Settlement patterns and rural development: a human geographical study of the Kaonde, Kasempa District, Zambia

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CHAPTER 4

RESETTLEMENT SCHEMES AND POPULATION CONCENTRATION

'Kifu kya ngulube kitemwa mwine'
The pig's stomach is for the one who likes it.
(Everyone to his taste).

4.1. INTRODUCTION: RURAL DEVELOPMENT POLICY

With the coming of independence plans were proposed for the first time to promote on a large scale rural development in the Kasempa area just as in many other parts of the country. The First National Development Plan (1966-1970) emphasised the importance of rural development in general and of increasing agricultural production in particular. Improvements of infrastructure and establishment of basic services in rural areas as well as expanding farm production by means of introducing large-scale projects were envisaged.

Plans were worked out for each province in Zambia to establish state farms or livestock units and tractor mechanisation centres (Siddle 1970). In addition, plans were made to relocate farmers at settlement schemes or to regroup and concentrate villages around service centres. This large scale approach, whereby considerable amounts are invested in a limited number of locations in the country and where active government participation is primary, was in line with the general development trend for the 1960's in Africa.

Official statements refer to the necessity of an 'agrarian revolution' (Kaunda 1967, 41) and in the introduction of the second four-year development plan (SNDP 1971, iii) President Kaunda wrote: 'For us, developing the rural areas is a matter of life and death...'

The philosophy of 'Zambian Humanism' plays a substantial role as background to these national goals. It places the
individual central to all activities undertaken or supported by the state. Participation by inhabitants is seen as important to the development process as is the strengthening of co-operation.

An essential feature of the philosophy is the retention of the valuable characteristics of the traditional society in combination with an acceleration of material development and introduction of modern know-how and technology. As Kaunda (1969) expresses it: 'a crucial point is, in fact, how do we preserve what is good in our traditions and at the same time allow ourselves to benefit from the science and technology of our friends both in the West and the East'.

Also important for rural areas is enlarging the number of services - the fruits of independence - and making them available to every citizen. Kaunda (1967:31) states:

'I cannot see Government effectively combating hunger, poverty, ignorance and disease without some sort of regrouping of our villages. I am not proposing that villages should lose their identities completely. What I do suggest is that through our Chiefs and our Party we could regroup the villages in such a way as to bring, say, about a dozen or so villages together into one fertile area. The villagers and their headman would still retain their identities and yet be regrouped in such a way that it would not only be possible, but a worthwhile undertaking by Government, to provide them with the amenities of life in the way of schools, health services, social centres etc. In this way the cultural importance we attach to the past will be preserved and at the same time, these units will be sufficiently big to make modern social services worthwhile'.

Regrouping villages on a voluntary basis as well as retaining village identity and strengthening the (assumed) co-operative framework within traditional village society were important features of the new agricultural development plans.

For Kasempa District, agricultural co-operatives as well as two large-scale village regrouping schemes were proposed and partly implemented.

Just as in the rest of the country, the farm co-operative programme has not been a success. Most of the co-operatives that were established shortly after 1964 had but a short existence. Factors influencing this were those of introducing mechanisation too quickly, stagnation in the de-
Fig. 4.1

KASEMPA DISTRICT LOCATION OF THE PROPOSED MUSHIMA AND MPUNGU RESETTLEMENT SCHEMES 1966

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movement of village groups  
proposed but not realised village regrouping  
service centres  
mpungu state farm
livery of sowing seed, fertilizers, and spare parts, lack in the degree of farming, technical, and administrative know-how of the participating members as well as bureaucracy and weak management at the national level (Quick 1972). The willingness of the farmers to work in a co-operative bond had also been greatly overestimated. Conflicts among the farmers and great fluctuations in inhabitant participation were reasons, in addition to the above, for the usually quick disintegration of the co-operatives.

The proposed and partially implemented village regrouping schemes for the district were also ultimately only minimally successful. These plans proposed direct intervention in the traditional settlement pattern of the population as a means of advancing rural development and will be evaluated in more detail in this chapter.

4.2. RESETTLEMENT SCHEMES IN KASEMPA DISTRICT

Plans for regrouping the district's population actually date to before independence. In conjunction with combatting sleeping sickness, the Department of Tsetse Control suggested, in the early 1960's, concentration of the small and widely dispersed population living in the southwest and southeast of the district on the higher plateau area around the Kasempa centre. This is an area where tsetse fly can be better controlled because of the greater distance from the tsetse fly's favoured habitats of game reserves and extensive river systems in the lower regions of the district. Also, population concentration in one area and the presence of adjacent agricultural fields will contribute to an effective fight against tsetse. The most important points of the proposed programme were, thus, moving inhabitants away from the heavily infested areas, concentrating the villages and stabilising village movements. Obligatory relocation of the villages was included in these colonial plans.

