Jan Rudengren

PEASANTS BY PREFERENCE?
Socio-Economic and Environmental Aspects of Rural Development in Tanzania

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ABSTRACT

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Development is not always an entirely positive process in which the gains are equal to the risks. Rural development implies a penetration of the existing peasant mode of production by alternative systems. History has shown that this penetration creates its own barriers. A successful rural development policy must therefore be geared towards unblocking these barriers. Peasant societies are not static. On the contrary they are constantly exposed to challenge. In order to adapt, peasants do not repulse all change, but they maximize the positive and minimize the negative effects of development. The decisions they make in the course of thus adapting are quite rational, although the agents of change often perceive them as 'irrational'.

The aim of the present study is to stimulate a deeper knowledge and understanding of African peasant societies. It is shown here that 'the peasants' are a far from homogeneous group of people, a fact which must be recognized in development planning. The importance of demographic and ecological factors as determinants of change are also stressed.

The study is based on extensive original data from an area in northern Tanzania. This material is used in seeking an answer to five major research questions: what type of society are we dealing with, what type of agricultural system dominates, what is the relation between man and his physical environment, what is the role of natural hazards in development and, finally, what factors determine the current socio-economic stratification?

To be able to analyse the peasant mode of production, and in particular its constraints in relation to change, it is necessary to transcend current social science paradigms. This book represents an attempt to analyze an African society on its own terms.

Key words: Rural development, peasants, socio-economic, environment, dependency, natural hazards.

PEASANTS BY PREFERENCE?

Socio-Economic and Environmental
Aspects of
Rural Development in Tanzania

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Jan Rudengren

PEASANTS *by* PREFERENCE?

SOCIO-ECONOMIC and ENVIRONMENTAL ASPECTS of RURAL DEVELOPMENT in TANZANIA

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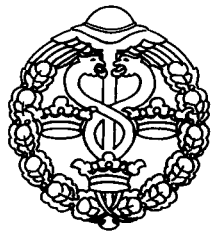

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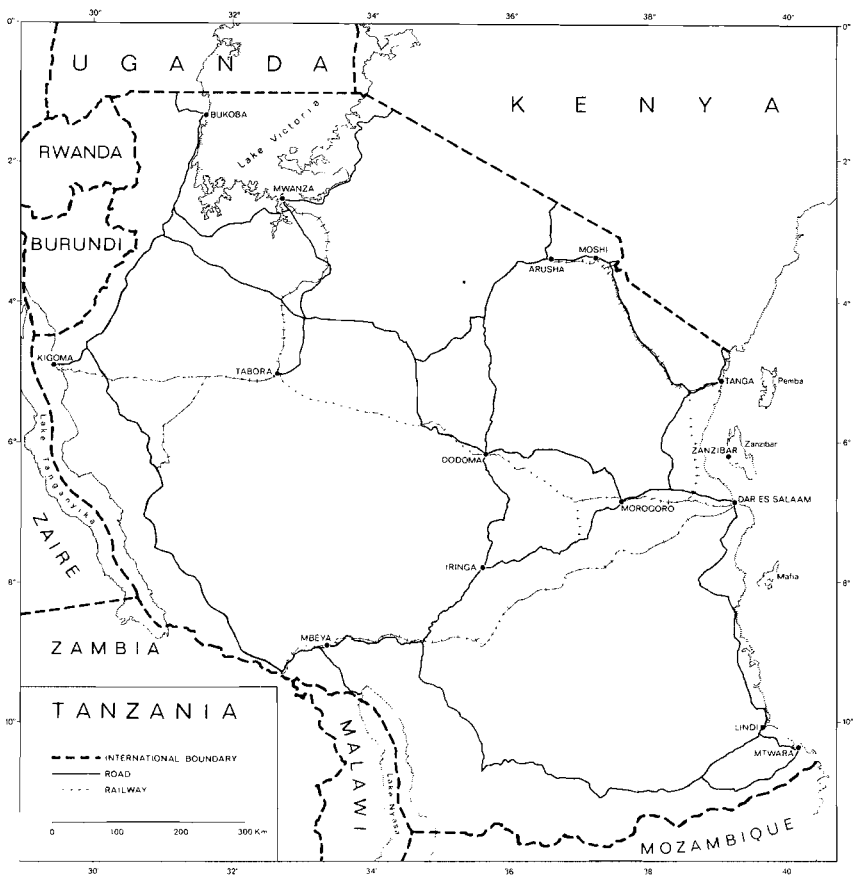
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Once again, thank you all!

Stockholm in March 1981

Jan Rudengren

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MUHTASARI

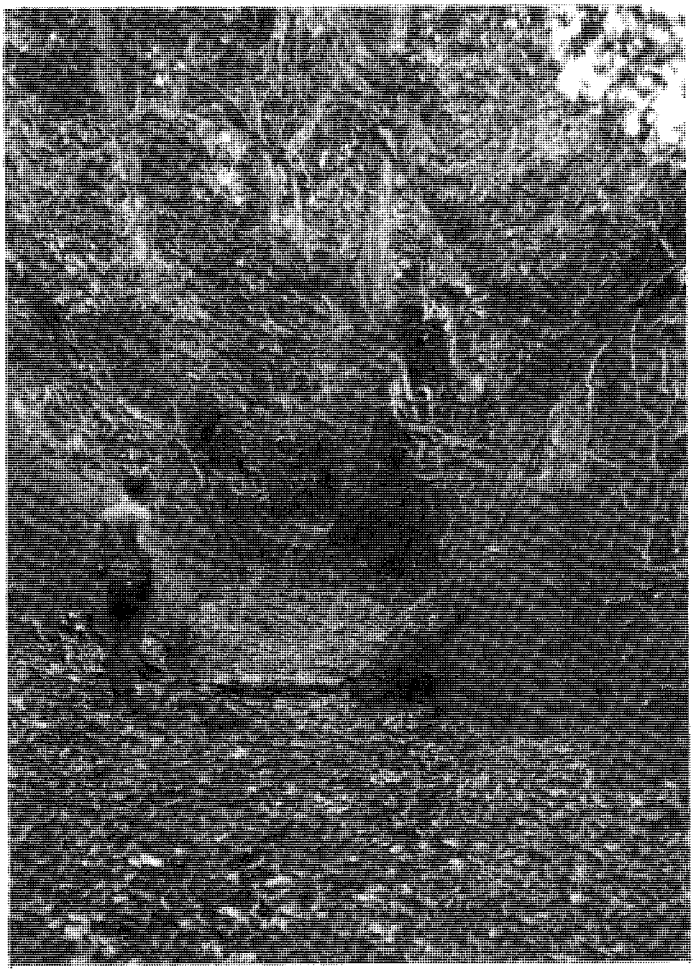
Maendeleo siyo lazima mambo mema yenye hakika iwapo faida yake ni sawa na jukumu au hatari zilizomo. Maendeleo vijijini yanahitaji kwamba uchumi wa ukulima (wa asili) ulivyo sasa ubokolewe na taratibu nyingine za kilimo. Historia imeonyesha kwamba ubokoaji/uingizaji huo umeleta vipingamizi vyake wenyewe. Badala ya kuondoa kabisa ukulima wa kizamani, sehemu yake fulani inasisitizwa. Kwa hivyo, siasa ya maendeleo vijijini ya kufanikiwa lazima iazimie kuondoa vipingamizi hivyo. Jamii za wakulima si zilizokoma kuendelea. Kinyume chake, wakati wote zimebenuka kukabili mabadiliko. Kurekebisha hali ya wakulima, usipinge mabadiliko yote, bali uzidishe athari njema na kupunguza athari mbaya za maendeleo. Maamuzi yao wakulima ya kujirekebisha ni ya busara ijapo waendeshaji miradi ya maendeleo huyafikiria kuwa "si yenye busara".

Utafiti huu unakusudia kupanua ujuzi na ufahamivu wa jamii za kiafrika za wakulima. Unaonyesha kwamba wakulima si watu wa namna moja tu, na hilo lazima litambuliwe katika kupanga maendeleo. Tena, unasisitiza pia umuhimu wa mambo ya umati na mazingira yakiwa viweka-mipaka vya mabadiliko.

Utafiti huo unaegemea data nyenezi za asili kutoka sehemu ya kaskazini ya Tanzania. Habari hizo zimetumika kujibu maswali matano makubwa ya kiutafiti: ni aina gani ya jamii tunayoishughulikia; utaratibu gani wa kilimo umechaga na kuenea; kuna mahusiano gani baina ya watu na mazingira yao; nini umuhimu wa hatari ya maafa, maangamizi na ajali nyinginezo; na mwishoni, mambo gani yanaamua kuwapo kwa tabaka za kijamii na kiuchumi kwa hivi sasa?

Kufafanua utaratibu wa uchumi wa kiukulima, na hasa vipingamizi vyake kuhusu mabadiliko, inatupasa tuziachilie mbali nadharia za kijamii zilizoenea siku hizi. Kitabu hiki kinajaribu kuchunguza jamii ya kiafrika kwa sharti zake yenyewe.

(Imetafsiriwa na Abdulaziz Y. Lodhi, Idara ya Lugha za Afrika na Asia, Chuo Kikuu, Uppsala.)



The predicament

1. INTRODUCTION

The central issue of rural development - the penetration of the peasant mode of production by alternative systems - has its roots far back in history. The resistance of the peasants to innovations and alternative production systems is puzzling. Why do they not accept the fruits of development and enjoy a better life?

Development or change is not an entirely positive process in which the gains are equal to the risks. Rural development implies a change in the mode of production and the economic system which the people affected do not conceive as positive. The agent of change often regards the peasant as conservative and irrational, a person who does not know what is good for him, since he often 'refuses' to accept the innovations suggested. Peasants prefer to stick to their present mode of production instead of adopting new techniques and production systems. They prefer autonomy to a brilliant production performance. It should be remembered, however, that when the peasant is invited to adopt new techniques, it means asking him to experiment with the life of his family; if he fails, there is no safety net.

Peasant societies are not static societies that repulse any idea of change. On the contrary peasants are constantly exposed to challenge. To adapt, they must

maximize the positive and minimize the negative effects of any development; which in itself involves important values and ethical considerations. The peasant decision not to adopt new techniques may be quite rational, if these techniques contradict the economic and social organization of the peasants at too fundamental a level. The existing systems are often regarded by the peasants as superior to the alternatives. Frequently, too, the peasant and the agent of change may possess different information about the new techniques and their evaluation of the consequences will therefore also diverge.

Galbraith (1958) discussed the inclination of societies to adhere to familiar and known ways of tackling problems, which he called their 'conventional wisdom'. Conventional wisdom accommodates itself not to the world it is meant to interpret, but to the audience's view of the world. Since the audience prefers the familiar, while the world is continually changing, conventional wisdom is always a danger of becoming obsolescent (Galbraith, 1958, p 10).

The real danger to conventional wisdom stems not from new ideas but from events in the real world. Thus the inclination to stick to what is familiar, to solve problems as they have always been solved, tends to last too long. The adoption of new ideas or techniques is postponed until it becomes absolutely necessary, until events have shown that the conventional ways just do not solve the problems.

A closely related discussion is to be found in Wilkinson (1973). Wilkinson argues that development or change is simply the escape route of a society caught in the ecological pincers of population growth and scarce resources. For every step up the 'development ladder', the work requirement per capita will increase (cf. Boserup, 1966). Since in their initial stages new techniques require more labour per capita, they are not generally adopted until it becomes unavoidable. For example,

coal was not mined as a household fuel in England until the forest resources were exhausted and charcoal could no longer be produced, although the existence of coal and the technique of mining were already known. The reason according to Nef (1977) was that coal mining was too laborious compared to the familiar production of charcoal.

The peasant mode of production is superior in certain contexts, and it is very flexible. However, that does not mean that it is a suitable production system in any situation. This is equally true of the capitalistic and socialistic economic systems. When the challenge to the peasant mode of production becomes too strong, the system will eventually change, as it has done in the industrial countries. But this does not necessarily mean that it should be automatically replaced by capitalism or socialism.

It is now evident that peasant production is no longer appropriate in large parts of Africa. Per capita production in agriculture has been declining ever since the 1960s, and operations do not generate enough savings for investment in non-agricultural industries.

The tendency to stick to what is familiar appears not only in peasant societies but in all human groups. Indeed we have only to look at the social sciences and their approach to development studies: the inability of Western social scientists to transcend the two mainstreams of development theory, the neo-classical and the Marxist, is evidence enough. In this context it is not out of place to caution the reader against the false analogy trap. To state that the current situation in the Third World is similar to that of the industrial world in the nineteenth century is misleading. A policy that advocates copying the development of the West during the industrial revolution is an excellent formula for disaster. The situation of the Third World today is completely different. Moreover, the Third World countries should not be treated as a single entity.

To analyze the African economies, and in particular the constraints on the peasant mode of production in rural development, it is necessary to transcend existing social science paradigms. African societies must be analysed in their own terms. This study represents a step in that direction. The following intensive micro-study is an attempt to penetrate an African rural society and to expose the factors that constitute the structural constraints on the peasant economy, as well as to identify the crucial forces in the development process and to expose the inhibiting factors. Hydén's concept of the 'uncaptured peasant' (Hydén, 1980) has helped me to structure the analysis and to give a sharp edge to the discussion.

The study has naturally had to be contained within appropriate limits. For example, the question of innovation diffusion is not discussed and producer prices are barely touched upon. Since the market economy has penetrated very little into rural life, these prices do not enter into the peasant's decision matrix. The study centres on the socio-economic and environmental aspects of rural development. Together with other studies of rural Africa it may provide some insights on which rural development policies to benefit the rural dwellers could be based. If these people are excluded from the development process - and they will continue to choose non-participation as long as the policies seem to them to be irrelevant - the development of African economies is likely to have only meagre results.

It may not be out of place to remind the reader once again that development, unlike economic growth and modernization, is basically a moral category. Participation and a pluralistic approach are therefore imperative, since development

> ... is not something to be decided by experts, simply because there are no experts on the desirable goals of human life. (Berger, 1977, p 76)

The objectives of this study are twofold. The first is to study in depth an African peasant society facing a whole range of challenges, economic, social and environmental; to provide insights and knowledge about the problems of transformation, about the factors that determine and explain the current state of underdevelopment. Special attention will be paid to the relation between man and his environment.

An attempt will also be made to reveal the great diversity that lies hidden in a seemingly homogeneous society. This diversity must be recognized when development plans are being initiated, and it must be recognized as a policy issue. Peasants do not all act the same way just because they have been labelled 'peasants'.

The second objective, which was also the orginal purpose when the study was initiated, is to provide planning officers at various administrative levels with information about the Kahe Ward, to help them to carry Operation Kahe through to a successful conclusion.

A micro-study provides a useful approach to the type of research questions and research problems formulated here. It increases our understanding of the subject, in this case the peasant economy and the obstacles to the transformation of this kind of society. It allows an intensive study of the actors and their environment. It makes it possible to identify and analyse certain critical variables and to test the relevance of general theories, e.g. the theory of the peasant economy.

BACKGROUND TO THE STUDY

This project started in 1973 when I was working with the Bureau of Resource Assessment and Land Use Planning (BRALUP) at the University of Dar es Salaam. The study originated in a request from the Tanzania Investment Bank

(TIB) to BRALUP for a study of the social conditions of the workers at the East African Kenaf Industries Limited (EAKIL) plantation at Kahe.[1] This plantation is located a little to the west of Kahe Station, and occupies some 4 000 ha. The Kenaf fibres are sent to the same company's bag factory in Moshi. In February 1973 approximately 800 permanent and 800 casual workers were employed there. The workers are not provided with housing by the company, but have to find their own accommodation. One result of this situation was the rapid and unplanned growth of Kahe Station, with all the associated social problems.

The team engaged in the study found that an examination of the area surrounding the EAKIL Estate would be necessary. During our first contacts with the district planning officers in Moshi, we learned that a special development programme for Kahe Ward,[2] Operation Kahe, had just been launched. The officers responsible were keen to obtain BRALUP's assistance in providing data for this operation. In February and March 1973, 340 people in Kahe Ward were interviewed.[3]

At the beginning of 1974 another member of the BRALUP staff, Professor Jack Romanowski, was engaged in a water-resource study, and he suggested the merging of our studies. His suggestion was accepted and a new series of interviews was held in May-June 1974. Besides the Kahe Ward, these included the Msaranga and Mandaka areas (Map 1:2).

The 1974 survey provided us with an opportunity to incorporate into the new questionnaire all the issues and problems raised by the previous study. In addition, mistakes in the 1973 questionnaire could be avoided.

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[1] Mascarenhas & Rudengren, 1973.

[2] In 1974 a ward was the smallest administrative unit.

[3] Rudengren, J., 1975a, b. Some preliminary findings were also published in December 1973 (Rudengren & Mascarenhas, 1973).

It was at this stage that I expanded the original purpose of the study, namely to provide planning officers with information about the Kahe Ward, and became interested in making a more detailed and comprehensive study, which would not only provide a synthesis of the physical and socio-economic geography of the area but would also reveal the processes underlying the present state of underdevelopment.

THE STUDY AREA

The study area - situated in the Moshi District of the Kilimanjaro Region in northern Tanzania - is part of the Lower Moshi area on the southern slopes of Mount Kilimanjaro (Maps 1:1 and 1:2). It is a gently sloping plain at an altitude of some 700 metres. The area is in the transitional zone between the humid and fertile slopes of Mount Kilimanjaro and the dry Masai Steppe. It is a transitional zone not only in physical terms but also in cultural, having long been the border between the agricultural Wachagga[1] and the pastoral Wamasai. The area is the core region for the Wakahe, who live by agriculture and livestock keeping.

The area epitomizes rural Tanzania, although the people living there have been affected by the 'modern way of life' to a greater extent than the average Tanzanian peasant. After the 1973 survey it was clear that the area would be suitable for a study of rural change. The area proved to be heterogeneous both ecologically and socio-economically and thus suited to the type of research questions with which the present study is concerned.

The area includes several examples of various types of economies. The majority of the people are peasants,

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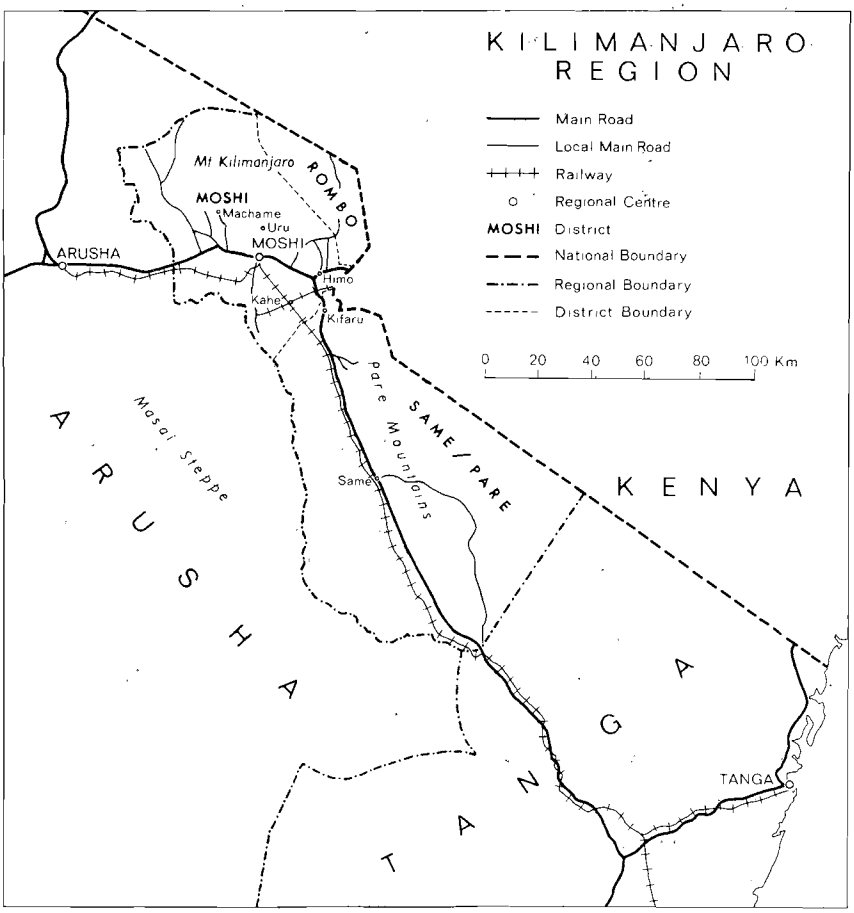
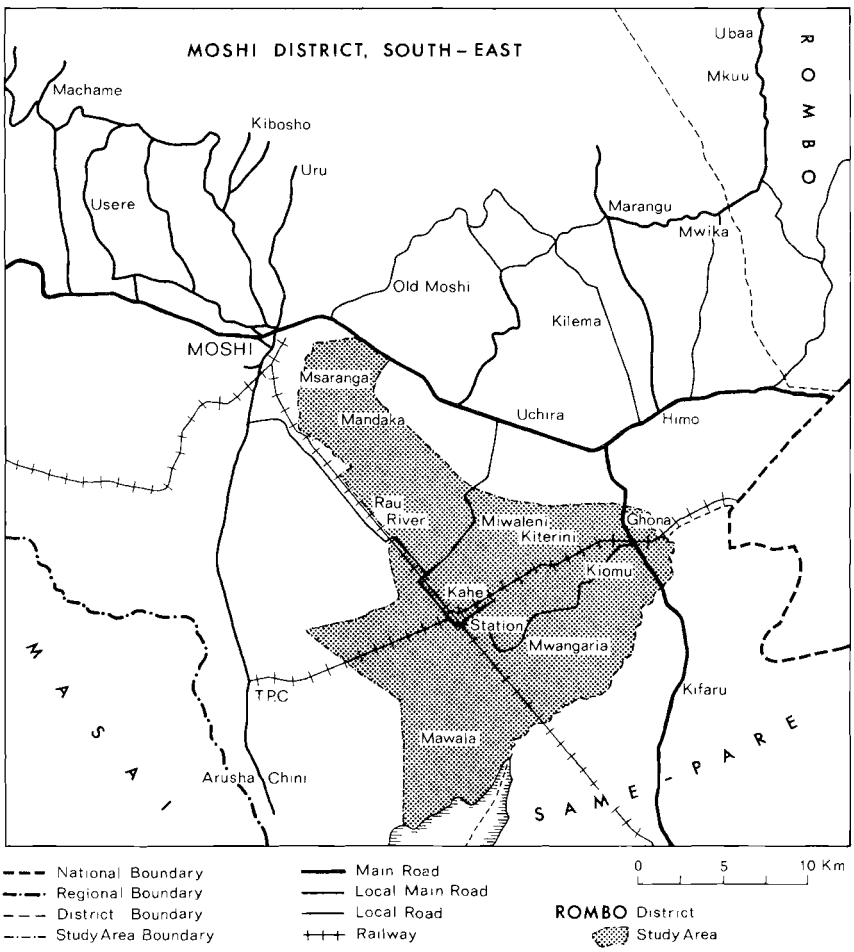
[1] The Swahili prefix 'Wa-' means people; the Wachagga thus originate in the Chagga area.



Map 1:1. The Kilimanjaro Region

but there are also some pastoralists who are slowly being pushed out. The plantation economy is also important and a large section of the population is employed on plantation work.

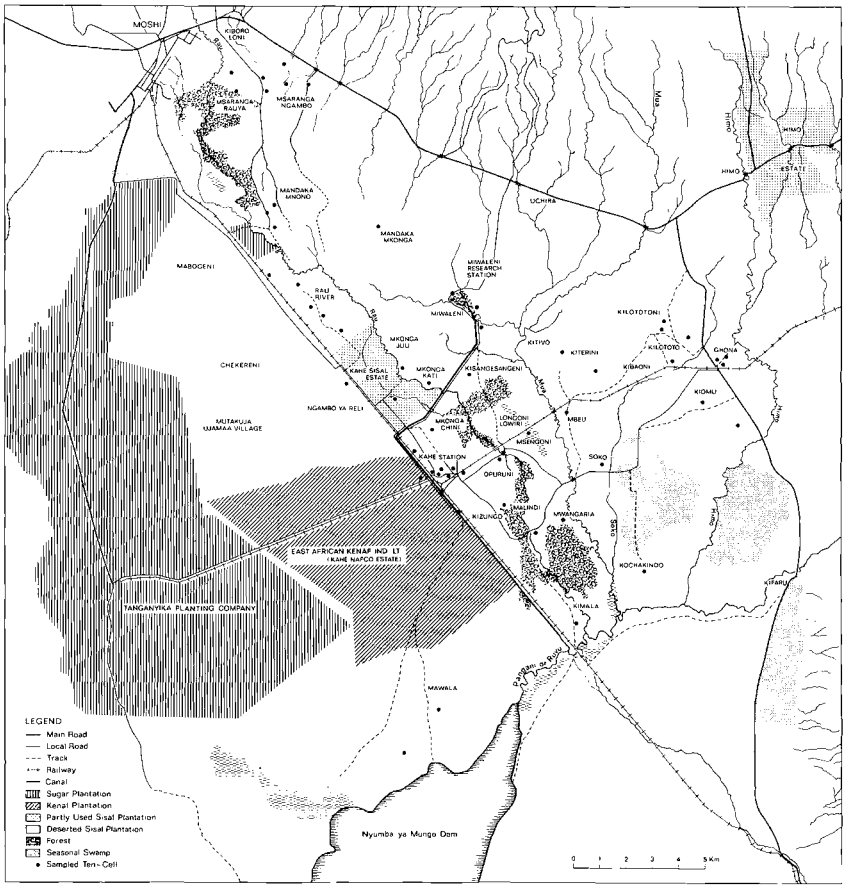
Land use varies considerably, reflecting variations in precipitation, ranging from about 800 mm per annum in the northern part of the area to 400 mm in the south. Generally,



Map 1:2. The Moshi District

the southern and eastern parts are mainly used for grazing - large areas are overgrazed - but the cultivated area is steadily increasing. The already cultivated areas are more intensely used, and only small parts are left fallow.

In 1974 some 12 600 people lived in the area in approximately 20 nucleated settlements (Map 1:3). The northern parts are the most densely populated. In 1974 the average



Map 1:3. The Study Area

population density was 42 per km^2. The major settlement is Kahe Station with approximately 1 500 inhabitants. Migration in the area is heavy, as the ethnical mixture shows. Over two-thirds of the heads of household were born outside the study area.

Peasant agriculture, directed to use-value production, dominates. However, the majority of the peasants are in

a transitional stage between the traditional agricultural and economic system and the 'modern' market economy. Farms are small on an average (1.5 ha), but there is considerable variation between the households, depending mainly on the structure, or size, of the families. Due to population pressure on the land and the great influx of people, the traditional land tenure system is gradually being eroded, giving way to private ownership of the use-right.

Maize is the staple crop, but a great variety of other crops are also grown; cotton is the major cash crop. Irrigation is vital since rainfall is low and unreliable. The land is tilled by the hoe, but many peasants rent tractors for land preparation; no draught-animals are employed. Fertilizers and manure are little used, although many people are aware that the fertility of the land is declining.

Livestock is an important source of income and an insurance against 'rainy days'. In 1974 the estimated livestock population was slightly larger than the human population. The cattle are of the ordinary East African Zebu type; there are only a few hybrid cattle in the area. Livestock is owned by individuals but grazing land is held in common. Pastures are generally of low quality and large areas are overgrazed. The competition for land between cropping and grazing has increased over the years. The southern and eastern parts are the main livestock areas.

THE ORGANIZATION OF THE BOOK

Part One provides the theoretical and historical background of the study. In Chapter 2 the concept of development is discussed and the development theories relevant to this study are reviewed. The review concentrates on regional and rural development aspects. Within this complex field

the discussion centres on demographic and ecological factors as determinants of agricultural transformation. The role of agriculture versus industry in the development process is also examined in this chapter, which concludes with a discussion of how to characterize and classify the African rural producer. Chapter 3 consists of a review of Tanzanian development policies and planning, especially rural development.

Part Two comprises the case study. Apart from Chapter 4, which consists of a methodological discussion, each chapter is devoted to one of the major research questions. In Chapter 5 the type of society studied is discussed, and concepts and theories for analysing and describing 'primitive' economies are tested. In Chapter 6 the agricultural system in the area is analysed. The results show that there is a group of peasants who are in a transitional stage between the peasants and the farmers, and that some of them have already abandoned the traditional agricultural system. In Chapter 7 an attempt is made to determine the way in which socio-economic, cultural and ecological factors influence the production pattern of the households: livestock versus agriculture. In Chapter 8 the importance of natural hazards in the decision-making of peasants is examined, and in Chapter 9 the current state of underdevelopment and stratification between areas, ecozones and households is analyzed with the help of a factor analysis. In this chapter the main variables determining the stratification, discussed earlier in Part Two and the Annex, are brought together. The factors arrived at are then used for the classification of the subareas and ecozones.

Part Three brings together the various theories, the review of Tanzania's development planning and experiences as discussed in Part One, and the specific findings of the case study, to provide the basis for a general concluding

discussion. The central theme of this discussion is rural development planning and an attempt is made to identify factors that are essential to successful rural development planning. These factors naturally have an impact on the governments of the Third World as well as on the donors.

The initial purpose of this study was to provide district planners with data to enable them to carry 'Operation Kahe' through to a successful conclusion, and the book therefore has a very comprehensive Annex. The study area is described in great detail and the distribution of the manifest variables discussed. All variables discussed in Part Two of the main report can be examined specifically in the Annex. The detailed analyses of the individual variables support the conclusion arrived at in the main report.

The data presented in the Annex will also lend itself to further research, making possible a dynamic study of the transformation of this area. It is my hope that similar studies, although not necessarily all the variables included here, could be carried out at ten-year intervals. They would contribute significantly to our understanding of the complex situation of transforming the peasant economy.

PART ONE: THEORY AND PRACTICE OF DEVELOPMENT PLANNING

The world today is divided into ideological camps. The adherents of each tell us with great assurance where we're at and what we should do about it. We should not believe any of them.
(Berger, 1977, p 11)

Peasant irrigation - the Soko area.

Example of typical housing - Kisangesangeni.

2. THEORY AND CONCEPTS

Policies for social change are typically made by cliques of politicians and intellectuals with claims to superior insights. These claims are typically spurious.
(Berger, 1977, p 13)

Studies of development and underdevelopment span broad areas of inquiry and include many research disciplines. However, most development studies fall within the social sciences. Great progress has been made within this field of research and the research questions have become increasingly complex. New theories have evolved in response to the extension of the development aspects. As a result, many schools of thought have emerged.

The following review is limited to theoretical contributions that have influenced the present study. The theoretical aspects together with the economic development in Tanzania provide the background to the hypotheses and analyses in part two.

WHAT IS DEVELOPMENT?

The terms development and underdevelopment[1] are currently almost exclusively associated with changes in the Third

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[1] The state of those countries which have been termed backward, underdeveloped, or with euphemisms such as less developed and developing. These countries are listed by the UN and the OECD. The words may also be used without precise meaning. 'Underdeveloped' indicates that resources exist which have not yet been exploited, but this meaning seems to have vanished. Although the word is now close in meaning with poverty, a few 'underdeveloped countries' have high per capita income (Bullock & Stallybrass, 1978, p 652).

World. Development used to be defined as increase according mainly to various economic indicators, such as income, growth, saving, employment in the monetary sector, etc. However, emphasis has shifted from a focus on economic poverty only to cover a much wider concept.

Growth in per capita income brings a potential for development. In the long run economic growth is a necessary condition for a poor country to develop, but not a sufficient one. Seers (1979/1969, p 12) summarizes his discussion on the meaning of development in a series of questions:

> What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality?

Changes in socio-economic indicators do not alone suffice to describe and analyze the complex process of change; political and cultural goals must also be taken into account. Goulet (1971, p 333) maintains that:

> My main emphasis is placed on the ethical demands of development experience. Moreover, the same term - 'development' - designates simultaneously two realities: a terminal condition and a process by which successive approximations to this allegedly desirable conditions are made.

The concept of development has become wider and looser as the number of people writing about it has increased. New definitions of development include: (1) progress towards a complex of welfare goals, such as reduction of poverty, inequality, and (2) a process that changes peoples' living conditions.

In all examples but the last, development implies something positive - a better life for the people - in the long run. However, history shows that negative effects also follow development.

> I prefer to adopt a goal-free definition that, in one sence, is so broad as to be meaningless: development is the whole process of change brought about by the creation and expansion of an interdependent world system. Development is therefore positive and negative, according to one's goal.
> (Brookfield, 1975, p xi)

Finally we have reached a stage where

> ... development is what it has come to mean in the hands of numerous writers of very different persuasion, and hence there is no more agreement on this topic than there is over a definition of geography.
> (Brookfield, 1975, p xi)

The above statements are so ambiguous that they are useless as a definition. Is it possible to define or broadly conceptualize development? Todaro (1977, pp 62-63), inspired by Goulet, lists three core values that serve as a conceptual basis and as practical guidelines: (1) life-sustenance, ability to provide basic necessities; (2) self-esteem, to be a person; and (3) freedom, to be able to choose.

