

The situation is complicated by the fact that the project will result in a large population concentrated in a relatively small area and which will require services such as slaughter houses, animal pounds, refuse collections, meat inspection and licensing of commercial undertakings.

Table 3.4 summarizes the budget for the proposed local authority, operating from the Rural Centre, under the control initially of the District Officer at Bura, but gradually becoming more directly associated with the Divisional Council and the County Council. These proposals will require further discussion with the Ministry of Local Government.

Table 3.4 - Local Authority Budget Requirement (K Sh 1 000)

Item	1979-80	1980-81	1981-82	1982-83
Capital:				
Abattoir	60			
Housing	719	222	82	40
Vehicles	243	68	2	-
Contingencies	96	29	8	4
Total Capital	1 118	319	92	44
Recurrent:				
Salaries	40	169	218	242
Building Maintenance	-	14	18	20
Vehicles Operation	82	109	109	109
Administrative Running Cost	4	4	5	5
Contingencies	13	30	35	38
Total Recurrent	139	326	385	414
Total Capital + Recurrent	1 257	645	477	458

There are a number of factors which make Bura unique with regard to usual government developments. To begin with, the whole irrigable area comes under the authority of NIB, and NIB has the right, and obligation, to set aside areas for purposes such as housing and trading. NIB licenses settlers as tenants on certain conditions relating to the growing of crops and keeping of livestock. The NIB Project Manager will not, however, wish to be involved in such matters as the licensing and collection of fees for trading operations; the use and collection of fees for slaughter houses; for meat inspection; control of animal pounds and the like.

It is recommended, subject to approval by the Ministry of Local Government, that the Divisional Council should, for a number of years, be composed of the chairmen (or headmen) of the village committees (see Section 3.2 above) who would sit as a council under the chairmanship of the District Officer. The Deputy Project Manager would act as ex-officio Secretary to the Council. The Council's function would be advisory, though they would elect representatives to sit on the District Development Committee and the County Council.

The executive officer of the Divisional Council would have his office in the 'town hall' at the Rural Centre, and would control the small staff required to deal with licensing, fee and rate collections etc. as each facility develops. He would be responsible to the District Officer.

3.6 Implementation Programme for the Administrative Services

The main features of the implementation programme for the various elements of the administrative services in the project area are as follows:

- (a) The Administrative Assistant, together with his driver and a clerk and messenger, would be the first administrative staff posted to Bura early in 1979 because his particular area of responsibility will be the areas adjacent to the project area where he would deal with the development of services to the Pokomo and Orma.
- (b) The District Officer would be posted during the last quarter of 1979 together with supporting staff which would include a driver, clerk and messenger. The full Administrative Police Unit of Sergeant and nine Constables would be set up early in 1980 in preparation for the build-up of tenants.
- (c) The Chiefs, their support staff and Administrative Police Units would be posted to the area before the settlement of each Market Centre area commenced. They would thus be available to assist in the organisation of the actual village settlement programme. The same phasing will apply to the eight sub-chiefs.
- (d) The provision of Local Government services will be the District Officer's responsibility until an effective Local Council is established. Thus local government staff will be appointed at the same time as the District Officer. Their presence at this early stage will be necessary to control trading activities and basic services at the Rural Centre. The Executive Officer will be required by July 1980 and would assume his duties under the direction of the District Officer.

In the past, the education system has been producing about 70% of the secondary school leavers of the secondary education system (Development Plan 1974/75). The system has been producing increasing numbers of individuals with academic qualifications which have little bearing on the needs of the economy of the country. Too many school leavers have expectations, qualities and innovation which are out of phase with employment opportunities. To reverse this situation, Government has perceived the necessity for different levels of education at different levels against the demands which different sectors of the economy are making for particular skills and abilities. Future policy will be directed toward strengthening the fifth and sixth classes at the top end of the secondary system, and increasing the quality of third forms in maintained schools for entry by competitive examination to provide 'second chance' opportunities at the lower end of the system. In addition, there will be increased emphasis on applied and vocational subjects, such as Agriculture, Home Science, Technical Education and Business Education. Multi-stream schools will be given preference over single stream schools.

The whole of secondary education is being reviewed by a specially appointed Committee on Education. The Committee's report has not yet been released. It is likely, however, that it will give particular attention to that field of education covered by vocational training, which policy will include education extension programmes. It is hoped that these are the areas which could be expected to bring long-term benefits to settlement projects such as Bura.

The review of educational policy includes a reassessment of the purpose and relevance of the primary education system as it exists at present. It will seek to evolve a system in which some of the existing traditions are removed. For instance, primary schooling finishes now at the primary level, but an increasing number of children are reaching the grade at the age of 12 or 13. Strictly speaking, under the laws of Kenya, they cannot seek paid employment under the age of 16, and if they do not go on into the Secondary school they will have acquired no specific skills from the primary system to equip them for employment. The 'second chance' opportunities referred to above would hardly mitigate this problem, because entry to the Secondary Form II would be by competitive examination.

The current direction of thinking, which will have very important implications for the Bura

CHAPTER 4 EDUCATION SERVICES

4.1 Review of Education Policy

A major element of Government policy toward education is its long term objective of free and compulsory primary education. The first step toward this has been to remove fees from Forms I-IV and to standardise fees for Forms V-VII at K Sh 60/- per pupil. This has resulted in a considerable increase in the usage rate of primary schools, which has required an increase in the numbers and quality of teachers. The Development Plan 1974 - 1978 gave a forecast of qualified teachers in the primary school sector in 1978 as follows:

	S1	P1	P2	P3	P4	Others	Total
Graduates	267	18 424	18 605	27 201	1 901	200	66 628
30							

The projected total requirement of primary teachers in 1978 was 91 000, thus leaving a balance of 24 372 unqualified teachers or 26.8 per cent of the primary teaching staff. The Government's policy is to replace the unqualified staff with professionally trained teachers. The Government plan further aims to guarantee a sufficient number of qualified teachers to maintain a pupil/teacher ration of 40:1 by 1985. The teacher allocation policy for the future is to assign P1 teachers to Forms VI and VII, P2 teachers to Forms IV and V, and P3 teachers to the remaining Forms I, II and III. Furthermore as the supply of secondary school teachers improves, S1 teachers will become available for posting to primary schools. It may thus be possible by 1980 to assign a limited number of this grade of teacher to primary schools where it is important to take account of special factors in the population structure.

In the field of secondary education, there have been misgivings about "the relevance of both the structure and content of the secondary education process" (Development Plan 1974/78). The education system, in fact, has been producing increasing numbers of individuals with academic qualifications which have little bearing on the needs of the economy of the country. Too many school leavers have expectations, qualities and motivation which are out of phase with employment opportunities. To reverse this situation, Government has perceived the necessity for balancing the content of education at different levels against the demands which different sectors of the economy will be making for particular skills and abilities. Future policy will be directed toward rationalising the fifth and sixth classes at the top end of the secondary system, and increasing the capacity of third forms in maintained schools for entry by competitive examination, to provide 'second chance' opportunities at the lower end of the system. In addition, there will be increased emphasis on applied and vocational subjects, such as Agriculture, Home Science, Industrial Education and Business Education. Multi-stream schools will be given these facilities before single stream schools are considered.

The whole field of education is being reviewed by a specially appointed Committee on Education Objectives and Policies, whose report has not yet been released. It is likely, however, that it will give considerable attention to that field of education covered by vocational training, village polytechnics and education extension programmes. It so happens that these are the areas which could bring significant long term benefits to settlement projects such as Bura.

This review of educational policy includes a reassessment of the purpose and relevance of the primary education system as it exists at present. It will seek to evolve a system in which some of the present contradictions are removed. For instance, primary schooling finishes now at the seventh grade, but an increasing number of children are reaching this grade at the age of 12 or 13. Strictly speaking, under the laws of Kenya, they cannot seek paid employment under the age of 16, and if they do not go on into the Secondary school they will have acquired no specific skills from the Primary system to equip them for employment. The 'second chance' opportunities referred to above would hardly mitigate this problem because entry to the Secondary Form III would be by competitive examination.

The current direction of thinking, which will have very important implications for the Bura

Project, is that the Primary system should be extended by two further grades so that it will accommodate children up to the employable age of 16. The eighth and ninth grades would be the equivalent of the present Secondary Forms I and II, but would be specifically orientated toward the acquisition of vocational skills to equip children for employment. This radical change may be introduced by 1983, the year during which the final settlement of tenants will take place at Bura and should therefore be considered as a planning factor for the project primary school network.

If this change is to be effected, teacher training programmes will need modifications to provide more S1 specialist teachers, offering a range of skills.

4.2 Factors Considered in Planning the Bura Project Educational Facilities

While it is important to see the development of the Bura Project as part of a wider pattern of development for the country as a whole, it is also necessary to emphasise the particular conditions which make settlement in the area a unique problem. Selection of some 5 000 tenants in the age group 25 - 45 with a family capable of mustering an equivalent of four adult labour units will inevitably produce an atypical population age distribution on the project compared to the rest of Kenya. This will have important implications on the education requirements of the project. There will be a deficit of the older adult age group and secondary school age children. There will be a high proportion of children of pre-primary and primary school age. It is estimated (see the Sociology and Settlement Annexe) that of the initial population, 40 per cent will be under 10 years of age as compared with the national average of 34 per cent in this age group.