Immediately after independence, the Department of Agriculture carried out a soil survey of the area around Kasempa. Two regions were found to have reasonable to good potential — the Mpungu and the Mushima area (cf.fig.4.1.). In the centre of these areas which were proposed as resettlement
locations, expanses of red clay ground occur which are suitable for permanent agriculture and the production of cash crops such as maize (Kasempa Land Use Survey, 1965). The plans objectives became:

a) population location in the Mpungu and Mushima resettlement area by means of village regrouping, that is to say relocation of entire villages and village groups in the proposed areas
b) creation of an infrastructure and establishment of primary services
c) creation of a state agricultural production unit with the aims of 1) increasing the maize production of the district 2) functioning as a centre for training farmers to improve farming methods 3) functioning as a tractor service station for improved farmers.

The plan was to be carried out in two phases: first, regrouping the villages of the dispersed population to the vicinity of a few service centres; and secondly, introducing new farming methods and establishing those farmers who wanted to produce for the market in areas with the best red clay soils.

Without having any exact figures, it was estimated that ca. 3000 people from the southeast (the Lunga and Mukunashi river area) would be resettled around Mpungu and ca. 3000 people from the southwest (the Dongwe and Lumba river area) would move to the Mushima resettlement area. It was assumed that once this process was begun, villages from other parts of the district would follow and relocate in these areas as well. The relocation of villages would have to proceed on a voluntary basis as the Zambian constitution protects fundamental human rights and guarantees individual freedom including choice of settlement location and movement (Constitution of Zambia, 1965, Chpt.VII, art.24).

The plans contained implicit assumptions which were not tested but still regarded by the technical planners as almost established fact. They assumed that as the Kaonde in-
habitants traditionally moved their villages regularly, they would be willing to move to an area where new services had been established.

It was also expected that if services such as farm extension workers, market, and credit facilities were present, the majority of the population would quickly adopt newly introduced production modes.

It appeared in practice that these were false assumptions. The plans were conceived and carried out from a technical viewpoint. Preliminary research had not been done as to the size and composition of the population, and to factors involved in village relocation and inhabitants attitude toward change of modes of production.

The manner of putting the plans into operation was not well co-ordinated. Several departments were involved, but these worked fairly independently. The Land Resettlement Board in Lusaka operated as co-ordinating body at a national level but lacked authoritative control over other departments.

At the district level, co-ordination took place through Kasempa Rural Council and Districts Development Committee, but these had little contact with the apparatus of the implementing departments which are largely centralised in the capital.

Finally, no extensive consultation took place with the population. A few village leaders were conferred with only at the moment when the plan was about to be put into action. The plans also lacked consistency as they originated from two different periods. The original intention in the colonial period emphasised combatting sleeping sickness accompanied by possible forced movement of villages and an eventual very gradual transition to permanent agricultural methods. Directly after Independence, the plan was altered in the direction of increasing farm production and offering a package of services to all inhabitants as a means of accelerating social and economic development and at the same time retaining traditional village bonds as much as possible.
4.2.1. Evaluation of the Mpungu resettlement scheme

Operationalisation of this plan began in 1965. The soil survey of the Mpungu river basin involved ca. 1000 km² and showed that good, permeable red clay soils are present over large areas (ca.45% cf. table 4.1). This higher-lying ground is often densely forested and the distance to streams great, which are reasons why the area was virtually uninhabited. A state production unit (Mpungu State Farm, cf. fig.4.1.) was established in the centre of an extensive C1 soil area. Good land was reserved in the adjacent area of the production unit for settling individual farmers who wished to start market production based on modern farm methods. A communication network was projected for the whole area along which villages would have to locate. The Department of Water Affairs researched possibilities for location of wells. The Department for tsetse fly control began to destroy the underbrush along the upper Mpungu River and to cut wide treeless swathes through the forest. The centre of Mpungu area became thereby largely free of tsetse fly. The first objective was convincing the village clusters of Kalasa and Kasonso to resettle in the Mpungu area. Both groups were settled in the vicinity of the Lunga and lower Mpungu river and (as we have seen in the last chapter) had relocated regularly within that region.

An increase in the number of sleeping sickness cases among the Kalasa villagers was the reason they were the first to be urged to relocate. On the south flank of the Mpungu area, the Kasempa Rural Council established a rural service centre. The location was chosen due to negotiations with ex-Chief Kalasa. Resettling by the new centre was made attractive for Kalasa by offering him a position at a local court to be established and by promising that the centre would be expanded with additional services (such as a clinic, a primary school, a pumped water supply) suitable for a population of 2000-3000 people. These promises and a start made on building the centre were what finally convinced Kalasa to move together with a number of his villages to the area. He believed that his social status would substantially increase through being located by such a modern centre, especially
when a larger group of villages eventually located there.