Jacoby (1971, pp 13-14) also stresses the importance of the human goal in development. Progress for man and improvement in his social position are the final objectives of development. Technological advance at the expense of human value is hollow.

In addition to a definition of development, Seers (1979, p 28) argues for a geographical extension of 'development'.[1]

> For if 'development' is now not primarily about per capita income, but also about distribution, and even more about the national capacity to negotiate with transnational corporations, and to cope with their technological innovations and their cultural impact, then it is not just needed in 'developing' countries but in all countries.

This geographical extension - 'development' is no longer assumed to tackle Third World problems only - should relieve the industrial world of its paternalism and its self-assumed responsibility for solving other peoples' problems. The definition invites all nations to tackle common, worldwide problems.[2]

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[1] Postscript to The New Meaning of Development.

[2] Cf. Hettne, 1978, p 8.

DEVELOPMENT THEORIES

A development theory is concerned with societies in change and is related to development strategy - the purposive alteration of economic systems and social structures. Furthermore, such a theory is usually normative. As development theories have tried to describe and explain various societies and various paths of development, they have evolved and become more complex. There are many classifications of development theories,[1] but as always some cases fall between and others overlap the established categories.

Modern development theories have their roots in general economic theory (classical, marginalist and Keynesian). Understandably, capital formation was seen as an important problem in the early 1950s. Rostow (1960) distinguishes five stages in economic history through which every country must pass: (1) the traditional society, (2) the preconditions for take-off, (3) the take-off, (4) the drive to maturity, and (5) the age of high mass-consumption. Rostow's theory has been heavily criticized mainly on two counts: (1) the situation for developing countries of today cannot be compared with the situation that characterized the industrial world at the time of take-off, and (2) the theory denies the developing countries a history.

The importance of capital formation for the take-off is seen in Rostow's definition of the concept.

> The take-off is defined as the interval during which the rate of investment increases in such a way that the real output per capita rises and this initial increase carries with it radical changes in production techniques and the disposition of income flows which perpetuate the new scale of investment and perpetuate thereby the rising trend in per capita output.
> (Rostow, 1960/1953, p 274)

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[1] E.g. Hettne, 1973, and Lundahl & Södersten, 1974. Lundahl (1978) criticizes Hettne's classification.

The importance of capital formation was also stressed by Lewis (1977). Underdevelopment was explained by the massive poverty which prevented saving, which in turn prevented an increase in production and so on. This reasoning is an example of the vicious circle of poverty. The only way to break this circle was by balanced development.

> Balanced growth may be a good thing for its own sake, but here it interests us mainly for the sake of its effect on the demand for capital. It appears in the present context as an essential means of enlarging the size of the market and of creating inducement to invest.
> (Nurkse, 1971, p 122)

Others have advocated an unbalanced growth, arguing that growth is normally nonregular. Growth in one sector creates bottle-necks in others, and the elimination of these creates activities (Hirshman, 1966/1958).

'Dualism' is widely discussed in development literature. The concept was originally used by the Dutch economist Boeke (1953) in his study of Java. He stated that the classical economic theory, valid for the capitalist society, was not applicable to societies where the modern market economy exists side by side with a peasant economy, largely ruled by precapitalist relations. Boeke used the concept of dualism to make a distinction between economic and social needs. His arguments have been strongly criticized by several authors who claim that economic and noneconomic needs cannot be separated.

More commonly 'dualism' is used to describe an economy with a small modern sector - mainly industrial - and a large traditional sector - mainly agrarian. Explicitly or implicitly structural differences are recognized.

Lewis (1954) also uses the concept of 'dualism'. Productivity differs in the various sectors. He further states that marginal productivity in the traditional (agricultural) sector equals zero. Its role in Lewis' model is to provide the modern sector with an unlimited supply of cheap labour.

'Dualism' can be extended from the analysis of the relation between sectors to embrace relations between regions and nations. Myrdal (1972/1957) discusses regional inequalities and uses the term 'backwash' to indicate the cumulative processes toward greater inequalities between localities because of external economies.

> More specifically the movements of labour, capital, goods and services do not by themselves counteract the natural tendency to regional inequality. By themselves, migration, capital movements and trade are rather the media through which the cumulative process evolves - upwards in the lucky regions and downwards in the unlucky ones. In general, if they have positive results for the former, their effects on the latter are negative.
> (Myrdal, 1972, p 27)

Myrdal extends his arguments regarding regional inequalities to the international context. Frank (1969) explains the problems of underdevelopment as a strong structural dependency between the satellites and the metropolis. A similar reasoning is used by Amin, who uses the concepts centre-periphery.

Myrdal also rejects the notion that a disturbed economy will eventually return to a state of equilibrium. Friedmann (1970, pp 14-17) gives a number of reasons why the equilibrium theory does not correspond to reality.

Development in most less developed countries (LDCs) impoverished a large number of people in spite of economic growth - growth without development. This conclusion can be drawn from many empirical studies (e.g. Lipton, 1977, and Griffin, 1978).

The Marxists have seriously criticized the classical and neo-classical development theories. The latter have been counterpoised by a theory of underdevelopment, on the grounds that

> The theory of development is simply a theory, and a bad one. Its predictive success is nil. It has solved no problems in the underdeveloped world.
> (Blaut, 1977, p 309)

The two main systems of thought in social science - neoclassicism and Marxism - have both, according to Lipton (1977), been unsuccessful. The effect upon social science of the intellectual dichotomy has been disastrous, especially on its capacity to analyse rural development (Lipton, 1977, p 90). The Marxists have stressed the class struggle and viewed the outcome as determined. They (excluding the Maoists) see the peasant as objectively reactionary. Since they have been relatively uninterested in efficient production or markets or the price system, the waste of forced industrialization has meant much less to them than the supersession of the peasantry as a reactionary class.

The neoclassical social scientists have stressed the likelihood, the modalities and the 'social efficiency' of individual optimizing behaviour within a smoothly working market system. Since they have been relatively uninterested in class alignments or dominance or elite formation, they have not noticed the discrimination against the small farmer nor his distress as industrialization has deprived him of resources.

Regional Development

Regional development theory analyses aspects of the social system relevant to the spatial planning of settlements, activities, budgets, etc. (Raikes, 1976a, p 6).[1] Regional theory has borrowed their models and concepts to a large extent from national and international economic theory, disaggregated to a regional level. The disaggregation does not necessarily imply that the aspect of space is emphasized.

The theory of growth poles has had great impact because of its explanatory content and its usefulness when designing

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[1] Raikes, 1976a, makes a critical review of the regional theories, distinguishing the following major types: central place theory, location theory, regional economic growth theory, growth pole theory and modernization theory.

strategies for regional development (Gyllström, 1977 b, p 17). Perroux (1950) introduces the abstract concept of 'economic space' in the growth poles context.

> The fact, rough but solid, is this: growth does not appear everywhere at the same time; but manifest itself in points or 'poles' of growth, with variable intensities; it spreads by different channels and with variable terminal effects for the economy as a whole.
> (Perroux, 1971/1955, p 279)

Although originally deduced from observations in developed countries, the growth pole concept has been widely used in regional policy and national development plans in the underdeveloped countries, especially in terms of growth centres - the geographical manifestation of the pole development. Regional policy has risen to become a major issue in industrial as well as underdeveloped countries, especially after the Second World War.

> The decision of where to locate a new project is as important as the decision to invest in it. The question of social justice in the distributions of the fruits of economic development are as important and as difficult in terms of region as in terms of social classes.
> (Friedmann & Alonso, 1964, p 1)

Hirschman regards regional imbalances as a natural outcome of economic development. To lift itself into a higher income level, an economy must develop within itself one or more regional centres of economic strength. This need for the emergence of growth poles means that inequality of growth is a condition of growth. Thus, in the geographical sense, growth is necessarily unbalanced (Hirschman, 1966/1958, pp 183-184). Hirschman uses two terms to describe the forces that are set in motion by growth: 'trickling-down' and 'polarization effects'. The first refers to the positive and the latter to the negative spread effects from one region to the other. The role of the government is to counteract the polarization effects.

The theory of growth centres that will eventually spread economic growth to more backward areas and lift the in-

come of a nation, implies the favouring of a modern sector, the development of manufacturing plants. The strong emphasis on industrial development may well be a result of this argument. According to Hansen (1967, p 719), some of the more naively enthusiastic interpretations of the growth pole theory maintain that the establishment of one or more large plants, preferably in a relatively fast growing industry, will automatically generate economic growth in a region.

It is still uncertain whether the spread effects from induced growth centres can really lift income and employment levels in lagging or declining regions to that of the more advanced ones (Hansen, 1972, p 103). In developing countries a period of scepticism is now followed by fresh attention to the growth centre strategy after recent positive observations (e.g. Misea & Bhooshan, 1980).

The argument that poles-of-growth have limited applicability in underdeveloped nations, hinges on the notion that such industry must generally be capital-intensive and operate under high returns to scale (Seidmann, 1974, p 119). However, Seidmann provides an example of a small-scale industry acting as a growth pole. A relatively small flour mill, established in the 1950s in Iringa, Tanzania, had a major effect in stimulating the cash crop production of maize, being the touchstone for further small-scale plants as the peasant's income expanded.

Ecological Aspects

The term human ecology describes a set of relations at the important interface of the biophysical world and the world of human society[1] (Porter, 1978, p 15). Human ecology emphasizes the interdependence between man and his physical environment.

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[1] Cf. Hartshorne's (1939) discussion on natural and cultural landscape.

The old environmentalistic approach in geography, the view that human activities are determined by the biophysical environment, was greatly influenced by Darwin (Stoddart, 1972). However, empirical studies showing that various groups of people have interpreted and used the same area differently, have challenged the environmentalists. Their fault was not related to the question they asked - How do the physical surroundings affect human action? - but to their sweeping generalizations and deterministic approach (Brock & Webb, 1978, p 31).

Possibilism appeared as a reaction to the necessitarianism of the environmentalists. In its simplest form possibilism is cultural determinism. The role of human beings was perceived to be to conquer the environment (Zomolzak & Stansfield, 1979, p 11). This in turn caused a new reaction, a line of thought that avoided the crudity of the earlier concept of environmental control, as well as the dead end of possibilism, by stressing the probability in any given situation. Dialectically, probabilism can be regarded as a synthesis of environmentalism and possibilism.

Although environmental and ecological aspects have been major issues in geography, they have largely been neglected in other social sciences,[1] and until recently development theory has completely disregarded such aspects. Development theory has been strongly possibilistic; only recently have ecological aspects become a matter of concern (Hettne, 1978, p 9).

In a review of *Geography as Human Ecology* Porter (1978) discusses five relatively distinct themes in which human geographers have carried out studies: (1) population pressure and limits of growth, (2) the evolution of cultural systems, (3) environmental perception and natural hazards, (4) medical ecology and medical geography and (5) human ecology and political economy.

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[1] Some anthropological studies have considered ecological aspects, e g Geertz, 1968.

Development studies in geography have mostly been carried out in the spheres of human and economic geography, but some geographers within this field, interested in development problems, have recently tried to work on both sides of the interface between physical and human geography. The necessity for ecological aspects in development studies have led to renewed close cooperation between physical and human geography disciplines. Development studies, like geography, are by nature interdisciplinary. Therefore geographers, dealing with development questions, should not confine the cooperation to physical and human geography, but should include also other social and natural sciences.

> The study of development, that is, joins directly with the study of all change in man's use of environment, and provides elements of positive theory for infusion with other theory in the task of generating a dynamic man-environment paradigm.
> (Brookfield, 1975, p 208)

Ecological aspects are especially important when 'primitive' or peasant economies are being studied.[1] These societies are highly dependent on their biophysical environment and the possibilities for environmental engineering are limited. Many questions raised in this study are ecological, e.g. natural hazards, people's adaptation to the physical environment, the rational utilization of natural resources.

AGRICULTURE VERSUS INDUSTRY

Traditionally the role of agriculture in regard to industry has been passive and supporting. It has supplied industry with labour and the urban population with food. The debate on which sector should be given priority has been lively for several decades.[2] During the 1950s and early 1960s the pro-industrialist met with great response for their ideas.

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[1] Cf. Brookfield, 1972.

[2] This section only reviews some postwar arguments. In the longer historical perspective, the role of agriculture has been very strong. Physiocrats argued that agriculture was the only productive sector in the economy. As an echo from the physiocratic doctrine is Papi's argument: ...'We conclude that a developing country, even if it
(to be continued on next page)

> There has been a marked change in recent years in the climate of ideas about industrialisation in developing economies and it is fortunately no longer necessary to argue in favour of industrialisation in opposition to another approach to economic development.
> (Ewing, 1964, p 351)

Lewis' two sector-model is a famous example of great importance placed on industrialization for achieving rapid development. The recognition of the dual economy and the growth pole model, as feasible routes for analysing underdeveloped economies and promoting development, paved the way for the emphasis on industrialization in developing countries. The industrial sector is given the leading role as promoter of development and modernization in these models.[1] Agriculture and rural life represent the traditional and lagging sector of the economy. Through industrialization, the backward sectors and areas of the economy will eventually be modernized and developed. According to this view, industry represents progress while agriculture stands for stability, inertia and tradition.

Indeed, industries must have markets for their products. Manufacturing also plays a supporting role as supplier of agricultural inputs. Since most people in the Third World live from agriculture in rural areas, this sector cannot be neglected. Although the need for industrial products is great, the effective demand of the rural population must increase to provide a market for the industrial products. There exists a strong interdependence between the two sectors, which Ewing (1968, p 5) summarizes under six broad headings:

(footnote 2, continued from the foregoing page)

trades extensively with other nations, has every reason to direct its main efforts at first to raising agricultural income beyond the level of demand for essentials, and to postpone to a later date the stimulation of industrial production and of services.' (Papi, 1965, pp 75, 76).

[1] For a discussion on modernization studies in geography, see e.g de Souza & Porter, 1974.

> ... agriculture as a supplier of food and raw material; as an earner of foreign exchange; as a supplier of both capital and labour for industry; as a market for industrial products; as one of the main bases for industrialisation in the form of agro-allied industries; and perhaps most important of all, the fact that it is the growing demand from the non-agricultural sectors which is the main stimulant of agriculture development itself.

Although Ewing has recognized the interdependence between industry and agriculture, he unhesitatingly gives industry the key role in the development process. Seidmann (1974) also favours carefully planned industrialization, but it has to be accompanied by rural development.

There has been a shift from the very strong emphasis of the 1950s and 1960s on industrialization towards a more balanced view, mirrored in the debate on balanced versus unbalanced growth. One of the factors leading to this shift was a growing awareness that too great emphasis on industrialization and the modern sector would eventually lead to increasing inequality between rural and urban areas, accompanied by an intensification of the tensions in society and to polarization (backwash effects). The assertion of economists that industrialization is the main hope for most poor countries to increase their standard of living has not proved viable. Today they are much less certain. Many in fact believe that the agricultural sector is the main bottleneck to progress in many LDCs (Griffin & Enos, 1970, p 123).

The balanced approach dominates in current official documents. But this need not be interpreted as a conscious assertion of the benefits of balanced growth, but simply as meaning that the middle way is the easiest to defend. Moreover, great discrepancies very often exist between the general goals, often presented in popular phrases, and the actual allocation of funds.

> There is therefore no question of chosing between agricultural and industrial development, merely of striking the right balance between them To over-emphasize industry, as some countries have found out to their cost, leads paradoxically in the end to a slower rate of industrialisation.
> (Seers, 1971/1961, p 253)

Livingstone (1971/1968) discusses several arguments in support of agriculture and industry. Those in support of industrialization include absorption of excess labour, higher rates of return than in agriculture, increasing returns and external economies, the 'big-push' argument, unfavourable terms of trade for primary products, etc. Livingstone's analysis of the arguments for industrialization shows that they can be turned round, being as valid in support of a strong emphasis on agriculture. He concludes that the interdependence between the two sectors leads to arguments for balanced growth, but this does not mean that the resources should be divided fifty-fifty between agriculture and industry. Allocation should be determined by the relative rates of return 'at the margin' (Livingstone, 1971, p 236). The pre-dominant-position-of-agriculture argument is a statement of need rather than of possibility. It has an element of truth in this sense (Livingstone, 1971, p 237). This is also proposed by Mellor (1966) in his argument for the importance of the development of agriculture in the LDCs.

Griffin & Enos (1970) advance several reasons in favour of agricultural development. (1) A slow-growing agricultural sector in a country with rapid population growth is likely to constitute a serious drag on the balance of payments, reducing the import capacity of goods important to the development process. (2) Due to its weight, a slow-growing agricultural sector will greatly reduce the aggregate growth of the economy. (3) If agricultural output - especially food production - fails to increase, the standard of living of large sections of the society is likely to fall, almost regardless of the rate of expansion in other sectors.[1]

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[1] Per capita food production in Africa has decreased during the 1960s and 1970s, from 99 in 1968 to 91 in 1979 (1969-71 = 100). See Table 3:3, p 66.

The major agriculture policies are summarized by Lipton (1977, pp 20-21). He depicts four stages. In the first farming is left alone and allowed few resources, if possible it is heavily taxed and its output extracted cheaply to finance industrial development, which has top priority. Lipton gives two examples, similar in kind but different in degree: Stalin's squeeze on agriculture and The Second Indian Plan (1956-61). The second stage is a result of the failure of the previous one. Policy-makers argue that agriculture cannot be safely neglected if it is to provide industry adequately with workers, materials, markets and savings. Rural development is advocated, not for the benefit of people living in the country side, but mainly for the transfer of resources to support an urban-industrial growth. In stage three it is recognized that industrialization is unlikely without growth in rural inputs and that such growth cannot be achieved efficiently or equitably - maybe not at all - on the basis of immediately 'extracted surpluses'. This stage accepts the need for transformation of the *mass* rural sector through major resource inputs, *prior* to substantial industrialization, except when industrialization is more efficient than the importation of farm requirements. Stage four represents the belief that industrialism degrades. 'One should stay rural forever.' This is an unrealistic approach.

In past decades there seems to have been an ideological conflict between agricultural and industrial development, reflecting the conflict of interest between the urban elite and the rural masses. But it does not have to be that way. A more genuine conflict - according to Griffin & Enos (1970) - is that between the production of consumer or producer goods for the domestic market and production for export. The latter can be either in the agricultural or the industrial sector.

ECOLOGICAL AND DEMOGRAPHIC FACTORS IN RURAL DEVELOPMENT

In the type of society studied here, rural development and agricultural development are almost synonymous. To achieve a change and increase per capita income in the rural areas, agricultural production must change and peasants be induced to produce a surplus above their own requirement. Rural development will eventually imply a decreasing percentage of people engaged in agriculture, since the goal of agricultural development is to increase productivity. Large parts of the rural population must be employed in non-agricultural sectors.

Regional development means rural and urban development. A successful development of a region depends on the rural as well as the urban areas and the integration of the two parts, which is implicit in central place theory. The linkages between urban and rural areas are also important in growth centre theory. To stress the integration of rural and urban areas, in addition to sectorial integration, the term 'integrated area development' has been coined.

For several reasons the discussion in this section will be limited to the ecological and demographic aspects of rural and agricultural development. In most studies dealing with rural and agricultural change, these factors are omitted. Instead, the discussions centre on aspects related to the economy, social and cultural factors and structural and institutional obstacles. A comprehensive approach to rural development will be discussed in the last section.

Before the central topic of agricultural change is discussed, a brief introduction to the primitive modes of production - hunting and gathering - would not be out of place. A common notion holds that these types of livelihood involve a constant striving for survival. The members of hunting and gathering societies have limited leisure, are perpetually in quest for food, are faced with meagre

and relatively unreliable natural resources and lack any kind of economic surplus. To survive, the society demands maximum energy output from a maximum number of individuals.[1]

Sahlins (1974) dismisses this common belief by referring to many field studies. He suggests that the hunting society was in fact the first affluent society.

> The most obvious, immediate conclusion, is that the people do not work hard. The average length of time per person per day put into appropriation and preparing of food was four to five hours.
> (Sahlins, 1974, p 17)

A hunting society requires constant movement, which demands minimum possessions to carry. All unnecessary utensils and other items - in agricultural societies signs of wealth - are a threat to this way of life.

The transition from a hunting to an agricultural society is caused by diminishing returns. Generally, hunting societies are characterized by high labour productivity, provided there is enough game.[2]

As well as high mobility, the hunting and gathering mode of production requires large areas, 10-15 km^2 per capita, depending on the environment (Clarke, 1967, p 131). When an area becomes overpopulated the mode of production must change, unless birth control and migration allow a solution.

> But agriculture eventually had to be adopted, with we can imagine how much reluctance, because increasing pressure of population simply left no alternative. For some generations, however - as in some parts of the world now - the men still regarded agricultural work as so degrading that it could only be performed by women.
> (Clarke, 1967, p 131)

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[1] Cf. Carlstein, 1980.

[2] 'The Bushman figures imply that one man's labour in hunting and gathering will support four or five people. Taken at face value, Bushman food collecting is more efficient than French farming in the period up to World War II, when more than 20 per cent of the population were engaged in feeding the rest. Confessedly, the comparison is misleading, but not as misleading as it is astonishing.' (Sahlins, 1974, p 21).

A common view holds that the domestication of animals and the creation of a pastoralist society was the natural transition from a hunting society - pastoralism preceded agriculture.[1] This theory states that nomadic tribes did not settle and start to clear forest and bushland for cultivation until they became too numerous to subsist on livestock kept on natural grassland. Another theory reverses the sequence on the grounds that a large share of the grasslands is man-made. Tribes that previously cultivated short-lived plots in the forest began to graze their animals when sufficient forestland was cleared and turned into grassland (Boserup, 1966, pp 20-21).

Boserup (1966, 1976) describes the process whereby an increasing population density forces the introduction of new techniques which require more labour. Her major line of argument is that population change brings about agricultural change rather than the other way around, which was previously the dominant view.[2] Boserup dismisses the classical theory of rent as the explanation of agricultural development. This theory stresses the distinction between virgin and cultivated land. Increased agricultural production could be accomplished mainly along two lines: (1) by the extension of cultivation into virgin lands - less fertile marginal lands, and (2) by more intensive cultivation of existing fields. According to Boserup, this theory is unsuitable for a general theory of agricultural development, for the simple reason that in primitive agriculture (slash and burn) there is no sharp distinction between cultivated and uncultivated land. Land fertility is not entirely an exogenous factor, but is also related to population density

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[1] For a discussion on unilinear development, cf. Spencer & Thomas, 1969, p 159.

[2] Datoo (1978) discusses two fundamental inadequacies in Boserup's theory: 1) the unicausal conceptualization of agricultural change, and 2) the failure to take into account any set of constraints within which agricultural systems evolve.

and agricultural methods.[1] According to Boserup, this new approach also enables us to treat land tenure as an endogenous factor, thereby avoiding unrealistic assumptions.

Boserup turns Malthus upside down by claiming that population growth is the independent variable, not the dependent as in the classical theory. Yet, many are reluctant to accept Boserup's argument for two principal reasons: (1) most models of agricultural variation in space and over time have assumed peasants to behave like farmers (e.g. Schultz, 1964). (2) Most people have accepted the Malthusian assumption that population growth is possible only by increased food production.

Boserup's major argument is based on labour productivity. In the earliest stage of agriculture - forest-fallow cultivation - relatively little input of labour was necessary, and almost no capital. The only tool was an axe. Clearing was done by fire and seeds planted directly in the ash with a digging stick. When the soil decreased in fertility a new plot was cultivated. Increased population led to a shortening of the fallow period, which required new methods of soil preparation.[2] The shorter the fallow period, the more grass invaded the fields. To destroy the grass roots, it was necessary to use a hoe and later a plough. More frequent weeding also became necessary. The shortening of the fallow period was accompanied by a decline in fertility. The soil did not have enough time to recover. Fertilizing ashes became less abundant and soil fertility had to be restored by the addition of manure, refuse, mud, etc. For every step in land-use intensification, labour input and capital investment had to increase. The introduction of draught animals meant more work for the peasant.

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[1] Brookfield (1972, p 34) lables Boserup's theory: 'an environmental free theory of agricultural evolution'.

[2] In Swedish agriculture the plough was introduced when the heavy clay soils were put under cultivation.

They required a good supply of fodder, which had to be cultivated and gathered. Indeed, land productivity increased the more intensively the plots were cultivated. But, according to Boserup, the decrease in labour productivity explains the reluctance among primitive cultivators to change production methods.

This is why people in many regions may be aware of the existence of less primitive tools and more intensive land-uses, but because of the decrease in output per man-hour they may not adopt these techniques until a critical population density has been reached.[1] Like Boserup many other authors have also noted a high correlation between population density and agricultural practice, and have observed that the practice is modified as density changes (e.g. Maude, 1970; Gleave & White, 1972; Datoo, 1973; Grigg, 1976; Clarke, 1966; Basehart, 1973).[2]

Critics of Boserup's thesis note several factors that may modify the proposed relationship between population and agricultural intensity.[3] Turner II, et al. (1977) have analysed some, such as type of staple crop, livestock and aquatic resources, and environmental factors like precipitation and soil fertility. Their conclusion is: the general model confirms the initial conclusion that population density maintains the strongest relationship with agricultural intensity (Turner II, et al., 1977, p 394). The amount of explained variation in agricultural intensity was increased

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[1] 'Thus the threshold of demographic pressure is not an absolute determination of the means of production but is relative to the society at issue. Moreover, how this pressure is organizationally experienced, the level of the social order to which it is communicated, as well as the character of the response, also depend on the institutions in place.'(Sahlins, 1974, p 49, note 5)

[2] Grigg (1976) makes an excellent review of the literature on population pressure and agrarian change.

[3] Commercialization of the agriculture is an important factor which must be included when the change process is analysed.

by adding subsistence base (type of staple crop) and environmental factors to population density. Moreover, the rate of increase in agricultural intensity brought about by increasing population density is greater for groups that rear livestock than for others (Turner II, et al., 1977, p 391).

A specific type of relation between population pressure, environment and agricultural system is discussed by Geertz (1968). With example from Java he shows how an increasing population among the wet-rice agriculturalists is accompanied by an ever increasing intensification of the agricultural system. This specific ecological condition and agricultural system have a high capacity for absorbing more labour. 'Agricultural involution' is what happens when a system has reached its productivity limit. The result is an elaborate process of sharing increasing poverty, with social as well as ecological consequences.

Many writers have worked on the question of an 'optimal population density'. Sauvy (1969), in his general theory of population, distinguishes between economic optimum and power optimum, the former defined as the population that maximizes output per capita with given resources and technology.

If we accept the concepts of underpopulation and overpopulation, there must be a state where the population is at an optimum. Given an agrarian community with a limited amount of land, a given technology and a labour supply below optimum, the marginal as well as the average product will increase as a result of the division of labour when the population- labour supply - increases. The optimum population would be at the point where the marginal product starts to decline. If the population continues to grow beyond that point, total production will increase but average production will decline. A society in such a situation - under stress - can respond in several ways: demographic responses, production responses - intensification

of agricultural production or increasing of non-agricultural production. The demographic responses include the natural - or 'Malthusian' - ones: disease, war, etc. There is evidence that a society in ecological equilibrium may try to maintain this state by birth control, infanticide, cloistering of males or females, etc.

> We have seen that cultural systems do not just happen to settle into ecological equilibrium, but tend instead to develop ways of positively maintaining themselves in such a situation. (Wilkinson, 1973, p 52)

If land is available in other places, migration is a common way of relieving a community of its population stress. It is in fact common within traditional societies, which by nature are centrifugal (Sahlins, 1974) - dispersed settlements.

When demographic responses become insufficient, a change of mode and pattern of production and technology is imperative. Hypothetically, the shift from a hunting and gathering society to an agricultural society is mainly related to population increase. Likewise agrarian societies under stress must, to avoid impoverishment, change their production system - shorten the fallow period - if expansion of the cultivated area is not possible, e.g. through migration (the centrifugal forces). The shortening of the fallow period and the extension of cultivated land may also mean the hoeing and plowing of former grazing land. Agricultural technology may also contribute, e.g. through the introduction of high yielding varieties, fertilizers, insecticides, pesticides, etc.

Among the symptoms of overpopulation - stress - in an agrarian society are the subdivision of farms, or land fragmentation and changes in land tenure such that commonly owned or clan-owned land falls into private ownership. As in Java, people may continue with the traditional production system and accept a declining farm income per capita. But eventually farms will become too small to substain a family. Some must leave the land.

A landless rural population, not gainfully employed in non-agricultural sectors, is an indication of overpopulation. However, in many cases it can be an imaginary land shortage due to an uneven land distribution. It is common to view the landless labourers or peasants with very small farms as underemployed; the marginal productivity is almost zero. However, this argument has been seriously questioned on the ground that in traditional agrarian societies there is a great demand for labour during the peak seasons: land preparation and harvest.

Some (e.g. Grigg, 1976) also include technical retardation as a sign of overpopulation. Labour becomes so cheap that investment in machinery is unprofitable. It is doubtful whether this is the case. Many studies show that in areas with a large supply of labour, e.g. India, investment in agricultural machinery has increased during the green revolution, despite an increase in landless labourers. According to Boserup, technical retardation will occur in a situation of population decrease, since it is possible to return to a more extensive land-use.[1]

Naturally, the environmental effects will be great in a situation of overpopulation. Cultivated land will be exhausted, marginal land and forests cultivated, grazing land overgrazed and soil erosion increased.

In conclusion, it can be stated that ecological and demographic factors influence the techniques, methods and production patterns, as well as the intensification of resource utilization - natural and human. However, to state that these factors are the major influence is to stretch the argument too far. To explain a state of underdevelopment and to achieve development, a whole spectrum of additional factors must be included, i.e. cultural, social, economic, structural, institutional, etc.

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[1] See also Brookfield, 1972.

CLASSIFICATION OF THE AFRICAN AGRICULTURALIST

Two distinctive types of farming appear in the contemporary agricultural system of the world. The first is the highly effective farming of the developed world, the second is the inefficient agriculture of the Less Developed Countries (LDCs). There is a great variety of agricultural types both between and within the LDCs. However, one must briefly differentiate between agriculture in Latin America and Asia on the one hand, and Africa on the other. In the former regions various historical circumstances have led to land concentration. The feudal system had a great impact. The penetration of the capitalist system in these areas did not confront residual feudalism. Feudal power was normally strengthened, not replaced, by capitalist development (Lipton, 1977, p 39). However, in Africa the situation for the cultivator in general is different. Here, the feudal system did not have the same impact. Moreover, the market economy has not managed to penetrate African rural life and its mode of production (Hydén, 1980).

This study has been limited to the African context and especially to the East African situation. We here face a rather primitive agricultural system, where the cultivators still have a great degree of freedom from state agencies and institutions. They have on the whole avoided being incorporated into larger systems. However, it must be remembered that although the African cultivator, in general, is independent, there exists a large variety of agricultural systems: from primitive slash and burn cultivators to highly efficient farmers, as well as some cooperative and state farms.

So far the term 'cultivator' has been used deliberately since great confusion exists in the literature about how to describe and classify Africans engaged in agriculture. Is he (or she) a peasant, a subsistence farmer, a market-oriented farmer? Is he a profit seeker or is he governed

by some other rationality? Tackled in another dimension, can the agricultural production system be analysed in terms of natural economy, primitive production, domestic mode of production, subsistence economy, peasant economy, etc? The result of the analysis will to some extent depend on the conceptual background adopted for the study. Moreover, within these general concepts great variations in definition and generalization exist.

Classifications of agriculturalists are i many cases attempts to create 'ideal types', which serve to explain the social behaviour of real people. The ideal type is not ideal in the sense that it is excellent, nor is it an average, but it is a logical ideal used to structure reality. The ideal type concentrates and even exaggerates certain features of people while ignoring others.

The discussion in this section is not an attempt to construct an ideal type of the African agriculturalist, nor is it a mere exercise in taxonomy. The 'labelling' and classification of agricultural producers have several implications and consequences besides being a relevant base for an analysis of an agricultural community.

To describe and analyse societies which are primitive or mainly producing for subsistence, or which are in the process of being integrated into the larger complex of national and international relations, has proved difficult. Many concepts useful to a meaningful analysis have been suggested. Economic rationality in connection with the existence of a market system has long been the major criterion for classification. Other important factors are, type of production unit and method of surplus extraction. Depending on the factors included in the classification and their mutual importance, various concepts have been established.