Thus on the one hand there will be a dearth of experienced elders whose stabilising influence would normally be an important component of a balanced community within which the processes of education are most effective, while on the other hand, there will be an above average number of school age children with a reserve of pre-school age children leading to an increasing number of school places needed each year.

This reserve, furthermore, is likely to increase as the tenants, once they have established themselves and have access to the income from their cotton crop, are likely to attract relatives to live on the project and to increase the numbers in their own families.

A further important consideration is the probability that the usage rate of the various services to be provided at Bura - health, education, day-care and so on - will be very high. This is particularly likely because the tenants will generally come from a background of unemployment, landlessness and deprivation. They will see the opportunities to break away from this background and will make good use of the facilities provided.

Another factor which is likely to influence the usage rate of the schools is the fact that all primary school fees, including Forms V, VI and VIII, have been remitted for Tana River District. The tenants themselves will be building the schools and, as a necessary substitute for the direct "harambee" approach, will be contributing to the costs of building materials by deductions from their cotton payments over a period. It is unlikely under these circumstances that parents would not use the facilities as fully as possible.

There is a further factor which should be recognised in planning educational facilities at Bura. The population will be drawn from all parts of the country and will therefore have diverse cultural and even linguistic backgrounds which will need to be welded into a cohesive community. The process of community building must be commenced among the primary school age groups and will be most effectively achieved by the selection of experienced and understanding teachers.

4.3 Primary School Planning Criteria

- (a) The project plan provides for 23 villages and one rural centre. The villages will fall into the PPD hierarchy with 4 market centres, 8 local centres and 11 sub-local centres. There will be slight variations in the population of these categories. The main component in each village will be about 226 tenant families representing a population of 1 570. With management staff and other services, the market centre populations will be an estimated 2 100 at full settlement, the local centres 1 785 and the sub-local centres 1 775. There will be one village of each category settled in the first year of the project and by the end of 1983, their populations are likely to have grown to 2 413, 2 050 and 2 035 respectively.
- (b) It is argued elsewhere that the population structure determined by the tenant selection criteria will produce a high proportion of school age children. The national average of children between the ages of 5 and 14 years (which can be taken as the range of ages at primary schools now) is 29.2 per cent. At Bura, the percentage could be very much higher, with a constantly growing population of pre-school age children. An estimate of $33^{1/3}$ per cent has been used for calculating the probable number of classes needed to accommodate the primary school age children in a typical village.
- (c) An average class size of 40 pupils was adopted because this is the Ministry of Education's standard, and an absenteeism of no more than 20 per cent was allowed to account for dropouts, home helps, etc.
- (d) The maximum distance desirable for a primary school pupils to have to walk to school has been adopted as 2.4 kilometres, as recommended by the Ministry of Education.

The Rural Centre or town will have a considerable population of government and NIB senior and middle level staff, ginnery personnel, postal staff, traders and others. This population will have diverse characteristics in terms of family sizes, social attitudes and economic status. The greater average wealth and smaller average family size, compared to project villages, will result in a demand (for which the parents would be prepared to pay) for smaller classes and possibly extra teachers. The population growth will be only partly due to natural increase because the administrative, technical, commercial and social services staff will increase in response to the steady growth in the number of tenants and the irrigated area.

4.4 Primary School Requirements for the Bura Project

As shown in Table 4.1, an average of 14 classrooms will be required at each of the 23 villages (market, local and sub-local centres) in the project to accommodate 80 per cent of the estimated number of school age children. Two possible solutions could be offered to meet this requirement. The first solution considered was to build one double stream school at each village; the second was to build one four-stream school at three market centres and at each of the eight local centres, and one double stream school at the fourth market centre. This would be necessary because this village would be the last to be occupied and would be over 2.4 kilometres from the nearest school.

4.5 Primary School Staff Requirements

Table 4.2 gives the salary structure of the various grades of teachers who will be needed at Bura (primary and secondary). Table 4.3 summarises the requirements and cost of the standard double stream primary school teaching unit proposed for Bura. Table 4.4 sets out the staffing requirements for the 23 village schools and the two rural centre primary schools with construction phased over a period of four years.

Table 4.1 - Primary School Classroom Requirements for Typical Villages

Village Unit	Estimated initial population	Estimated population 4th year (1)	Primary age population (2) (year 4)	Estimated attendance (3) (year 4)	No. of classes per centre
Rural centre (4)	1 000	4 500	1 100	1 000	25
Market centre	2 103	2 413	804	643	16
Local centre	1 785	2 048	683	546	13.6
Sub-local centre	1 773	2 034	678	542	13.5

- Notes:
- (1) The population growth rate for the project villages is taken as 3.5 per cent per annum.
 - (2) The number of primary school age children is estimated as 33 1/3 per cent of the centre population.
 - (3) The attendance rate is estimated at 80 per cent of the school age population.
 - (4) The development of the Rural Centre will be different from the villages. Its population will grow over the 3.5 years of settlement with the increasing requirement for services. The attendance rate will be higher than in the villages, and the size of classes may be smaller than average of 40 assumed for the villages.

The advantages of multi-stream schools are that cost savings would be made over headmasters, housing, responsibility allowances and to a certain extent equipment and buildings. A further advantage would be that children from different villages would mingle at one four-stream school. The advantages of one double stream school at each village, however, is that no child or group of children would be disadvantaged by having to walk from one village to the next, and this would contribute to the integration of different cultural groups within each village. In addition the teachers in each village are likely to play a more positive role in the village development if they associate and participate in the affairs of their village. The extra costs of double stream schools in all villages would not be significant, particularly as the tenants would be building the schools, under supervision, with their own labour, and would accept the harambee principle more readily than if the building were in an adjacent village. Finally a double stream school is a more flexible unit than a four stream school, and its expansion for instance, in one market centre where growth has been faster than anticipated, to a triple stream school would pose no special problems.

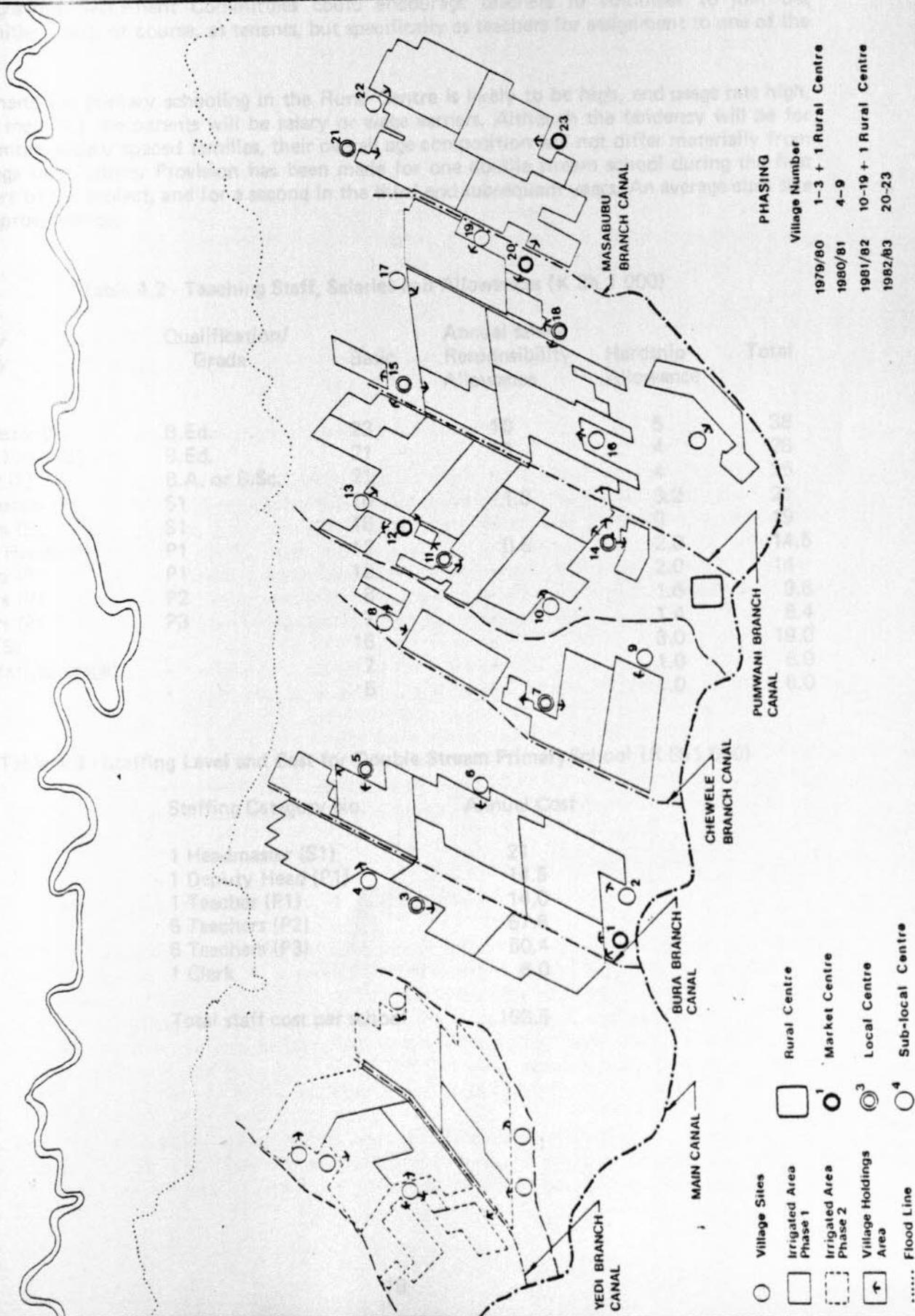
Another factor which favours double stream schools is the consideration that by 1983, with the possible extension of primary education to a ninth grade, even a double stream school would comprise 18 classrooms and a greatly increased emphasis on vocational training. The administration, and the control of the quality of teaching, in the very big multi-stream schools would call for a level of skill and experience which would be difficult to attain at Bura.