The villages moved at first to a site along Kanongo stream and later (1968) relocated around the new centre and access roads after windlass wells had been dug there.

This, however, involved only a small population group of ca. 400 people and the distances moved were relatively short, from the lower Mpungu river to the Kanongo stream. Not even all of the villages of the Kalasa group moved in the same direction. A number of villages forming a rival section to the Kalasa village cluster resettled along the main route and were suspicious of the new position attained by Kalasa.

A group of Dutch volunteers was located near the centre in 1967 to assist in the regrouping scheme. They had the tasks of giving agricultural instruction and carrying out medical care and community development activities such as under-five clinics, domestic science, and improvement of housebuilding (cf. Jaeger 1975, 1980). This team also had the task of advancing the relocation of other groups in the Mpungu area. It was anticipated especially that after the Kalasa group had resettled, the relocation of the Kasonso village cluster would follow, as well as the village clusters along the Mukunashi River and its tributaries (cf. fig. 4.1.).

A detailed plan had not been worked out for the resettlement of these villages. Some of the services located in the areas were re-established at the new centre at Kanongo, other provisions in those areas such as a primary school were not expanded or maintained because of the envisioned final resettlement. It soon became evident, though, that not one village of the Kasonso group was going to relocate to the Mpungu resettlement area. Rather, complaints were made about the withdrawal and the lack of services in their area. Pressure was put on the Kasempa Rural Council by their representative to rectify the situation. Arguments were put forward based on the constitutional guarantees in regard to freedom of movements and right to medical and educational facilities since independence. The lack of a co-ordinated plan led subsequently to divergent and conflicting actions being taken by the various departments involved. The Department of Education, for example, decided to rebuild and
enlarge the primary school in the Kasonso area (Kamakechi school), because of its delapitated state. This encouraged the inhabitants to persevere in their reluctance to re-settle and was a stimulus for making further demands on the government for provision of services.

In 1968, a last effort was made by the government to convince the villagers to move to the Mpungu area. A number of meetings were held with all of the headmen in the Kasonso and Mukunashi area but the regrouping scheme was categorically rejected. Inhabitants were willing, though, to regroup to some extent within their own area by moving to sites along the main road and near their own primary school. The most important reasons for the rejection of the resettlement plans can be delineated as follows:

a) Social structure:
Although the entire area of southeast Kasempa had been incorporated into the sphere of Chief Kasempa since 1947, villagers still recognise their own headman as the primary social and territorial leader. It is still deplored that these leaders are not officially recognised as chiefs anymore. Chief Kasempa's authority is not strongly felt and although he did support the government plans for village regrouping and urged villagers to move, this had little effect on the inhabitants.

An intense rivalry between some of the village groups greatly contributed to the plan's failure. Many villagers of the Kasonso area belong to the Bena Kyulu clan. As described in Chpt.2, they were, together with Balonga clan the first immigrants to the Lunga and Kafue area and are proud of their long-standing tradition.

In contrast, the Bena Mbwa clan-section of ex-Chief Kalasa is a more recently arrived group and is regarded as an intruder in the Lunga area. The Bena Kyulu and Bena Mbwa share no affiliation whatsoever and feelings of rivalry date to the last century. Regrouping these clans together in one area or even organising them around one centre was out of the question. This was even more so as resettling at a centre where Kalasa's villages were already established would
have meant losing autonomy and identity by being subordinate to a headman of another clan.

The situation would have been different if villages were regrouped from the Kasonso and Mukunashi area. In both areas there are a large number of villages of the Bena Kyulu clan and they are closely affiliated with the Bayanga clan villages located in the Mukunashi area. Moreover, spontaneous relocation of villages from the Mukunashi area to sites along the main route in the Kasonso area occurred.

A short preliminary survey as to the clans present, inter-clan affiliations and headmanships could have easily revealed conflicting and mutual bonds which would have indicated possible and impossible combinations for village re-grouping.

b) Ecological circumstances:
The Kasonso area and particularly the Mukunashi area, are, relative to ecological circumstances, well-favoured. In the area there are good hunting possibilities, due to the proximity of the Kafue National Park, and there are rich fishing opportunities in many rivers and streams and at the nearby Busanga swamps. A relocation to the higher ground of the Mpungu area would have meant an alteration of the subsistence basis and a heavy dependence on the government in relation to access to a reliable water supply as well as to assistance with crop production. Preference was given to the traditional area with its varied means of subsistence instead of the risks involved at the resettlement schemes. Another factor involved, applicable to the Kasonso as well as the Mukunashi area, is that pockets of good red soils occur in both areas, which are suitable, in principle, for cash-crop production.

c) Government interference:
The Kasonso villages were forcibly displaced several times during the colonial period due to the creation of Kafue National Park and the occurrence of sleeping sickness. Each time the population had been assured that the relocation would be the last. Sleeping sickness was rejected as a reason for moving again under the direction of the newly independent
government. Moreover, the number of cases was on the decrease, so the government argument was seen as even less valid. Additionally, the population was accustomed to living near tsetse-infested areas and in general, the cause of sickness and death is not directly correlated to environmental circumstances but rather seen as being results of social and supernatural influences.