> Classifications are not right, true, or beautiful: they can only be relevant, analytic, and useful for the solving of problems.
> (Nash, 1966, p 36)

Generally, great confusion exists in the concepts used. They often overlap. Sometimes they have a precise meaning but often they are ambiguous.

The treatment of 'peasants' or 'subsistence farmers' as a homogeneous group may prove fallacious. Level of consumption, proportion marketed, incentives to produce for the market and level of production techniques are all used in defining the 'subsistence farmer'. The decision process among 'subsistence farmers' varies greatly. It can also differ between two producers with the same proportion marketed (Miracle, 1968). If this heterogeneous group is treated as homogeneous in policy making and planning, e.g. for increasing agricultural production, the results will very likely be meagre. Increases in producer prices may, for example, only affect a minority of the producers, and they will respond and alter their production accordingly. Some may increase it, while others prefer to grow less. However, those producing for their subsistence will be affected only marginally, if at all, and will not therefore make any decision to alter their production.

In this section some concepts are discussed and some factors determining the analysis and classification of societies are highlighted. The review covers four types applied in the analyses of non-Western rural societies. However, most of them originate in the analyses of historical societies of the industrialized world.

'Primitive' Economy and Uneconomic Culture

This group includes hunters and gatherers, pastoralists, and to some extent agriculturalists. The latter usually employ shifting cultivation of the slash-and-burn type. There are problems of classification in connection with agriculturalists; the other groups are relatively easy to distinguish.

Nash (1966) uses four features in distinguishing a peasant and primitive economic system:[1] technology and division of labour, structure and membership of productive units, system and medium of exchange and, finally, control of wealth and capital.

In a primitive economy technology lacks complexity and is accompanied by little division of labour, mainly by sex. The main production unit is the family. The families are undifferentiated and each unit tends to be multipurpose. Normally, the economy lacks any generalized medium of exchange. On the other hand, money is used and markets exist, but their importance is marginal. Certainly, there is exchange between households, mostly in the form of 'reciprocity', the 'vice-versa' movements between two parties. The chief production factors are men and land, the latter being allocated through kinship. The levelling mechanism plays a crucial role, inhibiting aggrandizement by individuals or by social groups (Nash, 1966, p 35).

Sahlins (1974, p 188) also includes the role of the political state:

> ... primitive shall refer to cultures lacking a political state and it applies only insofar as the economy and social relations have not been modified by the historic penetration of states.

Natural economy is more or less synonymous with primitive economy - something original. Bernstein (1979, p 423) uses the concept very broadly:

> By the category natural economy we mean a social formation in which the production of use-value is dominant .... By using the term natural economy we are simply drawing a historical base-line, as it were, between the period of penetration of modern capital and the social conditions prevailing before that process of penetration.

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[1] Nota Bene, Nash treats primitive and peasant economic systems as one entity.

An important feature of the primitive economy is its 'underproductivity' in relation to natural resources. Agricultural as well as pre-agricultural primitive societies do not seem to realize their own economic capacity. Labour power is underused, technological means are not fully engaged and natural resources are left untapped (Sahlins, 1974, p 41).

Whether these societies are economically rational or not has been a major issue. Formal economic theory has at best been of marginal relevance only in achieving insight into primitive societies (Dalton, 1961). Since economic theory cannot be applied, it is easy to conclude that these societies are not economically rational. Instead, the 'uneconomic cultures' are regarded as being philosophically and religiously biased. According to Enke (1963) there is a wide acceptance of poverty as the only condition most people have ever known. Traditional attitudes discourage the full utilization of human resources. People are less likely to strive for extra money and extra consumption.

The absence of economic rationality in primitive societies was questioned by Malinowsky already at the beginning of this century. In what he termed the 'tribal economy' production, exchange and consumption are socially organized and regulated by custom. A special system of traditional economic values governs the activities and spurs the people to effort. Rather than being un-economic or pre-economic, economic elements enter into tribal life in all aspects - social, customary, legal and magico-religious - and are in turn controlled by these (Malinowski, 1921, p 15).

Subsistence Farmer - Economy

The definition of 'primitive cultivators' involves the least difficulty. The problems arise with the sedentary agriculturist. Is he a subsistence farmer, peasant or farmer? Wharton Jr (1969) lists a number of criteria for defining 'subsistence farmers'. They include (1) economic criteria,

such as marketing, use of hired labour, level of technology, standard of living and freedom of decision-making, (2) socio-cultural criteria, such as non-economic factors, in decision-making, degree of outside contacts, interpersonal relations, psychological differences, and (3) development criteria, such as the rate of change. Although most subsistence farmers have experienced change, the rate of change is slow. There is a strong adherence to established patterns of production.

The term 'subsistence' has become ambiguous due to its frequent use and to its application to describe the minimum level of food and shelter to support life as well as the sources and means to produce these minimum requirements. Even the more precise term 'subsistence production' is ambiguous. Pure subsistence production refers to a self-contained and self-sufficient unit where all production is consumed and nothing is sold, which is hardly ever possible to find in the real world. Instead, the term is used to include units with various degrees of commercial contacts with the surroundings.

Wharton Jr also discusses sectoral breakdowns of the national economy regarding agriculture. Among his three types of breakdowns, the 'subsistence-commercial' according to him is the most useful. He concludes that 'subsistence agriculture' is essentially the kind of industry in which subsistence farmers are engaged, while 'subsistence agricultural economy' is the activities which they carry out through societally determined patterns of economic organization (Wharton Jr, 1969, p 18).

Peasant, Peasant Economy and Peasant Mode of Production

Some use the term 'peasant economy' to characterize entire societies, others deal with the peasant economy as part of society or as a way of life. Peasants are usually seen as forming part of a larger whole. They fall between the landlords and the landless. Peasants are norm-

ally conceived as settled agriculturalists. Yet, there are groups relying on shifting cultivation of the slash-and-burn type classified as peasants.

Wolf (1966, p 2) speaks of peasants as rural cultivators,[1] a distinguished group between farmers and primitive cultivators:

> The peasant, however, does not operate an enterprise in the economic sense; he runs a household, not a business concern. But there are also primitive peoples who live in the countryside and raise crops and livestock.

The difference between primitive cultivators and peasants can be understood by the nature of their involvement in the society as a whole. It is not a question of degree, but in the character of involvement.

> In primitive society, surpluses are exchanged directly among groups; peasants, however, are rural cultivators whose surpluses are transferred to a dominant group of rulers that uses the surpluses both to underwrite its own standard of living and to distribute the remainder to groups in society that do not farm but must be fed for their specific goods and services in turn.
> (Wolf, 1966, p 3-4).

Ståhl (1974) stresses that the structural dimension of the definition of peasants is essential. The 'underdog' position and the expropriation of surpluses are critical features.

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[1] Wolf uses the term *rural* cultivator (my italic) 'that is, they raise crops and livestock in the countryside, not in greenhouse in the midst of cities or in aspidistra boxes on the window sill' (Wolf, 1966, p 2). The use of the term rural cultivators are common in peasant literature. However, to stress the obvious that peasants are *rural* dwellers is unnecessary. People raising plants in aspidistria boxes cannot be classified as cultivators and those cultivating in greenhouses are running an enterprise.
Mabogunje (1968) discusses cases of urban settlements based on agriculture, but they are urban only in a morphological sense, not in a functional one. These peasants are cultivating land outside the settlement and live in the agglomeration for defensive purposes. They cannot be characterized as urban cultivators.

The question of treating the peasant economy and peasant mode of production as a specific type has been and is still much discussed, especially since the revival of Chayanov's idea in the 1960s. In order to analyse the societies of the Third World, there was a great need to establish a coherent theory applicable to this type of economy, since the conventional economic theories have proved insufficient.

Chayanov's theory of a specific peasant economy (Chayanov, 1966) provided a theory of peasant behaviour at the level of the individual farm, and showed that on the national level the peasant economy ought to be treated as an economic system in its own right, not as the Marxists had claimed, as a form of incipient capitalism, represented by petty commodity production. Chayanov showed that the prevailing concepts of classical economics and marginalist theory do not apply in a peasant family, depending solely on its own labour. In this type of farm, decreasing returns do not hinder peasants from working so long as the needs of the family remain unsatisfied (Kerblay, 1976, p 151). Key features of the household economy is the interdependence of consumption and production and the absence of hired labour. Moreover, the households have in theory entered the sphere of monetary and commodity circulation and land is in flexible supply.[1]

The concept of the peasant economy as perceived by the Chayanov tradition rests on three basic foundations: the nature of the technology, the nature of the family and the nature of the modernization process (Harrison, 1979).

Thorner (1976) prefers to reserve the term for entire economies. To determine whether the economy of a given country should be characterized as a peasant economy, he

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[1] For further discussion on definition of peasant, see e.g. Mintz, 1973 and Shanin, 1976.

uses five criteria, all of which must be fulfilled simultaneously. The first two relate to production and working population: in a peasant economy roughly half the total population should be engaged in agriculture. The third relates to the existence of a state power. The fourth presupposes the existence of towns. The last and most important relates to the unit of production. In a peasant economy the most typical production unit is the household (Thorner, 1976, p 203 f).

There has been much lively criticism of 'peasant economy', 'peasantry', 'peasant mode of production' as a specific concept during the 1970s, especially from neo-Marxist writers.

> ... a rigorous concept of 'peasant mode of production' cannot be constructed because it is impossible to specify distinctly 'peasant' relations of production ... If there is a unity to these diverse forms of non-capitalist production it is to be found in their relationship to capitalism - in the forms and effects of the process of capitalism penetration and not in any general type of 'peasant' economy.
> (Ennew, et al, 1977, p 319)

Another general criticism of the specific peasant economy is advanced by Bernstein (1979), who claims that it is impossible to construct a viable teory of contemporary peasantries, including peasant mode of production, outside the circuit of capital and in disregard of the historical forms of capital penetration.[1]

According to Saul & Woods (1976) a distinctive African peasantry exists, which can be distinguished from 'primitive agriculturalists' on the one hand and from 'farmers' or 'agricultural entrepreneurs' on the other.[2] The fact that the ultimate security and subsistence of the peasant rests upon maintaining his right to land and to family labour is

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[1] Cf. Littlejohn, 1977 and Harrison, 1975. Hunt, 1979, summarizes some of the more specific critiques of Chayanov's model. For a discussion of the Marxist critique, cf. Harrison, 1979.

[2] Fallers, 1971, concludes that the traditional African villager was a peasant economically and politically, but not culturally. Therefore, Fallers prefers to call him a 'proto-peasant' or 'incipient peasant'.

an important determinant in shaping and restricting his social action. This characteristic the peasant shares with the 'primitive agriculturalist' but not with the 'farmer'. Although it may appear that the 'farmer' is dependent on his land, he has alternatives for security and investment. The regular extraction of a surplus distinguishes the peasant from the primitive cultivator.

Domestic Mode of Production

Among attempts to characterize and analyse the mode of production in non-European and pre-capitalist economies is Sahlins' domestic mode of production or DMP (Sahlins, 1974), which was influenced by Chayanov's ideas on the peasant economy. Sahlins' interesting conclusion is that these societies are 'underproductive'. The absence of a surplus is not due to the lack of potential in environment and technology. There is in fact a potential abundance, but underproduction is in the nature of an economy organized by domestic groups and kinship relations.

Underproduction is characterized by three dimensions. (1) Drawing on Allan (1965) and others, Sahlins shows that the DMP economies underutilize their resources. The population density is below the carrying capacity. (2) Labour power is underused. (3) Some households - domestic groups[1] - persistently fail to produce their own livelihood, although they are organized to do so.

> The household is to the tribal economy as the manor of the medieval economy or the corporation to modern capitalism: each is the dominant production-institution of its time. Each represents, moreover, a determinate mode of production, with an appropriate technology and division of labour, a characteristic economic objective or finality, specific forms of property, definite social and exchange relations between producing units - and contradictions all its own. (Sahlins, 1974, p 76)

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[1] Sahlins admits that the identification of domestic group with family is too loose and imprecise.

To characterize the DMP Sahlins uses several elements. (1) The family contains within itself the division of labour, also found in society as a whole. Division by sex and age is the dominant but not the only economic specialization. (2) There is a primitive relation between man and tool. The basic tools can usually be handled by the houshold groups. (3) Production for livelihood - use-value production - is the prime objective. The DMP is not profit-oriented and it is an anti-surplus system. The societies, even the primitive communities, are of course not fully self-sufficient. Some exchange occurs. But more fundamental than this exchange is, according to Sahlins, the producers' relation to the productive forces.

The Chayanov influence is clear in the discussion of labour intensity. (4) Intensity of labour in a system of domestic production for use varies inversely with the relative working capacity (consumers/producers) of the producing unit. (5) In the DMP ownership is not the equivalent of the European notion. Rather, the family enjoys the use-right. (6) Household means pooling, although the household is a consuming unit. Pooling is socially a *within*-relation. Reciprocity is a *between*-relation, the action and reaction of two parties. (7) The economy is fragmented into thousands of petty existences, each organized to produce independently of the others. Instead of unifying a society by sacrificing the autonomy of its producing groups, the division of labour - by sex - sacrifies the unity of the society to the autonomy of its producing groups. Left to its own devices, the DMP is inclined towards a maximum dispersion of homesteads, because maximum dispersion means the absence of interdependence and a common authority. This, by and large, is the way production is organized. The DMP is not organized to give a brilliant performance.

Most of the critiques of the concept of the DMP have originated among neo-Marxist writers. Household production is understandably the basis for characterizing a type of economy or mode of production, but the central concept for analysis and examination of agrarian social relations is the form of production (Friedmann, 1980) or relation of production (Cliffe, 1977). The models of peasant or domestic mode of production cannot formulate the social relations of production, which provide the most important element in the materialist theory of mode of production. For those who try to formulate these types of models, these relations are external to the dynamics of the elementary unit of production, the household (Bernstein, 1979).

The concept of 'reciprocity', a non-antagonistic productive relation, is associated with a certain division of labour. However,

> At a certain point, the voluntary and mutual help on the farm from neighbours, relatives or beer parties is subtly transposed, into the hiring of casual labour.
> (Cliffe, 1977, p 199)

Concluding Discussion

The taxonomic discussion has so far clearly shown that the concepts used in describing and analysing non-European and non-capitalistic societies (economies) vary considerably, that they are sometimes ambiguous and that they often overlap. Two factors, depending on the schools of thought, play a determining role in defining the concepts: (1) the market or system of exchange for the classical or neo-classical economists and (2) surplus extraction or class-relation for the Marxists.

In an attempt to structuralize the previous complex discussion, Table 2:1 was constructed. A number of factors are included such as intensity of land-use (fallow period), dependency on environment, technology, main producing unit and dependency on society. It is of course impossible to state when a certain type of agriculturalist

Table 2:1. Classification of the African Agriculturalist

Type	Settlement	Land-use intensity	Main producing unit	Relative dependency on physical environment	Relative dependency on external institutions	Market system	Level of technology	Division of labour
Primitive cultivator (Natural/primitive economy)	shifting, dispersed	forest - bush fallow	household	high	low	none	low	low
Domestic mode of production	shifting - stable, dispersed	shifting cultivation	household	high	low	local markets	low	low
Subsistence farmer (Subsistence economy)	shifting - stable, dispersed - nucleated	shifting cultivation - annual cropping	household	high - (medium)	low - (medium) (link to urban system)	local markets - rudimentary market system	low - (medium)	low - medium
Peasant (Peasant economy)	(shifting) - stable, dispersed - nucleated	shifting cultivation - multicropping	household	high - (medium)	medium (link to urban system)	local markets - partially developed market system	low - (medium)	low - medium
Capitalist farmer	stable, dispersed - nucleated	annual - multi-cropping	household - non-household	(medium) - low	(medium) - high (link to urban system)	fully developed market system	medium - high	medium - high
Cooperative farmer[1]	stable nucleated	annual - multi-cropping	non-household	medium - low	(medium) - high (link to urban system)	partially - fully developed market system	low - high	low - high

[1] Although not discussed, the cooperative farmer is separated from the capitalist farmer. Cooperative farming - Ujamaa villages - is the backbone of Tanzania's rural development. However, no ujamaa villages exist in the study area.

should be termed 'primitive cultivator', 'subsistence farmer', 'peasant' or 'farmer'. However, it is possible to make qualitative statements, e.g. about when agriculturalists move on from being primitive cultivators to become agricultural entrepreneurs. Land is then more intensively cultivated, the producer becomes more involved in the market economy, he becomes less dependent on the environment - by the use of irrigation, machinery and satellite weather forecasting - and more dependent on - society supply of input and sale of output - he uses more sophisticated technology and, finally, the household becomes less important as the main producing-consuming unit.

The discussion has clearly shown that communities labelled 'subsistence economy', 'primitive economy', 'peasant economy', etc are far from homogeneous. They are in fact quite heterogeneous. Even in the African context there is a great diversity between and within agricultural communities.

The differences *between* agricultural communities are not only due to differences in land holdings and to the circumstance that many peasants are supressed in a feudal system. More likely they are explained by regional variations in climate and soil. The African agriculturalist is only partly engaged in the cash economy. He generally cultivates a piece of land to which he has the use-right. The main objective of his production is the subsistence of his family. As will be shown below, the differentiation *within* the agricultural community is mainly due to socio-economic and ecological factors.

The introduction of cash crops - coffee, tea, cotton, etc - has involved the agriculturalists more in the national and international market economy and made them more dependent on national organizations. The household is still the main producing unit, although hired labour and use of modern techniques are realities. The African agriculturalist is to some extent integrated into a larger

society, although not to the same degree as elsewhere, and demands can be made upon him by national organizations.

The primitive economy is different from the market industrial society. Why is it believed then that the body of theory derived from the industrial world's institutional matrix has analytical relevance to all economies, including the primitive ones? (Dalton, 1961, p 20). The discussion has shown that classical and neo-classical economic theory has little relevance to an analysis of these communities. It provides no useful tool for policy formulations.

Marxist theory is also ethnocentric. It cannot fruitfully deal with primitive economies, in which class relations and surplus extraction has little or no relevance.

> The same criticism of limited relevance to the contemporary Third World can be made of the model, constructed by the Marxists in the 1930's, of three classical stages of evolution derived from the western European history: slavery, feudalism, and capitalism. And just because Marx and Engels sketched a possible fourth mode, the 'Asiatic mode of production', must we therefore apply it textually to the newly discovered world of Africa, when the concept was based on the historical experience of the Middle East and Southeast Asia?
> (Coquery - Vidrovitch, 1976, p 92)

In the study area three major types of households exist: those mainly engaged in agriculture, pastoralist households, and those with wage-employed heads (main income is derived from off-farm work).

The discussion in this section relates to the classification of the first type and to the determination of their level of development. The agriculturalists in the area are all permanent settlers. They cannot thus be classified as primitive cultivators or solely analysed by means of the DMP concept. They are neither running an enterprise nor engaged in collective farming.

Which are the characteristics of the agriculturalists in the area? As will be shown below the household is the main producing and consuming unit. The division of labour is small, mainly organized by sex. Households for their production are highly dependent on a physical environment that varies considerably.[1] This variation also determines the intensity of land-use. Annual cropping is the main practice, but multi-cropping is common in some areas. Small segments of the cultivated land may be left fallow for one cropping season or for longer periods. The level of technology is generally low, but some households use quite sophisticated tools and machinery. Similarly, great variations exist between households in their dependency on external institutions and their involvement in the monetary sector.

To conclude, the agriculturalists in the area mostly correspond to peasants, and the economy can be characterized as a peasant economy. However, it must be stressed that the definition is broad and allows for great variations. One of the purposes of the analysis is to reveal this variation.[2]

SMALL IS POWERFUL[3]

> Most writers on the political economy of Africa[4] have been reluctant to transcend the boundaries of the conventional Marxist paradigm, maybe for fear of becoming associated with other intellectual traditions, notably the one which stresses the unique features of peasant society.
> (Hydén, 1980, p 20)

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[1] The adaptation of households to the constraints of the physical environment is one of the major topics of this study.

[2] Cliffe, 1977, discusses the popular misconception that the African peasants are primitively homogeneous.

[3] The ideas in this section are greatly influenced by the writing of Hydén, 1980.

[4] Hydén obviously refers only to the literature of the late 1960s and 1970s.

Prevailing theories of African development assume that the roots of underdevelopment can be sought in the dependency of the African states on international capital. They are satellites of the West, the centre. On the whole, neoclassical and Marxist economists alike overemphasize the market as the determinant of African development and underdevelopment. Their analyses have failed to describe and explain the real structural constraints of the African societies. In their paradigms there is no place for the notion that small is powerful, even less for the existence of a peasant mode of production[1] that allows such a structural articulation. Each mode of production corresponds to a specific type of economy. So does the peasant mode, with its ties based on common descent and residence, etc, 'the economy of affection',[2] according to Hydén. Since affection is not the major determinant but rather mutual connections, a better term would be 'the economy of affinity'. Familial and other communal ties are here the basis for the organization of activities, decision-making and resource transfers. Conflicts tend to arise between communities rather than between social classes or interest groups as in the capitalist or socialist societies.

History shows that the development of modern society has been achieved by the submission of the peasants under a national economy. Development occurred at the expense of the freedom of the peasants. As long as they are not integrated into the national economy, controlled by and dependent on other social classes, a domestic development

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1 In development and Marxist literature 'mode of production' is synonymous with 'system of production', i.e. also refers to ownership and relations of production (cf. Hinders & Hirst, 1977).

2 The influence of non-economic motives on peoples' behaviour have been vastly discussed. For instance, Max Weber analysed the processes of groupformation based on feelings of affinity. In this connection he discussed the household community, the neighborhood, extended kin groups, estates and states groups, religious communities, etc. (Bendix, 1968, p 498)

would not take place. Generally, the cession of the African peasant has not yet ocurred. By and large, they are still independent of any ruling class. In fact, the latter are dependent on the peasants.

The main issue in African rural and agricultural policies has been how to capture the peasants and to extend control over them, while at the same time increasing their dependency on other social classes. This holds for the colonial as well as the independence period. The problems of this task have been immense. For example, the Ujamaa policy in Tanzania aimed at breaking the emerging capitalist attitudes and achieving a socialist transformation. The capitalist influence has been diminished. But the growth of a socialist society has been marginal. Instead, the substitution of a political market for an economic market has increased the scope of the economy of affinity. The control of the peasants and their integration into the national economy have not been successful. It has been easier to control international capital than the majority of the rural producers, the peasants.

The great influence of the economy of affinity, even in the national economy (the modern sector), is seen in the prevailing patterns of loyalties, links and resource transfers. Many officials and employees have land in their native villages, invest in village houses and transfer money to their extended family. Their social and economic security lies in the economy of affinity. In times of crisis it would be possible for them to withdraw from the national demands. The ties and loyalties of most people in the modern sector are with their extended family, engaged in peasant production, more than with their colleagues in the same office building.

The peasant mode of production is flexible and has proved successful in achieving its goal, the subsistence of the family, but it is not designed for great performance.

This flexibility and the peasants' independence of other social classes as well as their exit option[1] - the possibility to withdraw from national demands - gives them their strength.

Three elements, small labour differentiation, simple technology and finite production objectives, identified by Sahlins (1974) as characteristic of the domestic mode of production[2] also distinguish the peasant mode of production and its great ability to oppose intrusion from other types of production and economic organization. These elements are systematically interrelated, not only in reciprocal bonds, but each by its own modesty of scale is adapted to the nature of the other two. If one tends to change, it meets an increasing resistance from the others. Normally this tension is restored to a status quo by means of what can be called negative feedback. Only in conjunction with external opposition or after severe disturbance would a situation result in a transformation or destruction of the traditional mode of production and its type of economy. That is why the peasant mode of production has been successful in Africa in blocking the intrusion of foreign elements.

Peasants are interested in change, but if in conflict with fundamental parts of their mode of production, they will resist, either by revolting, or more often by using their exit option. The real problem facing the development efforts of African governments, is the unwillingness and inability of the peasants to achieve changes at a pace demanded by the national economy. This is one reason for the great emphasis on plantation and state agriculture in many African countries.

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[1] Cf. Hirschman, 1970.

[2] For a discussion of the domestic mode of production, see above pp 49-51.

The essence of this section has been to direct attention to the inadequacy of Western models in explaining the transformation of the peasant economy and the making of modern society.

> The development problematic (sic) in Africa calls for an inventive approach, a willingness to challenge conventional truths. Such an orientation, however, must not lead to hubris. We are all well-advised to adopt a little of that humility of which the peasants have such a plenty. We must start from the premise that change and development are processes about which we still have only a very limited knowledge. Above all, we must accept that socialist transformation is no easier or faster than marginalist changes in a situation where pre-modern structures still prevail. In passing our judgements, we must make a clearer distinction between 'failure', which is difficult to discern clearly, and 'time to succeed' - the fact that development takes time and that it is a process which is characterized by as many unanticipated as anticipated consequences.
> (Hydén, 1980, p 260)

3. DEVELOPMENT PLANNING IN TANZANIA

Tanganyika gained independence on December 9, 1961. In 1964 a federation was formed between Tanganyika together with Zanzibar and Pemba, off the coast, and the new state was named Tanzania.[1]

Tanzania, one of the poorest countries in the world, had a GNP/capita of USD 230 in 1978 (World Bank, 1980, Table 1). Her land area is roughly 945 000 km^2, or twice the size of Sweden. In the latest census, 1978, the population was 17.5 million, of which 17.1 million on the Mainland. The annual population increase is some 3 per cent. Urbanization is low, only 12 per cent live in cities of 5 000 or more.[2] The highest population densities are in the periphery of the country, mainly in high altitude areas.

DEVELOPMENT POLICIES

After independence the Tanganyika African National Union (TANU), the only party allowed on the Mainland since 1965, has increasingly become the major policy institution. In Mwongozo (TANU Guidelines), adopted in 1971, the supremacy of the party is clearly spelled out. In 1977 the two political parties, TANU on the Mainland and ASP (Afro-Shirazi Party) in Zanzibar-Pemba, were amalgamated into a single

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[1] The discussion is limited to Mainland Tanzania if not otherwise stated.

[2] Preliminary figures, 1978 Population census.

party for the whole country - Chama Cha Mapinduzi - the Revolutionary Party.

The creation of the CCM solidified the position of the party, which became more powerful than the parliament and the central administration in all policy matters. The position of the CCM has since been strengthened. Several mass organizations - the trade unions and the youth, women and parent organizations - were suspended in 1978 and copy organizations created as subdivisions of the CCM.

The development strategy of the party is influenced mainly by President Nyerere. In speeches and articles he has sketched a strategy for a socialist development of the country. The principal documents are: the 'Arusha Declaration', 'Socialism and Rural Development', 'TANU Guidelines', and 'Education for Self-Reliance'. The choice of a socialist development did not emerge from an internal class struggle, although the first years after independence showed tendencies of capitalistic development, but was due, rather to the international economic order. In this system 'socialism is the only rational choice', according to Nyerere.

In the Arusha Declaration, published in 1967, socialism is defined as: (1) absence of exploitation, (2) the major means of production and exchange are under the control of the peasants and the workers, (3) the existence of democracy and (4) socialism as a belief.

> Ujamaa, then, or 'familyhood', describes our socialism. It is opposed to capitalism, which seeks to build a happy society on the basis of the exploitation of man by man; and it is equally opposed to doctrinaire socialism which seeks to build its happy society on a philosophy of inevitable conflicts between man and man.
> (Nyerere, 1966, p 170)

As an immediate result of the Arusha Declaration, banks and enterprises were nationalized. People in political positions were forbidden to own private firms, to hold shares, or to occupy positions as directors. Furthermore,

they were not allowed to have more than one source of income. As a consequence, Tanzania was viewed as anti-West. The flow of capital to Tanzania from the Western countries diminished (Hydén, 1969 and 1972).

The general development goals of Tanzania can be summarized as follows:

1. To introduce a form of decentralized socialism based on active popular participation.
2. To abolish poverty, to increase equality between individuals in respect of purchasing power and supply of public services.
3. To transform the economy of the country to provide a better balance between production and consumption and to achieve higher national economic integration and self-reliance.
4. To expand the productive forces to create a material base for sustained progress toward the goals mentioned.

(URT, 1978, pp. 9-10, and Green, 1976, p. 5)

In an attempt to move the decision process closer to the people, a first step towards decentralization was taken in the late 1960s by the establishment of 'Regional Development Funds'. By a decentralization reform in 1972 government bodies were established at regional and district levels and the elected local governments were abolished. The new bodies became responsible for the implementation of development projects. Through this reform many decisions were moved from the ministerial level to the regions. Consequently, it became harder for the ministries to influence and follow up projects in their respective fields.

Simultaneous with the decentralization - or rather deconcentration - reform was a trend to reduce the financial autonomy of regional, district and semi-official bodies -

trade unions, cooperatives[1] - while their executive power as central government organs increased (Boesen & Raikes, 1976, p 7).

The increase in responsibility and executive power of the regional bodies reflects a paradox in the Tanzanian system. Active popular self-organization and participation in the decision process are vital parts of Nyerere's ideology of socialistic transformation, but participation constitutes a threat to the bureaucratic control and the officials' view on how to develop the country. Growing bureaucracy is viewed by many, e.g. Coulson (1975), as a threat to rural development.

The transformation of Tanzania into a socialist country will take a long time.

> In 1967 a group of the Youth who were marching in support of the Arusha Declaration asked me how long it would take Tanzania to become socialist. I thought 30 years. I was wrong again: I am sure that it will take us much longer.
> (Nyerere, 1977, p 1)

THE TANZANIAN ECONOMY

To fully understand the development policies and strategies of Tanzania, some basic facts are needed about its economy. Tanzania is an agrarian society with 40 per cent of the 1978 GDP derived from agriculture, of which more than half from the subsistance sector. Some 90 per cent of the economically active population are engaged in agricultural production.

Monetary agriculture is the major foreign exchange earner and is dominated by some major cash crops: coffee, cotton, sisal, cashewnuts, tea and tobacco.

Smallholders dominate, accounting for almost 90 per cent of the cultivated area. Farms are small, 83 per cent

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[1] The cooperative unions were abolished in 1975-1976.

below 2 ha in 1972. Besides peasant agriculture, there is a small sector of private and cooperative estates and state farms. The number of private estates has diminished since independence due to nationalization.

Over the years, the main emphasis has been on the encouragement of cash crops for export. In reality, this sector has also received most attention and the greatest financial and organizational support. Food production was supposed to solve its own problems. However, in 1974 and 1975 Tanzania experienced a severe food shortage. Large quantities of cereals had to be imported (Table 3:1). As a result, food production received more attention from the mid-1970s onwards after the dramatic increase in world grain prices in the early 1970s and the somewhat later rise in energy prices. The former was temporary, but still a warning; the latter was permanent and has led to various repercussions on commercial agriculture.

Table 3:1. Net Cereal Imports 1971-1977 ('000 tons)

	1971	1972	1973	1974	1975	1976	1977
Maize	-0.3	119.3	13.2	254.7	231.4	72.0	0
Rice	8.7	1.9	0.7	71.2	64.0	8.8	15.0
Wheat	24.1	41.8	12.3	102.7	157.5	3.0	30.0
Sorghum/Millet	4.4	0.9	2.6	-0.2	4.8	0	na
Total	36.9	163.9	28.8	428.4	457.7	83.8	45.0

NB: Maize flour converted to grain (90%), rice is milled and wheat flour converted to grain (75%).

Source: Tanzania Food and Nutrition Centre, 1978, Table 20.3.

Cash crop production has dropped during the last ten years, despite the efforts to encourage such cultivation (Table 3:2). More severe is the steady decline in per capita food production during those years (Table 3:3). While the general pattern for the Less Developed Countries (LDC) has

Table 3:2. Indices of Export Volume and Prices for Four Major Agricultural Crops, 1966-1976

	1965	-66	-67	-68	-69	-70	-71	-72	-73	-74	-75	-76
Volume												
Cotton	65	100	71	73	66	70	64	75	70	57	44	64
Coffee	56	100	88	97	98	84	70	108	119	81	108	114
Sisal	107	100	103	95	86	109	81	77	57	47	51	40
Cashewnuts (raw)	89	100	98	110	114	107	113	156	152	158	135	92
Prices (unit price/ton USD)												
Cotton	107	100	102	111	102	100	110	128	139	237	185	274
Coffee	102	100	90	91	87	117	107	118	140	154	144	263
Sisal	113	100	83	71	79	70	71	80	168	420	243	241
Cashewnuts (raw)	92	100	94	92	104	107	90	96	94	124	126	143

Source: Economic Survey 1977-78 and Hydén, 1980, Table 5.2.

been an increase in agricultural as well as food production, the African countries on the whole, like Tanzania, have experienced a declining per capita production in these sectors.