On balance, therefore, the recommendation is for a double stream school in each village. The probable order of construction is shown in Figure 4.1. School buildings would be built to standard designs, and from materials supplied by NIB. The tenants harambee effort will be in the form of their labour (NIB providing the building supervision) but the costs of material would be deducted from the value of their seed cotton, in the same way as for their own houses, over the same period of time (15 years).

4.5 Primary School Staff Requirements

Table 4.2 gives the salary structure of the various grades of teachers who will be needed at Bura (Primary and Secondary). Table 4.3 summarises the requirements and cost of the standard double stream, primary school teaching unit proposed for Bura. Table 4.4 sets out the budget requirements for the 23 village schools and the two rural centre primary schools with construction phased over a period of four years.

PHASING OF PRIMARY SCHOOLS DEVELOPMENT



In proposing specific grades of teachers, the consultants have attempted to allow for the particular problems likely to be encountered in the area and have recommended grades which are above those found in the average primary school in other rural areas.

It is also suggested that, wherever possible, married couples, both of whom teach, should be recruited, partly as a means of saving on housing costs, and partly to add another element which would assist in the process of developing a cohesive community. It would also be of special value if the District Settlement Committees could encourage teachers to volunteer to join the communities - not, of course, as tenants, but specifically as teachers for assignment to one of the schools.

The demand for primary schooling in the Rural Centre is likely to be high, and usage rate high, because many of the parents will be salary or wage earners. Although the tendency will be for smaller more widely spaced families, their overall age composition will not differ materially from the village populations. Provision has been made for one double stream school during the first two years of the project, and for a second in the third and subsequent years. An average class size of 35 is provided for.

Table 4.2 - Teaching Staff, Salaries and Allowances (K Sh 1 000)

Position/ Category	Qualification/ Grade	Basic	Annual salary Responsibility Allowance	Hardship Allowance	Total
Headmaster (S)	B.Ed.	23	10	5	38
Deputy Head (S)	B.Ed.	21	3	4	28
Teacher (S)	B.A. or B.Sc.	21	-	4	25
Headmasters (P)	S1	16	1.8	3.2	21
Teachers (S)	S1	16	-	3	19
Deputy Heads (P)	P1	12	0.5	2.0	14.5
Teachers (P)	P1	12	-	2.0	14
Teachers (P)	P2	8	-	1.6	9.6
Teachers (P)	P3	7	-	1.4	8.4
Bursar (S)	-	16	-	3.0	19.0
Other staff (average)	-	7	-	1.0	8.0
Clerical	-	5	-	1.0	6.0

Table 4.3 - Staffing Level and Cost for Double Stream Primary School (K Sh 1 000)

Staffing Category No.	Annual Cost
1 Headmaster (S1)	21
1 Deputy Head (P1)	14.5
1 Teacher (P1)	14.0
6 Teachers (P2)	57.6
6 Teachers (P3)	50.4
1 Clerk	6.0
Total staff cost per school	163.5

**Table 4.4 - Ministry of Education: Primary School Budget Requirement
(K Sh 1000)**

Item	1979/80	1980/81	1981/82	1982/83
Capital:				
School Buildings: Villages	864	1 152	1 152	1 109
School Buildings: Rural Centre	675	675		
Housing	1 860	2 790	2 170	930
Sub Total	3 399	4 617	3 322	2 039
Contingencies	340	462	332	204
Total Capital	3 739	5 079	3 654	2 243
Recurrent:				
Salaries	463	1 608	3 067	4 052
Administration	28	96	184	243
Sub Total	491	1 704	3 251	4 295
Contingencies	49	170	325	430
Total Recurrent	540	1 874	3 576	4 725
Total Capital + Recurrent	4 279	6 953	7 230	6 968

4.6 General Review of Secondary School Requirements

Acceptance at any maintained secondary school is on a basis of examination in Kenya. Pupils or their parents may nominate the school of their choice, and there is thus a tendency for schools with the best reputation to have more applicants than places, and particularly at secondary boarding schools. Fees of K Sh 690 per pupil per annum are paid in the low cost secondary boarding schools of the type which would be appropriate for Bura. Although government policy is to improve existing maintained secondary schools and upgrade harambee secondary schools rather than to build new ones, an exception will have to be made at Bura.

The arguments in favour of a boarding school at Bura are numerous. It would be located in the Rural Centre to serve the project as a whole, and would accept allocations of successful candidates from other parts of the Province and Country. This would be an important consideration to counteract any tendency for Bura school children to feel isolated and cut off from the mainstream of development. This would not be possible if Bura offered only day attendance facilities. Furthermore, the secondary students from the majority of the 23 villages would find it virtually impossible to attend a day school unless buses were provided, which would be costly.

4.7 Size and Staff - Secondary School Requirements

The size of the school will need to be related to the Provincial situation, as modified by the rapid increase in population at Bura. It is proposed that a triple stream boarding school, with full facilities for Forms I to VI and for teachers in applied subjects additional to the normal staffing rate, would be best suited to the circumstances of the project. The school would be of sufficient size to attract the right calibre of staff and would develop into one of the more important secondary institutions in the Province. In the first instance, however, the triple stream system should be restricted to Forms I to III, reducing to two streams for Forms IV to VI.

Ample space for a boarding school of this description has been allocated in the Rural Centre structure plan. The building of the school could thus proceed, along with other developments at the centre, in the second year of project implementation. Staff and pupils, however, would not

arrive until mid-1982 by which time the majority of the settlement programme would have been completed, and settlement services would be fully operational. Table 4.5 gives the estimated costs for the secondary school.

**Table 4.5 - Ministry of Education: Secondary School Budget Requirement
(K Sh 1 000)**

Item	1981/82	1982/83
Capital:		
School Buildings	1 240	—
Housing	1 705	—
Vehicles	160	—
Sub Total	3 105	—
Contingencies	311	—
Total Capital	3 416	—
Recurrent:		
Salaries	44	503
Building Maintenance	—	60
Vehicle Operation	50	50
Sub Total	94	613
Contingencies	9	61
Total Recurrent	103	674
Total Capital + Recurrent	3 519	674

4.8 District Education Office

No specific provision has been made for any change in the District Office. This would continue at Hola, though there may be a case for transferring it to Bura at a later stage.

4.9 Implementation Programme for the Education Services

Recognising the importance of developing the village communities into integrated units as soon as possible, each teaching unit should arrive as nearly as possible complete at the beginning of the month preceding the first family arrivals at each village. This will give each headmaster time to get to know his staff, and to work out his own tactics for dealing with the problems facing his school. It will also give the teachers time to participate in the processes of familiarisation at each village, to meet the community as well as observing the final stages of the school building operation.

No specific provision has been made anywhere for shift working in the lower forms, though it is recognised that it may be convenient for the Headmasters at the primary schools at the market centres (where the estimated school age population may exceed the average of 40 pupils per class) to keep this as an option. This would particularly be the case in the early years, where there could be language problems. It would not however alter the number and size of schools planned for.

Since the recommendation is for the complete teaching unit to be brought to the project in advance of the final arrival of all tenant families, the programme of recruitment or selection of staff should be commenced a year ahead of the implementation programme. One of the early responsibilities of the Project Coordinator will thus be to acquaint the Department of Education with the timing of the village development programme.

The estimates presented here assume that every village will conform to the population age structure discussed in Section 4.3. It is recognised that there will be variations, and the programme consequently must be seen as being flexible. The probability is that, given the selection criteria, the variations between families will not be great enough to modify the requirement for a double stream school at each village by the fourth year of settlement. Flexibility exists by the extent to which each classroom is used. When the selection of settlers has been finalised, there will be opportunities to review the programme requirements in terms of the numbers of classrooms to be built at each village school or even modifying the stream system.