There also existed a suspicion among local leaders of government interference. This was a feeling caused by the fact that many villagers were members of the Jehovah's Witnesses who at that time rejected any contact with worldly governing forces.

Finally the government accepted the situation and did not urge village regrouping any further. The Department of Agriculture has shifted attention since 1969 to a further development of the Mpungu State Farm and to establishing groups of individual farmers there (cf.chpt.5). Kasempa Rural Council and District Development Committee concentrated from then on more on a policy of making a package of services available to the small dispersed groups of villages.

4.2.2. Evaluation of the Mushima resettlement scheme

Contemporary with the Mpungu resettlement scheme, plans were also put into action for regrouping villages under Chief Mushima in the southwest of Kasempa District. It was envisioned that these villages would resettle along the Dongwe River.

Although the soils there were not generally as good as at Mpungu, a few areas of good red clays are to be found, (ca. 20% of the 900 km² resettlement area; Kasempa Land Use Survey, 1965) (cf. table 4.1.).

The largest expanse of good red clay soil is some distance away from the Dongwe so that any village settling there would require that wells first be made. The Department of Agriculture designed the phasing of the plan. The first phase consisted of resettling villages along the Dongwe and its tributaries and along the main route Kasempa-Kaoma. It was projected that villagers would continue traditional farming during the first phase. In the second phase, farmers
wishing to produce maize for marketing would be established on the higher ground, assuming a water supply had been installed there. Preparatory to regrouping, extensive discussions were held with Chief Mushima. He was willing to move a distance of 60 km on the condition that a service centre would be established, that a pumped water supply would be taken care of, and that he would have a house worthy of a chief. The boundaries of his territory would also have to be altered as the centre of the resettlement area was traditionally under Chief Kasempa. After these conditions had all been fulfilled and under pressure from the chief as well as Kasempa Rural Council, the villages relocated. Chief Mushima's clan (the Balembu clan) together with some closely related clans are dominant in the village clusters that were proposed for resettlement (cf. Appendix V). This was the reason why Mushima could exert more pressure on his followers to agree to moving the villages, as was the case with the more heterogeneous situation discussed for the Mpungu area. Under the supervision of the Department of Community Development, a large number of villagers were moved with the help of lorries in the dry season of 1966. A small village cluster directly allied with Chief Mushima settled around the new service centre; other groups located elsewhere in or near the resettlement area (cf. fig. 4.1).

Actually, a configuration arose which was not unlike the old pattern consisting of a number of dispersed small village clusters.

As a part of the subsequent phase, a plan was developed by the Department of Town and Country Planning, at Lusaka, for transformation of the rural service centre into a kind of rural township whereby the whole population of 3000 could be located into one settlement. This plan did not take traditional subsistence base into consideration, which prevented a too large population concentration. Nor did it take into account opposition for social reasons to a regrouping into one large settlement, as this would mean losing headmanship status and one's own village identity. The proposed plan was soon rejected.

In the course of time a reasonable package of services has been established at the Mushima Centre, but the population directly adjacent to this service centre was minimal and the other village clusters were located too far away to make daily
use of the services offered. Soon dispersed services, such as primary schools, a medical clinic of the Flying Doctor Service were established at the sites of the various more distant villages.

With respect to farming developments, aside from the vicinity adjacent to the main route to Kasempa, practically no market production emerged. Problems with constructing a water supply on the higher red soil areas and lack of agricultural extension staff meant that no encouragement was given to individual farming in the resettlement.

Although the resettlement program had achieved its goals as far as moving village clusters of the southwest to an area closer to Kasempa centre and into a less infested tsetse fly area, the resettlement did not contribute very much to further agricultural development. The thinly spread population distribution led to a haphazard and dispersed pattern of services. Moreover, ten years after the resettlement (late 1970's) a tendency toward further population dispersion and a return to where one was settled earlier can be observed.

4.3. POPULATION DISTRIBUTION AND ECOLOGICAL ASPECTS OF CONCENTRATION

The village regrouping schemes in the district were not successful. Expectations of voluntary relocation by entire village clusters and amalgamation into greater units appeared to have been unrealistic, as noted for similar projects elsewhere in Zambia (Kay 1967). Social structure opposes village concentration, which is not carefully planned in participation with inhabitants, as well as the subsistence base of shifting cultivation, hunting, fishing, and gathering allows only a limited population concentration. Examples of successful practising of production for the market were lacking in the resettlement areas in the 1960's so that there was no stimulus of this kind. Moreover, the resettlement plans were based on relocation and transformation of whole villages and not on settling individual families as separate entities for promotion of agricultural
advancement, as was the case in the 1970's with subsequent farmers settlement plans (cf.Chpt.5).