Table 3:3. Food and Agricultural Production Per Capita, Index 1969-71 = 100

	Food production per capita			Agricultural production per capita		
	Tanzania	Africa	LDC, Total	Tanzania	Africa	LDC, Total
1968	96	99	97	96	98	98
1969	98	100	99	100	100	99
1970	105	100	101	104	100	101
1971	97	100	100	97	100	100
1972	94	99	98	95	99	98
1973	92	93	100	92	93	100
1974	89	98	101	89	97	101
1975	90	95	104	89	94	103
1976	95	95	104	94	93	103
1977	95	91	104	92	90	103
1978	92	93	107	88	91	106
1979	88	91	106	85	90	105

Source: FAO, 1980, Tables 6 and 7.

Adverse weather conditions may to some extent explain the Tanzanian agricultural crisis. But some researchers, e.g. Lofchie (1978),[1] claim the ujamaa programme (or collectivization[2] according to Lofchie) to be the main reason. But weather and ujamaa provide too simplistic an explanation of the decreasing agricultural production. The structural constraints of the peasant economy are an important additional factor.

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[1] Raikes, 1979, criticizes Lofchie's arguments.

[2] To put the lable 'collectivisation of the Tanzanian agriculture' on the ujamaa programme is misleading. Only a small segment of the peasant holdings is communal. Furthermore, the stress on communal farming has decreased after 1972, see below, pp 82 ff.

The manufacturing sector is small in Tanzania. Its contribution to the GDP was 10 per cent only in 1978. Production of consumer goods dominates. Annual growth, after being quite substantial in the late 1960s (some 15 per cent), has declined in the 1970s, and came to a virtual standstill in 1975 (0.3 per cent). The cause of the poor performance of the manufacturing industry is partly long-term, including inadequate planning, declining productivity, low investment level, and shortage of managerial and skilled personnel, and partly short-term, e.g. lack of raw materials and spare parts, rising input costs, shortage of electricity and water, etc.

Paid employment plays a subordinate role in the economy. Some 475 000 were wage-earners in 1977 - roughtly 5 per cent of the labour force - primarily in the agricultural sector, closely followed by community service. Manufacturing accounted for only 17 per cent of the wage-earners. The regional differences were great. Dar es Salaam accounted for 22 per cent; other important regions were Tanga and Morogoro.

Foreign Trade

Tanzania's exports consist mainly of agricultural products. Since the mid-1960s the export volume has dropped for the main crops - cashewnuts, and to some extent, coffee being exceptions - while prices have increased (Table 3:2). Imports are mainly manufactured goods, machinery and transport equipment. The oil bill has taken an increasing share of the import value. In 1974 and 1975 imports of food and livestock accounted for 20 per cent, while the average in previous years had been 10 per cent. After 1975 food imports were again at the 'normal' level.

In the mid 1960s the balance of trade showed a surplus. But during the 1970s this turned into a deficit. The exports did not pay more than a small share of the import

(Table 3:4). In 1978 the deficit in the balance of trade amounted to TZS 5.1 billion, some 20 per cent of GDP. The deficits have been covered by loans abroad and by international aid. The great deficit in 1978 was followed by a severe financial crisis. Negotiations started with the IMF, whose demands Tanzania would not accept; one demand was a drastic reduction in public spending.

Table 3:4. Exports (fob) as Percentage of Imports (cif)

1965 %	66 %	67 %	68 %	69 %	70 %	71 %	72 %	73 %	74 %	75 %	76 %	77 %	78 %
105	111	108	90	99	77	66	72	68	53	45	82	74	41

Source: Ståhl, 1980, Table 5:6.

DEVELOPMENT PLANNING

National Planning

Pre-independence planning in Tanzania was mainly related to a collection of development projects and it was more ad hoc than systematic. But one ten-year plan was presented during the colonial period, in 1946, amounting to 17.8 million pounds. Development budgets were mostly geared towards the development of transportation and natural resources (Burke, 1965, Appendix 1 and Ehrlich, 1964). No clear priorities were set as guidelines for these plans, which were limited to government budgets. The only attempt at a major development project, the post-war groundnut scheme, was such a resounding and expensive failure that it discouraged other large-scale agricultural schemes and is still a famous example of how not to plan.

In the late 1950s a World Bank mission made a study of the Tanganyika economy. The first national plan after independence was based on its recommendations. It was essen-

tially a capital budget, outlining public projects. Investments were directed towards projects that would yield the highest returns. No structural change was attempted, nor redistribution between the sectors. Industrial development was considered desirable. Some 25 per cent of the TZS 480 million was directed into agriculture, mostly irrigation projects, and 14 per cent to education and road development (Khakee, 1970, p 23). This plan did not meet the political and social needs of the country. The government therefore launched a 'People's Plan' in 1962. TANU was given the task of mobilizing the villagers by creating village development committees and stimulating self-help projects (Khakee, 1970, p 24).

The first five-year plan, of 1964-69, was seen as the first medium-term plan in the long-term perspective-plan for 1964-80. By contemporary standards it was a bold and imaginative document, envisaging a high rate of growth in national income, based on ambitious targets for agricultural and manufacturing production (Raikes, 1976, p 10). TANU did not provide a body of detailed proposals and did not develop firm socio-political ideological commitments. Thus, the planners had only a broad and unspecific set of goals to translate into economic policy (Green, 1965, p 253). To a large extent the plan was a technocratic product, influenced by French planning procedures.[1]

Over half of total investments were allocated to direct productive investments, of which industry received the largest share (Table 3:5). Investments in social services also got a large share, almost 30 per cent.

The financing of the plan was heavily dependent on foreign capital. The ability to attract these funds turned out to have been severely overestimated. Between 1964 and

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[1] A French planner was appointed and given 12 months to prepare the plan (Khakee, 1970, p 25).

Table 3:5. Capital Investment Allocation by Sector for Three Five-Year-Plans

	1st FYP[a] 1964-69	2nd FYP 1969-74		3rd FYP[d] 1976-81
	%	1[b] %	2[c] %	%
Agriculture, livestock	15.0	9.1		14.7
Industry	22.0	16.1		26.7
Mining, natural resources	2.0	-		5.0
Commerce, tourism	13.4	7.4		2.1
Directly productive	52.4	32.6	27.8	48.5
Communication, transport	11.7	16.4		8.2
Power	1.8	9.2		5.0
Water, other physical infrastructure	2.5	21.9		5.5
Physical infrastructure	16.0	47.5	47.9	18.7
Education, culture	7.2	6.8		6.4
Health	4.1	1.8		2.9
Housing, construction	17.0	8.0		10.0
Human, social services	28.3	16.6	22.0	18.3
Administration, security	3.2	3.4	2.2	13.7
Total	100	100	100	100
Total investment (TZS million)	4,920	5,038	7,768	26,978
Share of external loans and grants in government budget	72%	43%[e]		62%

a Public and private investments.
b Government and parastatal investments, excluding TZS 305 million local costs for the TAZARA.
c Including private and East African Corporation investments.
d Governmental and parastatal investments.
e Including transfers to parastatals and local cost of the TAZARA.

Sources: Green, 1965; First Five-Year-Plan; Second Five-Year-Plan; Third Five-Year Plan.

1968 less than half of the expected foreign loans and grants were actually supplied. In the beginning of the plan period a drastic drop occurred in export crop prices, especially for sisal, and they remained depressed during the whole plan period (Table 3:2).

Real economic development differed from plan estimates. In addition, after the Arusha Declaration in 1967, the economic policy was only marginally related to the plan.

The second five-year-plan (1969-1974) was adjusted to the new political and economic circumstances. It attempted to give a logical pattern to the socio-economic development principles, which are laid down in the Arusha Declaration. The Government set the pace for economic development to a greater extent than in the previous plan (Van de Laar, 1973). Government investments amounted to almost 70 per cent of the total (Table 3:5). The main shift was a move from direct productive investments to infrastructure, mainly in communications and transports. The construction of the Tanzania Zambia Railway (TAZARA) was the largest project. Industrialization of the country was to continue but by domestic means - parastatals and joint ventures - rather than by direct private investments. Allocations within the manufacturing sector were still largely directed to import substitution in consumer goods and to agricultural processing.

Generally, more emphasis was laid on rural development. After the failure of the capital-intensive approach in agricultural development, attention was shifted from large-estate and settlement schemes to ujamaa villages and, to some extent, to state farms. It was proposed that production should be reoriented to meet domestic requirements rather than those of export markets. But due to the lack of an agricultural policy, export crops continued to be favoured.

The third five-year plan (1976-81) is the last medium-term-plan in the long-run perspective-plan presented in 1964.

It was originally to have started in 1974, but was postponed until 1976. Consequently, the plan period of the previous plan was extended by two years. The official reason given for the postponement was the serious foreign-exchange problem facing Tanzania in 1974. This really reveals the governments's view of planning. Just when the need for coordinated and careful planning of scarce resources was greatest, the most important planning tool was postponed.

Much of the 'new approach' to development, reflected in Nyerere's analysis of the economic and social progress over the past ten years (Nyerere, 1977) has provided the guidelines for this plan. It is ambitious and amounts to almost TZS 27 billion (Table 3:5). As in the first five-year-plan, it is assumed that a large share of the investments will be externally financed (some 60 per cent). Similarly, the largest part of the development investments is allocated to direct productive investments, of which industrial development will get the lion's share. Compared with the previous plan, the 'modern' sector - manufacturing and urban - will receive more resources, at the expense of rural development. The private sector will play a marginal role only, although general attitudes to private enterprise have become more pragmatic.

Regional Planning

In Tanzania 'regional planning' has a specific meaning, since the term 'region' is used for the major administrative divisions of the country.[1] 'Regional planning' means planning for administrative areas, whether or not it involves spatial aspects.

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[1] In 1967 there were 18 regions in Tanzania, 17 on the Mainland. Since then three more regions on the Mainland have been created by division of large or populous units. The increasing number of regions may be viewed as a manifestation of the growing interest in and awareness of regional aspects in development planning. On the other hand, it may be the result of increasing power of the bureaucrats.

During the preparation of the first five-year-plan the planning team attempted a pilot plan for each region. This was mainly a data-gathering exercise and was probably never intended to be implemented (Raikes, 1976b, p 14). During the preparation of the second five-year-plan a four-man team was appointed that toured every region and wrote a 'regional planning report'. Only after the publication of the two first volumes of the five-year-plan was the commitment to produce a regional volume remembered (Raikes, 1976b, p 14). The philosophy of regional development planning was to spread the development efforts over the country in such a way that equalization between rich and poor regions could be accomplished. Nine towns were designated the role of growth poles. The spillover effects from these centres were to develop the surrounding rural areas.

In the preparation of the third five-year-plan, regional planning was taken more seriously, partly as a result of the decentralization reform. The planning model and procedure is described as a 'bottom-up' approach as opposed to the 'top-down' planning philosophy of the previous medium-term plans.[1]

The need for coordinated regional development planning became obvious in the early 1970s, especially after the presentation of the Kigoma development plan, which was executed by a World Bank team. This plan formed the model for long-term (15 years) perspective plans for each region. As part of the preparation of the third five-year-plan each region was to prepare an integrated regional development plan.[2] The integrated approach draws attention to the necessity for realizing, in the process of planning, the functional

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[1] Whether the Tanzanian model and procedure should be labelled 'bottom-up' is debatable. The Tanzanian model of rural and regional planning is discussed in Jones, 1974.

[2] For a review of the regional planning model and the experience of regional planning procedure in Tanzania in the mid-1970s, see Hedkvist, 1977 and SIDA, 1977.

interdependence between sectoral activities in society (Claeson & Moore, 1976).

Most regions lacked competent personnel for realizing this kind of plan. Therefore, foreigners were recruited to support the regional administration. Ten national aid-institutions, beside the UNDP and the IBRD, supplied regional planning-teams. Sweden became responsible for the Mwanza and the Arusha Regions. The only Tanzanian institution, Bureau of Resource Assessment and Land Use Planning (BRALUP), was appointed the newly created Rukwa Region. The composition of the teams differed and so did their work approach and cooperation with the regional authorities. Coordination and cooperation between the regional planning teams was limited and accidental.[1]

The original meaning of the regional planning exercise was to incorporate regional plans in the third five-year-plan, besides preparing a long-term perspective plan. BRALUP was appointed the task of compiling the plans delivered from the regions and putting them into the same format. However, the work was terminated before completion due to the postponement of the third five-year-plan.

The strategies and approaches employed by the regional planning-teams and the times for their completion differed, which made them rather useless as strategy tools for regional development. Instead, they were mainly used for the identification of regional projects, which, hopefully, were to be financed by the donor agency that had supported the regional planning-team.

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[1] Terms of reference of the regional planning-teams, issued by the Prime Minister Office (PMO), are presented in Claeson and Moore, 1976, pp 06-08.

RURAL AND AGRICULTURAL DEVELOPMENT POLICIES

Pre-Independence Policies

When returning from East Africa, the early European explorers brought back an impression of bounty and relative affluence. Many recent studies, e.g. Kjekshus (1977a), have demonstrated that pre-colonial societies in present Tanzania were well adapted to the physical conditions. People had methods and experience in controlling their environment.

The early German colonization was largely a trial and error affair. Contacts with the Europeans brought crisis to the African economies. Population decreased due to new diseases and livestock diminished. Disorder - accompanied by poverty - was a negative picture that Europeans brought back from East Africa at the turn of the century and it helped justify colonization morally.

The German agricultural policy promoted a mixture of settlers and plantations, on the one hand, and peasants growing some cash crops, on the other. The colonial power thus destroyed the pre-colonial mode of production, but did not manage to substitute capitalism for the traditional mode.[1] Instead, a pre-capitalistic mode of production was created, in which the integration of the rural producers into a wider economy was essential. The peasantization of the rural producers was initiated.

> In brief, it can be stated that the German colonization of Tanganyika effectively put an end to the prosperity of the indigenous pre-colonial economies. A combination of epidemic diseases, natural catastrophes and German colonial policies wrecked the fragile balance between man and nature on which the economy rested.
> (Hydén, 1980, p 41)

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[1] Another opinion is represented by Iliffe (1971, p 9), who argues that capitalism has had a great impact on the Tanganyikan economy. It was introduced in the pre-colonial time by slave plantations on Zanzibar.

When the British took over Tanganyika after the first world war, they were not especially interested in the new protectorate. In many respects they followed the policies of the Germans. They tried to incorporate the peasants into the cash economy. Agricultural extension service was directed to the 'progressive' peasants and it was hoped that their example would be imitated by the others, the 'improvement approach'. Plantation agriculture dependent on hired labour was stimulated. Land shortage did not force peasants to become wage earners on plantations. Workers were recruited far away to minimize family ties and stabilize labour input.

Naturally, the agricultural changes initiated by the British were resisted by the peasants, not because of their 'traditionalism' or 'laziness' but because of the structural constraints of the peasant mode of production. British agricultural policy and rural development did not make sense to the peasants (Hydén, 1980, p 64).

Post-Independence Policies, 1961-1966

The improvement approach, pursued by the British, implied an intervention into the existing farming system. The World Bank mission, studying the Tanzanian economy at the time of independence, recommended 'transformation' of the peasant agriculture through settlement schemes. Given the frustrating experience of the colonial government's attempt to improve peasant agriculture, it is not surprising that the transformation approach was adopted. It did not interfere with the existing system, since completely new settlements were established by people willing to leave their old villages. Capital and extension services could be concentrated to the new settlements located in fertile areas. The new system was capital intensive and was also to be developed towards more intensive land use.

Between 1963 and 1965 several villages were established. Each settlement was planned for 250 families with a capital input of some TZS 3 million. The 23 villages formed by 1965 had some 6 000 ha of crop land and held 3 400 families (Ellman, 1975, pp 313-314).

This programme of rural development was not a success. Peasants had limited influence on the planning. All major decisions were made at the government level. Everything was prepared with little popular participation, which made the peasants feel they had no responsibility for the settlements.

In addition, there were problems of over-mechanization and excessive subsidies.[1]

> As it was not wished to force the decision, the attempt was made to attract the settlers by a policy of 'spoon feeding': free rations for one and sometimes two years, Shs 30:- per month pocket money, fine houses perfect from the beginning, etc ...
> (Dumont, 1969, p 9)

Dumont dismisses the transformation approach, while he points to the relative success of the improvement alternative. Progressive farmers, through the cooperative unions, have become receptive to innovation. This holds especially as regards cash crops such as cotton and coffee. However, in the sphere of food production this approach cannot be considered satisfactory from all points of view (Dumont, 1969, p 11).

Ujamaa 1967-1973

Parallel with the above events, spontaneous development of communal farming occurred in some parts of the country, as a response to President Nyerere's idea of a socialist transformation of Tanzania.[2]

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[1] The same lesson was learnt in West Africa, where the people in the settlements regarded themselves as government employees, a privileged minority in the public sector (Hydén, 1980, pp 198-199).

[2] Most of the first spontaneous 'ujamaa villages' were short-lived. Conditions were tough (Coulson, 1977, p 88).

The most famous example is the communal villages in the Ruvuma Region, which started as early as 1960. Seven years later, 20 communal villages formed the Ruvuma Development Association (RDA), an organization which was met with hostility from some groups. At the same time it received much support. In 1969 President Nyerere had the organization declared illegal. Its assets were confiscated by TANU; the most advanced ujamaa organization was thus destroyed (Coulson, 1977, p 91). The 'take-over' of the RDA was interpreted by some observers as a sign that control of the villages was considered more important to the party and administration than spontaneous popular initiative towards a socialist transformation (Hydén, 1975, p 57).

With the presentation of the Arusha Declaration - and the second five-year-plan two years later - ujamaa became the major policy tool for rural development. In 'Socialism and Rural Development' President Nyerere elaborates the ujamaa concept, outlining its goals and strategies.

> It should not be our purpose to convert our peasants into wage-earners, even on Government farms. To make our socialism and our democracy a reality we should instead adapt to modern needs the traditional structure of African society. We must, in other words, aim at creating a nation in which ujamaa farms and communities dominate the rural economy and set the social pattern for the country as a whole.
> (Nyerere, 1968, pp 350-351)

Ujamaa is derived from the traditional African society. People worked together at harvest and planting times, but rights and obligations referred only to the extended family.[1] 'Ujima' was a way to secure the livelihood for all members of the community. However, ujamaa is broader than ujima, since it also includes communal ownership of the means of production and communal work goes beyond the extended family.

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[1] These rights and obligations are by rural Tanzanians referred to as 'ujima'.

The concept of ujamaa rests on four basic principles: (1) people shall live together in villages, (2) the means of production shall be communally owned, (3) people shall work together, and (4) they shall share the fruits of their work. The creation of an ujamaa village is a three-step process. The first involves movement to a village and farming on individual plots. In the second stage, sales from the communal farm are inaugurated and the village is registered as an agricultural association. In the final step, the village is registered as a producers' and consumers' cooperative. Not until this stage has been reached, is it an ujamaa village in the real sense.

The ujamaa policy involved several radical changes of Tanzanian society. It was intended to close the widening social gaps and break the capitalistic influence in rural areas. In the second five-year-plan, ujamaa is described as a frontal attack on exploitation of people in rural areas.[1]

Ujamaa was also a challenge to the cooperative movement. An investigation in 1966 had shown that the cooperative societies were being mismanaged and that the socialistic principles had not been accepted by the members. From now on, ujamaa villages were to form the basis of the cooperatives, thereby diminishing the capitalistic influence.

Ujamaa was also to increase agricultural production by means of its economies of scale. Larger farms were to facilitate mechanization. However, over-mechanization was to be avoided. In fact, the ideal picture of ujamaa agriculture consisted of a lot of people hoeing the land together. If the peasants lived in villages, they could be reached more easily by agricultural services and could have better access to social services (school, water, medical care, etc.). Transport was also easier.

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[1] Ujamaa was often expressed as a revolutionary policy. Rodney, 1972, discusses an attempt to identify ujamaa with 'scientific socialism in certain ideological essentials'.

The economic, social and political goals can be summarized as follows:

- Increased productivity in agriculture
- Increased openness of society to technical innovations
- Advantages of economies of scale
- Self-reliant and self-determining communities
- Exploitation and excessive differentiation in wealth, income and power to be avoided
- The status of agriculture to be raised, and the gap between rural and urban areas bridged

Two strategies for achieving ujamaa were discussed, the selective approach - transformation - and the frontal alternative - improvement. The latter was chosen partly because the former had proved less successful. People were all to be encouraged to move and settle in ujamaa villages, but the President carefully stressed that it was a voluntary process.

People from densely populated districts were encouraged to move to areas with plenty of land. In 1969 some 900 Wachagga families from the Kilimanjaro area, moved to Mpanda District, approximately 750 km (Ellman, 1975, p 320).

Most ujamaa villages were established in sparsely populated areas, generally in the less developed parts. In the south, along the border of Mozambique, the Lindi and Mtwara Regions, people were moved to villages for security reasons. In the Rufiji Valley whole communities were moved to higher grounds after severe floods. This movement was meant to protect people from future flood hazards, but many moved back to the lowlands. A study showed that the whole ecological system established by the peasants was destroyed by the resettlement (Sandberg, 1973 and 1974).

The creation of ujamaa communities was a slow process. In 1969 there were only about 400 registered villages, in addition to the 400 in the Lindi and Mtwara Regions (Table 3:6).

Table 3:6. Number of Ujamaa Villages Between 1969 and 1974, and Percentage of Total Population Living in Ujamaa Villages

Region	1969	1970	1971	1972	1973	1974[a]	1974[a] % of total population*
Arusha	20	25	59	92	95	110	3
Dar es Salaam[b]	-	-	-	-	-	25	-
Dodoma	40	75	245	299	336	354	60
Iringa	60	350	651	630	659	619	30
Kigoma	14	34	132	129	129	123	20
Kilimanjaro	7	9	11	24	24	14	0,4
Lindi[c]	148*	285*	572	626	589	339	61
Mtwara[c]	264*	465*	748	1 088	1 103	1 052	61
Mara	19	174	376	376	271	111	36
Mbeya	22	91	493	713	715	534	-
Morogoro	16	19	113	116	118	96	3
Mwanza	10	28	127	211	284	153	3
Coast	46	56	121	185	188	238	27
Rukwa[b]	-	-	-	-	-	121	-
Ruvuma	26	120	205	205	242	180	13
Shinyanga	6	98	150	113	108	134	2
Singida	12	16	201	263	263	317	26
Tabora	41	52	81	148	174	156	-
Tanga	37	37	132	245	245	255	7
West-Lake	21	22	46	83	85	77	2
Total	809	1 956	4 463	5 546	5 628	5 008	17

- No data
* Estimates
a Both columns refer to January 1. The last column shows percentage of population living in ujamaa villages.
b Dar es Salaam and Rukwa Regions were created in 1974
c Lindi and Mtwara Regions became separate regions in 1971.

Source: The Economic Survey 1973-74, and Rudengren, 1976.

In the light of this slow progress, TANU took a more active role. The frontal approach was changed to one that was more selective. Operation Dodoma was first, reaching its climax in 1971. In three months 40 000 families were moved to existing or new villages (Hydén, 1972). The choice of Dodoma for the first large-scale campaign was political. The problems were to be tackled where they were greatest. The Dodoma Region is one of the poorest. Through this opera-

tion, regional differences were supposed to be diminished. After Dodoma similar operations were started in Kigoma and Iringa.[1]

By the end of 1973 some 2.5 million people (17 per cent) lived in ujamaa villages. The regional variation was great. The Mtwara and Lindi Regions excluded, the largest shares were found in predominantly poor areas. In the 'rich' regions and especially in the Kilimanjaro Region, ujamaa had made marginal progress only. To increase the number, some traditional villages were labelled ujamaa. Thus, in 1974 all villages in the Kahe area - part of the study area - were labelled 'ujamaa', although no changes had been made in settlement pattern, ownership and farming methods.

Villagization

Despite the huge resources allocated to the ujamaa programme between 1969 and 1974, about TZS 500 million (Hydén, 1975), progress was slow. The transformation of the rural communities in a socialistic direction was no more than marginal. The capitalistic influence was broken, but this did not pave the way to a socialistic society.

Communal farming was practised in small fractions of the ujamaa villages only. Productivity was lower on communal farms than on individual, private ones. The aim of increasing productivity by communal farming through more efficient use of labour and more rational cropping methods, was thus not accomplished.

A change in agricultural and rural development was noted already in 1972 , with the presentation of *Siasa ni Kilimo* , 'Politics is Agriculture', also referred to as the 'Iringa

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[1] The Party Secretary in Iringa, Klerruu, saw as his aim to put an end to the capitalistic influence in his region. On Christmas Day 1971, he was shot dead in Ismani as a result of the political tensions he had stirred up. As a result, by 1972, all peasants in Ismani were invited to farm the land of the capitalistic farmers on an ujamaa basis.

Declaration'. The document stresses the necessity of modern farming practices; the word ujamaa is hardly mentioned (Boesen, 1976, p 6). It also places TANU in the centre of agricultural education and transformation (Kjekshus, 1977b, p 270). Eventually, in 1973, the collective farming objective was abandoned in favour of individual farms arranged in a block pattern. This indicates that the initial ujamaa experience - in relation to agriculture - was on the whole unsatisfactory (Marke, 1976, p 71).

In 1974, due in part to long-term agricultural problems but mostly because of the acute agricultural crisis, President Nyerere announced *Kilimo cha Kufa na Kupona* - 'Cultivate or Perish'. At the same time old bye-laws on compulsory cultivation were reinstituted, not only directed towards the rural population but to enterprises and institutions as well. The two policy statements mentioned above both showed great concern about the low agricultural production and productivity. They put agricultural practice and the availability of inputs above ujamaa reforms (Nnunduma, 1977, p 77).

The voluntary settlement in ujamaa villages was definitely ended in November 1973 when President Nyerere announced the policy of compulsory villagization. All Tanzanians were to be living in villages by the end of 1976.[1] This was the strongest blow to peasant autonomy since independence (Hydén, 1980, p 127). The resettlement between 1973 and 1976 is the largest in African history. People in densely populated areas, already living in nucleated settlements, were not affected, but still the resettlement involved some 5 million people (Hydén, 1980, p 130).

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[1] The idea of villagization as a development tool is very old. Both the Germans and the British saw the nucleization of the population as a necessary step to rural development in Tanganyika. "It was then held that villagization was 'a condition precedent to real progress on the part of the African population' and it was suggested that the villagization should become 'the declared policy of Government and an integral part of post-war development'". (Kjekshus, 1977b, p 271. Quotes from Tanganyika National Archives (TNA) no 31351.)

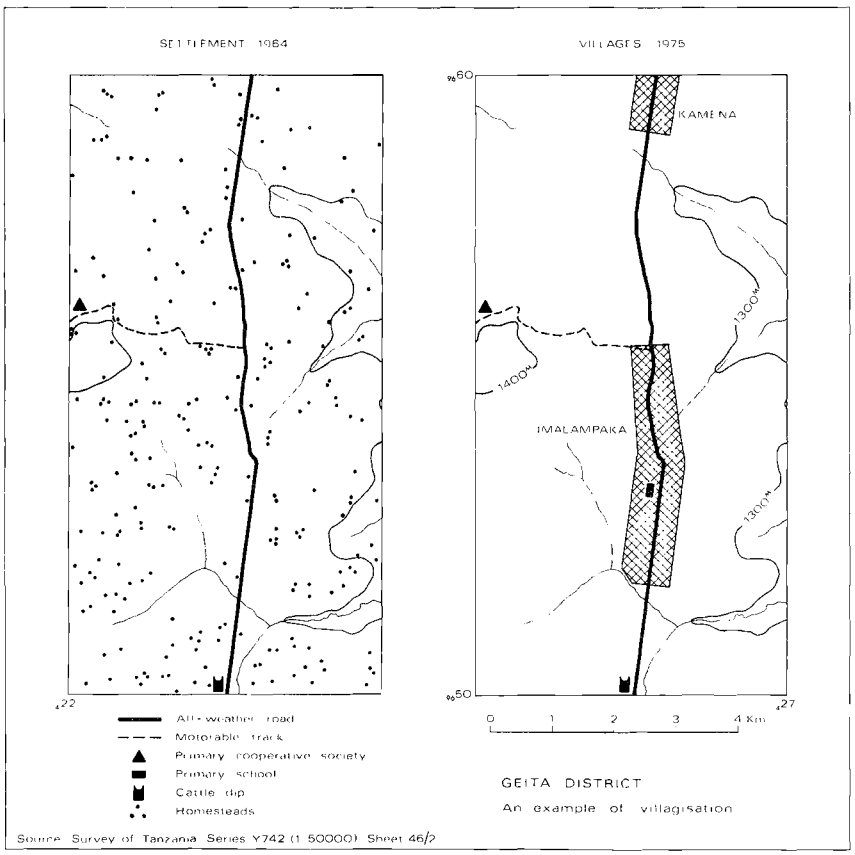
Villagization may be seen as another step towards ujamaa, but it seems more directed towards the modernization of the peasant economy. Since 1973 the new settlements have been called not ujamaa but planned villages.

The rational behind the villagization policy is similar to that of the ujamaa. It is easier to mobilize and organize (control) people living in nucleated settlements. It facilitates innovations through education, training and demonstration. A village has some economy of scale in marketing and purchasing of inputs. Social amenities are more easily supplied to villagers than to dispersed people. In the long run the village may support small-scale industry. Finally, villagization is seen as a vital step towards the creation of self-reliant communities (Moore, 1979).

The resettlement was made in haste. No time was allowed for proper planning. Planned villages became synonymous with houses built in straight rows. Factors such as soil quality, water availability, infrastructure - schools, dispensaries, godowns, etc - often received no attention. New village sites were mostly selected along existing roads. This criterion was easiest for the administration (Figure 3:1). Where people refused to move, coercion was applied.

Each village was to have a minimum of 250 families, but due to the rudimentary pre-planning, many villages became too large and some were poorly sited. Many families thus had to be resettled again. Of course, there is no universally ideal village-size. The optimum varies with a number of factors: land resources, distance to farmland, village layout, amount of livestock, type of farming system, non-agricultural activities, community organization and administration (Moore, 1976, pp 5:23-25).

In addition to a one-acre (0.4 ha) plot around the house, peasants were allocated land in the surrounding area. During the first year after resettlement they were allowed to continue cultivation of their old plots.



Source: Moore, 1979, p 72.

Figure 3:1. Example of Villagization, the Geita District

The drought at the time of the initiation of the resettlement facilitated the movement to the villages. Afterwards there was a feeling of expectancy among the villagers. However, disillusionment became apparent when the villagers realized that they would not get the positive support expected, and that there were no ideas as to how they should help themselves (Moore, 1979, p 79).

Villagization is an important step towards the capturing of the peasants. It can be a useful tool for the transformation of the rural areas, but it cannot be an aim in itself, only a prerequisite for development.

> .... in this respect, the reallocation of a large percentage of the Tanzanian population constitutes a step forward. But if it is necessary, it is nevertheless not sufficient; and even more crucially, if not followed up by mobilization and support for local self-direction, it may not at all be followed up by any fostering of socialist development. Similarly, unless it is accompanied by a successful effort to introduce agricultural practices that will be appropriate to the more dense and permanent cultivation that will be a consequence of it, villagization may even lead to declining productivity. (Mascarenhas, 1979, p. 162)

LIMITS OF DEVELOPMENT PLANNING

Every Third World country with national pride has development plans - annual plan, five-year-plan, perspective plan. Why has planning become such an important issue, regarded as an effective development tool?

Tinbergen characterizes planning by the following general features (from Leys, 1969, p. 248):[1] (1) a plan shall refer to the future, (2) it is based on a number of aims which have to be specified and (3) it requires coordination of the means of economic policy to be used to reach the aims.

A plan is not simply a statement of goals or of general policies, but a detailed programme of action for projects as well as for specific economic policies (Green, 1965, p 250). Reasons for planning have emerged, according to Onyemelukwe (1974), because of problems connected with (1) the shortage of foreign exchange and skilled manpower, etc,

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[1] Leys gives a critique of planning in the context of development. "Reflection on these suggests that 'comprehensive planning', regarded by many planners as its most developed and valuable form, is in practice apt to be rather the most developed form of the confusion of optimal policy-making with planning, and that this underlines much of the current disillusionment with it." (Leys, 1969, p 248)

(2) infrastructural development, (3) problems of capital accumulation, and (4) lack of popular participation in development projects of various kinds.

The planning tasks require a sophisticated administrative machinery in addition to highly skilled manpower. Lack of these elements characterizes the underdeveloped countries. Their experience is that plans have little relevance to most people's reality and that plans to a large extent have failed to promote development.