Successful projects are supported by a well considered publicity campaign designed by experienced information workers. It will give potential tenant candidates a basis for deciding whether or not to apply for the scheme. Well planned schedules of movement of tenants and their families, together with detailed programmes for reception at their new homes will limit the placements to regular periods of transition to the unfamiliar, rural environment. There will need to be a continuing programme of rehabilitation and social restructuring, to enable the tenants to orientate themselves in their new life and to secure progressive improvement in productivity on which the project is based, which is necessary for the achievement of its goals.

These aspects have been discussed at length in the Sociology and Settlement Annexes. The purpose of this Annex is to examine the institutional context whereby the tenants can be helped to build a new community out of culturally diverse elements, in which there will be a pronounced gap between the very young and the elderly who normally confer vitality upon a community. It is proposed elsewhere that there should be an experienced sociologist assigned to the project, but it is recognised that his function would be to identify stresses and analyse the social pattern, and to offer solutions rather than to act upon them. The action would be the responsibility of the government agency with specific responsibilities for community and social work, namely the Department of Social Services of the Ministry of Housing and Social Services.

5.2 The Department of Social Services

The staff of the Department are trained in the diverse activities involved in social work and community development. The consultants' discussions with senior officers of the Department indicate that they have a full understanding of the nature of the tenants' problems, and are in agreement with the general approach to their solution. In particular they appreciate the importance of a well planned village layout which will contribute to the development of a settlement. As a result of the build-up of units from the basic six-man construction unit to the 24-man unit and the 72-family ward to the village, the community workers and other workers working with tenants will have ready-made groups through which they can advise and assist tenants directed at individual and at community problems.

5.3 Community Development Activities

The village will have provision for a multi-purpose community centre in which activities can be organised. These activities concerned with community development which are discussed below.

5.3.1 Labour

It is of vital importance to the success of the project that tenants are able to manage their labour requirements during peak periods of labour demand involving in-canton bricklaying, plastering, masonry, heavy lifting and sorting and grading. The typical tenant family is likely to consist of a number of young children which will tend to reduce the field work capacity of the mother and because they will not be able to afford to employ individual home help, are reluctant to employ them in self-help community effort. It is therefore necessary to ensure that such labour

CHAPTER 5 SOCIAL SERVICES

5.1 Introduction

There is general recognition of the complexity of the Bura Project, depending as it does upon the skilful coordination of diverse institutions concerned with a range of activities such as health, security, irrigation works and irrigated forestry plantations. The least known component of all, however, are the tenants and the 'informal' squatters who, one way or another will accompany or follow them.

Careful preparation, supported by a well considered publicity campaign devised by experienced information staff will give potential tenant candidates a basis for deciding whether or not to apply for admission to the project. Well planned schedules of movement of tenants and their families, together with a detailed programme for reception at Bura will limit the discomforts consequent upon the transition to the unfamiliar Bura environment. There will need to be a continuous process of rehabilitation and social restructuring, to enable the tenants to orientate themselves toward their new life and so secure progressive improvement in productivity on which the project is based and which is necessary for the achievement of its goals.

These aspects have been discussed at length in the Sociology and Settlement Annexe. The purpose of this chapter is to examine the institutional means whereby the tenants can be helped to build a new community out of culturally diverse elements, in which there will be a preponderance of the very young and a deficiency of the elders who normally confer stability upon a community. It is proposed elsewhere that there should be an experienced sociologist assigned to the project, but it is recognised that his function would be to identify stresses and analyse behaviour patterns, and to offer solutions rather than to act upon them. The action would be the function of the government agency with specific responsibilities for community and development namely the Department of Social Services of the Ministry of Housing and Social Services.

5.2 The Department of Social Services

The staff of this department are trained in the diverse activities involved in social work and community development. The consultants' discussions with senior officers of the Department indicate that they have a full understanding of the nature of the tenants' problems, and are in agreement on the general approach to these problems. In particular they appreciate the importance of a well planned village layout which will contribute to the development of a community spirit. As a result of the build-up of units from the basic six-man construction unit to the 24-family module and the 72-family ward to the village, the community workers and other workers concerned with tenants will have ready-made groups through which their advice and assistance can be directed at individual and at community problems.

5.3 Community Development Activities

The village plans make provision for a multi-purpose community centre in which space will be available for the activities concerned with community development which are discussed below.

Baby Creches

It is of vital importance to the success of the project that tenants are able to muster the labour required during peak periods of labour demand involved in cotton production, such as weeding, harvesting and sorting prior to marketing. The typical tenant family is likely to consist of a number of young children which will tend to reduce the field work capacity of the mothers and because they will not be able to afford to employ individual home helps, the solution to this problem lies in self-help community effort. It is therefore recommended that each village

community centre should have an area set aside for a creche and equipment provided under the project. The community should provide the staff needed to run the creche and they would be trained by the Department of Social Services. These attendants would receive an honorarium of about K Sh 200 per month which is equivalent to about K Sh 10 per family per annum. It is suggested, however, that this cost could be subsidised by NIB for the first two years of the project, so that the full cost of the creche attendants would not be borne directly by the tenants until their farming operations were stabilised, and their sense of community responsibility fully developed. The village committee should then take over full responsibility for running the creches, selecting and paying the attendants under the guidance and assistance of the community development officers.

Day-care Centres

For the same reasons as make it important to provide creche facilities, provision for pre-school age children, between three and six years of age is important. This is an important age in the physical, mental and emotional development of a child, and it is certain that the tenant family will have no facilities at home to aid and stimulate development particularly during the early years of settlement.

The object of a day-care centre is to provide a place where children can learn to play in harmony with their environment and fellow children with diverse cultural backgrounds. This would enable the adult family members to employ their full labour potential on the production of crops.

The day-care centre would be adjacent to the creche in the multipurpose community centre and would be similarly equipped. A minimum of one attendant would be needed and would receive some basic training. The same rate of honorarium would be paid as the creche attendant, and on the same basis. Estimated costs are shown in Table 5.1.

Table 5.1 - Village Creches and Day-care Centre Costs (K Sh 1 000)

Item	Unit Cost	1980-81		1981-82		1982-83		1983-84		1984-85	
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Equipment:											
Creches	6.0	3	18	6	36	10	60	4	24		—
Day-care Centres	6.0	3	18	6	36	10	60	4	24		—
Staff:											
Creches	2.4	3	7	9	22	16	38	14	34	7	17
Day-care Centres	2.4	3	7	9	22	16	38	14	34	7	17
Sub-Total			14		44		76		68		34
Total Basic Cost			50		116		196		116		34
Contingencies			5		12		20		12		3
TOTAL COST			55		128		216		128		37

No provision has been made for either creche or day-care centres at the Rural Centre, although in fact both units will be needed here as elsewhere. However, it is felt that the employees at the Rural Centre will be wage and salary earners, and will therefore be able to provide the facilities for themselves. The Community Development officials would assist in organising them. Two creches and two day-care centres will be needed, and would best be sited near to the two primary schools. The staff rate of one per centre may be insufficient, if large numbers of children attend.

Village Polytechnics

Village polytechnics are designed to provide primary school leavers with skills suited to the self-employed. The emphasis at Bura would most appropriately be on activities related to agriculture and village services. Courses in such rural skills as leatherware, blacksmithing, carpentry and joinery are likely to be particularly important. It is recommended that a community development officer specialising in village polytechnics should be posted to the project, to assess the needs and support for this development. The initial solution would appear to be to establish one polytechnic within the project, possibly in the Rural Centre, or at one of the Market Centres, and to obtain a District Development Grant for setting up a second one, with a strong agricultural bias, outside the project.

Community Centres

There is space in the village community centres for the following facilities:

- (a) Co-operative branch office: This would be equipped with basic furniture, and located so that tenant members could conveniently wait while their cotton was being examined, weighted and receipted. As the society develops, it would be able to organise its members to improve upon the basic facilities provided in the first instance. Improvements would include building a buying verandah and simple off-the-ground racks for any further sorting necessary before dispatching the cotton to the ginnery.
- (b) The creche and day-care centre: These should ideally occupy the opposite wing of the multi-purpose centre, and be sited adjacent to the village health centre so that the water supply for the village health centre could be extended to the day-care centre if necessary. They should be spacious enough for additional 'aids' and furniture as these are added by the community.
- (c) Community hall: This would occupy the centre of the block and would have a small office attached to accommodate the village level community worker. This person would be responsible for the care of the multipurpose centre as a whole. Funds for upkeep could be in the form of 'rents' from the various occupants such as the co-operative and possibly the nursery school, etc. The community hall would be available for meetings, seminars, entertainments and ceremonies. Its equipment would gradually be built up to include radio, audio-visual equipment and teaching equipment generally.
- (d) Other facilities at the Centre would include an office for the sub-chiefs in the local centres, and in each of the market centres the needs of the Chief, his clerical assistant and administrative police, would be provided for. Finally, there would be an office for the use of the project staff - those, that is, who would be physically housed in the village, and who would be responsible for the crop production and water distribution.