The failure of village regrouping led subsequently to a disjointed and inefficient service network. Villagers, wherever located, regarded it as a basic right that the state would supply them with a package of services. The Zambian government, following a policy focussed on equal chances for everyone and allocation of developmental means to rural areas, also felt obliged to fulfill its promises (Rothchild 1972). In the 1960's when the Zambian government had relatively extensive funds available, the trend was to expand government services as quickly as possible. Schools, clinics, agricultural instruction camps, marketing depots, credit facilities, and so on, were made available to the population at a rapid tempo.

Often these services were of a limited quality and the population being cared for (in the immediate vicinity) was small so that the services were not very efficient. The very dispersed village settlement pattern resulted, moreover, in many living too far away from the services offered. I will examine more closely this situation as it emerged in the 1960's and 1970's for the southeastern region of the district in the following section.

4.3.1. Service centre effectiveness and accessibility

The southeastern part of the district considered here is a 3600 km² area with a population of about 6300 (cf.fig. 4.2). (Area and inhabitants within a 20 km radius of Kasempa are not included.) By 1978, there were 6 small service centres, with a number of functions, varying from 1 to 7, in the area. For assessing the effectiveness of the provided services, attention will be given here to two basic services: educational and medical facilities. There are 6 primary schools and 3 clinics in the area. Taken on the average it could be said that this is a favourable situation, namely one school per 1,000 inhabitants and one clinic per 2,000. (Compare the average in the North-Western Province with 1 school per 1,600 inhabitants and 1 clinic per 3,600, Gruher 1975.)
If we look, however, at the distribution of the population over the area, then a large discrepancy between services offered and the location of the population appears to exist. For the government the effectiveness and efficiency of the service offered is of importance and for the population, on the other hand, the distance at which this is located.

To arrive at an indication of the efficiency and accessibility of the offered government services, it is necessary to see a service related to its 'threshold value' (or 'standard') - that is, the minimal number of people necessary for the efficient practice of a certain service - and its 'threshold area': the distance whereby an offered service is within reasonable reach of the inhabitants (Van Dusseldorp 1971, 22; Van den Berg 1980). Establishment of norms in this area is, however, arbitrary. In the case of services such as education and medical care, which are provided free of charge for the population, economic assessment such as the number of customers necessary in an area to operate profitably is not of primary concern.

Government policy, internal local politics, and local circumstances play a major role in the decision of where a school or clinic will be established. Still, there are rough guidelines which can be used in planning, as Van Dusseldorp (1971, 30) remarks:

'It has been found that the standards for schools and clinics at the local level are very similar in many countries, in spite of varying types of organisation'.

A general standard justifying the establishment of a full primary school (grade 1-7) is a population of at least 1500 people (Kay 1967, Van Dusseldorp 1971). A population of 2000 to 3000 is considered to be the minimum for a clinic (dispensary); for a well-equipped rural health centre this number is at least 10,000 persons. These norms can only be seen in relation to the threshold area, the action radius of the service. Also in this case norms are arbitrary and depend on government policy, transport availability etc. Norms generally applied in Zambia are: a school within 5 km. (one hour walking distance) and a clinic within 15 km. (half to 3/4 of a day necessary for a visit)
Fig. 4.2
SERVICE CENTRES AND POPULATION DISTRIBUTION, 1978

- Clinic
- School
- Local court
- Villages
- 2 villages = ca. 30 persons

5 km. radius
15 km. radius
Fig. 4.3 VILLAGES AROUND KANONGO CENTRE

SITUATION 1968

- stream
- dash-dot-dash: dambo
- solid: road
- circle: village
- triangle: windlass well
- circle with plus: service centre

0 1 2 km

SITUATION 1978

- stream
- dash-dot-dash: dambo
- solid: road
- circle: village
- triangle: windlass well
- circle with plus: service centre

If these norms are applied to the situation in this part of the district, one finds that 32% of the population lives farther than 5 km from a school, and 41% live outside the 15 km norm set for a clinic (cf.fig.4.2). Further it appears that no clinic has a population of 2000 within its 15 km radius; in the vicinity of one clinic there is even a population of less than 700. There is a similar situation in relation to the schools, where, of the six schools in the area, no school has a population of 1500 within a 5 km radius. Both the accessibility and efficiency of the offered services are far from optimal.