> In proportion to its popularity and the amount of money invested in it, no other policy tool has been as ineffective as planning.
> (Hydén, 1980, p 229)

The failure of development planning and in particular the implementation of the plans have been blamed primarily on the specific environment of the Third World countries - their dependency on an unpredictable world market. However, it would be more fruitful to seek the causes of plan-implementation-failures in the domestic environment of these countries. To the majority of the African population - the peasants - planning is irrelevant. In the African peasant economy, based on independent production units, planning and coordination make no sense to the peasant. The rationality behind planning is that of the Western society - capitalistic or socialist - while the rationality of the peasants has other connotations. Therefore, these two rationalities can never meet in a fruitful way in planning. Moreover, it should be noted that:

> Participation in government policy-making is rarely seen by the peasants as an advantage. Efforts to involve peasants in development planning are likely to produce very limited results.
> (Hydén, 1980, pp 229-230)

Thus, the fourth reason for development planning mentioned above is in most African countries wishful thinking only. Governments are not likely to achieve popular participation in policy-making and development planning, since

the majority of the population does not want to get involved in this type of exercise. Development planning can be used as a tool for capturing the peasants. But used in this sense it is not a question of popular participation, even if that label is commonly used.[1]

Generally, planning curtails flexibility and creativity, which are important features in development.

> In short, development cannot be planned. One can provide the incentives but many of the activities of men who are at the centre of development elude rational planning. At least, it is necessary to accept that planning is not the answer to everything. Many of the plans emanating from the Third World seem to give the opposite impression. True development is not rationalist in character. It occurs through consistent efforts of individuals and peoples trying, modifying, testing, discarding and replacing. The development process occurs in the midst of waste and inefficiency but the trend is always upwards and always finding new levels after each change has worked itself out. This is clearly out of line with the present planning approach to development which is essentially cautious and doctrinaire in character.
> (Onyemelukwe, 1974, p 85)

Onyemelukwe advocates indicative and indirect planning instead of comprehensive planning. Development should be built on indigenous technology, which then would remove the above four reasons for planning.

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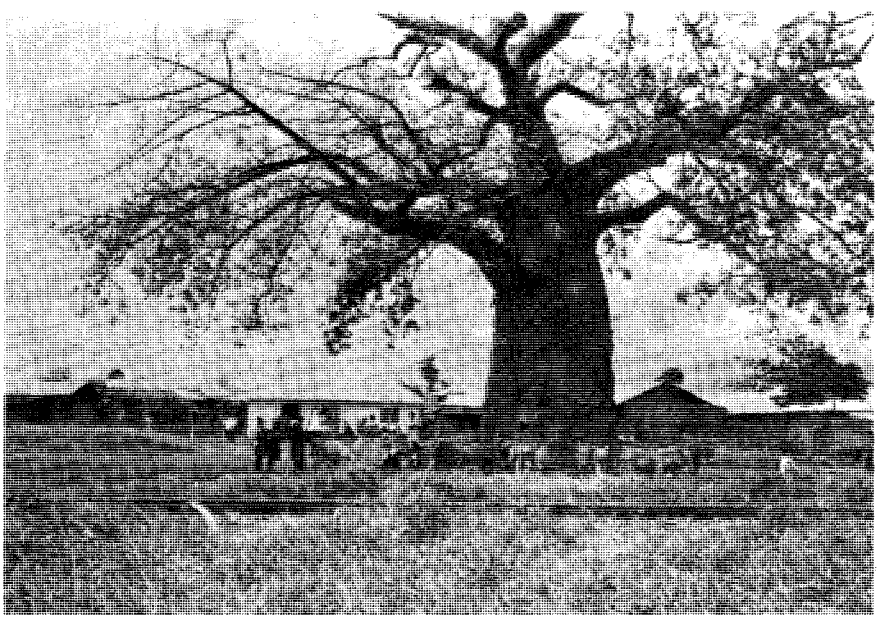
[1] For a discussion of the relation between power, planning and development, see Pusić, 1969.

PART TWO: THE CASE OF THE KAHE AREA

Modernity exacts a high price on the level of meaning. Those who are unwilling to pay this price must be taken with utmost seriousness, and not to be dismissed as 'backward' or 'irrational'.
(Berger, 1977, p 14)

Oblique aerial view of the major settlement - Kahe Station.



The Wamasai gather after market visit at Kahe Station.

4. METHODS

Research in developing countries is associated with many complex situations. Although the same is true for the Industrial World, the difference in degree is great. This holds especially for community research in the Third World. Moreover, a researcher educated and brought up in the Western World faces more problems than his indigenous counterpart.

The most striking problem is the lack of data. This problem becomes more acute, the smaller the area under study. For micro-studies data must be collected in the field. The ways and means by which information is gathered vary considerably.[1] The most common way is to use a questionnaire, with or without enumerators (interviewers). In social anthropology information is often acquired through active participation in the daily life of the community. The choice of methods and data depends on the formulated research problem.

Irrespective of the research question asked, the researcher will encounter a great variety of problems. Cultural, psychological and language barriers have to be overcome. The hierarchies through which the researcher must work differ from those he is used to. In most cases the sampling procedure is hard, due to lack of population records. However, in the case of Tanzania it is comparatively easy to

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[1] Cf. Lipton and More, 1972.

overcome these circumstances due to the ten-cell system (see p 93, note 1).

Evaluation is made difficult by the many biased answers. Most noticeable is the courtesy bias: the respondent tends to give an answer that will please the interviewer.

Researchers have long been aware of the problems in connection with surveys and questionnaires in developing countries. Pausewang (1973) made a comprehensive review in light of his field work in Ethiopia. He summarizes as follows: the use of questionnaires, in developing countries compared to developed countries, is more expensive, less reliable, more difficult, more complex, often less valid, less relevant and bound to produce more dangerous side-effects (Pausewang, 1973, p 192). He further criticizes the copying of methods and concepts developed in social science in the Industrial World. These methods and concepts cannot be used in a developing country. New methods must be created and adjusted to the prevailing conditions (Pausewang, 1973, p 193).

Third World countries can obviously ill afford to employ advanced social research methods imported from the Industrial World. They must concentrate on research projects that are in the interest of the majority of the people, projects that will supply directly applicable results. Therefore, ideas of high precision and scientific quality and originality are not so important as results which are communicable to the people concerned.

Even though the macro-aspect of social research in developing countries must be changed - and there is a lively discussion about this - a serious question still remains to which Pausewang does not give an answer: how do we collect basic data for relevant research? Even with a change in research objectives and methods, the need for basic data is great.

APPLIED METHODS

All aspects of life and social change cannot be covered in a survey, even with large inputs of time and resources. Priorities must be set, due to time and cost restrictions. In the present case questionnaires and interviewers were used for data-gathering. The types of questions asked and data required made this method the most appropriate. Naturally a study of this type will never catch the whole reality, especially not the part covered by 'soft data', such as dependency systems between families and individuals, opinions, hierarchies, black markets, etc.

All limitations must be taken into account when the results are evaluated. Thus, a description of the method of data collection is needed as well as a discussion of the reliability and validity of the data.

DATA COLLECTION

When the team first arrived in the area, its members knew very little about the local population and geography. One of the first tasks was to gather as much information as possible from the local authorities. However, by far the great part of the necessary information had to be collected in the field. No population records are kept, but the ten-cell system[1] provides a good base for estimating the number of inhabitants and their distribution. It is also a good medium for sampling.

To carry out a study and get the cooperation of the people it is necessary that the ward officers and local party officers recognize the study and the research team.

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[1] The TANU party was organized all over the Mainland in ten-cells. These cells contain approximately ten households - houses - and every household must belong to a cell.

We therefore arranged meetings with the local party officers and the administrators to whom the study, its purpose and design were presented. We also arranged a general meeting with the ten-cell leaders, at which we explained the study and initiated the sampling process.

Later, during the field work, we noticed how important these initial meetings were for the successful completion of the project. Pipping (1976) reported that he noticed some reluctance on the part of the villagers to speak their minds freely. Our experience was different. In fact in some cases people who had not been selected asked to be interviewed.[1] The villagers actively participated in the sampling process. The sample of the ten-cells was drawn by some of the ten-cell leaders. At the village meetings the villagers drew the households to be interviewed.

One psychological issue may be mentioned. One of the purposes of the survey was to stimulate development in the area and the villagers might have expected some positive results to emerge directly, such as the construction of a school or a hospital. In retrospect it can be noted that this type of study, in which the objects (villagers) act solely as suppliers of information, may be frustrating for the villagers, especially if the area is visited frequently.[2] It is a common phenomenon in developing countries that some areas are subjected too often to field work and data collection.

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[1] These interviews - not randomly selected - were excluded when the questionnaires were processed. In the 1973 survey the members in one ten-cell refused to be interviewed. However, the reason was not that the household heads of that cell objected to the study. They were in opposition to the cell leader and did not come to the meeting he had announced.

[2] When we made the 1974 survey, many villagers did in fact ask us about the outcome of the previous study, and wondered whether it was necessary to make another one. In a later BRALUP study, in which I participated, one of the objectives of the design was to get as much participation from the villagers as possible in the actual collecting and analysis of data (Rudengren & Swantz, 1976). The overall impression was a positive reaction from the villagers, but the reliability of the collected data was lower than in studies where interviewers were used. For a discussion on participant research, see also Swantz, 1975.

SAMPLE DESIGN

The 1973 Survey

The main objective was to provide a data base for the description of the socio-economic conditions in Kahe Ward. A simple random sample without stratification was used, since the ward was regarded as fairly homogeneous. The sampling was carried out on the household level and those to be interviewed were the heads of household. The required sample fraction was set at 20 per cent. Lack of information on individual households made a two-step sampling necessary. First a number of ten-cells were randomly selected, then the households within each cell.

A sample through the ten-cell system can be drawn in several ways. For example, all ten-cells can be the base and a required number of households can be selected, in order to get the desired sample fraction. Or, a small number of ten-cells are randomly chosen and all households within these ten-cells become the sample. The first method will give a better geographical distribution and a minimal bias. On the other hand, it is time-consuming and implies a lot of travelling and is thus costly. The second method means smaller transport costs, as the sample is concentrated in space, but it increases the bias risk.

The chosen design is a mixture of the two ways. From the ward list of 142 ten-cell leaders, 52 were randomly selected, and within each of these, 60 per cent of the households were drawn. In theory, this design would give a 22 per cent sample, provided every ten-cell consisted of ten households.

The 1974 Survey

The processing of the 1973 survey showed that the area was less homogeneous than expected from physical, social and economic points of view. The 1974 survey was therefore

designed to allow differentiation between villages. The sample fraction was set at 20 per cent for all villages - a stratified random sample. As the area was larger this time, and since we had to involve every village, it was necessary to concentrate on fewer ten-cells, and include all households of the cells drawn in the interview programme.

SAMPLE FRACTION

Since the number of households was unknown, only an estimation of the sample fraction is possible. In the 1973 survey the average number of households per ten-cell was 12.2 with a variation between 5 and 25. The average number of households per ten-cell gives an estimated household population of 1 732, which indicates an estimated sample fraction of 20 per cent (Table 4:1).

The estimated sample fraction of the 1974 survey was 23 per cent for Kahe Ward and the same when the Msaranga and Mandaka areas were included. Only a few villages fell below the 20 per cent target (Table 4:1). However, since some villages are quite small, the sample size at the village level became too small to make useful estimations of the studied variables. Since a main purpose of the 1974 survey was to unravel the spatial variations within the study area, the villages were agglomerated into 12 subareas. Three criteria for singling out the 12 subareas were used: (1) each area should have at least 30 observations (head of household interviewed); (2) the area should be continuous and (3) physical variations within the area should be at a minimum.

Mawala does not fit the first criterion (Table 4:2), but is treated as a separate subarea due to its special conditions. Its people are overwhelmingly nomads or semi-nomads and the cattle economy plays the dominant role.

Individual villages within each subarea and the location of the subareas are presented in Table 4:3 and Map 4:1 (see also fold-out map at the end of the book).

Table 4:1. Estimated Sampling Fractions of the 1973 and 1974 Surveys

Village *(Mabalozi)*	1973					1974				
	Number of ten-cells	Number of ten-cells drawn	Estimated number of households	Number of house-holds interviewed	Sample fraction % (estimated)	Number of ten-cells	Number of ten-cells drawn	Estimated number of households	Number of house-holds interviewed	Sample fraction % (estimated)
Ghona	5	1	61	7	11.5	11	3	123	18	14.6
Kahe Sisal Estate	9	1	110	7	6.4	5	1	56	19	33.9
Kahe Station	25	8	305	47	15.4	24	6	269	58	21.6
Kahe Kenaf	-	-	-	-	-	12	3	135	29	21.5
Kahe Oria	-	-	-	-	-	3	1	34	13	38.2
Kilototo	6	2	73	10	13.7	14	4	157	30	19.1
Kiomu	8	4	98	17	17.3	9	2	101	20	19.8
Kiterini	10	2	122	10	8.2	8	2	90	25	27.8
Kochakindo	6	3	73	18	24.7	5	1	56	16	28.6
Kimala	2	0	24	0	0.0	2	1	22	6	27.3
Mawala	4	1	49	9	18.4	4	2	45	17	37.8
Miwaleni-Kisangesangeni	7	2	85	16	18.8	15	4	168	44	26.2
Mkonga Juu, Kati	9	5	110	28	25.5	7	2	79	20	25.3
Mkonga Chini	3	0	37	0	0.0	3	1	34	9	26.5
Mbeu	3	0	37	0	0.0	6	2	67	21	31.3
Mwangaria	5	1	61	9	14.8	8	2	90	18	20.0
Opuruni	8	5	97	40	41.2	7	2	79	15	19.0
Rau-River, Ngambo ya Reli	27	11	329	74	22.5	23	6	258	52	20.2
Soko	4	2	49	12	24.5	4	1	45	13	28.9
Kahe Ward	142	52	1732	340	19.6	170	46	1908	443	23.2
Mandaka Mkonga						3	1	34	9	26.5
Mandaka Mnono						11	3	123	31	25.2
Msaranga Ngambo						13	3	145	27	18.6
Msaranga Rauya						17	4	190	51	26.8
Total						214	57	2400	561	23.4

Note: 1973 estimated number of households in village$_i$ $P_i = a_i \cdot \bar{x}_w$

1974 estimated number of households in village$_i$ $P_i = a_i \cdot \bar{x}_i$

a_i = number of ten-cells in village$_i$

$\bar{x}_w$ = average size of the ten-cells drawn in the Kahe Ward

$\bar{x}_i$ = average size of the ten-cells drawn in village$_i$

For the location of the villages, see Map 1:3

Table 4:2. Sample Size and Estimated Sample Fraction by Subareas in the 1974 Survey

Subarea	Number of ten-cells	Number of ten-cells drawn	Size of ten-cells drawn	$\bar{x}$	$\hat{\sigma}$	Estimated number of households	Number of households interviewed (sample size)	Sample fraction (estimated) %
Msaranga	29	7	14,12,14,11,12 8,7	11.1	2.7	322	78	24.2
Mandaka	14	4	10,13,8,12	10.8	2.2	151	40	26.5
Rau-River	19	5	12,12,8,7,10	10.0	2.5	190	42	22.1
Miwaleni	11	3	13,9,18	13.3	4.5	146	34	23.3
Kahe Sisal	16	4	19,12,13,12	14.0	3.4	224	50	22.3
Kahe Station	39	10	13,10,10,9,9, 9,11,8,11,13	10.3	1.7	402	100	24.9
Lenduru	14	4	11,10,8,15	11.0	2.9	154	33	21.4
Kilototo	22	6	16,9,10,7,12,9	10.5	3.1	231	56	24.2
Soko	10	3	15,11,13	13.0	2.0	130	34	26.2
Mwangaria	15	4	10,16,12,14	13.0	2.6	195	40	20.5
Ghona	20	5	10,12,8,6,5	8.2	2.9	164	37	22.6
Mawala	4	2	32,10	21.0	15.6	84	17	20.2
Total	214	57				2 393	561	23.1

DATA COLLECTION INSTRUMENTS

The design of the questionnaire[1] and the form of the interview are two integrated elements of the research process - beginning with the research questions and ending with the analysis of the data.

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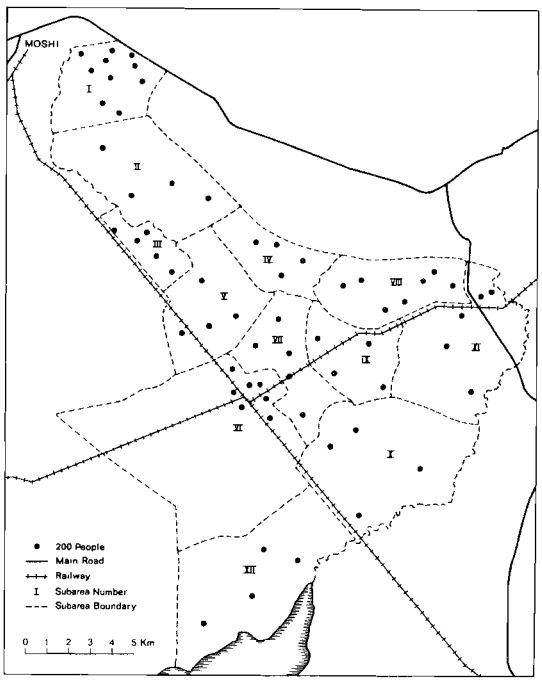
[1] The discussion in this and subsequent sections refers to the 1974 survey only.

Table 4:3. Subareas and Villages in the Study Area

Subarea Number	Subarea Name	Villages in the subarea
I	Msaranga	Msaranga Rauya Msaranga Ngambo
II	Mandaka	Mandaka Mkonga Mandaka Mnono
III	Rau-River	Rau-River Juu Rau-River Kati Rau-River Chini
IV	Miwaleni	Miwaleni
V	Kahe Sisal	Kahe Sisal Estate Mkonga Juu Mkonga Kati Ngambo ya Reli
VI	Kahe Station	Kahe Station (Oria) Kahe Kenaf Kizungo
VII	Lenduru	Kisangesangeni Longoni Lowiri Malindi Mkonga Chini Msengoni Opuruni
VIII	Kilototo	Kilototo Kiterini Kibaoni
IX	Soko	Soko Mbeu
X	Mwangaria	Mwangaria Kimala Kochakindo
XI	Ghona	Ghona Kiomu
XII	Mawala	Mawala

Note: Villages are clusters of houses locally known by a name. The concept does not correspond to the ujamaa or planned villages, which have surveyed boundaries and a legal status and consist ideally of some 500 households. The location of the subareas is shown in Map 4:1 and fold-out map at the end of the book.



Map 4:1. Population Distribution 1974 and Subarea Division

The design of the questionnaire depends on the type of objects studied, the type of data required, the research quesions and the method of data analysis. Many scholars have elaborated at great length on the design of a questionnaire and how to conduct an interview, e.g. Kahn & Cannel (1957), Katona (1951), Swedner (1970). The discussions and recommendations are intended for students planning to do a study in developed countries. Only parts are relevant to a survey of a rural area in developing countries, where a large part of the population is illiterate, and the cultural, psychological and language barriers are high.

> In conclusion, it would seem that the difficulties encountered are not, in any case, fundamentally different from those we meet in European or Western countries. But they are considerably increased by features that are peculiar to developing countries. All the rules and all the precautions which are customary in the West, must therefore be even more scrupulously observed.
> (Girard, 1963, p 15)

Questionnaires

The design of the questionnaire was a compromise between the number of questions necessary for ascertaining the required data, and the time available for an interview. Most questions in the questionnaires were open, as it was hard to imagine the type of answers to be expected.

> Conversely (to closed questions), it is proposed that the open question is preferable when the interviewer's objectives go beyond classification of the respondent and include the discovery of his reasons for feeling as he does, when the level of respondent information is low or unknown to the interviewer, when the respondent must think through problems or formulate opinions at the time of interview, when the barriers to communication are serious, and when the interviewer is uncertain as to the thinking and characteristics of the respondent.
> (Kahn & Cannel, 1957, p 165)

The questionnaire was in English, complemented by a Kiswahili version, to make sure that the interviewers used the same wording. When the Kiswahili version was prepared, the interviewers were gathered and made the translation from English in a group. When all had agreed on the translation of a question it was put down. As a final check the interviewers were asked to translate the Kiswahili version back into English.

Before the final version of the questionnaire was decided upon, about 20 persons in a village were interviewed. Through this test of the questionnaire we could correct and reformulate dubious questions, remove irrelevant ones and include new ones.

A manual was prepared for the 1974 questionnaire in which concepts were defined, e.g. unemployment, main occupation, dependent, etc. The reason for some questions was also explained.

Interviews

The interviews were made by university students and secondary school leavers in April-June 1974. Before the interviewers were sent out into the field they were trained for one to two weeks. Every question and its relevance with regard to the required information was discussed. The students interviewed one another, while a supervisor listened and corrected mistakes and misinterpretations as they occurred. During the test-interviews the interviewers also had some training.

During the first week of interviewing, two people worked together and partners were changed every day. By this method we tried to diminish the errors in the interpretation of a question and its answer. Ideally, this system should have been retained throughout the study, but time and money did not allow such a solution.

Lundqvist (1975), who to a great extent used group-interviews to obtain information, gave three reasons for this method:

> Firstly, they (group-interviews) could furnish some kind of 'synthesis' of the situation in the area, which would have been difficult to obtain from individual interviews ..... Another reason for group-interview was that certain facts are more reliable when presented by a group, since the members can correct each other and reach the correct answer. Finally, the group-interviews were used with the intention of investigating whether the ten-cell leaders possessed information which the farmers did not, ...
> (Lundqvist, 1975, pp 65-66)

Group-interviews were used in this study only once - in investigating the agricultural calendar in three ecological zones. The reasons were the same as those given by Lundqvist: it was possible to get a 'synthesis' of the agricultural calendar; the respondents could correct one another and fill in gaps.

Individual interviews were used in the main survey because information was needed on the status of the indi-

vidual household. This information allows a synthesis and makes it possible to describe and explain the variations of a variable over the households.

EVALUATION

Most of the above discussion is relevant to the evaluation of the reliability and validity of the data. Few have discussed these problems in connection with data collection at the local level in a developing country. The general problems of data collection by means of interviews are of course valid in this study, e.g. conditions relating to the objects under study (type of properties measured, psychological conditions, etc), relation between the interviewer and the person interviewed, the situation in which the interview is made and the character of the instruments of measurement. However, such issues are generally discussed in the contexts of psychological studies and developed countries.

In recent years more attention has been given to the status of the statistics of the developing countries not only in order to advocate the necessity of statistics but also to discuss the reliability and validity of existing statistics. Unfortunately, the discussion has focused mainly on official statistics, national accounts etc.[1] Little attention has been paid to the special problems in connection with data collection in the field.[2] Discussion on the problems of biased data refer mostly to sampling errors.[3]

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[1] See e.g. Seers: What are we trying to measure? IDS Bulletin, 1975, and Norbye, 1976.

[2] National statistics are of course to a large extent collected by interviews. But the problems concerning the process of data collection are seldom discussed.

[3] See for example Datoo, 1973, and Egerö & Henin, 1973. In the latter case there is also a discussion on some non-sampling errors in the Tanzanian 1967 census.

A general weakness in most recent studies dealing with Tanzania and the problems treated in this study, is the lack of an analysis of the research design and especially the design of the data collection. A discussion on the reliability and validity of the data is even more rare. For example, in the Tanzanian studies by Knight (1974), Pipping (1976) and Rald (1975), there is hardly any discussion on these subjects. Lundqvist (1975) touches on them very briefly.

> ... but, as always, data from this type of survey suffers from defects, and in the case of developing countries there are special problems of registration due to varying interpretation of definitions ..... Reliability and validity much depend upon the types of questions asked.
> (Lundqvist, 1975, p 64)

In Knight's study there is a good description of data collection procedure, but unfortunately no discussion on the reliability and validity of the data. His design is very similar to the one in the study of village skills made by BRALUP (Rudengren & Swantz, 1976), in which the villagers themselves filled in the questionnaires, one for each household. If the household had no literate person, someone else from the village filled in the form. When every household had finished, the questionnaires were collected and the results consolidated in a 'village summary form'. The original intention was to use these summary forms for data processing. However, when checked they were found unusable due to misinterpretations and 'adding' mistakes. Instead, the household questionnaires had to be used, but the quality was low, although the questions were extremely simple. The general conclusion from the BRALUP study regarding the quality of the collected data, was that only a few very simple variables could be processed by statistical methods. For most variables only general, qualitative statements could be made.

Before discussing our material, a note should be made on the quality of official statistics in Tanzania. It is hard to judge their reliability, and not always advisable

to take them at face value. The 1967 census is regarded as being of fairly high quality compared to censuses in other developing countries,[1] but this is not true of the data from the regional, district and cooperative offices. I came across several cases of obvious adding mistakes and others where, for example, a crop was not recorded as being purchased by a cooperative, although the peasants had stated that they had sold the crop to the cooperative.[2]

Reliability

> Is it at all possible to define 'reliability'? Behind each figure there is a range of definitions and behind the different interpretations of the figures there is a range of values - emotional, political, ideological.
> (Bondestam, 1973, p 49)

As it is impossible to quantify the reliability of the collected data, I shall limit myself to mentioning some sources of error - not in order of importance - affecting the reliability.

Language - The questions were formulated in English and translated into Kiswahili. In several cases the interviewees did not understand Kiswahili very well. The questions were then translated into the local language, in most cases Kichagga. The interviewers were familiar with Kichagga as they were born in the Moshi area. The successive steps of translation may have distorted the form and confounded interpretation of the question.

Understanding the question - There are two sources of error: the respondent and the interviewer. If the respondent obviously did not understand a question, or if the interviewer suspected that the respondent did not understand,

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[1] For a discussion of the 1967 census, see Egerö & Henin, 1973.

[2] In this case one might suspect a case of embezzlement. Since 1967 all the regional, district and primary societies of the cooperative movement have been abolished in Tanzania, partly because of corruption within the societies. The whole cooperative movement is now in a state of reorganization.

the question was explained. Although the interviewers had been trained in advance and were expected to understand and interpret the questions in the same way, there might have been cases when the questions were understood differently.

Courtesy - This source of error is very hard to check and to estimate, and is therefore also difficult to reduce. Before the interview started the respondent was asked to give precise and correct answers and the point was stressed. To the general 'interviewer effect' a special cultural bias is added in this case. People are particularly keen to please a stranger with their answers.

Incorrect information - This error is similar to the previous one. If people have forgotten or do not want to give a correct answer, little can be done. When the interviewer suspected or knew that the respondent was consciously giving incorrect information, this was indicated, and the answer was treated as a non-answer.

The research team may have been believed by some to be a government representatives, which may also have affected the answers. However, we were careful to clarify that the study was independent of any government institution.

To reduce the error resulting from the last three sources, several cross-questions were asked. When an interview was finished, these cross-questions were checked, and if inconsistencies were found, the respondent had to answer these questions again.

Reluctance to answer - In this case there is no actual error, but reluctance to answer a question may lead to an incorrect answer instead of refusal to answer. (The general reluctance to participate in the survey has been discussed above.)

Giving the same answer as they heard others giving - Although we tried to conduct the interviews in privacy, it was difficult to prevent others from listening, as several

people were gathered at the same place. Some were waiting to be interviewed and others were waiting for their friends. Whenever someone was sitting beside an interviewee we asked him to move away a bit, and explained the reason why. In general, we could not insist too much on privacy during the interview. A feeling of suspicion among the respondents or between those who had been selected and those who were not interviewed could easily develop.

Retrospective assessments - This phenomenon was hardly a source of error because of the nature of the study and the type of questions asked. Only few questions involved retrospective assessment, e.g. when peasants were asked to state the reason for losses of crops and livestock and changes in the crop structure.

Vested interest in the outcome - This may be a source of error in certain variables. As discussed below the respondents probably understated the number of livestock due to fear of taxation and destocking. In questions about obstacles to development, they may have listed some just in the hope that the government might come and help people remove them.

Confidentiality - There were no problems of access to the data needed, but as shown above, confidentiality for the respondents may have affected the answers. The team was aware of this problem and some of the most sensitive questions were left out, specially those concerning the ujamaa policy.

Estimating quantitative data - Data relevant to this study included acreage of fields, livestock owned, number of items possessed, etc. The degree of unreliability in this data could not be ascertained. It was beyond the resources of the team to measure a sample of fields or count the number of livestock. However, a check of the accuracy of peasants' estimations of the acreage of their fields has been made in the Southern Highland Socio-Economic Survey

(SHSES), summarized in Pipping (1976, p 32) as follows: (1) the accuracy of the peasants' answers was fairly low; (2) their estimations of the acreage of cash-crop fields were better than those made for other types of crops; (3) they more often over- than understated the acreage of their fields and; (4) those who had little land tended to overstate their acreage more than those who had much.

For livestock, it is likely that those who have many units tend to understate the number, being afraid of taxation and other measures unfavourable to them. It is also common that the respondent does not know the exact number of his livestock, as it is considered a bad omen to count them. On the other hand, they know each individual animal. This 'reluctance' to count heads shows in the answers. Many stated that they owned 5, 10, 20, 50, 100, etc.

In this connection it is worth mentioning that people tend to overstate for prestigeous reasons, e.g. the number of items owned. Further, it is obvious that they overstate their ability to read and write, as illiteracy is looked down upon. A person may consider himself literate - although he cannot read and write - because he has completed an adult-education course.

Measurement instability - Important factors are changes in the observers (interviewers) and the subjects. Most of the error resulting from these changes have been discussed above. However, a point in connection with the coding of the answer should be noted. The way the answers were interpreted and grouped might also have led to instability. Two people were responsible for the coding of the questionnaires, and I did all the check-coding in order to get a one-dimensional interpretation and method.

Let me end this section with a comment on the relation between the level of literacy and the reliability of the stated acreage of fields. In the SHSES it is suggested that

some inaccuracy in the estimation of the acreage is caused by the low level of literacy. Over 50 per cent of the respondents were illiterate and had only a vague idea of what an acre is. In the study area the level of literacy is higher - the Moshi District has one of the highest literacy levels in the whole of Tanzania. However, the reader should be reminded that the same bias as in the SHSES may occur in my data.

In conclusions, the overall reliability of the data is high enough for the type of analysis applied and the type of conclusions drawn. However, a general problem in this connection is that, while the data-gathering process is much more difficult in developing than in developed countries, the norms for evaluating the quality of the data are the same as if the data were collected in an ideal situation.

Validity

Is the collected data relevant to the research questions? I shall comment on this in connection with the discussion of the findings. However, one aspect of the validity of the data will be briefly touched upon in this section.

Campbell & Stanley (1966/1973) and Alloway (1976) have discussed various factors which jeopardize validity. They make a distinction between internal and external validity. The former, in my opinion, is a question of reliability rather than validity. The external validity is a question of generalizability - the relation between the data on the one hand and the findings and the answers to the research questions on the other.

> External validity asks the question of generalizability: To what population, setting, treatment variables, and mesurement variables can this effect be generalized?
> (Campbell & Stanley, 1966/1973, p 5)

The question of generalization is very relevant, and with regard to the present area the question should be phrased: to what extent can the findings from this study be generalized to other areas?

It should be born in mind that one of the purposes of this study is to make a geographic synthesis and to explain the present situation. For an explanation it is necessary to use not only interview data but also historical and official records, aerial photographs, etc. To generalize the findings we have to refer to similar case studies and try to find out how far the results support or reject one another. For a comparison of the case studies, it is important that the background variables - political, social, economic, historical, etc. - are comparable. The economic system, the social conditions and the historical situation should be roughly similar. However, if one of these background factors is the explanatory variable this will not be so. Because of the uniqueness of each case study, the processes observed may contain many confounding factors that prevent generalization, even if some results and conclusions from case studies can be generalized.

5. TYPE OF SOCIETY

A major purpose of this study is to reveal the great stratification between households, in both social and spatial aspects. The African peasantry is commonly misconceived as being homogeneous. In reality it is a rather heterogeneous and diversified society. This observation is relevant to the analysis of African rural societies aimed at formulating recommendations for achieving a surplus production among smallholders.

Northern Tanzania, and especially the Kilimanjaro region, has long been more developed than the other parts of the country. Many trade routes touched the southern slopes of Kilimanjaro, e.g. the Kahe area (Stahl, 1964). Many early European explorers passed through the area. When the Germans colonized East Africa, the Kilimanjaro region received prime interest.[1] White farmers settled in the area, cultivating wheat and coffee. In addition, plantations were established for the production of sisal and sugar.

The European settlers produced for the market and the African smallholders were encouraged to grow cash crops, mainly coffee. The cooperative union was established early

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[1] During the First World War the British attacked the Germans in the Kilimanjaro area and pursued them throughout Tanganyika, and even in Mozambique and Zambia. A battle was fought in the Kahe area. (Gardner, 1963, and Sibley, 1973).

in the area, but the initiation of the Kilimanjaro Native Cooperative Union was a difficult matter. The Wachagga peasants were suspicious of this new organization (Hydén, 1980, p 54). It eventually became a major promotor of cash crops and development, but it was criticized as principally serving the wealthiest peasants, who allegedly used the organization for their private interests.