Adult Literacy and Other Activities

The majority of tenants are likely to be illiterate or at best semi-literate. It will therefore be desirable for the Social Services Department to organise classes to promote literacy and numeracy and to help the tenants master the unfamiliar problems which they will have to deal with in the day-to-day operation of their farms. These classes would be centred on the community centres of each village and would be supplementary to the training programmes connected with farming or co-operative activities.

Other activities which would make vital contributions to the processes of community building would involve the formation of women's clubs and groups, youth activities, sports and environmental clubs. These are unlikely to develop of their own accord for a very long time, whereas with trained assistance, their promotion would add a desirable stimulus to the tenants' lives and community building processes.

5.4 Social Services Staffing and Organisation Budget Requirement K Sh 1 000

Although the importance of community building is, perhaps, self-evident, it is thought that the normal strength of the Department of Social Services in rural areas would be inadequate to cater for the particular problems to be dealt with in the project community. In making proposals for staffing, stress should be not only on numbers, but also on seniority and experience. In particular, the senior officer, who will be an important member of the Bura Development Council, should, it is considered, be an experienced and highly motivated officer. He would have a supporting staff of community development workers to deal with the complexity of the problems of the tenants and persons living on the project. Every village should have a resident Community Development Assistant, whose salaries would be a charge either directly on Central Government through the Department, or indirectly through the County Council, possibly by means of a special District Development Grant. They would be in charge of the community centres, and would act as liaison officer between the various other users of the centre, and the village committees.

5.5 Implementation Programme for the Social Services

If the contribution from the Department of Social Services is to be fully effective, their staff needs to be posted to the area at a very early stage in the implementation phase of the project. The first four villages settled will be staffed by eight Community Development Assistants initially. Four would then move to the next four villages settled and would have a further four newcomers to work with them. In this way each village for the first month or so of settlement will have two Assistants to help them over the initial problems, and each assistant will go to his own village with experience gained previously, and with the temporary assistance of one of the new Community Development Assistants. The last three villages will not have the new incoming staff.

The Senior Community Development Officer (CDO) should be posted to the project area before the first tenant arrives in June, 1979 and should be followed after one month by three Assistant Community Development Officers (ACDO) for Social Welfare, Day-care Centres and Self-help Activities. The final two ACDO's will arrive after a further lapse of three months. This phased build-up of staff will give the Senior CDO a better opportunity for working individually with his specialist staff in preparing the outline strategy for providing the services to each village as the tenant population builds up.

Each CD Assistant will conduct a series of programmes under the guidance of the Assistant CDO's with priorities decided by the Senior CDO, but broadly speaking being in the order of initiating self-help projects; supervising and training villager workers for the creches and day-care centres; developing and assisting the Chiefs and NIB workers in the development of the various levels of village committee. Women's clubs, youth activities, village sports, adult education etc. will follow more gradually as village communities and groups become established.

5.6 Budget

The budget required for the Department of Social Services activities is summarised in Table 5.2. The total annual budget required, once the project services are fully staffed, will amount to some K Sh 815 thousand per annum.

Costs of providing the village creche and day-care centres are not included from the second year of operation since they would then be taken over by village communities.

Table 5.2 - Department of Social Services Budget Requirement (K Sh 1 000)

Item	1979-80	1980-81	1981-82	1982-83
Capital:				
Offices (incl. in District Admin. Budget)	1 484	502	174	—
Housing	117	172	3	—
Vehicles	36	72	120	48
Equipment	164	75	30	5
Contingencies				
Total Capital	1 801	821	327	53
Recurrent:				
Salaries	386	547	602	603
Building Maintenance (see District Admin. Budget)	—	—	—	—
Vehicle Operation	35	90	90	90
Contingencies	42	63	69	69
Total Recurrent	463	700	761	762
Total Capital + Recurrent	2 264	921	1 088	815

...not only through social intercourse that communities are developed. The well-integrated community includes the provision of health, nutrition and education, as well as the development of commercial activities dealing with credit, marketing, and other industrial undertakings. This is the area in which the co-operative movement can play a great deal.

Co-operative development indicates the need to ensure that co-operation should be based on the association of people with a common need, and they must therefore be able to identify the common need and (c) understand the duties and responsibilities which should be shouldered on the shoulders of the members. Whether or not co-operatives develop as an integral part of the project therefore will therefore largely depend upon the will and initiative of the officers of the Ministry of Co-operative Development posted to it in the early years of implementation. Because of the important part which a well-founded co-operative movement can play both in building a cohesive and self-reliant community, and because of its ability in providing the tenant with a sense of involvement beyond that which the bonus is capable of giving him, the input recommended from the Ministry will be very high. The average in total asset turnover in Kenya. A prerequisite for their successful development would be, of course, the support and collaboration of the State Budget Manager and the State.

8.2 The Tana River District Co-operative Office

The Department of Co-operative Development in the Tana River District is represented by an Officer in Charge of Co-operatives Office at Hola, with a Co-operative Assistant and a representative of a Rural Credit Specialist being posted to the area under the Co-operative Promotion Scheme (COPS). The Hola Scheme operation, any of course, very much must be based on the fact that the State Project, but the Co-operative Society, consisting under the supervision of the NCD. The government handles the marketing of seed cotton, and surplus production of these are processed by its members.

A scheme is being built at Hola by the Cotton Lint and Seed Marketing Board (CLSB) which will be linked to the Co-operatives along with the NCD. It will be linked to the State project in the long term, it could well be that NCD would wish to withdraw from both marketing

CHAPTER 6 CO-OPERATIVE SERVICES

6.1 Introduction

No attempt was made in the ILACO Feasibility Study (1975) or in the IBRD Appraisal Mission (1976) Report to examine the potential for co-operative activities in any depth. For a number of reasons, this is thought to be an important omission. To begin with the Kenya Development Plan (1974-1978) makes it clear that the Government expects that co-operative activities will play an important role in agriculture, and attaches a high priority to their development. Many of the settlement schemes in the rainfed mixed farming areas have been developed with a co-operative basis, although not always successfully. The longest NIB project to date at Mwea has an important co-operative element which, properly handled, will increasingly release the scheme management from day-to-day responsibilities concerned with crop marketing.

There are, however, further and more particular reasons why it is thought that the promotion of co-operative activities should be built into the Bura Project from its inception. Elsewhere in the report it has been stressed that the tenants on arrival will be disorientated and lacking in any sense of social cohesion. A strong community development input has been proposed, so that working through the cellular structure of the villages, the process of community building can be encouraged, and, to a certain extent, guided during the initial years of settlement. It is during this initial period that the need to form community bonds among staff and tenants alike is most needed. Thus the five years during which initial settlement takes place will be critical in determining the future development of the community and therefore of the management-tenant relationship. But it is not only through social intercourse that communities are developed. The other components of a well integrated community include the provision of health, nutrition and education services as well as the development of commercial activities dealing with savings, credit, marketing and small scale industrial undertakings. This is the area in which the co-operative system can accomplish a great deal.

Experience in co-operative development indicates the need to ensure that co-operation must be based on free association of people with a common need, and they must therefore (a) wish to associate, (b) perceive the common need and (c) understand the duties and responsibilities which association lays upon the shoulders of the members. Whether or not co-operatives develop as an integral and useful part of the project therefore will therefore largely depend upon the skill and experience of the officers of the Ministry of Co-operative Development posted to it in the early years of implementation. Because of the important part which a well founded co-operative institution can play both in building a cohesive and self-reliant community, and because of its function of providing the tenant with a sense of involvement beyond that which the licence to occupy and use his holding gives him, the input recommended from the Ministry will be on a scale above the average in rural areas elsewhere in Kenya. A prerequisite for their successful involvement would be, of course, the support and collaboration of the Bura Project Manager and his staff.

6.2 The Tana River District Co-operative Office

At present the Department of Co-operative Development in the Tana River District is represented by an Assistant Co-operative Officer at Hola, with a Co-operative Assistant due shortly, and the prospect of a Rural Credit Specialist being posted to the area under the Co-operative Production Credit Scheme (CPCS). The Hola Scheme operations, are of course, very much more limited in scope than the Bura Project, but the Co-operative Society, operating under the supervision of the NIB Management, handles the marketing of seed cotton, and surplus production of maize and groundnuts of its members.

A ginnery is being built at Hola by the Cotton Lint and Seed Marketing Board (CLSMB) in which it is understood the Co-operative along with the NIB will be invited to participate on a share basis. In the long term, it could well be that NIB would wish to withdraw from both marketing

and processing operations because its statutory function is laid down as being to 'promote' the marketing of crops and to 'provide, either by itself or by agreement with other persons' for processing.