This situation is similar to the functioning of other services. Since ca. 1966, a start was made with farming instruction for villagers located in the area and the promotion of maize market production. It became possible for villagers to receive a seasonal loan for purchasing sowing seed, chemical fertilizers, and for financing tractors used for ploughing. But also in this case the population is much too dispersed to obtain an optimal use of the offered services. Moreover, various services such as tractor stations, agricultural camps, marketing depot are not located together but spread over different centres in the area.

Generally, the results with cash crop production were extremely varied (cf.Appendix VIII and Jaeger 1980). Tractor mechanisation, in particular, created numerous problems. Considerable distances (30-60 km) from the tractor centre (in this case established at the Mpungu Farm) to the farmer, bad road connections, and repeated tractor breakdowns resulted in this service being unreliable. In addition, the problem also existed of farmers' fields being too widely scattered with only very small areas reserved for maize (½-1 ha).

The government policy by which agricultural modernization and market production was paid with introducing tractor mechanisation resulted, moreover, in farmers expecting that their fields would be tractor-ploughed even when the areas involved were minimal. If no tractor help arrived or arrived late in the season, no maize was planted or the harvest was marginal due to
late ploughing and sowing. This led to non-profitable management, debts to the loan authority (Agricultural Finance Cy.), and often discontinuance of cash-crop production.

Service extension to the too widely dispersed farm network, based on a too sophisticated technical level (tractor mechanisation), led to a very inefficient and heavily subsidised government policy and an irregular and extremely fluctuating situation for the client. It seems clear that if the government wishes to extend a service package directed at increasing production, a prerequisite is a rearrangement of those services as well as a rearrangement of the population distribution (cf. Chpt. 7). But, also, when working from the viewpoint of a continuance of the present subsistence activities for the time being and extension of basic services such as education and health care, further population concentration will be necessary. As shown in previous sections, both social and ecological factors determine the issue of population concentration. The following section will assess the limits of population concentration from an ecological point of view.

4.3.2. Land carrying capacity

The system of shifting cultivation obviously implies a certain maximum level of population density. In many countries, population pressure is such that shifting cultivation has been replaced by more permanent forms of farming. This process is often accompanied by considerable problems of soil exhaustion, too short a period for tree regeneration, over-grazing, erosion, and environmental imbalances in general. This is not (yet) the case for Kasempa District, and, considering the population size, will not occur even in the distant future.

On the basis of assessments of land carrying capacity and critical population density in Zambia made by Allan (1967), it is possible to gain an insight into the possibilities for further population concentration as well as of the critical levels which have to be taken into account. The critical density is described by Allan (1967, 89) as follows:
'the human carrying capacity of an area in relation to a given land-use system, expressed in terms of population per square miles, is the maximum population density the system is capable of supporting permanently in that environment, without damage to the land'.

Calculations with regard to the land carrying capacity in conjunction with shifting cultivation were done for the Lamba population in Ndola Rural Districts in the 1950's. As the soil type, climate, and rainfall are comparable for Kasempa District (particularly the eastern part) and both the Lamba and Kaonde practice a similar farming system involving a staple food crop of sorghum, the calculations which Allan has done can be applied to the traditional Kaonde farming system in the Kasempa District as well. Allan (1967, 24,30,35) takes into account: a) land-use factor; b) cultivable percentage; c) cultivation factor. I will briefly review these factors.

a) The land-use factor (L.U.) is the relation between the duration of cultivation carried out on a specific soil unit, and the period of subsequent rest required for restoration of fertility. For a number of different vegetation and soil types it was estimated how long a certain piece of ground could be cultivated and how long the same ground must lie fallow for fertility rejuvenation. On this basis, the land-use factor of a number of different soil types was delineated. Red clay soils having a good structure have a factor of 2 to 3. That is, a one year of use to a one or two year fallow period. In practice, this often is a 6-year period of cultivation followed by 6 to 12 years fallow. Poorer, leached, sandvelt soils and Kalahari sands have, according to Allan, a factor of 13 to 16, i.e. a rate of one year of cultivation to 12 to 15 years fallow.

b) The cultivable percentage (C.P.) is the land which would normally be included in the cropping sequence and land rotation of a balanced system, unaffected by pressure (Allan, 1967,24). The exact assessment of this percentage is, as Allan says, very difficult and arbitrary. Which percentage of land is actually put under cultivation depends on demographic and social factors, traditional territorial bounda-
ries between village groups. The cultivation percentage varies also according to the different soil types; some areas are more intensively used than others. The mean cultivable percentage for the Lamba area is estimated at 22%.

c) The cultivation factor (C.F.) is the average acreage under cultivation per head of the population at any one time. Allan calculates the average for the Lamba at 1.01 acre under cultivation per person. Other areas in Zambia are summarised by him as follows (1967,57):