The study area epitomizes rural Tanzania. The environment varies considerably from good agricultural areas to infertile and very dry parts. The culture and social composition is similarly mixed. Over 50 ethnic groups are to be found, and the social stratification is pronounced. However, the people living here have been more exposed to the 'modern way of life' than the average rural dweller in Tanzania.

The area is economically diverse. The smallholders dominate production, but plantation work is an important source of income. Other types of wage employment exist, especially in Moshi. Remnants of a pastoralist economy are to be found in the southern parts, Mawala, where the semi-nomadic Wamasai live almost exclusively from livestock.

This section deals with the social stratification of households. Their spatial stratification is discussed in the Annex. The common notion of a homogeneous peasantry will be proved to be false and Chayanov's theory of peasant economy will be tested.

The households can be classified into three groups according to the main source of income of the head: (1) wage-earners, (2) agriculturalists, and (3) pastoralists.

The analysis focuses on the second group. They are the dominant type and the process of change affects them most - the pastoralists excluded. They are also politically the central group, since the rural development policy is geared towards a changed production pattern for smallholders. They are expected to produce enough, not only to support them-

selves, but also to sustain a growing urban population. Moreover, their surpluses should contribute to the financing of an industrialization of Tanzania.

SUBSISTENCE AGRICULTURAL PRODUCTION

African peasants are often characterized as subsistence producers. This characterization is challenged here. It is obvious that household production is organized to supply basic needs. But this type of production is not the same as subsistence production.

With the loosest definition of subsistence agricultural production - households have a farm and do not market agricultural products - a total of 48 households (8.5 per cent) fall into this group. The more strict the definition of subsistence production, the smaller the number of household that will come within this category. For example, if subsistence households are characterized as those that do not market any agricultural or livestock products, including live animals, and do not have any off-farm income, 31 households (5.5 per cent) fall into this group. If the demand side of involvement in the monetary sector is included - the purchasing of goods - only one household remains that can be characterized purely by its subsistence production.[1]

Admittedly, this definition of subsistence is strict. It does not account for the amount of products sold. To reach a more operational definition the variable 'growing cash crop' was substituted for 'marketing of agricultural

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[1] To buy products you must have cash. The 30 households that claim not to have sold any products in the preceeding 12 months, nor to have had any off-farm income, have still managed to purchase some goods, up to 13 items during the last four weeks. These households must have sold products before the twelve months studied, or some members of these households must have had off-farm work which has not been recorded. However, these 30 households purchased fewer items than the average for the whole area.

products'. This meant that only those selling a possible surplus are excluded and considered as subsistence peasants. The new definition gives the same number of households (31) that can be characterized as 'subsistence peasants'. These households are to be found mainly in the Soko (IX), Mwangaria (X), Rau-River (III), and Msaranga (I) subareas (see Map 4:1). For the two former subareas the result was expected. They represent the least developed areas.

Interestingly enough, the largest proportion of 'subsistence' households is found in the Msaranga subarea, almost 20 per cent. This is strange and unexpected, since the households here are strongly influenced by Moshi, and on the average are quite involved in the monetary sector.

These nine households were therefore specially examined. They did not differ from the average peasant-household in the subarea with respect to the following six variables: (1) age of the head, (2) standard of living, (3) size of cultivated land, (4) consumer-worker ratio, (5) number of agricultural inputs and farm machinery used,[1] and (6) size of livestock holding. However, the nine households had one distinct feature in common: their heads were migrants.[2] In addition, heads originating in Lushoto in the Tanga Region were overrepresented.

There is thus a group of peasants living close to Moshi and not producing for sale, although the market is very close and the market economy is a reality. They do not differ from the average peasant in the area, except that they

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[1] See note 3, p 116.

[2] The share of migrants in Msaranga subarea is below the average for the whole study area (Annex, Part II, pp A85-A94 and Table II:4).

are all migrants and most of them come from an area where land competition is hard.[1]

(1) Do these households form a group that has resisted integration into a larger and more complex society? (2) Have they marketed products or had off-farm income earlier? In other words, do they represent a fringe group that sometimes grows cash crops or has off-farm income and sometimes withdraws from the market economy?

If the first hypothesis holds, there is a great diversity of peasant households in the area. Alongside fairly developed households, some continue to live according to traditional social and economic norms. The second hypothesis suggests that some were not classified as 'subsistence peasants' because they were temporarily growing cash crops or having off-farm income.

The second alternative is most plausible, because those currently classified as 'subsistence peasants' have the same standard of living as the average peasant-household. Moreover, the other socio-economic variables are not significantly different. Thus, a group of peasants may be marginally integrated into the market economy, sometimes being included and sometimes not.[2] No household seems to be completely outside the monitary system. They enter the market system from the demand side as buyers more often than from the supply side as sellers of agricultural products (Hydén, 1980, pp 13-14).

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[1] For comparison, heads of household who had farmland and were wage-employed were analysed by the same socio-economic variables. Two variables showed significant differences from the average. (Significant levels were 0.05 and 0.001 respectively.) Employee heads were on the average younger and had higher standard of living. Note, those employed and living in Msaranga are working in Moshi and are paid according to rates for urban areas.

[2] That the 'subsistence peasants' are sometimes within the market system is supported by the fact that 45 per cent of them are members of a producers cooperative union.

PEASANT ECONOMY

Although the peasants are partly in the market economy and are well aware of its existence, production for use-value is dominant. Given a system of household production of this character, Chayanov's theory of peasant economy postulates that the intensity of labour per worker will increase proportionally to the domestic ratio between consumers and workers. The greater the relative number of consumers the harder on an average each producer has to work.

Since production techniques and methods are almost homogeneous in traditional agriculture, labour intensity can be approximated by cultivated acreage per worker.[1] Hence the more hectares a worker cultivates, the greater the labour intensity.

Labour intensity was tested by multiple regression for six variables: (1) consumer-worker ratio,[2] (2) number of livestock owned, (3) number of input used,[3] (4) farm machines used,[3] (5) standard of living,[4] and (6) education.[5]

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1 Sahlins (1974) discusses two cases where there is a good correlation between labour intensity and consumer-worker ratio.

2 Number of workers and consumers in a household were calculated in the following way:
Worker = adults + children above 15 years x 0.7 + other relatives x 0.5.
Consumers = adults + children below 7 years x 0.3 + children 7-15 years x 0.7 + children above 15 years + other relatives x 0.9.
The weights are derived from Kerbly, 1976, Table 2.

3 Inputs include: manure, fertilizer, hybrid seed.
Farm machinery include: tractor, plough, sprayer, cart and other machinery.

4 Cf. Annex, Part II, pp A106-A109.

5 Cf. Annex, Part II, pp A110-A117.

It was hypothesized that the tested variables had the following effects:

1. Consumers per worker: given a traditional society with use-value production the intensity of labour should augment with an increasing ratio.
2. Farm machinery: more farm machines means that less labour is needed to produce a specific amount of agricultural products.
3. Inputs: more inputs mean that less labour is needed to produce a specific volume, since inputs generally increase the yield.
4. Livestock units: it could be expected that more livestock would mean less labour in agriculture and a smaller acreage per worker.
5. Higher standard of living and higher education mean better access to farm machinery and inputs, implying a lower labour intensity (cf. points 2 and 3 above).

The six variables accounted for only 3.3 per cent of the variation in labour intensity (hectares cultivated per worker). Thus the variables used do not explain the variation in labour intensity. Most important was farm machinery. The consumer-worker ratio did not explain any variation, consequently it does not have any explanatory value at all in relation to labour intensity. Since farm machinery has greater (though still slight) explanatory value, capital accumulation is important. Households produce not only for use but also for sale.[1]

The question related to hired labour is central to Chayanov's model of peasant economy, but cannot be fully analysed by my data. The hiring of outside labour would distort the relationship between the consumer-worker ratio

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[1] Almost 50 per cent of the households owning farms sold agricultural products (Annex, Part I, Table I:18).

and the size of land holdings. Many pieces of evidence point in the same direction: it is as common to hire labour as it is to hire farm machinery for work on the farm.

Farmland holdings by households show great variation (Annex, Table I:8). A traditional agriculture economic system does not imply an even distribution of land among the households. Land holdings vary due to the number of consumers and workers. Chayanov showed that a household's land holding also varied over time, depending on the consumer-worker ratio. Land was assumed to be in unlimited supply.

Can the variation monitored in this area be explained by the number of consumers or producers within a household, or do other factors again have more influence? It was discussed in the Annex, pp A21-A24, that the traditional land tenure system is slowly breaking up, giving way to a system of private ownership of the use-right. Approximately one third of the plots in the area have either been bought or inherited. The areal distribution of plots also points towards an erosion of the traditional land tenure system (Annex, Figure I:2).

In a stepwise multiple regression analysis over households owning farmland, a number of variables were tested to reveal their effect on the variation of farmland holdings by households. Together the eight variables absorb 36 per cent of the variation (Table 5:1). Almost two thirds of the variation in farmland holdings was unexplained by the studied variables and must therefore be related to other factors. The most important variables are the number of consumers and workers in a household, an indication of the importance of use-value production.

Sale of products (D2) is more important than farm machinery. Growing of cash crops is a better determinant of a household's land holding than use of farm machinery.

Table 5:1. Determinants of Farmland Holdings by Households; Regression Estimates (Owners of Farmland)

Variable	β
Consumer	0.22[x]
Worker	0.19[x]
Sale of products (D2)	0.16[x]
Standard of living	0.15[x]
Off-farm work (D1)	0.12[x]
Farm machinery	0.11[x]
Livestock	0.08[x]
Input	0.05
D3 (D1 x D2)	-0.03
Intercept	0.74
R^2	0.36
F	28.4
N	474

β = Standardized regression coefficient
D1, D2 and D3 are dummy variables
x = Significant at 0.01 level

Traditional methods of land preparation and harvesting are thus used by most households, even among those that grow cash crops.[1]

Livestock could mean less dependence on agriculture.[2] It is possible to sustain a family on less land - grazing land is commonly owned. However, livestock owned by a peasant household only marginally influences its acreage.

The analysis of the main occupation of the heads of household (Annex, pp A94-A97) shows that many of them have incomes from outside sources. Some 30 per cent are wage-

[1] Peasants marketing their products have larger farms on an average than the rest, 2.2 ha compared to 1.5 ha.

[2] Livestock versus agricultural production will be discussed below.

earners. On an average they have less land than the peasants, 0.9 ha compared to 1.8 ha. The farm in these cases provides extra income. However, the variable 'off-farm work' (D1) only marginally influences the variation in land owned by household.

Resources within the household are to a large extent allocated to use-value production. This is extended in many cases beyond the basic needs. Marketing and the use of farm machinery also determine the variation among households in farm acreage. Those marketing their products and those employing farm inputs and machinery have more land. This is a further proof that farm implements are used not to diminish labour intensity, but rather to increase production. In other words, there is no backward-bending supply curve.[1]

Acreage by the household is mainly determined by the number of consumers (producers). Labour for the preparation of land is a production bottleneck and, if this is reduced, less land can be prepared and production drops. The marginal productivity of labour is thus greater than zero (cf. Lewis, 1954).

As has been shown, the variation in farmland holdings is largely explained by the number of consumers and workers per household. If the area is divided into ecological zones,[2] the result still applies to all the zones except the eastern one (Table 5:2). However, in the southern zone there is a negative relation between 'consumers' and farmland holding, while there is a positive relation between 'workers' and acreage. 'Sale of products' and 'livestock' are the most important variables in the eastern zone. The latter is also important in the northern zone.

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[1] For a discussion of the backward-bending supply curve and subsistence peasants, see e.g. Huang, 1976.

[2] See below, Map 7:1 and Table 7:1.

Table 5:2. Determinants of Farmland Holdings by Households; Regression Estimates (Owners of Farmland or Livestock)

Variable	Whole area	North	Central	East	South
	β	β	β	β	β
Consumer	0.22^{x}	0.41^{x}	0.10	0.08	-0.39
Sale of products (D2)	0.16^{x}	0.30^{x}	0.03	0.49^{x}	-
Standard of living	0.16^{x}	0.14^{x}	0.02	0.14	0.30^{xx}
Worker	0.15^{xx}	0.18	0.27^{x}	0.04	0.56
Farm machinery	0.13^{x}	0.03	0.17^{x}	0.09	-
Off-farm work (D1)	0.10^{x}	0.19^{x}	0.10^{xx}	0.19^{xx}	-
Input	0.06^{xx}	0.05	0.07	-0.03	0.29^{x}
Livestock	0.02	0.40^{x}	0.24^{x}	0.49	0.17
D3 (D1 x D2)	-	-0.23^{x}	0.15	-0.33^{x}	0.22
Intercept	-0.26	0.04	-0.14	-0.50	-0.35
R^2	0.33	0.46	0.46	0.48	0.41
F	29.1	13.4	19.1	7.3	3.3
N	485	153	215	81	36

β = Standardized regression coefficient
x = Significant at 0.01 level
xx = Significant at 0.05 level

This result suggests that peasants do not act homogeneously even in a small area. They vary according to external influences: physical environment, linkage to urban centre, cultural influences, etc. Individual peasants behave according to the particular constrictions that they face, and are influenced by their total environment. But constrictions and influences are naturally not uniform to all households.

The result of the testing of the variables is summarized below and related to Chayanov's theory of the peasant economy.[1]

Dominance of the non-wage family unit

The family has a dominant position as production unit and most do not earn wages. However, paid employment plays a vital role in some parts of the area especially around EAKIL and in the vicinity of Moshi. The dominant position of the household unit makes it impossible to calculate resource allocation and decision behaviour according to the marginalist theory. Households are not profit maximizers. Production is extended at least to the point where basic needs are satisfied. If this crucial point is reached before marginal utility equals marginal disutility, production is extended to a point where they are equal.

Level of technology

Agricultural technology varies somewhat among households.[2] The basic technique is common to all households and represents a simple level. But the differentiation among the households increases. Some lease sophisticated technology: tractor with plough, sprayer, etc. Moreover,

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[1] One of the few studies to test Chayanov's theory in an African context is Hunt, 1979. Her findings, from a study in Kenya, agree well with my results.

[2] For a detailed discussion of the farming system in the area, see Chapter 6.

the extension service is mostly geared toward the 'progressive' peasants. The significant difference in per capita production is explained not only by variations in resource endowment; some households have completely broken away from the traditional way of production (Annex, Appendix 3).

Managerial ability

Managerial skill is assumed to be roughly the same in all households in a primitive society. That all households have the same means of production does not mean, however, that they all possess the same farming skills. Sahlins (1974) pointed to this problem when discussing the characteristics of the 'domestic mode of production'. In that type of economy there is always a fraction of the households which falls below the minimum production required. In the study area, managerial ability is even more differentiated due to variations in education, wealth, access to extension services, etc.

Minimum level of output

All households strive to reach a minimum level of output, which to a large extent is socially determined. However, the minimum level is no longer acceptable to most households. Whenever possible they produce beyond this point. The variation in standard of living among peasants indicates an erosion of the socially determined level of output.

Family size influences farm acreage

The number of consumers (producers) has the greatest explanatory value in interpretating variations in cultivated land. However, the consumer-worker ratio does not affect labour intensity.

Free access to land

In some parts of the area land shortage has eroded the traditional land tenure system. Land, or rather the use-

right, is traded. In many parts there is limited access to land. In the area with the greatest population pressure - the northern zone - the consumer and livestock variables have the greatest influence on the acreage of cultivated land. The strong influence of 'consumer' is surprising.

Off-farm income

Many heads of household work for a wage either regularly or temporarily. Some also have other types of off-farm income such as charcoal-burning, a bar, a shop, etc. Work off the farm contributes considerably to the income of many households.

The existence of off-farm income renders the theories of primitive economies or the 'domestic mode of production' irrelevant to the analyzing of our type of society.

Despite 'our' peasants being more 'developed' than the average Tanzanian peasant, Chayanov's theory for an analysis of this type of society provides in a general way some fundamental insights. The results obtained cannot obviously be transferred to any peasant society. Hunt (1979, p 277) states that three variables have decisive influence on the extent to which Chayanov's model holds:

> ... the availability of, and access to land; the importance of education as a determinant of access to different types of off-farm work; and, social norms regarding the diffusion of labour.

The analysis clearly shows that the peasant-households are heterogeneous rather than homogeneous. The differentiation, already quite noticeable, will increase with the ability of wealthier households to afford better techniques and to take risks,[1] to get better services and provide their children with a better education. Formal education requirements act as a barrier to wage-employment and social mobility (Boesen, et al., 1977, p 30). When extended to those who

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[1] For a discussion of risk aversion among peasants, see Chapter 10.

lack the formal competence, the wage-employment opportunity alters the economic stratification of the households even more. The unskilled have access only to low-paid jobs. The educated will take the better-paid jobs in the urban areas.

When the analysis is enlarged to include others as well as peasants, the social stratification becomes even greater. Among the employee-households there is a great difference between those living in the Msaranga subarea on the one hand and those living in Kahe Station on the other. Most of the former work in Moshi and are paid urban wages, while the latter are paid according to rural scales. Most of them are plantation workers. This group can be characterized as 'proletarian' with a low standard of living. Moreover, they have to buy their daily consumer goods.

The marginal group of the area, the Wamasai, are slowly being pushed out. They have a relatively low standard of living. The crucial point is that the very existence of their way of life is threatened when their pastures are taken over by smallholders or large plantations.

In conclusion, the social stratification is pronounced, not least among the peasant-households. The establishment of the EAKIL plantation has created a group of households with a low standard of living. They rely on purchased goods for their daily consumption. The heterogeneity of the peasantry must be recognized when aspects of policy for the area are being discussed or implemented.

Our type of society cannot be analyzed in terms of one set of concepts only, e.g. the theory of the peasant economy, since these would be relevant to one segment of the society only, albeit the largest. Households depending on wage-employment are an important group that must be analyzed and described in terms of other concepts; the same applies to the pastoralists.

6. AGRICULTURAL SYSTEM

> An agricultural system is the fundamental linkage between farmer and environment, indeed between all societies and environments for producing food and other agricultural commodities.
> (Knight, 1976, p 198)

The agriculture of the study area differs markedly from that of the higher slopes of Mount Kilimanjaro with their fertile land, well supplied with rain and irrigation. Coffee, bananas and maize are the main crops here. In the last few decades an important and particularly interesting farming system has developed. The farms are small, between 0.5 and 2 ha. Since the introduction of coffee, the lower slopes of the mountain have also become a major area for maize cultivation. Communal grazing land has been abolished and given over to permanent cultivation due to the population pressure. Livestock are kept in stables and fed from banana stalks and leaves as well as hay collected in the low-laying areas. Land shortage has eroded the traditional land tenure system. Among the Wachagga, land has been turned into a commodity that can be traded (Ruthenberg, 1968, pp 214-217).[1]

The system of stable-feeding the livestock does not seem to have resulted from the introduction of coffee as a cash crop. Most Wachagga stable-fed their cattle already

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[1] Dundas' (1968, pp 258-269) discussion centers on the ceremonies in connection with agriculture and livestock management.

before this. Nor were the cattle kept in stables, as has been suggested, in defence against Masai raids. The system seems to have a simple economic explanation: population pressure (Kjekshus, 1977a, p 35). By the end of the nineteenth century little land was left for grazing and mixed farming had developed already by that time. Manure from the stables was spread on the banana fields.

Irrigation is a main characteristic of the Kilimanjaro agricultural system. Recent studies have dated some major furrows earlier than 1850. Early European explorers in the middle of the nineteenth century in the Kilimanjaro area reported extensive irrigation systems (Kjekshus, 1977a, p 34).

Over the years, population pressure and land fragmentation have increased. The lower slopes could be used not only for the cultivation of maize, grazing and hay collection by people living on the higher slopes but also by residents. Gradually, people living on higher altitudes were forced to settle in the lower region, and thus became dependent on the crops that could be raised here. Consequently, more land was put under permanent cultivation, and the grazing area was reduced. As the Wachagga penetrated into the lowland, the Wapare for similar reasons entered the lower slopes of Kilimanjaro from the south and east, reducing the grazing land even further.

The original people, the Wakahe, whose core area is around Kahe Barazani, lost much of their land by this penetration. The Wakahe, besides being agriculturalists, kept livestock that was herded on the lower slopes. The Wamasai also used this area for grazing when the Masai Steppe became too dry. The gradual cultivation of the lower slopes has primarily affected the pastoralists, the Wamasai, and they have been almost entirely pushed out.

Besides smallholder cultivation large parts of the lower slopes were acquired by plantations, starting in the

early twentieth century. Even today new land is being brought into the plantation economy, while some of the old sisal plantations have been abandoned.[1]

The gradual intensification of land use in the study area, especially in recent decades, is clearly shown by the land-use data for 1962 and 1975, Maps 6:1 and 6:2). The northern part was only partly cultivated in 1962. However, large parts were lying fallow, indicating that the land had been cultivated. Thirteen years later the whole area was under cultivation. Only marginal parts are periodically left fallow. In fact, all potential land is cultivated, and even some marginal land that is not suitable for agriculture.

The land produces one or more crops a year and only small segments are left fallow, usually for a year. The grass on the fallow is burned and the ashes serve as fertilizer. Generally, the agricultural system can be characterized as annual cropping. However, multi-cropping is common in the northern parts. The second group is grown in low-lying areas, close to rivers or otherwise irrigated. In the eastern and southern areas one crop only is possible. Here, the short-rains are insufficient, very unreliable and frequently non-existent.[2]

Irrigation is common. However, the potential for irrigation varies greatly.[3] Most rivers have water during the rainy seasons only. But irrigation can even out the local variation in precipitation. Irrigation is mainly implemented during the rainy seasons. It cannot provide water for a second crop in areas with insufficient or non-existent short rains.

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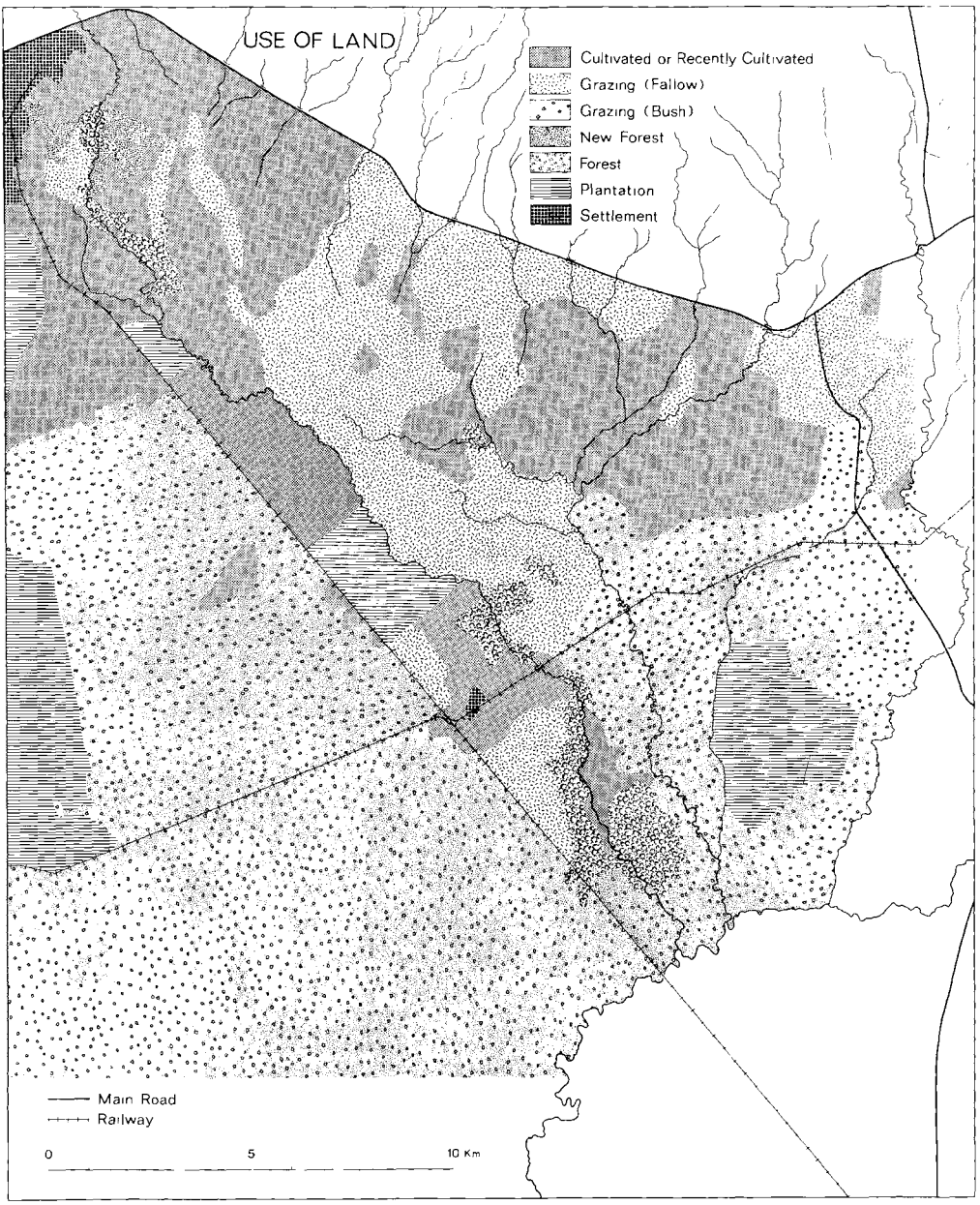
[1] Cf. Annex Part I, pp A14-A15.

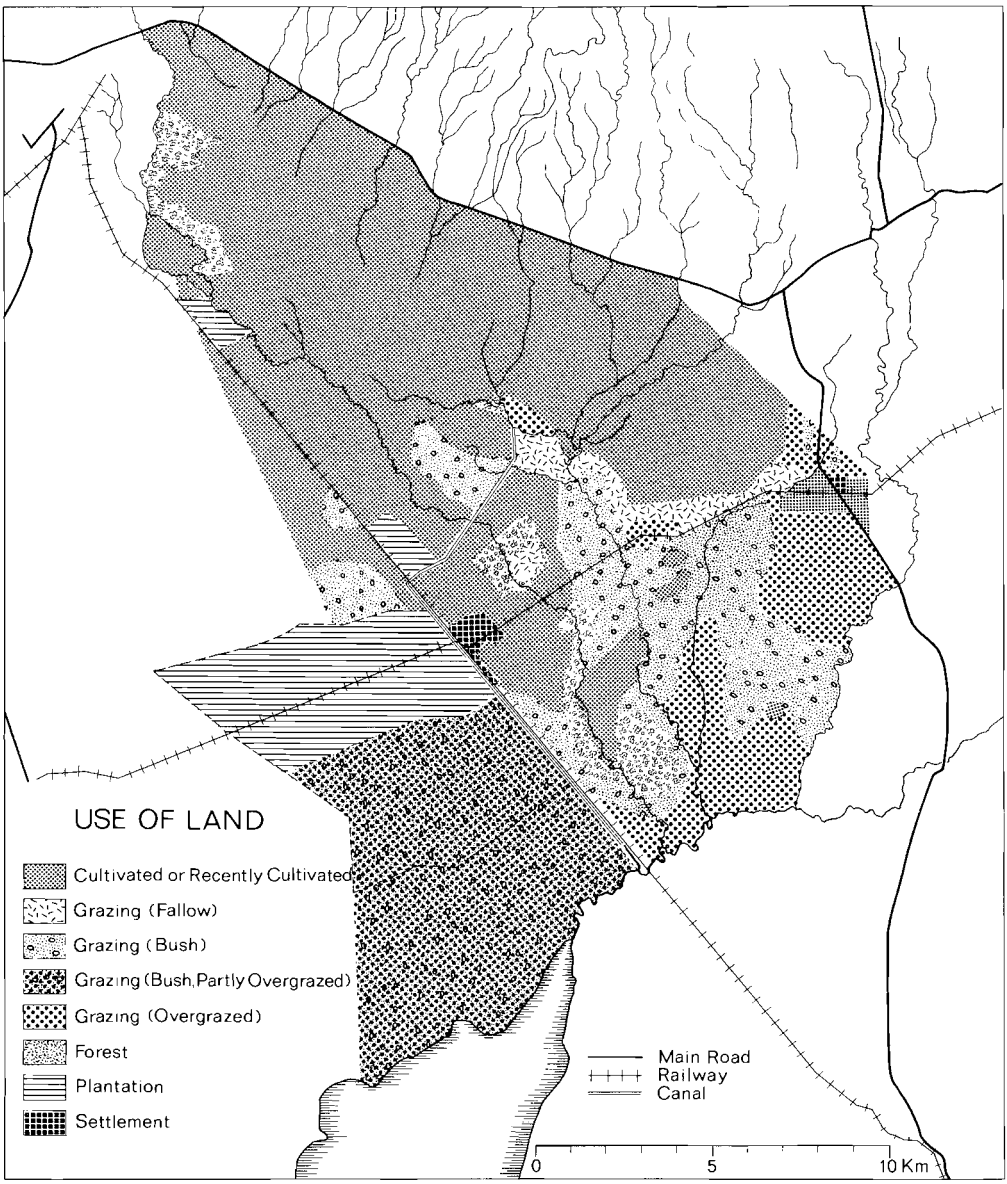
[2] Annex, Appendix 2.

[3] Annex Part I, pp A41-A42.



Map 6:1. Land Use 1962

Source: Aerial photography: 60-TN-2, 1962.01.14, plates 064-079, 136-138.
60-TN-7, 1962.02.01, plates 065-066.
60-TN-4, 1962.01.26, plates 041-044.



Map 6:2. Land Use 1975

Source: Aerial photography: Hand camera, 1975.06.28.

The same technique is applied in all households. Land is tilled with the hoes. Draught animals are not used, but many households hire a tractor with a plough for land preparation. Agriculture inputs, such as fertilizers, manure, insecticides and hybrid seeds are seldom used, and then mainly in the northern parts.[1]

The major crop is maize, followed by beans and bananas. Cotton is the main cash crop, while coffee is only cultivated marginally. Intercropping is common, mainly maize and beans. In addition a large variety of crops are grown.[2]

Mixed agriculture is not common, except among some households in the northern area. In most places livestock supports agriculture as an insurance in case of a bad harvest. Livestock or livestock products can be traded for cereals. Among the Wamasai livestock is the main source of income and agriculture is the supporting element.

ANALYSIS OF THE FARMING SYSTEM

The analysis is limited to the farming system and the ecological impact has been disregarded.[3] The socio-economic setting of the households, their technology (farm implements and inputs) and their involvement in the monetary sector provide the main variables in the analysis.

Among the inherent difficulties in a study of this type is the establishing of cause and effect among the statistical data. Does a household have a high standard of living because of large land holdings and involvement

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[1] See Annex, Table I:16.

[2] For a thorough discussion of the agricultural sector and the variables studied, see Annex Part I.

[3] For a discussion of the ecological influence on production patterns, see Chapter 7.

in the market economy, or is it the other way around? Does a household use many farm implements and inputs because it is rich and can afford them, or vice versa?

An investment in land will increase income, provided there is enough labour to till and harvest. This extra income can in turn be invested in farm implements, which will reduce the production bottleneck faced by a household using traditional methods. The abolishing of bottlenecks will further increase the production and income of the household.

Such a rising spiral lays behind the choice of variables used in the analysis to investigate whether some households have 'taken-off', leaving the traditional farming system and becoming more involved in the market economy and more dependent on a larger and more complex society than the village.

The variables are grouped into three major aggregates: (1) socio-economic, which give the overall household structure; (2) farming practices - farm machinery and inputs,[1] irrigation and crops grown; (3) market contacts - cash crops and items purchased.[2] Acreage of tilled land by households is the main discriminating variable (Figure 6:1).

Farmland acreage is influenced by all three groups. However, of the two variables measuring involvement in the monetary sector only 'cash crop' has any influence. Two of the socio-economic variables - family structure and standard of living - and three of the four farming-practice variables are interdependent with a household's land holdings (Table 6:1 and Figure 6:1).

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[1] Farm machines include: tractor, plough, sprayer, cart and other machinery. Inputs include: manure, fertilizers, hybrid seeds, see Annex Part I, pp A43-A45.

[2] Cf. Annex Part I, pp A45-A48 and Part II, pp A117-A123.