The CLSMB is empowered to own and operate ginneries but experience elsewhere indicates that a Statutory Marketing Board functions better as a regulating and inspecting agency within the ginning industry rather than adding the ownership and operation of the industry to its prime concern which is the marketing of the crop. It is therefore conceivable, especially in the light of Section 7 (m and n) of Cotton Lint and Seed Marketing Act, that the Hola ginnery could eventually become a co-operatively owned enterprise. Furthermore, it is of a size which would be within the capability of the Hola Co-operative to manage, given that the CLSMB and the Ministry of Co-operative Development ensure that an experienced Ginnery Manager is appointed, and that supervision is strict.

The District Staff at Hola could thus become over-extended before very long, and the addition of responsibility for Bura would not be feasible. It is therefore suggested that the Bura Project should have a separate office at the rural centre. Because of the disproportionate significance of Bura to Hola, it is likely that this new office would become the District Co-operative office, with Hola being run as a sub-unit. The Bura office personnel although mainly concerned with the co-operative potential of the project tenants, would also be concerned with promotional work in the surrounding area but connected with needs which would develop within the project. In addition to specific possibilities such as the supply of firewood, they would have a responsibility for collaborating with Ministry of Agriculture Crop and Livestock Officers in improving the productive capacity of the riverine settlements, minor irrigation schemes and Orma livestock projects.

6.3 Co-operative Activities

Primary Marketing

The most appropriate lead into the formation of a co-operative would be through primary marketing of the tenants' produce. The Organisation, Management and Training Annexe discusses the NIB agricultural management and extension system, and proposes a simple programme of courses for tenant induction and training in irrigated crop farming practices. These courses, and the management supervision and extension system will provide the tenant with the necessary technology. The approach to the formation of a co-operative would be different, though the link between agricultural extension and the co-operative marketing society would at all times be a matter of first importance.

The co-operative promotional work would be conducted through the village neighbourhood groups of 12 tenants and the ward groups of 72 tenants, each village being considered as a potential branch of a Bura Co-operative Society, once registration conditions had been fulfilled. The proposed co-operative staff build-up is phased with the tenant's arrivals over a period of four years. The first year would be mainly concerned with member education, and the problems of seed-cotton collection, grading and packing, recording and despatching would be discussed as the focal point for possible co-operative activity. The experience gained and the response noted from the first three villages settled in the first year would be the basis for increasing promotional work in the second, third and fourth years.

It is unlikely that a society could be registered before the first seed cotton harvest because of the lack of experience and of share capital. It might be possible, however, for the co-operative groups in the first three villages to operate under tutelage of the Co-operative Department and NIB staff up to the first harvest so that by the second year, Branches 1, 2 and 3 might be registered and licenced by the CLSMB to buy seed cotton for delivery to the Bura ginnery, thereby qualifying for the buying commission. Once the Society has a specific source of income, it can plan its organisation and establish its branch accounting and its grading and collection system. In these early years it would be dependent on NIB for the supply of tractor/trailer units for delivering the

seed cotton to the ginnery. In the longer term the scheme may also attract seasonal transport contractors from outside. The demands of the ginnery for a secure flow of raw cotton and the equally pressing demands for quality which will require the rapid removal of the sorted cotton from temporary collection points will give Society officials experience upon which to build up a reliable and increasingly useful service to both tenants and NIB.

Co-operative Accounting

It is clearly not appropriate at this stage to recommend a detailed co-operative accounting system, but it is important to establish objectives towards which a co-operative should aim. It must be remembered that by the time the project settlement programme is completed, there will be over 5 000 tenants: each tenant will have some 3½ tonnes of seed cotton to sell, which will involve at least 35 separate deliveries to a collecting point during the harvesting season. These will require the issue of receipts, postings etc. Similarly tenants will collect various inputs for which they must accept a debit: while there will also be water charges, crop spraying charges, house purchase instalments, contributions towards the primary school premises and community centres, contributions towards the honoraria for the village level health workers, day-care centre attendants, etc. Each of these represents an accounting operation which will at any time indicate to the tenant his financial standing. By encouraging the co-operative organisation to handle the tenant's affairs through the village branches, a real sense of participation could develop. Furthermore NIB would be relieved of a multitude of minor operations.

It is recommended therefore that, as a corollary to the proposed co-operative marketing operations, the co-operative should in due course assume responsibility for recording members' deliveries, writing their ledger accounts and controlling their credit requirements (i.e. inputs, water charges, etc.).

NIB, under this recommended co-operative participation system, would debit the Society for water charges, for seed, fertilizer inputs and the like by irrigation block, and pass on credits from the ginnery for seed cotton delivery. It is recognised that the Society would not be in a position to provide this service from the first harvest, but it would be a routine accounting problem for NIB and the Co-operative Department together to evolve and agree the system and stationery needed, and for the village branch scales and other equipment to be purchased by NIB from project funds for hire purchase by the Society in due course. Provision in the village community centre for a co-operative society office, buying area and stores has already been made. Table 6.1 gives an estimate of the equipment required and operating expenses of the Project Co-operative Society.

Table 6.1 - Estimated Annual Budget for the Basic Co-operative Society (K Sh 1 000)

Capital:	Scales	23 platform scales @ 3 000/-	69
	Furniture	for stores and office	10
	Sub total		79
Recurrent:	Staff	1 manager	20
		23 branch store clerks @ KSh12 000	276
		23 storeman/watchmen @ K Sh 5 000	115
		Seasonal labour (loading) 5 months	100
	Stationery		15
	Sub total		526
Total Capital + Recurrent:			605

Savings and Credit

An important contribution to small scale capital formation could be made by establishing a Savings and Credit Department within the multipurpose Bura Co-operative described above. This would provide tenants with a source of credit for social, commercial and even minor industrial purposes, once they have begun to settle securely into a community. The existence of a savings programme associated with the provision of credit would be a further means of stimulating the sense of participation, because it would enable tenants to plan for items such as house improvements. The credit department would operate in conjunction with the seed cotton marketing department through voluntary deductions from the value of the produce marketed. From discussions with the NIB Mwea scheme management, it is apparent that a Savings and Credit co-operative could relieve scheme staff of difficult and time-consuming detailed work involved in making decisions on loans and advances to tenants.

It is estimated (Forestry Annexe) that existing supplies of firewood will be sufficient for most of the project construction phase, the balance being obtained from coastal natural forests, until the forestry plantations are ready for felling. However, the gathering or cutting of wood for fuel from the riverine and floodplain areas, and eventually exploiting the planned forest plantations, are operations best conducted under a system of licenses issued by the Forestry Department. It is apparent that local industry will quickly develop to supply the needs of communities in the villages and rural centre. This would be an industry well suited for Pokomo participation, but it is unlikely that individual Pokomo would be able to supply the steadily growing demand without assistance in setting up an appropriate commercial organisation. There would clearly be an opportunity to establish a Wood Fuel Supply Co-operative which could rapidly develop from a simple gathering/marketing operation into a mechanised felling and sawing operation and later into a sawn wood and charcoal supply and marketing society.

Other Opportunities for Co-operative Action

Mention has been made of the possible value of the co-operatives network in respect of the accounting for agricultural inputs supplied to the tenants. With experience and advice from NIB management, the Bura Co-operative Society could take this a step further, and procure and stock the essential inputs related to the cultivation of the main crops, as well as other inputs related to the tenants and the riverine settlers' production of food crops, vegetables and small livestock. This would not only relieve the project management of some of an onerous task but supply the needs of the peripheral settlements which would not be any direct responsibility of NIB in any case.

Other areas, such as the wholesale supply of basic consumer items could be considered by the Bura Society, once their needs become clearer. The relatively isolated situation at Bura could, for instance, expose the tenants to high consumer prices and periodic shortages unless the traders and shopkeepers organise bulk purchase and a modest system of buffer stocks. Similar opportunities would develop for a co-operative organisation out of the problems connected with the tenants' livestock activities. (Sociology and Settlement, and Livestock Annexes).

Co-operative Organisation and Budgets

Table 6.2 gives the budget of the Department of Co-operative Development. These main requirements have been discussed with the Department, and although there can be no commitment on their part at this stage, there has been agreement in principle on the need for a special staff input on the Bura Project. The table does not include the costs of operating the Bura Co-operative Society. These would, in any event, be a charge on the Society, not on NIB or on Government. To ensure that the Society has capable staff, it is recommended that a subsidy should be paid to it for a period of perhaps three years by the Co-operative Department. This is understood to be consistent with the practice with other Societies elsewhere. Table 6.2 gives an estimate of the cost of staff - and the initial capital cost of equipment for a multipurpose (marketing and credit) co-operative during the first three years of development. It is proposed that loan funds should be made available to assist in establishing such a Society, providing the tenants are properly prepared and in favour of the co-operative system.