<table>
<thead>
<tr>
<th>Area</th>
<th>Plateau</th>
<th>Ngoni</th>
<th>Lamba</th>
<th>Ndembu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>284</td>
<td>259</td>
<td>254</td>
<td>461</td>
</tr>
<tr>
<td>Total Crop Acreage</td>
<td>316</td>
<td>281</td>
<td>254</td>
<td>494</td>
</tr>
<tr>
<td>Area Cultivated per Head</td>
<td>1.11</td>
<td>1.08</td>
<td>1.01</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Allan (1967,58) comments that:

'this figure of about one acre and a tenth in cultivation per head of population occurred with such consistency in the Northern Rhodesian sampling that it was thought it might be typical of simple hoe-cultivation systems of subsistence agriculture under a modified Sudanian climatic regime'.

In the Kanongo area in 1968, 22 households, totalling 122 people, which gives an average of 5.5 people per household, had 102 acres (41 ha) of land under sorghum cultivation. This averages 0.84 acre (0.34 ha) per head for the staple food crop production. Subsidiary garden acreage must be added to this. This was roughly 1 acre per household (ca.0.18 acre (0.08 ha) per person) for the Kanongo area. On this basis the cultivation factor for the Kaonde in Kasempa District can be put at about 1 acre (0.4 ha) per person following traditional agricultural practices.

For a calculation of the area of land (of a specific soil type) required per person the formula \[ LU \times CF \times \frac{100}{CP} \] is used (Allan 1967,89). When the area of the various soil types in a certain region are known it is possible with the help of this formula to calculate fairly precisely the human carrying capacity in that area.

The soil survey carried out in the Mpungu and Mushima
areas offers an opportunity for arriving at figures for the land carrying capacity in Kasempa District. Table 4.1 gives a review of these calculations based on the surface area of soil types in the two regions. The 1000 km$^2$ of the Mpungu area has a carrying capacity of 12,600 people under continuation of the customary agricultural and social system of the Kaonde. The Mushima area with 900 km$^2$ has a carrying capacity of 5000 people. These figures mean that a critical population density for the Mpungu area is reached by 12.6 persons per km$^2$ and 5.5 people per km$^2$ for the Mushima area.

Although the Mpungu area is perhaps too good to be representative of eastern Kasempa District as a whole and the Mushima area somewhat too poor for the western part, a rough indicative average of critical population density for the whole of the district comes to 9 persons per km$^2$. Allan's figure for the Lamba area is 9.2, and Turner, making use of Allan's assumptions, calculates a critical population density for the Ndembu in Mwinilunga District at 6.5-14.7 people per km$^2$ (Turner 1957, 21).

These figures give an indication of the population limit which cannot be exceeded without endangering the land and the production results of the traditional agricultural practices itself. The above calculations are based implicitly on the assumptions that ca. 1 acre of land per person under cultivation provides a sufficient food supply. Allan (1967, 58) figured that 1 acre cultivated for various grain-crops is sufficient to supply enough calories for a labouring man. A rough estimate of the caloric value for 1 acre planted with sorghum confirms this. Based on a harvest of 500 lb. (226 kg) sorghum per acre - a low average considering that 700-1000 lb. is certainly unusual - the calorie total is 768,000$^9$. This is an average of 2090 Kcal. a day.

The average requirement for a reasonable calorie intake for a rural inhabitant is set at 2030 Kcal. a day (together with 25 g. protein) (FAO, nutritional report Zambia, 1974; ILO 1977, 58). Calculation based on a 1 acre sorghum harvest does satisfy this requirement. In addition, other products are grown in the gardens and additional food supply is
<table>
<thead>
<tr>
<th>soil type</th>
<th>available area</th>
<th>Land Use factor (L.U.)</th>
<th>Cultivable area (C.P.)</th>
<th>Area required per head (acres)</th>
<th>Carrying Capacity (people)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 1</td>
<td>97,775</td>
<td>3</td>
<td>33%</td>
<td>9</td>
<td>10,860</td>
</tr>
<tr>
<td>C 2 + S 1</td>
<td>37,680</td>
<td>7</td>
<td>25%</td>
<td>28</td>
<td>1,350</td>
</tr>
<tr>
<td>S 2 and S 3</td>
<td>50,850</td>
<td>13</td>
<td>10%</td>
<td>130</td>
<td>390</td>
</tr>
<tr>
<td>unarable land (WG and D)</td>
<td>65,390</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td><strong>251,695</strong></td>
<td></td>
<td></td>
<td><strong>=1040 km²</strong></td>
<td><strong>12,600</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>soil type</th>
<th>available area</th>
<th>Land Use factor (L.U.)</th>
<th>Cultivable area (C.P.)</th>
<th>Area required per head (acres)</th>
<th>Carrying Capacity (people)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 1</td>
<td>32,800</td>
<td>3</td>
<td>33%</td>
<td>9</td>
<td>3,650</td>
</tr>
<tr>
<td>C 2 + S 1</td>
<td>24,300</td>
<td>7</td>
<td>25%</td>
<td>28</td>
<td>870</td>
</tr>
<tr>
<td>S 2 and S 3</td>
<td>60,900</td>
<td>13</td>
<td>10%</td>
<td>130</td>
<td>470</td>
</tr>
<tr>
<td>unarable land (WG and D)</td>
<td>103,450</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td><strong>221,450</strong></td>
<td></td>
<td></td>
<td><strong>=900 km²</strong></td>
<td><strong>4,990</strong></td>
</tr>
</tbody>
</table>