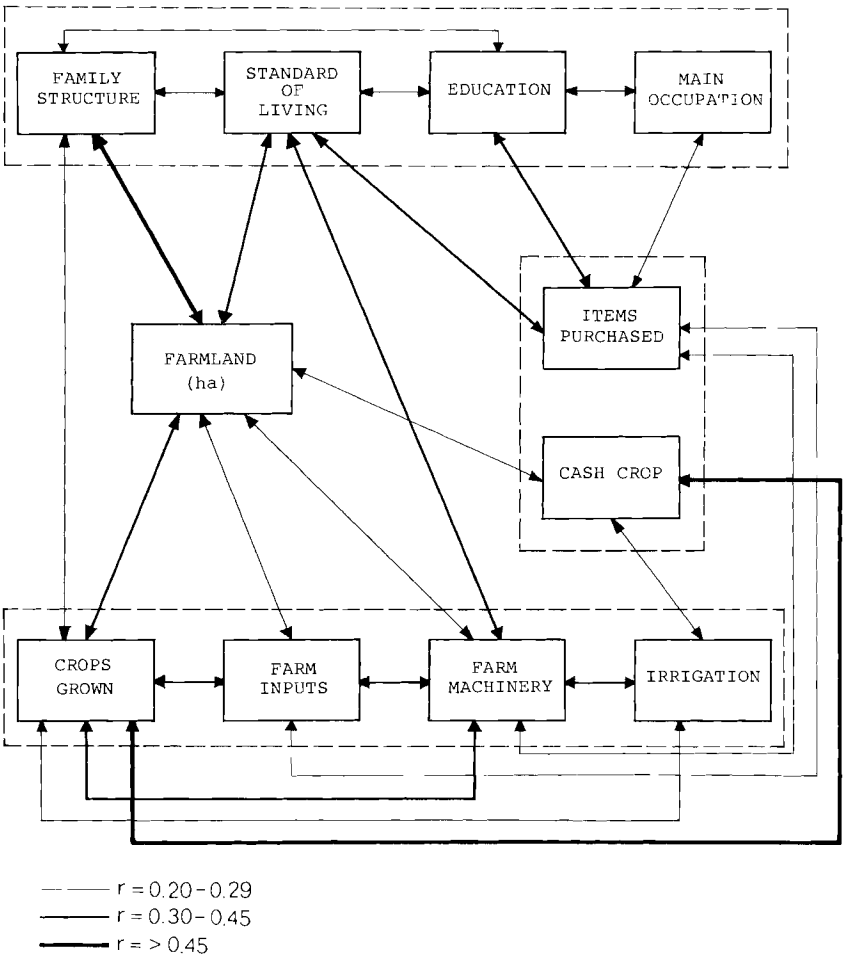

Figure 6:1. Farming System (Source Table 6:1)

Table 6:1. Farming System, Correlation Matrix

	Hectares of farmland	Level of education	Standard of living	Items purchased	Producers	Main employment	Crops grown	Farm inputs	Farm machinery	Irrigation	Marketing agricultural products
Hectares of farmland	1.0										
Level of education	0.06	1.0									
Standard of living	0.31*	0.28*	1.0								
Items purchased	0.18*	0.30*	0.32*	1.0							
Producers	0.50*	-0.06	0.24*	0.13	1.0						
Main employment	-0.11	0.23*	0.17*	0.26*	-0.11	1.0					
Crops grown	0.38*	0.15*	0.16*	0.16*	0.24*	-0.10	1.0				
Farm inputs	0.20*	0.19*	0.13	0.22*	0.12	0.00	0.31*	1.0			
Farm machinery	0.28*	0.18*	0.31*	0.23*	0.16*	0.04	0.34*	0.34*	1.0		
Irrigation	0.13	0.14	0.09	-0.04	0.07	-0.09	0.23*	0.12	0.08	1.0	
Marketing agricultural products	0.23*	0.07	0.10	0.11	0.12	-0.04	0.49*	0.19*	0.19*	0.20*	1.0

* Significance: s = 0.001

The interrelation between the socio-economic and farming-practice variables is quite small. The family structure affects the variety of crops grown, and the standard-of-living the number of farm machines. The level of education of the heads of household has some influence on the number of farm inputs and machines.[1]

Wage-employment does not influence the kind of farming practice, which is simple and commonly accepted, irrespective of whether the household has any off-farm income or not. No specialization has appeared between households solely dependent on agriculture and those with additional off-farm incomes. However, the latter do not have labour enough to cultivate as much, 0.9 compared to 1.8 ha, although they rent a tractor more often than peasants.

More interesting is the lack of difference between the two groups in the propensity to market their agricultural products, which could be interpreted in two ways: (1) households with off-farm incomes have not yet completely switched over to reliance on outside money, which is often either temporary or unreliable. They must always plan for a return to agricultural production without additional income. Production on the farm provides not only household consumption but also cash income. (2) Households deriving their income from agriculture only, market a surplus only if they have any. The majority of the peasants do not plan to grow a regular surplus.

In the other dimension of involvement in the monetary sector - purchasing of goods - the two groups show a significant difference. Wage-earning households buy more items on an average than the others. There are two main reasons for this: (1) they cannot produce enough on the farm to

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[1] All four socio-economic variables included are interdependent. It is beyond the scope of this analysis to determine which has the strongest explanatory power.

sustain the family; (2) off-farm work increases the available cash much more than the sale of agricultural surpluses.

Those who market their agricultural products are more prone to practise irrigation[1] and to grow a larger variety of crops. In addition they employ more agricultural inputs and farm machinery than the others.

The farming practice variables are also interrelated. For example, households using farm inputs also tend to employ more farm machinery and grow a larger variety of crops.

CONCLUDING REMARKS

The majority of peasants employ a traditional farming system, slightly modified to allow for the marketing of a possible agricultural surplus. Their only resources are land and labour. The socio-economic variables have a marginal effect only or, in the case of off-farm income, none at all. However, the material clearly reveals a group that is in a transitional stage between the peasant society and a 'modern' farming economy. These people have larger farms, market their products and irrigate their farms more often than others, they use more farm inputs and machinery and grow a larger variety of crops. On an average they enjoy a higher standard of living.

The transitional group has become dependent on regional and national institutions. They are slowly becoming integrated into a larger and more complex society and their societal dependency increases. They rely on institutions for the supply of agricultural inputs and on individuals for machinery. Since they regularly grow cash crops, they have also become dependent on marketing organizations.

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[1] A rank correlation by subareas between share of households that own farmland and sell agricultural products and the share practising irrigation gives $r = 0.52$.

7. ECOLOGY AND MAN

The socio-economic setting has a strong influence on the agricultural system. Some peasant households are mostly engaged in traditional agriculture in which family subsistence is the decisive element; others are in a transitional stage, where the family unit is still important in production decisions - pattern and quantity - and as supplier of labour. The market economy influences the decision process since some households periodically sell cash crops or take wage employment. Some may even be characterized as 'quasi capitalistic farmers'. Their production is geared to a large extent to the market. In addition to family labour they use farm machinery - e.g. a rented tractor with a plough - and such farm inputs as fertilizers, manure, etc.[1] By these means, production is extended beyond the traditional limits of family production.

Livestock is mostly a support for agriculture, an insurance against rainy days. The two sectors are poorly integrated. They are treated as separate elements. In the southern part of the area, livestock is the major source of income and agriculture has the supporting role.

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[1] The spatial variation between the subareas according to the 'modernity' of the farms are presented in Annex Part I, Map I:10.

The purpose of this chapter is twofold: to investigate the relation between man and his physical environment and to show the interaction between the many variables. The ecology-man relation is treated together with the decision process leading to the production pattern of the household. The latter focuses on the variable that has the greatest explanatory value and its variation when the effect of other variables are controlled.

What determinants explain the current production pattern: agriculture measured by the acreage of fields per household, or livestock measured by the households' livestock herds? Do socio-economic variables have a decisive impact or are environmental or cultural influences stronger?

Three groups of variables are analyzed (Figure 7:1): (1) cultural, measured by ethnic affiliation,[1] (2) socio-economic - standard-of-living index,[2] family structure (producing unit per family)[3] and main occupation of the head of household[4], and (3) ecological influences - soil quality and precipitation.[5] For this purpose the area has been divided into four ecological zones according to agricultural potential (Map 7:1 and Table 7:1). The main method used in the analysis, is an analysis of variance in the observed average farmland and livestock holdings of various groups of households (see e.g. Table 7:5).

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[1] Cf. Annex Part II, pp A79-A81 and Appendix 4.

[2] Cf. Annex Part II, pp A106-A109 and Appendix 5.

[3] Cf. above, pp 116.

[4] Cf. Annex Part II, pp A94-A96. Among the self-employed heads of household, only three are non-agriculturalists or pastoralists. Households, where the head is self-employed, are referred to as 'peasant-households', and where he is wage-employed, are referred to as 'employee-households'.

[5] Cf. Annex Part I, pp A3-A9 and Appendix 1.

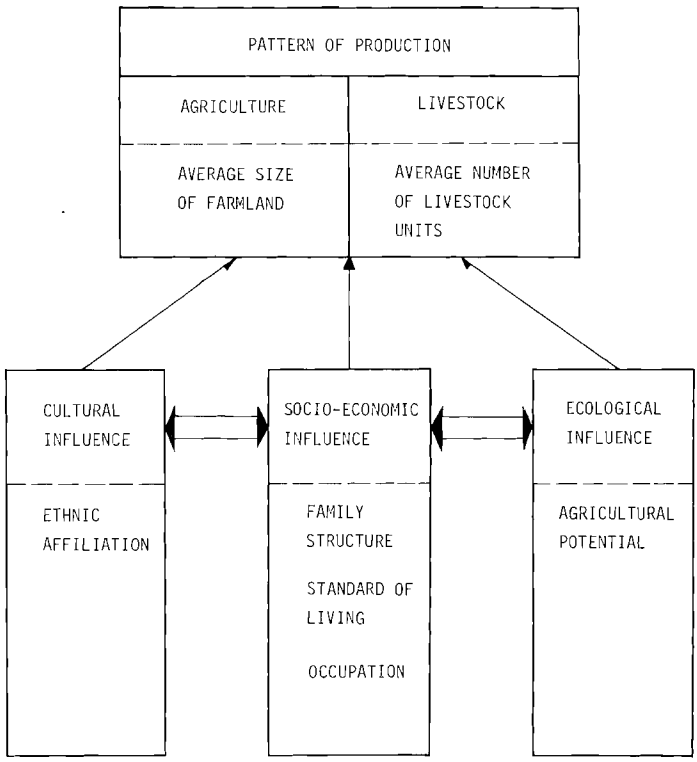
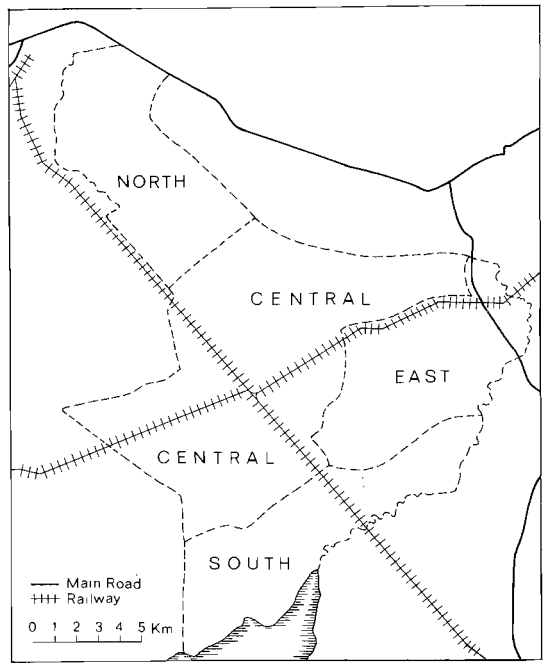


Figure 7:1. Structure of the Analysis

It is hypothesized that the households have adapted to the physical environment and have thus taken its constraints into account in decisions concerning their production pattern. In areas with low agricultural potential they have to rely more on livestock, while agriculture dominates in areas with high potential. Opportunities for off-farm work reduce the dependence on both agriculture and livestock.

If the hypothesis were valid, the correlation between acreage and livestock herds would be negative. However, there is a weak positive correlation ($r = 0.13$). Among households owning a farm the correlation is stronger



Map 7:1. Ecological Zones

Table 7:1. Ecological Zones by Descending Agricultural Potential

Zone	Observations N	%	Villages
North	160	28.5	Msaranga Rauya, Msaranga Ngambo, Mandaka Mnono, Mandaka Mkonga, Rau-River Juu, Rau-River Kati, Rau-River Chini
Central	272	48.5	Ngambo ya Reli, Kahe Sisal, Mkonga Juu, Mkonga Kati, Mkonga Chini, Kisangesangeni, Miwaleni, Kahe Station, Kahe Kenaf, Opuruni, Msengoni, Kahe Barazani, Longoni, Lowiri, Kiterini, Kilototo
East	90	16.0	Kiomu, Ghona, Soko, Mbeu, Mwangaria
South	39	7.0	Mawala, Kimala, Kochakindo
Total	561	100.0	

(r = 0.21): the more the livestock, the larger the farm. However, when the pastoralists are included the correlation drops to 0.11. Furthermore, when controlling for number of producers per household, the correlation becomes insignificant.

How do average farmland and livestock holdings deviate in the four ecological zones? Livestock decreases and acreage increases, as the agricultural potential grows. The situation depicted in Table 7:2 is referred to as the '*general pattern*'. If it holds, irrespective of cultural and socio-economic influences, it is an indication that the households do adapt their production pattern in response to the constraints of the physical environment.

Table 7:2. Average Size of Farmland and Livestock Herds by Ecozones

Ecozone	N	Livestock (units) $\bar{X}$	Farmland ha $\bar{X}$
South	39	198.8	1.03
East	90	19.6	1.66
Central	271	12.5	1.44
North	158	11.9	1.83
Total	558	26.5	1.56

SOCIO-ECONOMIC INFLUENCES

Main Occupation

Off-farm work is an essential source of income in many parts of the area. Peasant-households own livestock and farmland more frequently than employee-households.[1]

[1] Ownership of farmland is more common (85 per cent of the households) than ownership of livestock (44 per cent). Cf. Annex Part I, pp A21-A27 and A53-A56.
(footnote continued on next page)

Given the ecological zones, do the two groups follow the general pattern? Among peasant-households the livestock-owning share decreases with higher agricultural potential (Table 7:3) and the reliance on agriculture as the main source of income increases. For ownership of land the difference is between the southern zone and the rest only.

Table 7:3. Share of Households Owning Livestock or Farmland, by Ecological Zones (All Households, 558 Observations)

Ecozone	Peasant-households		Employee-households	
	Livestock	Farmland	Livestock	Farmland
	%	%	%	%
South	62.2	67.6	(0.0)[a]	(100.0)[a]
East	54.8	100.0	50.0	56.3
Central	46.1	100.0	19.8	52.5
North	46.3	99.2	57.1	88.6
Total	49.3	96.0	31.4	61.4

[a] Only 1 observation

The employee-households do not follow the general pattern. In this case ownership of farmland and livestock follow the same trend: the highest share in the northern zone and the lowest in the central. Off-farm work thus has an effect on the household's production pattern.

The low share of employee-households owning farmland and livestock in the central zone, is due to the heavy immigration of workers to the EAKIL plantation. These workers are mostly young, low-paid, recently settled and the turnover of the labour force is high. The living and

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(footnote from foregoing page)
Owners of farmland and owners of livestock have on an average a higher standard of living and more producer units within the family than non-owners. Level of significance between the groups - owners and non-owners - is 0.01 % in all cases.

working conditions of the majority of the workers inhibit them from investing in livestock. Farmland, on the other hand, is generally free but located some distance from the worker's place of residence. Those who want and have time and labour capacity can cultivate. But it means clearing land, which may not be worth the input of travel and work hours. Moreover, the workers want to leave the area as soon as they get a better offer. Why invest money in livestock and labour in a farm?

The difference between the northern and eastern zones in shares of households owning farmland or livestock is explained by the northern zone having been settled longer than the eastern. More important, the employees from the northern zone work in Moshi and are thus paid urban rates. Those from the eastern zone are paid rural rates, mostly as plantation workers, which is the lowest paid category.

In the northern zone it is more common for employee-households to own livestock than for peasant-households to do so, but when the latter are owners they have larger herds on an average than the former (Tables 7:3 and 7:4).

Table 7:4. Average Acreage of Farmland and Livestock Herds by Ecological Zones (Owners of Livestock or Farmland)

Ecozone	Peasant-households			Employee-households		
	N	Livestock units $\bar{X}$	Farmland ha $\bar{X}$	N	Livestock units $\bar{X}$	Farmland ha $\bar{X}$
South	35	221.5	1.1	1	(0.0)	(0.6)
East	72	20.7	1.9	10	27.7	1.6
Central	163	16.0	2.0	53	14.5	1.3
North	122	12.5	1.9	31	11.6	1.8
Total	392	34.1	1.9	95	14.8	1.5

The average acreage and livestock herds by owner-households[1] follows the general pattern for livestock, but not for farmland, among both the peasant-households and the employee-households (Table 7:4).[2]

The family structure - number of producers per household - has high explanatory value in interpreting variations in farmland and livestock.[3] The low acreage value for employee-households in the central zone might be explained by the large number of single-person households. However, if this was the only explanation it would also mean that there were small herds, which is not the case. In fact the main employment of the head of household has no discriminatory value when the family structure is controlled (Table 7:5, row 'Total').

When the effect of ecological conditions is also eliminated, only the central zone has a significant difference between peasant-households and employee-households for farmland acreage per producer. For livestock herds per producer the discriminating effect is slightly stronger. In all the ecological zones except the southern there is a small difference, employee-households on the average having larger herds.[4] Why is this so? Even in the central zone, where the households are poor, they have larger herds than their

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1 In the following discussion households owning livestock or farmland will be the base unless otherwise stated.

2 It is easier to get an idea of the increasing importance of agricultural production and the pressure on the land as the agricultural potential increases from a study of actual land use rather than from an analysis of the households' average size of farmland. The cultivated area increases from the south to the north. In the northern zone almost all land is under cultivation (Map 6:2).

3 Cf. above, pp 118-122.

4 Level of significance is between 6 and 11 per cent (Table 7:5). When controlling for family structure and main employment, only the ecological zone has a differential effect for peasant-households.

Table 7:5. Average Livestock Herd and Acreage per Producer by Main Occupation and Ecological Zones (Owners of Livestock or Farmland, N = 487)

Type of household / Ecozone	Livestock units per producer				Farmland (ha) per producer			
	Peasant-households	Employee-households	Total	Sign. level	Peasant-households	Employee-households	Total	Sign. level
	$\bar{X}$	$\bar{X}$	$\bar{X}$	%	$\bar{X}$	$\bar{X}$	$\bar{X}$	%
South	56.9	0.0[1]	55.4	*	0.36	0.16[1]	0.35	*
East	4.7	10.0	5.3	6	0.62	0.58	0.61	*
Central	4.4	7.8	5.2	11	0.75	0.59	0.71	3
North	2.8	4.7	3.1	7	0.71	0.66	0.70	*
Total	8.7	6.9	8.3	*	0.68	0.61	0.67	*
Significance level (%)	0.0	*	0.0		0.1	*	0.3	

Notes:

* Observed level of significance >15 %
1 Only one observation
The levels of significance are based on a one-way analysis of variance, computed in the 'Breakdown Program' (see Nie, et al., 1975, p 249 ff). Given the null-hypothesis, the level of significance expresses the probability to get the observed differences (or larger); low value, high significance.

neighbours engaged in agriculture.[1] The small labour requirements for keeping livestock compared to farming may be an explanation, although livestock involves an investment. The animals are often herded by young boys on a communal basis, which relieves the owner of work. He can have full outside employment and still keep livestock, whereas the responsibility for land cultivation cannot be transferred so easily. The hiring of labour for agricultural work is possible but only for short periods.

Standard of Living

The standard of living increases from south to north with a dip in the central zone, explained by the large share of poor plantation workers here.[2]

For the whole population standard of living does not explain the variation between households in respect of their livestock herds ($r = 0.07$). However, there is a positive correlation between standard of living and acreage of farmland (0.34 for all households and 0.31 for owners of farmland).

Among owners there is a significant difference between the five standard-of-living groups for acreage as well as for herd. The higher the standard of living, the larger the acreage of herd.

When family structure is controlled, the effect of the standard of living is naturally reduced, since there is a positive correlation between the number of producers and the standard of living within a household.

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[1] Level of significance is 11 per cent.

[2] The employee-household owning livestock or farmland has on an average twice the value on the standard-of-living index as the peasant-household, except in the central zone where there is no significant difference (the southern zone with only one employee-household is excluded). With all households as the base, the central zone is the only one where the peasant-households have a higher standard-of-living than the employee-households.

Table 7:6. Average Livestock Herd and Acreage per Producer, by Standard-of-Living Groups and Ecological Zones (Owners of Livestock or Farmland, N = 487)

Standard-of-living index[a] / Ecozone	Livestock units per producer							Farmland (ha) per producer						
	1 $\bar{X}$	2 $\bar{X}$	3 $\bar{X}$	4 $\bar{X}$	5 $\bar{X}$	Total $\bar{X}$	Sign. level (%)	1 $\bar{X}$	2 $\bar{X}$	3 $\bar{X}$	4 $\bar{X}$	5 $\bar{X}$	Total $\bar{X}$	Sign. level (%)
South	55.6	57.2	29.9	55.6	55.2	55.4	*	0.32	0.33	0.0	0.61	0.59	0.35	*
East	4.4	4.0	6.8	12.8	3.1	4.3	11	0.57	0.56	0.55	0.76	1.46	0.61	3
Central	3.1	4.6	14.4	8.4	3.7	5.2	1	0.67	0.77	0.80	0.81	0.50	0.71	*
North	1.0	2.1	3.9	5.4	5.4	3.1	0.7	0.70	0.60	0.61	0.95	0.75	0.70	*
Total	8.0	8.1	8.3	9.3	8.8	8.3	*	0.63	0.63	0.65	0.86	0.72	0.67	8
Significance level (%)	0.0	0.0	4	0.0	0.2	0.0		10	12	4	*	1.5	0.3	

[a] See Appendix 5.

Notes: See notes Table 7:5.

As for livestock units per producer, no significant difference was recorded between the five standard-of-living groups, but for hectares of farmland per producer the difference is significant on the 8 per cent level (Table 7:6). Households belonging to the next highest standard-of-living group have the largest farms per producer.

When the effects of ecological conditions are also controlled, the standard of living has a differentiating effect among the households for herds in all zones except the southern. However, the largest herds were not recorded for the highest standard-of-living group in the eastern and central zones. For acreage per producer only standard of living differentiates between the households in the eastern zone.

When controlling family structure and standard of living, the ecological zone still has a differentiating impact for all standard-of-living groups in respect of herds but for only three in respect of acreage (Table 7:6). Overall, the ecological zone has a stronger explanatory value than the standard of living in interpreting the variation in farmland and livestock herds.

Conclusion

The socio-economic variables explain some variations in the households' production pattern, with family structure as the most powerful. When controlling for this variable, main occupation has no differentiating effect, and standard of living only for acreage. When the ecological effect is eliminated, the differentiating effect for occupation increases. Standard of living is complex. Its differentiating effect decreases for acreage of farmland per producer but increases for livestock units per producer.

CULTURAL INFLUENCE

Cultural influence is measured by ethnic affiliation. The analysis is restricted to the three most numerous ethnic groups in the area: the Wapare, the Wachagga and the Wakahe.[1]

The Wapare have the largest livestock herds, measured by all households or by owners of farmland or livestock. The difference between the Wakahe and the Wachagga is insignificant, except that Wakahe employees have larger herds than those of the Wachagga and even of the Wapare.

The Wapare have larger farms than the other two groups, but the difference is small. Among the employees the Wapare have the smallest farms and the difference between the Wakahe and the Wachagga is insignificant.

When family structure is controlled, there is no difference between the ethnic groups in acreage per producer (Table 7:7). However, for livestock units per producer the difference is significant. Excluding the *ethnic group 'North'*, with by far the largest herds, the Wapare have most livestock. Are the large Wapare herds, compared to those of the Wachagga and the Wakahe, due to cultural influences? When controlling for ecological zones, the result shows that this is not the case. The Wapare have larger livestock herds per producer in the southern and central zones, but the Wakahe in the eastern, and the Wachagga in the northern zones. Thus the same ethnic group does not have the largest herds irrespective of ecological zone.

When family structure is controlled, 'ecological zone' has a differentiating impact on herds as well as acreage.

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[1] The other groups listed in Table 7:7 are aggregates. The Wamasai, exclusively living in the southern zones, are included in the *ethnical group 'North'* (see Appendix 4).

Table 7:7. Average Livestock Herd and Acreage per Producer, by Ethnic Group and Ecological Zones (Owners of Livestock or Farmland, N = 487)

Ethnic Group[a] / Ecozone	Livestock units per producer								Farmland (ha) per producer							
	Wapare	Wachagga	Wakahe	North	Remaining Tanzania	Outside Tanzania	Total	Significance level	Wapare	Wachagga	Wakahe	North	Remaining Tanzania	Outside Tanzania	Total	Significance level
	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	%	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$	%
South	53.2	0.0	11.7	104.3	0.0	0.0	55.4	*	0.44	0.81	0.69	0.14	0.47	0.36	0.35	2
East	4.0	3.2	7.8	9.7	1.5	0.0	5.3	*	0.56	0.58	0.68	0.67	0.41	1.11	0.61	*
Central	12.6	1.7	2.7	5.8	1.2	1.6	5.2	0.0	0.67	0.77	0.77	0.69	0.74	0.66	0.71	*
North	3.6	4.1	0.2	1.9	0.2	0.2	3.1	5	0.66	0.69	0.39	0.76	0.85	0.49	0.70	*
Total	9.9	3.5	5.2	33.4	0.9	1.3	8.3	0.0	0.64	0.70	0.71	0.56	0.69	0.66	0.67	*
Significance level (%)	0.0	*	2	1	*	*	0.0		*	*	*	2	*	*	0.3	

[a] See Appendix 4.

Notes: See notes Table 7:5.

If cultural influence is also controlled, the explanatory value of the ecological zone disappears for farmland, except in the *ethnic group 'North'*. For livestock per producer, ecological zone has an explanatory value for the Wapare and the Wakahe and the *ethnic group 'North'*, and there is a small difference between the ecological zones also for the Wachagga. However, only for the Wakahe and the *'North'* does the general pattern hold - smaller herds with larger agricultural potential. For the Wachagga the largest herds are found in the northern zone, for the Wapare in the central zone.

It is tempting to conclude from the above that ecological conditions have a greater impact on the decision process than culture. However, when scrutinized, the material reveals that in each ecological zone the dominant ethnic group has the largest herds per producer. The two variables, ethnic group and ecological zone, are thus closely interrelated.

The migration pattern explains the situation of the group dominating an area. The Wapare penetrated from the south and east, the Wachagga from the north. The core area of the Wakahe is the western part of the eastern zone, and part of the central zone around Kahe Barazani.

CONCLUDING REMARKS

Whichever variable is chosen as the starting-point of the analysis, that particular variable explains a large proportion of the variation in acreage of farmland and livestock herds. However, when controlling for other variables, much of this variable's explanatory value disappears.

The material does not support the conclusion that the household's decision process regarding production pattern is influenced mainly by ecological considerations. It does not show that, irrespective of cultural and socio-economic

backgrounds, households adapt in the same way to the physical constraints of the area, choosing the same pattern of production. Nor is it possible to conclude that cultural or socio-economic variables have the greatest bearing on the household's decision process. Rather, the results suggest a complex picture, where confounding factors are common. The above discussion, in which it was suggested that the dominance of an ethnic group was the main explanatory variable, demonstrates the complexity of the current production pattern.

However, should one variable be singled out as the most decisive, then the ecological zone is the strongest candidate,[1] at least for explaining the variations in livestock herds (Figure 7:2). One reason why it has low explanatory value for variations in acreage of farmland is that this variable is not a good measure of the importance of agriculture. In poor agricultural areas, acreages of farmland must be greater in order to produce the necessities of the household, since yields per acre are lower. Moreover, in good agricultural zones more than one crop a year is possible. The required acreage of farmland is smaller in such areas. Even if the household in poor agricultural areas demands a larger farm to produce enough for its subsistence, the number of its producing units sets a limit on the acreage a family can cultivate, given current agricultural practice. This is why the number of producing units has the strongest influence on the acreage variations (Figure 7:2).

'Ecological zone' is the strongest variable explaining variations in herds. It has in this case slightly greater explanatory value than family structure, i.e. the number of producing units within a household (Figure 7:2). The material shows that the role of livestock increases with decreasing agricultural potential and is completely dominating

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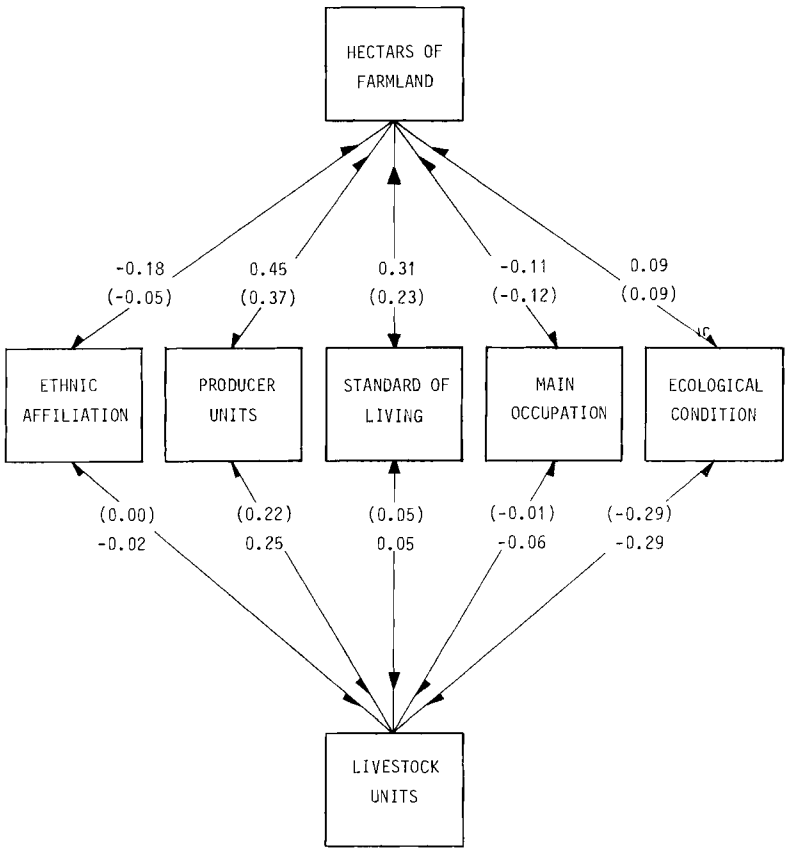
[1] Except for family structure.



0.30 = Zero level correlation coefficient

(0.30) = Partial correlation coefficient, when controling for the other four variables

Figure 7:2. Cultural, Socio-Economic and Ecological Inference on Acreage and Livestock Herds

in the southern part. Thus, in the case of livestock, the households have taken into account the physical constraints of the area. Herd size increases as the opportunities for agriculture decrease. Many agriculturalists cultivate marginal areas, where harvest prospects are hard to estimate. Livestock here becomes important as a source of food and as an insurance against 'rainy days'. These areas undoubtedly are more suitable for livestock than for crop cultivation.

8. NATURAL HAZARDS

Rural development and underdevelopment can best be understood as man's relation to his environment and his utilization of human and natural resources. In this complex field problems related to natural hazards play an important part. The studies of natural hazards include sections on human occupation of hazard zones, human adjustment to hazards, perception and estimate of hazard occurence, the adoption of damage-reducing adjustment to hazards, etc. (Berry, et al., 1972).

Drought, flood, vermin and diseases affecting crops and domestic animals are factors causing natural hazard situations. They are joint products of man and nature, related to variations in climate and man's adjustment to these variations, man's production system and his ability to change the mode of production as well as its composition and direction. The burdens of hazards are twofold, the obvious one of loss of harvest and domestic animals, and the efforts needed to anticipate, prevent, reduce and replace the losses.

The occurrence and magnitude of natural hazards are measured here by people's estimates of crop and livestock losses. The estimates of the 'worst year' will be analyzed to establish whether natural hazards are becoming more serious, or if they have been a long-time phenomenon. The analysis includes an appraisal of environmental deterioration and the potential for the inhabitants to earn

their living from the land, as well as a discussion of people's ideas on how crop and livestock losses can be reduced. The spatial variation of the occurrence and magnitudes of natural hazards is kept in the focus of the analysis.