Table 6.2 - Ministry of Co-operative Development Budget Requirement (K Sh 1 000)

Item	1979-80	1980-81	1981-82	1982-83
Capital:				
Offices (incl. in District Admin. Budget)				
Housing	360	116	226	58
Vehicles	84	10	78	—
Contingencies	44	13	30	6
Total Capital	488	139	334	64
Recurrent:				
Salaries	109	143	208	225
Building Maintenance (incl. in District Admin.)	—	—	—	—
Vehicle Operation	32	35	65	65
Contingencies	14	18	27	29
Total Recurrent	155	196	300	319
Total Capital + Recurrent	643	335	634	383

An alternative to the subsidy system outlined above would be that the collection, recording and marketing of seed cotton and other commodities, as well as the storage and distribution of inputs, would be a function of NIB. A marketing manager, village store clerks, and watchmen would be employed and village stores would be established and operated on precisely the same lines as it would as a co-operative organisation. As soon as the tenants had been fully informed of their responsibilities, and have voluntarily formed the Bura Co-operative Society, the staff and families would be transferred to this organisation. The advantages of this approach are that the tenants would have opportunities for establishing a viable mature community and the Co-operative staff would have more time in which to educate and train members and potential committee members. On the other hand, there would be the very real danger of the tenant seeing himself increasingly as a non-participating fragment of the NIB project organisation. The choice will have to be made when the quality of the tenants is better known.

6.4 Co-operative Services Implementation Programme

The Co-operative Officer will arrive shortly before the first tenants in July, 1979. He will be supported from the beginning by one Assistant Co-operative Officer with special training in co-operative education and promotional work. In addition, there would be two Co-operative Assistants who would conduct meetings and training courses in the first villages settled. Two more Co-operative Assistants would be posted to the project in July, 1980 followed by a further two in July, 1981. The probable strategy would be to concentrate on education covering basic principles and objectives and the formation of co-operative groups, among tenants, in preparation for the first season's cotton crop. It would be for the Co-operative Officer, in consultation with the Bura Development Council and with the co-operation of NIB field staff to decide upon actual priorities and action. The second Assistant Co-operative Officer, specialising in Credit, would join the project office in July, 1981. The seventh Co-operative Assistant would be assigned to work with the Pokomo settlements on the riverine areas adjoining the irrigation area.

The question of how the proposed Bura Co-operative Society will develop can only be determined from events observed on the project. However, cotton marketing must be organized one way or another, and it is assumed that the basic principle will be to adopt a village based collecting system. This will need equipment, storage space, staff and a simple but efficient recording system. Initially this may be undertaken by NIB personnel, but it is suggested that the system should be geared to the needs and methods of a probable future co-operative organisation.

CHAPTER 7 TECHNICAL AND OTHER SUPPORTING SERVICES

7.1 Agricultural Extension

This subject is covered, as far as extension to the tenant on irrigated areas is concerned, in the Organisation, Management and Training Annexe. Livestock, forestry and fisheries developments and, where appropriate, extension and research are also covered in their respective annexes. The only extension activity not specifically dealt with is that which concerns the existing agriculture in the riverine areas.

The district agricultural office at Hola is concerned with all crops and livestock including the development of co-operative ranching schemes, funded by AFC loans and with the development of minor irrigation schemes for which funds may be obtained through the District Development Grants system. The staff of the Ministry of Agriculture at Hola consists of the District Agricultural Officer, a Livestock Officer, a number of Assistant Agricultural Officers and Agricultural Assistants concerned with poultry schemes, home economics, maize, rice, vegetable production and the like. The presence of the district centre at Hola and the tenants on the pilot irrigation scheme has had the effect of attracting Pokomo and Orma groups who have settled in its vicinity.

The same pattern can be expected to develop at Bura, only on a very much larger scale. As with most other government agencies, it is essential that Bura has its own agricultural office and Table 7.1 sets out the budget requirement which it is considered should be provided. The livestock component of the Ministry of Agriculture is included because this, although discussed elsewhere, will be a component of the Bura Agricultural Office.

The Bura Agricultural Officer would be concerned with crop production outside the project as well as dealing with 'home economics' within the project area, and would play an important part on the Resources Standing Committee of the Bura Development Council. The adoption of improved cultivation methods and development of minor irrigation schemes will play an important role in supplying the vegetable and fruit requirements of the project. The staff should also include a soil conservation specialist to deal with catchment control measures in the area lying to the west as well as along the Tana river itself once the Nanigi weir is constructed. The extension methods adopted would be determined to a considerable extent by the structure of the village communities along the Tana river and within the Project. Emphasis would be upon the group approach, group demonstrations and meetings held in common with co-operative staff, community and health workers and present staff. It is expected that these methods will also be applied outside the scheme particularly where the development calls for a minor irrigation scheme, with the joint or co-operative ownership of pumping equipment and control over water usage.

**Table 7.1 - Ministry of Agriculture : Agricultural Extension Budget Requirement
(K Sh 1 000)**

Item	1979-80	1980-81	1981-82	1982-83
Capital:				
Offices (incl. in District Admin. Budget)	—	—	—	—
Housing	382	42	165	—
Vehicles	121	3	43	—
Contingencies	50	5	21	—
Total Capital	553	50	229	—
Recurrent:				
Salaries	104	140	170	170
Building Maintenance	—	8	8	12
Vehicles Operation	47	47	67	67
Demonstration and Miscellaneous	10	15	20	20
Contingencies	16	21	27	27
Total Recurrent	177	231	292	296
Total Capital + Recurrent	730	281	521	296

7.2 Post Office and Telecommunications

East African Posts and Telecommunications (EAP & T) (the Corporation) has responsibility for the postal network and the telephone services of the country. The situation created at Bura, with the arrival of a considerable population and commencement of a wide variety of operations, will require an efficient system of communication with other parts of the District, the Province, Nairobi and Mombasa. EAP & T is familiar with the problem and has a number of standard designs and staffing rates for service centres at different levels in the PPD hierarchy which would be applied to the Bura Report as follows:

(a) Rural Centre

The Corporation would build a post office and telephone exchange known as their minimum development. This would be staffed by a Post Superintendent, four Post Officers and two telephone Assistants. It would provide all the normal basic services, including a telephone service, to the NIB offices, government offices and main villages.

(b) Market Centres

At Market Centres the Corporation will provide a local post office by entering into a lease agreement with a private owner, or by building its own prefabricated units. The obvious choice for Bura market centres would be for the prefabricated unit, since there will be few private premises, although the NIB might erect a suitable building for leasing to the Corporation. It appears, however, that the Corporation is finding the leasing arrangements generally unsatisfactory.

The basic staffing at the local post offices would be one Senior Post Officer, two Sub-masters and two Telephonists.

(c) *Local and Sub-local Centres*

Local centres (which could include the sub-local centres at Bura, since there is no difference in the number of inhabitants and very little in the range of services between the two) would be served in a different manner. The Corporation would enter into an Agency agreement with a local businessman, or even an administrative officer, who would receive a nominal fee and training as a sub-postmaster. The budget requirements of the EAP & T to provide the facilities described above are given in Table 7.2.

Table 7.2 - Posts & Telecommunications Budget Requirement (K Sh 1 000)

Item	1979-80	1980-81	1981-82	1982-83
Post Offices	660	60	60	60
Housing	358	134	134	134
Equipment	300	—	—	—
Contingencies	132	19	19	19
Total Capital	1 450	213	213	213
Recurrent:				
Salaries	120	150	211	303
Building Maintenance	—	50	60	70
Contingencies	12	20	27	27
Total Recurrent	132	220	298	410
Total Capital + Recurrent	1 582	433	511	623

7.3 Ministry of Labour

During the construction phase of the project there will be a variety of activities going on which will involve the arrival on site of staff of all categories, with a preponderance of skilled and unskilled labour. These will be consultants, government ministry staff, NIB personnel and a number of different groups of contractors.

Once the project is fully operational, there will be numbers of government staff, NIB staff, casual and permanent labour at the ginnery, workshops and the like. In addition there will be a considerable range of trading and other activities involving a wage employment requiring employers carrying out their NSSF obligations and collections, workmen compensation, insurance and the like.

It would be surprising if the arrival of contractors employing large numbers of labourers and artisans, and their exposure to the unfamiliar and hostile environment at Bura, does not bring in its train a variety of disputes, claims, accidents and strikes. It would also be surprising if, among a mixed population of some 45 000 people in the fourth and fifth years of the project's operations, there were not further labour disputes, breaches of labour regulations, failures over NSSF payments, and problems of workmen's compensation. These are all matters in which the Ministry of Labour's personnel are trained and provided with statutory responsibilities.

At present, however, the nearest Labour Office is at Malindi, to serve a very big area of the Districts of Tana River itself, Kilifi and Lamu, while Garissa and the North Eastern Province is handled mainly from Thika. This would be satisfactory, so long as commercial or industrial activity remained at its present low level. It will not remain so when the Bura Project is implemented. The Ministry of Labour does not site its offices on a Provincial or on a District

basis necessarily, so the services of the Department of Labour could equally well be established at Hola (where there will shortly be a small cotton ginnery), at Bura or at Garissa.