x) Ref. Kasempa Land Use Survey, 1965 (see note 10)

xx) Figures based on comparable soil types

Ndola Rural District and Lamba Land Use System (Allan 1967)
available through gathering, fishing, and hunting. The allowance of the above mentioned land-use factor and cultivable percentage, moreover, allows ample space for those activities.

Although it is outside the scope of this study to give detailed attention to the nutritional condition of the population, it must be noted here that generally malnutrition in Zambia is extensive and that the child (0-5 year) mortality is 22% in rural areas (1969-1972) (FAO 1974); death being usually attributed to malaria and malnutrition. Child undernourishment of a serious to moderate degree is especially high among the rural population, in the Western, Northern, Eastern, and North-Western Province with malnutrition rates of 30%, 28%, 28% and 26%, respectively (weight relative to age under 70%) (FAO 1974). It is generally found that the largest shortcoming is in the caloric intake and that the protein consumption is reasonable to good.

The consumption per person per day of the rural population in the traditional sector in North-Western Province is estimated at 1907 K cal. with 55.2 g protein (FAO 1974). The occurrence of undernourishment in Solwezi District and Kasempa District, where there is no population pressure or lack of land (population density ca. 2 per km², compare critical population density of ca. 9) indicates that in general other factors than availability of land are concerned. A complex of causes seems tied to this situation such as: absence of men who have migrated to urban areas, unstable family relations, a more permanent locationing along roads by which one does shift gardens less regularly but at the same time does not apply systems of more permanent agricultural practice; transition to a cash economy under which the work done by men and women shifts to cultivation of cash crops which, if the harvest fails, leads to a lack of income as well as insufficient food supply from the subsistence gardens. Contributing to this general situation is also the increase in beer parties to acquire cash and at the same time spending large quantities of the grain stock at once. Moreover, personal observation and communication with people confirmed that during the period of beer parties (the hot dry season) less labour input is given to garden preparation, such as streamside gardens.

From the point of view of regional planning it seems, however, justified to take as a norm 1 acre (0.4 ha) of land per person under cultivation and to take into consideration that the critical population density is not exceeded.

4.3.3. Population density of service centre areas

The above norms can be combined with the wish
to make a basic package of services available to the rural population. Taking into account that for daily services, such as education, the distance from village to a centre should not be more than 5 km, and if we assume that fields can be 2.5 km from the village, which is often the case and is acceptable, then, in principle an area with a radius of 5 + 2.5 km around a centre is available for practising shifting cultivation. As a whole this gives an area of 177 km². Assuming that a critical population density is reached with 9 persons per km², 1590 people could live in such an area without any substantial damage to the environment and with enough land to satisfy nutritional needs. With such a population around a centre a full primary school would have a sufficient enrollment (cf. 4.3.1). The number of inhabitants within a radius of 15 km around a centre comes to (9. (15 + 25)².pi)=8650 people which is in any case ample justification for a clinic.

Although these are theoretical figures, they do imply that a larger population concentration around a service centre than has been usual in the Kasempa area can be supported from an ecological viewpoint. Such a population could still for ecological as well as for social reasons relocate its villages and fields regularly, and remain within an acceptable distance from a service centre.

Actually, this pattern does exist around present centres to a certain extent. Fig. 4.3 shows the way in which the Kalasa village cluster moved within the vicinity of the Kanongo service centre in the period 1968-1978. In this case, a population of about 700 lives within a 5-6 km distance from the centre. The area showed no signs of serious erosion in 1978. Considering the carrying capacity, it is possible for a larger population to be settled around the centre. Nearby dambos and streams provide a sufficient water supply for a larger population.

As noted above, the village regrouping scheme around this centre failed primarily due to social factors (cf. 4.2.1). Such a situation does not have to be the case everywhere in the district. Based on preliminary research on clan affiliations and local leadership, a gradual concentration around
carefully selected locations can be advanced with the help of intensive inhabitant participation. Chapter 7 will deal with how regional planning in the district can be based on the principle of continuation of shifting cultivation and at the same time the provision of a basic package of services.