It is understood that the administrative complex at Garissa has been planned to include a Labour Office. If this is the case, there would be no call for a permanent Labour office at Bura, providing it is possible to establish the necessary staff at Garissa before the project construction programme begins, early in 1978. The other point which should be made is that the Garissa Office would need to be at full strength, comprising a Labour Officer, supported by a Labour Inspector, a NSSF Inspector and a Wages Inspector by that time. The office would also need the usual clerical and subordinate staff and a vehicle and driver. The Labour Officer should be co-opted as a member of the Bura Development Council's Resources Standing Committee. In the case of the Ginnery and Project Workshops, it is not considered that the supervision of the factory rules and safety codes would need any additions to the existing Factories Inspectorate.

for the purchase from growers of all lint and seed produced by them at such prices as are in respect of each cotton season, fixed by the Board with the approval of the Minister.

The sale or disposal within Kenya, or the export and sale or disposal outside Kenya, of lint and seed, whether by its own agency or the agency of any other person and in any manner it may think fit.

The payment of all sums properly due from the Board by the Act.

To carry out such other duties as are imposed on the Board by the Act.

To perform these duties effectively, the Board has been given a number of specific powers 'to do all things necessary for and incidental to' the following:

- Purchasing raw cotton from growers and co-operatives and lint and seed from ginneries.
- Collecting, handling, transporting and disposing of raw cotton, lint and seed.
- Prescribing seed standards and regulating distribution.
- Inspecting cotton stores, ginneries and plantations.
- Arranging for treatment of raw cotton, lint and seed against disease and pests as necessary.
- Operating quality incentive schemes by differential payments.
- Leasing storage for raw cotton, lint and seed.
- Purchasing, leasing or acquiring and operating all kinds of ginneries.
- Fixing prices for raw cotton lint and seed with the Minister's approval.
- Granting financial technical and other assistance to growers or growers co-operatives or ginneries, in particular to undertake and promote research into growing, processing, ginning and protecting cotton in its various forms.
- Financing the purchase of ginneries by co-operatives of growers or "integrated growers" (a phrase whose meaning is not very clear).

Part II of the Act defines ownership of cotton in its various forms. Thus, raw cotton (the cotton as the grower becomes the property (and hence responsibility) of the grower, and if it is ginned, then the lint and seed become the property of the Board. The Board receives the raw cotton price which is fixed by the Minister, and the ginner shall pay for the cotton at that price. The Board had sole rights to sell lint and seed in Kenya, by auction, tender or otherwise, as the Board may think fit. This last proviso has led to the opening of the market to a system which is notoriously open to abuse. The Board is now required to sell by open auction and competitive bidding which has led to a considerable increase in prices realised. The Board licenses lint and seed buyers and only licensed buyers may buy at auction.

CHAPTER 8 THE COTTON LINT AND SEED MARKETING BOARD

8.1 The Cotton Lint Act

The Cotton Lint and Seed Marketing Act of 1955, as revised up to 1967, set up the Cotton Lint and Seed Marketing Board, a statutory body with wide ranging responsibilities and powers relating to the cotton industry in general. Its duties are defined in general terms in Section 6 of the Act as:

- (a) To make the necessary arrangements for the following activities concerned with cotton marketing.
 - The purchase of new cotton from growers and co-operatives and for the purchase from ginners of all lint and seed produced by them at such prices as are in respect of each cotton season, fixed by the Board with the approval of the Minister.
 - The sale or disposal within Kenya, or the export and sale or disposal outside Kenya, of lint and seed, whether by its own agency or the agency of any other person and in any manner it may think fit.
 - The payment of all sums properly due from the Board by the Act.
- (b) To carry out such other duties as are imposed on the Board by the Act.

To perform these duties effectively, the Board has been given a number of specific powers 'to do all things necessary for and incidental to' the following:

- (a) Purchasing raw cotton from growers and co-operatives and lint and seed from ginners.
- (b) Collecting, handling, transporting and disposing of raw cotton, lint and seed.
- (c) Prescribing seed standards and regulating distribution.
- (d) Inspecting cotton stores, ginneries and plantations.
- (e) Arranging for treatment of raw cotton, lint and seed against diseases and pests as necessary.
- (f) Operating quality incentive schemes by differential payments.
- (g) Erecting storage for raw cotton, lint and seed.
- (h) Purchasing, leasing or acquiring and operating all kinds of ginneries.
- (i) Fixing prices for raw cotton lint and seed with the Minister's approval.
- (j) Granting financial technical and other assistance to growers or growers co-operatives or ginners. In particular to undertake and promote research into growing, processing, ginning and protecting cotton in its various forms.
- (k) Financing the purchase of ginneries by co-operatives of growers or "intended growers" (a phrase whose meaning is not very clear).

Part III of the Act defines ownership of cotton in its various forms. Thus, raw cotton once delivered to the ginner becomes the property (and hence responsibility) of the ginner, until it is ginned, when the lint and seed become the property of the Board. The Board recommends the raw cotton price which is fixed by the Minister, and the ginner shall pay for raw cotton at that price. The Board had sole right to sell lint and seed in Kenya, by auction, tender, or 'by such other methods as the Board may think fit'. This last proviso has led to the disposing of lint by private treaty, a system which is notoriously open to abuse. The Board is now required to sell only by open auction and competitive bidding which has led to a predictable improvement in prices realised. The Board licences lint and seed buyers and only licenced buyers may bid at auctions.

The Board may levy a cess on cotton, the sale, ginning or baling of cotton. This cess if levied may be used for assisting the development of co-operatives, promoting the growing sector of the industry and for paying the Board's administrative costs. The Board may also establish a Cotton Price Assistance Fund to be applied either as a price support fund or as a source of loans to Government, growers, co-operatives or ginners.

8.2 The Present Activities of the Board

The Board (CLSMB) sees its main function in the future as the guide and guardian of the whole cotton production, ginning and marketing industry. It has thus recently recommended that the Government should seek French bi-lateral aid in the form of technical specialists covering such aspects as ginning operation and management and lint classification and research on growing and breeding. No details have yet been made available on the policy and objectives which the Board has for the cotton research element of this programme but it will clearly be important for NIB's cotton research operations at Bura to be co-ordinated with the Board's own efforts. It would appear logical to assume the NIB should undertake research into irrigated cotton at Bura while the Board's technical aid team might handle the rainfed cotton programme.

One of the aspects of the industry which the Board is particularly anxious to regularise is the capacity and method of ginning operations. Many of Kenya's ginneries are of outmoded design, with a theoretical surplus capacity. Their age and unreliability, however, leads sometimes to breakdowns, and the Board is therefore anxious to retain existing ginneries in operation for the present so that cotton can be moved from one to another if necessary and the ginning season kept as short as possible.

The Board is building and equipping a new ginnery at Hola with 10 Middleton double roller gins using funds provided by the Ministry of Agriculture and appears to favour a number of smaller units with a capacity of about 5 to 8 000 bales, in preference to fewer larger units. This question, and the issue of saw versus roller ginning is discussed in the Processing Annex.

8.3 The Situation at Bura

It is clear that the Board is anxious to maintain close control and supervision of the ginning industry generally. This does not appear to mean that it wishes to acquire and operate all ginneries, except as an interim measure. It is desirable that in the long term the Board should function as a regulating and supervisory agency in respect of ginning and have more direct involvement in marketing operations. It would appear that it will better achieve its purposes in these roles than by getting deeply involved in the actual operation of ginneries.

The proposals for co-operative collection, grading and transportation of seed cotton at Bura should be acceptable to the Board, as will recommendations that the co-operative be a shareholder in the Bura ginnery. The Board would also accept, subject to agreement by the NIB, a situation where the Bura Co-operative Society was paid directly for the value of seed cotton delivered to the ginnery, as well as receiving the present buying commission of cts 12/kg in return for undertaking buying and arranging transportation of the cotton crop to the ginnery (the cost of transportation being paid separately). The latter operation will need to be studied carefully, since the transport of cotton is a seasonal operation, and it would not be advisable for a co-operative to invest in vehicles for seed cotton alone; contracts with the Board and NIB for other forms of transport would be essential to justify this investment (i.e. lint and seed, agricultural inputs etc.).

The points discussed above raise the issue of the relationship between the Board and NIB over the design, initial ownership and future ownership of the Bura processing facilities. In the future, it is very likely that a successful co-operative, regulated by the Board with its powers under the Act, would be the appropriate institution to own and operate the ginnery for a period of at least 10 years, but during this time it is felt that the co-operative should be allowed to acquire a

proportion of the shares in the company set up for this operation. To make this possible, the ginnery should be built and finished as a joint undertaking between the CLSMB, the NIB and possibly the managing agents. The NIB and the CLSMB could then dispose of their shares progressively to the co-operative.

A further matter which will have to engage the attention of both Board and NIB is that concerning the appropriate variety of cotton to be grown. Since new American varieties suited for irrigation conditions will be introduced the Board should make Bura a separate ginning zone, so that all cotton from the project will be ginned at the Bura ginnery.

The above discussion clearly indicates that the CLMBS will play an important role in a number of operations which are vital for the success of the project and for this reason the Consultants recommend that the Board should be a member of the Bura Steering Committee, and that routine consultations on cotton varieties, production, handling and ginning be instituted between the NIB and the CLSMB.