Population growth on the higher slopes of Mount Kilimanjaro has created severe land shortage, forcing peasants further down into marginal areas. The introduction of coffee as a cash crop has aggravated the land shortage. The best soil is used for coffee cultivation. The lowlands were formerly covered with bush and some forest and were mainly used for grazing. The Wamasai especially used the lower slopes of the mountain for grazing during the dry seasons, when there was not enough grass available on the Masai Steppe. Rain-fed agriculture is very unreliable, since rainfall varies considerably over space and time.[1]

Historically, the area was mainly used for grazing. Patches of cultivation were found mainly in the core area of the Wakahe and in the north where the Wachagga, living on the higher slopes, cultivated maize. Rapid immigration has increased competition for land. An increasing proportion of the population has come to depend on marginal land for survival and is thus more exposed to natural hazards.

Great changes have taken place during the late 1960s and early 1970s. A large plantation (EAKIL) was established in Kahe Station in the early 1970s, occupying some 4 000 ha and drawing large quantities of water for irrigation from Miwaleni Spring. Moreover, permanent smallholder cultivation of former grazing land has made a great impact, creating a situation of overexploitation in the remaining parts, the former 'reserve land'. Moreover,

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[1] Cf. Annex, Part I, pp A5-A9.

1973 and 1974 were bad years, characterized by severe droughts, considerable reduction in livestock and crop destruction.[1] In 1974 some 300 000 people were under famine relief programmes in the Moshi District.

People living on marginal land are playing a sort of survival game. Dependence on rain-fed agriculture and hazard damages can be diminished to some extent by environmental engineering: irrigation, flood control, etc. Peasants can reduce the role of agriculture for their survival and start rearing livestock. In the first case people reduce their dependence on the physical environment, while the second implies a change in way of life and mode of production.

Game theory has been used to explain the peasant's behavior in relation to his environment. The cultivation of land can be regarded as a game against nature, in which the decision is a choice between crops to be planted. The choice is governed by rainfall estimates. Theoretically, a payoff matrix can be constructed in which the opponent (nature) has two strategies - wet year or dry year - and the players' strategies are crop alternatives (cf. Gould, 1969). However, this approach has only limited application to the type of environment people face in large parts of the present study area. Here, the peasant is not in a position to decide between crops according to the occurrence of a wet or a dry year. It is rather a game against nature involving the occurrence of adequate rainfall for survival or not. Some areas are flooded during the rainy season. This is due not to high precipitation in the area, however, but to heavy rains on the higher slopes of the mountain.

In the long run people living in marginal areas also play another type of game. Permanent cultivation, without

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[1] The drought period coincided with the great Sahel disaster.

proper environmental engineering (which is typical of the study area), will eventually lead to deterioration of the land, making it unsuitable for both farming and grazing, and thus endangering the possibility of future generations living on the land.

CROP HAZARDS

The farm household is faced with a whole set of hazards, not only low rainfall. In some areas the crop is first destroyed by flood during the rainy season - floods due to the deforestation of the higher lands - and then the new-planted fields are hit by drought, since the rivers have water for short periods only.

Four types of hazards are analyzed: flood, drought, crop diseases and vermin. The farm households were asked how much of a crop they had lost due to one of the four hazards: 'none', 'some' or 'all'. A hazard index was constructed in which 'some loss' scored one point and 'total loss' two. The maximum points by household was eight, or total loss for all types of hazards. The contradiction is only apparent. Households have fields in scattered places and theoretically it is possible to lose all crops due to the four hazards, one field may be hit by flood, another by vermin, etc. In areas with two crop seasons the peasant may be exposed to flood in the first and drought in the second.[1]

One important point must be noted. The material was collected by households and not by fields, so that an area recorded as being hit by flood refers to the residence of the household irrespective of the location of its fields. Since most fields are located within the subarea of residence, this does not materially affect the outcome.

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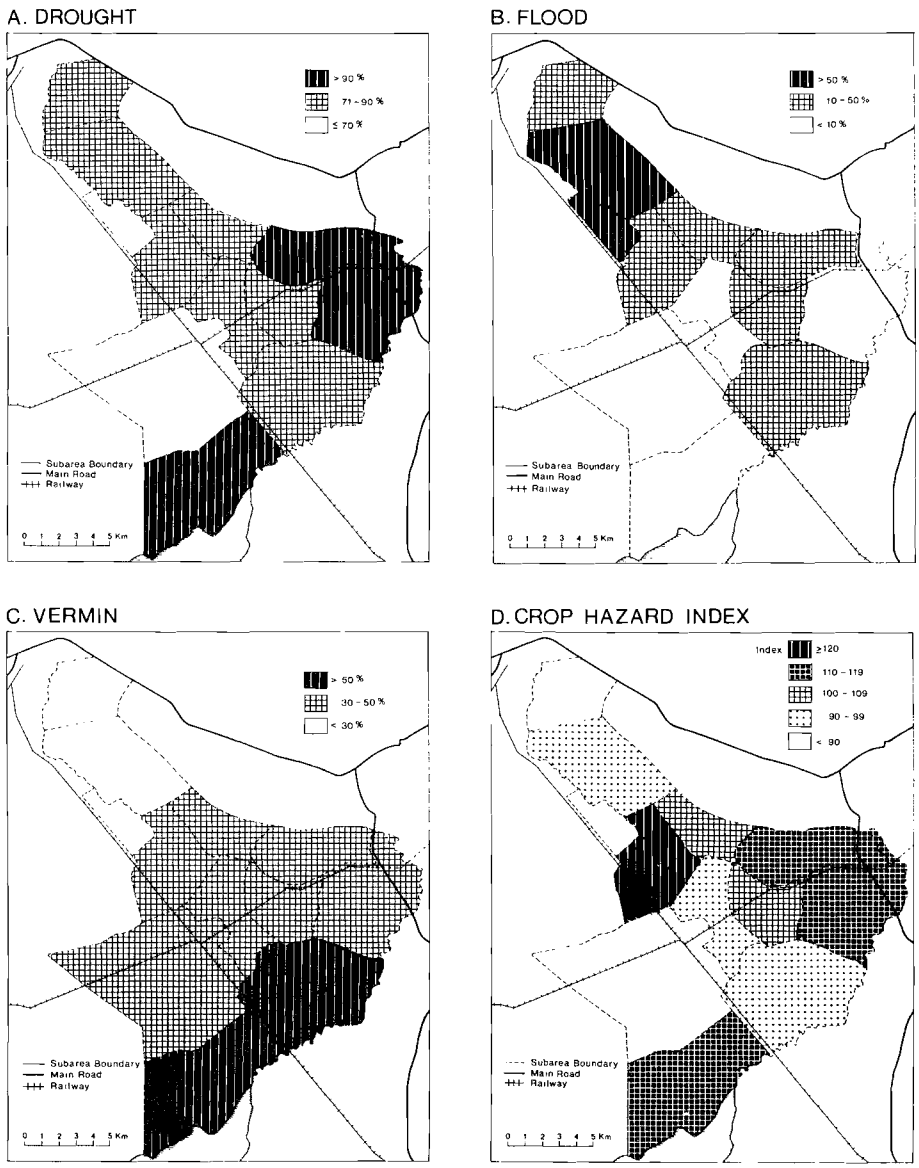
[1] Only eight respondents stated that they had lost the whole crop due to more than one type of hazard.

The spatial distribution of the four hazards varies and so does the share of households recording losses of crops due to a specified type of hazard. Floods were most frequent in Rau-River and Mandaka, where over 50 per cent of the farm households reported crop destruction from flooding (Map 8:1B and Table 8:1), which is explained by the virtually flat topography of the area. Many small and shallow streams traverse Mandaka, streams that cannot contain the water flushing down from the mountain during the rainy season. Large quantities of water are halted in the Rau-River area and in the southern part of Mandaka, which make them ideal for paddy cultivation, while at the same time the flood hazard increases. The same pattern, but less pronounced, holds for Miwaleni and Kilototo.

As might be expected, droughts are most serious in the southern and eastern parts. Over 90 per cent of the farm households in Kilototo, Ghona and Mawala had crop destruction due to drought. In Mandaka and Rau-River, where over 50 per cent recorded flood losses, 60-80 per cent also experienced losses due to drought (Map 8:1A). This pinpoints the type of problems the peasant in the northern part has to face: first flood and then drought, rather than a suitable flow of water in the streams to make irrigation possible.

Crop destruction due to vermin is most common in sparsely populated areas, monkeys being mentioned most often. In Lenduru vermin plays an important role, although the area is relatively densely populated. Proximity to the forest reserve is the main explanation here (Map 8:1C).

Crop diseases, not presented in the map, are fairly evenly spread, with Mawala in the top and Miwaleni, Kilototo and Kahe Station as the least affected areas. Maize diseases account for three-fourths of the destruction.



Map 8:1. Natural Hazards; Destruction of Crops, Percentage of Households with Farm

Table 8:1. Crop Losses Due to Hazards (Percentages of Farm Households)

Subarea		Flood			Drought			Disease			Vermin		
		None	Some	All	None	Some	All	None	Some	All	None	Some	All
	N	%	%	%	%	%	%	%	%	%	%	%	%
Msaranga	74	75.7	24.3	0	16.2	60.8	23.0	77.0	23.0	0	86.5	13.5	0
Mandaka	40	42.5	52.5	5.0	20.0	65.0	15.0	80.0	20.0	0	85.0	15.0	0
Rau-River	41	24.4	53.7	22.0	36.6	41.5	22.0	73.2	24.4	2.2	73.2	26.8	0
Miwaleni	32	53.1	34.4	12.5	31.3	37.5	31.3	93.8	6.3	0	56.3	40.6	3.1
Kahe Sisal	41	56.1	22.0	22.0	19.5	51.2	29.3	73.2	26.8	0	51.2	48.8	0
Kahe Station	56	100	0	0	30.4	37.5	32.1	87.5	12.5	0	69.6	30.4	0
Lenduru	33	90.9	0	9.1	18.2	45.5	36.4	81.8	18.2	0	57.6	42.4	0
Kilototo	55	72.7	23.6	3.6	5.5	34.5	60.0	89.1	10.9	0	58.2	41.8	0
Soko	28	82.1	14.3	3.6	21.4	32.1	46.4	67.9	32.1	0	60.7	39.3	0
Mwangaria	37	86.5	13.5	0	24.3	43.2	32.4	83.8	16.2	0	43.2	51.4	5.4
Ghona	34	94.1	2.9	2.9	5.9	29.4	64.7	70.6	29.2	0	67.6	32.4	0
Mawala	7	100	0	0	0	71.4	28.6	57.1	42.9	0	28.6	71.4	0
Total	478	71.7	21.8	6.5	19.7	45.4	34.9	79.9	19.9	0.2	65.8	33.6	0.6

When the four hazards and their losses are weighed to give a hazard index (set at 100 for the whole area), the subareas fall into five groups. The situation is most severe in the Kahe Sisal subarea, closely followed by Rau-River, Kilototo, Ghona and Mawala, and least severe in Msaranga and Kahe Station (Map 8:1D).

To check the validity of the hazard index, it was cross-tabulated with a variable measuring people's perception of the farming potential of the area in which they lived. Those who classified the area as poor for farming, have a higher score on the hazard index than those who classified the area as good. The difference between the groups is statistically significant.

Some 10 per cent of the farm households experienced no crop losses due to the four hazards in the preceding year. The share of no-loss households is fairly evenly distributed over the subareas, with the remarkable exceptions for Kahe Station and Soko, where over 20 per cent of the farm households have lost no crops (Table 8:2).

All theoretical combinations of the four hazards are represented in the sample. Four have fewer than ten observations: 'disease', 'flood & disease', 'flood & vermin' and 'disease & vermin' (Table 8:2). Households affected by only one of the four types are most common. Drought accounts for the largest share. Among the double-combinations, 'drought & vermin' is most common, almost twice as important as the next one: 'flood & drought'. Some 15 per cent of the farm households are affected by three types of hazards, while only 4 per cent are affected by all four.

LIVESTOCK HAZARDS

On an average the 245 livestock owners in 1974 had lost 6.0 units during the preceding 12 months, April 1973 -

Table 8:2. Crop Hazard Combinations (Percentages of Farm Households)

Type of hazard	Msaranga %	Mandaka %	Rau River %	Miwaleni %	Kahe Sisal %	Kahe Station %	Lenduru %	Kilototo %	Soko %	Mwangaria %	Chona %	Mawala %	Total N	Total %
None	5.4	5.0	2.4	3.1	4.9	25.0	18.2	1.8	21.4	8.3	5.9	0	42	8.8
Flood	2.7	7.5	22.0	18.8	2.4	0	0	3.6	0	0	0	0	23	4.8
Drought	50.0	30.0	9.8	31.3	29.3	41.1	33.3	43.6	28.6	27.8	55.9	28.6	172	36.1
Disease	1.4	0	0	0	2.4	0	0	0	0	0	0	0	2	0.4
Vermin	5.4	5.0	2.4	3.1	2.4	3.6	0	0	0	13.9	0	0	16	3.4
Subtotal	59.5	42.5	34.1	53.1	36.6	44.6	33.3	47.3	28.6	41.7	55.9	28.6	213	44.7
Flood & drought	8.1	25.0	17.1	3.1	7.3	0	3.0	7.3	3.8	0	0	0	33	6.9
Flood & disease	1.4	2.5	4.9	6.3	0	0	0	0	0	0	0	0	6	1.3
Flood & vermin	0	0	4.9	0	7.3	0	0	0	0	0	0	0	5	1.0
Drought & disease	6.8	2.5	2.4	0	2.4	3.6	3.0	0	3.8	8.3	5.9	0	17	3.6
Drought & vermin	4.1	0	7.3	12.5	9.8	17.6	24.2	23.6	14.3	25.0	8.8	28.6	63	13.2
Disease & vermin	0	0	0	0	0	1.8	0	0	0	0	0	0	1	0.2
Subtotal	20.3	30.0	36.6	21.9	26.8	23.2	30.3	30.9	21.4	33.3	14.7	28.6	125	26.2
Flood & drought & disease	10.1	12.5	14.6	0	2.4	0	0	1.8	3.8	0	0	0	22	4.6
Flood & drought & vermin	1.4	7.5	7.3	15.6	9.8	0	3.0	9.1	0	11.1	0	0	26	5.5
Drought & disease & vermin	2.7	0	0	3.1	4.9	7.1	12.1	3.6	14.3	5.6	17.6	42.9	30	6.2
Subtotal	14.9	20.0	22.0	18.8	17.1	7.1	15.2	14.5	17.9	16.7	17.6	42.9	78	16.4
Flood & drought & disease & vermin	0	2.5	4.9	3.1	14.6	0	3.0	5.5	10.7	0	5.9	0	19	4.0
Grand total	100	100	100	100	100	100	100	100	100	100	100	100	477	100

April 1974. If only households recording losses are included, the average increases to 9.6 units. Some households also recorded losses of poultry.

Disease is the major cause, followed by starvation. In the majority of the cases the cause is likely to be a combination of the two. Livestock lose their resistance to disease in time of fodder shortage.

The two columns in Table 8:3 show different aspects of livestock hazards. The first gives the share of households affected by losses in domestic animals, the second the magnitude of livestock losses among affected households. These on the average have more livestock than the average livestock owner, 16.9 units compared to 12.1, and they owned 88 per cent of all livestock in the area in 1974.

The share of affected households owning livestock varies considerably between the subareas (Table 8:3). The lowest share, under 30 per cent, was in Msaranga. The highest, 100 per cent, was in Mawala followed by Kilototo and Ghona.

The highest relative magnitude of losses was recorded in Ghona. Here the affected households lost 173 per cent in relation to their current herds. Almost two-thirds of the herds had been lost during the preceding 12 months. In Kilototo the livestock herds were halved. Although all livestock-owning households in Mawala were affected, their relative losses were smaller than the average for the whole area, but their absolute losses were the greatest.

To obtain an overall measure of livestock hazards an index was constructed (set at 100 for the whole area) by weighing the share of affected households in a subarea according to the magnitude of losses (Map 8:2). The lowest livestock hazard is in Msaranga followed by Rau-River and Mwangaria. The first two subareas differ from the third in that agriculture is the main activity and the agricultural potential is high in relation to the whole area.

Table 8:3. Losses of Livestock During the Latest 12 Months

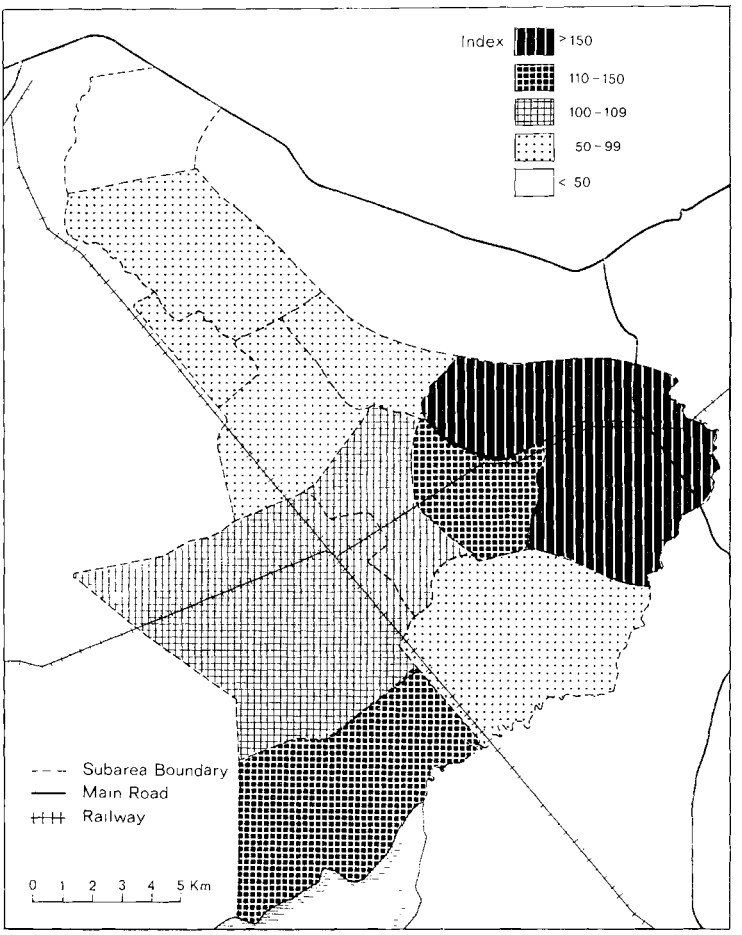
	Households owning livestock, reporting losses		Rank	Magnitude of losses (livestock units)[a]	Rank
	N	%		%	
Msaranga	15	29	1	26	1
Mandaka	5	46	2	64	8
Rau-River	9	60	4	30	2
Miwaleni	11	65	6	44	5
Kahe-Sisal	9	69	8	49	6
Kahe Station	14	70	9	52	7
Lenduru	9	56	3	69	9
Kilototo	28	93	11	107	11
Soko	12	68	7	83	10
Mwangaria	11	61	5	37	3
Ghona	13	77	10	173	12
Mawala	16	100	12	30	4
Whole Area	152	63		57	

[a] The material does not include any information on livestock population in 1973. An estimate of herds 12 months prior to the enumeration day is very hard to make, since the changes include not only losses but also trade, gifts, natural increase, etc. Therefore, the base for the calculation of percentage losses is the current (1974) average number of livestock units by subarea. Only households having recorded losses are included.

Although possession of domestic animals is comparatively common, especially in Msaranga, the average size of herds is small. The individual household has greater potential to counter various forms of hazards. It is possible to collect or buy fodder for a small number of livestock. Moreover, livestock supplements agriculture. In Mwangaria herds are large, but one of the best grazing areas is to be found in this area.

Ghona and Kilototo are the most severely affected areas.[1] In both areas livestock herds are large, and especially in Ghona livestock is more important than agriculture.

[1] Cf. Annex, Part I, pp A57-A58 and Map I:12.



Map 8:2. Livestock Hazard Index

Ghona and Kiomu (part of the Ghona subarea) were once considered very good grazing districts. Now the problem of overgrazing is serious. Moreover, in the relatively dry area more land has been put under cultivation lately as a result of irrigation, which has reduced the grazing area even more.

PERCEPTION OF THE 'WORST YEAR'

Did people perceive the latest ordeal to be the worst they had experienced for crop destruction and loss of livestock, or were losses during this period of just the same magnitude as in preceding years? The material confirms 1973 - April 1974 to have been the worst in living memory.

Among the farm households 7 per cent did not record any crop destruction. Among the remaining households almost 70 per cent considered the period 1973 - April 1974 to be the worst, 20 per cent 1970 - 1972 and 10 per cent years prior to 1970.

Among the livestock owners 20 per cent did not record any losses. Among the remaining households 60 per cent declared the period 1973 - April 1974 to have been the worst, 22 per cent 1970 - 1972 and 18 per cent years prior to 1970.[1]

Crop destruction and loss of livestock reveal the same picture: the latest 16 months were the worst, although the deviation is greater in the case of loss of livestock. The dominant position of the latest 16 months may have several explanations. (1) Many households did not own livestock in the 1960s and definitely not in the 1950s or earlier, and many have recently obtained a farm. (2) There is a tendency to overestimate the most recent losses and forget past disasters. (3) 1973 and 1974 were actually worse than previous years.

Generally the households which recorded big losses of livestock and crops during the latest 12 months, also perceive 1973 - April 1974 to have been the worst. Inversely, households recording relatively small losses in the preceding 12 months have a greater deviation in times for the

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[1] Among those who declared 1973 - April 1974 to have been the worst period, 94 per cent had experienced losses during the latest 12 months.

'worst year', especially those residing in the three nothern subareas.

DAMAGE-REDUCING ADJUSTMENTS

Among the peasants irrigation is the most commonly mèntioned method of reducing crop destruction. In areas hit by flood quite a large proportion mention flood control and the construction of dams. Only a small fraction mention 'help from government' or express fatalistic views suggesting that nothing can ever be done to prevent losses.

Livestock-owners who recorded losses gave 'measures against disease' as the most important way of reducing the losses (40 per cent). Almost the same proportion mention 'help from government' (36 per cent). Less than 5 per cent mention 'reduce the herds' or 'rotational grazing', although the area is definitely overgrazed.

The difference in attitudes towards government help in respect of crop and livestock damage-reducing adjustment is great. Such adjustment in agriculture by nature does not directly require governmental support. It is true that the government can help with investment in irrigation system, flood control, etc., but these measures can also be accomplished to a large extent through self-help schemes. On the other hand the livestock sector, where disease accounts for the major losses, requires a system of governmental services for reducing damage. Veterinary service definitely requires governmental assistance. Som measures can be organized in self-help schemes, such as the construction of dips. But these cannot function without a regular supply of medicine, which again involves the government.

Instead of a rational utilization of land, which implies rotational grazing and destocking, livestock-owners want to control the effects of hazards. Better control

would mean an increase in livestock herds, which would aggravate the overgrazing situation. On the other hand, better veterinary service and other measures against disease such as dips, clean water, etc., could be an incentive to livestock-owners to change to exotic breeds. The introduction of such animals would result in destocking, since these types of livestock yield much more. However, they require larger and, above all, better grazing areas.

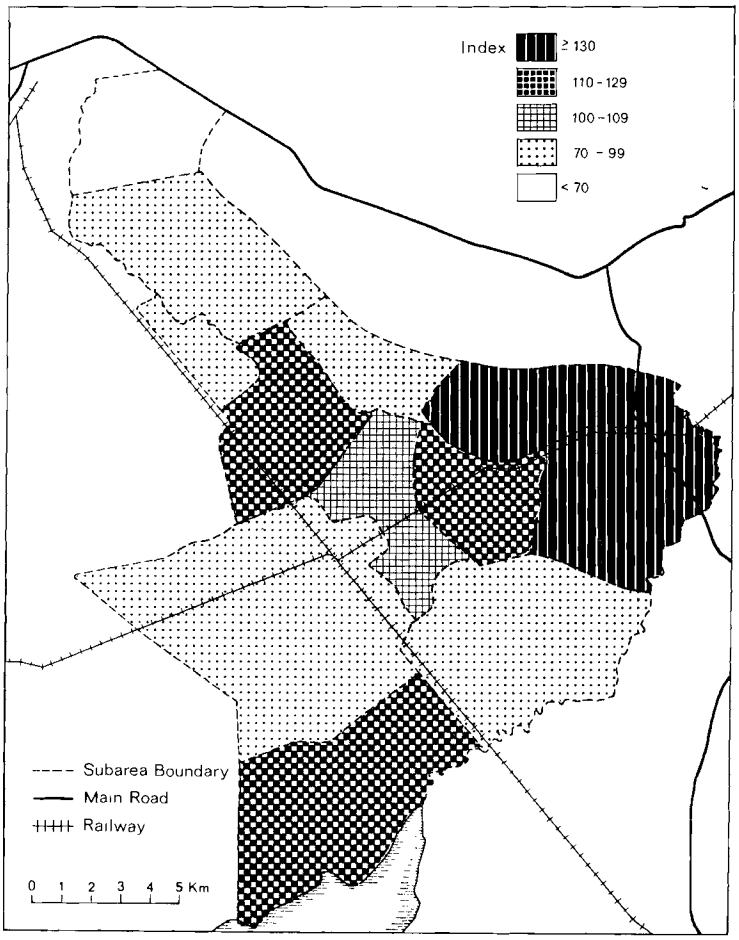
In the case of crop destruction adjustments, the results clearly show that the peasants are fully aware of the problems and have a good idea of how to solve them. They are also prepared to tackle the problems themselves. They are willing to supply labour for environmental improvement and hazard control. Over 80 per cent state that they are prepared to work on irrigation, flood control and tree planting projects without pay. On an average they are willing to work 12 hours a week, almost two working days, a substantial labour input.

CONCLUDING REMARKS

The most exposed subareas for natural hazards affecting crops and livestock are Kilototo and Ghona, followed by Mawala, Soko and Kahe Sisal. The least affected subareas are Msaranga, Kahe Station and Mwangaria (Map 8:3). In general there is greater exposure to hazard to the south and east, corresponding closely to the decline in rainfall.

Areas with larger herds, hard land competition between cultivation and grazing, and no opportunity for seasonal migration of livestock, have undergone a major reduction in livestock during the latest 12 months. Kilototo, Ghona and Soko are such areas. The biggest losses coincided with the severe droughts of 1973 and 1974.

These areas are particularly affected because of the over-exploitation of the land resources. The techniques



Map 8:3. Natural Hazards

used in agriculture and husbandry require a good supply of rain. There are almost no margins; small changes in rainfall will immediately affect these agricultural and livestock economies, with losses as a result.

Environment and settlement patterns do of course determine most hazard variations. But do farming practices, inputs, the size of herds and the socio-economic conditions,

have any effect? Cannot peasants and livestock-owners prevent some hazards, e.g. by limiting the drought damage through irrigation?

A number of variables were tested by an analysis of variance in order to try to find out whether peasants could to some extent master the environment. Among the socio-economic variables, only 'type of employment' had any effect on hazard variations. Peasants were hit more frequently than farm-owning wage-earners. Since the type of employment has no effect on either farming practices or number of inputs, neither of these variables can have influenced the result. Do peasants report crop losses more often than wage-earners with a farm because they are more aware of the losses and more dependent on their harvest, or because they have actually experienced greater losses?

No farming variables have any impact. This suggests that irrigation, as practised in the area, only marginally increases the peasant's control of his environment. Why? Firstly, the streams providing water have only small dams, which divert the water but do not store any significant amount that can be used in the dry season. Secondly, the streams dry up soon after the rains and water for irrigation is available for a short time only. Much irrigation takes place during the rainy season as rains are local and unreliable. This means that the peasants in the study area are caught in a trap. The progress of the area is wholly dependent on the development of the higher slopes of Mount Kilimanjaro. In Kahe the peasant may work hard to create irrigation facilities, but so long as the deforestation on the mountain is not halted and reversed, he will gain nothing from his work.

There is a weak statistical correlation between hazard index and number of inputs (0.23). The greater the number of inputs, the higher the hazard index and the greater the

risk of crop failure. The material also shows that peasants growing many crops are hit slightly more than those growing few.[1]

Of the individual input variables only one - 'use of hybrid maize' - has any impact. Those who use hybrids have a higher hazard index than the others. This finding is important since it explains some of the resistance among peasants toward hybrid maize. They know that by using hybrids they become more dependent on fertilizers and irrigation, more dependent on the society outside. Thus the peasants are sceptical of hybrid maize, even if they recognize that the average yield over the years will be much higher. Only 'modern farmers' producing a surplus can risk the use of hybrids. It does not matter if the crop fails one year; they can afford it. But peasants harvesting just enough to sustain the family cannot take this risk.[2] When peasants refuse to use hybrids it is a perfectly rational decision, given the environment in which they are working.

SUMMARY

The land shortage on the higher slopes of Mount Kilimanjaro has increased the immigration to and permanent settlement of the lower slopes. This area is agriculturally marginal and was used historically for grazing. More households have become dependent on marginal lands for their survival.

Most households in the study area have experienced the loss of crops and livestock. Drought is the major hazard, but the northern parts are also affected by floods. The south-eastern parts generally have experienced the greatest losses due to natural hazards, with the exception of the Mwangaria subarea.

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[1] The variables 'number of inputs used' and 'number of crops grown' are positively correlated.

[2] See below: Risk Aversion, Chapter 10.

Farm practice and inputs have little effect on hazard distribution by households. Peasant using hybrid maize suffer greater losses than others. On the whole 'modern farmers' are more affected than those practising traditional methods.

9. THE CURRENT SITUATION

In an attempt to explain the current situation, factor analysis was employed.[1] With the help of this analysis it is possible to classify and differentiate households in the subareas and ecological zones with respect to the underlying factors which are assumed to determine the variation in the manifest variables.

Fifteen variables were included altogether, covering family structure, agriculture, livestock, standard of living, involvement in the monetary economy, education and the main occupation of the heads of household. They are listed below together with a reference to the part of the Annex in which the variables are discussed.

Variable name	Operative definition	Reference
	Family structure	
Age	Age of head of household	Annex, Part II, pp A77-A78
Consumer	Number of consumer units in a household	p 116
Producer	Number of producer units in a household	p 116

(continued on next page)

[1] For a discussion on factor analysis - principles, merits and limitations - in geographical research, see e.g. King, 1969, pp 165-193; Cole & King, 1968; Lundqvist, 1969.

	Agriculture	
Farm size	Hectares cultivated by a household	Annex, Part I, pp A24-A27
Farm input	Number of farm inputs used by a household	Annex, Part I, pp A43-A45
Farm machinery	Number of farm machines used by a household	Annex, Part I, pp A43-A45
Crops grown	Number of crops grown by a household	Annex, Part I, pp A30-A39
	Livestock economy	
Livestock units	Number of livestock units owned by a household in 1974	Annex, Part I, pp A53-A56
Change in livestock units	Change in livestock units owned by a household between 1969 - 1974	Annex, Part I, pp A57-A62
	Standard of living	
Standard of living	Standard-of living index	Annex, Part II, pp A106-A109, Appendix 5
Items owned	Number of items owned by a household	Annex, Part II, pp A106-A109
	Involvement in monetary economy	
Products purchased	Number of products bought by a household in a four-weeks period	Annex, Part II, pp A117-A123, Appendix 6
	Education	
Education	Formal education of the head of household (number of years in school)	Annex, Part II, pp A110-A112
	Off-farm income	
Self-employed	Dummy variable: Main occupation of the head of household	Annex, Part II, pp A94-A96
Employee	Dummy variable: Main occupation of the head of household	Annex, Part II, pp A94-A96

Some variables have a very low correlation with the others, e.g. 'livestock units' which does not correlate strongly with any other, with the obvious exception of 'change in livestock units'. Other variables with low correlation are: education, farm inputs and products purchased (Table 9:1). On the other hand, consumer, farm size and crops grown are strongly correlated with the other variables.

Four factors with an eigenvalue greater than 1 account for 66 per cent of the variation in a factor analysis with orthogonal rotation varimax[1] (Table 9:2).

FACTOR 1 represents 'standard of living' as well as 'agricultural technology'.

FACTOR 2 covers 'main occupation of the head of household'. Households mainly engaged in domestic production have high values, while households with off-farm income have low values.

FACTOR 3 represents 'family structure and size'.

FACTOR 4 describes the livestock economy.

When the four ecological zones are classified according to the factor scores of the four factors,[2] as in Figure 9:1, the pattern is clear. The southern and eastern zones always fall into the same quadrant for all possible combinations, and most of the time the central and northern zones fall in the quadrants diagonally opposite to each other.

As a result of the factor analysis of the socio-economic conditions the four ecological zones can be characterized as follows:

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[1] See Nie, et al., 1975, pp 468-515.

[2] The factor scores of an ecozone is the average of the scores of the households living there.

Table 9:1. Correlation Matrix

	Age	Consumer	Producer	Farm size	Farm inputs	Farm machinery	Crops grown	Livestock units (L.u.)	Change in L.u.	Standard of living	Items owned	Education	Products purchased	Self-employed	Employee
Age	1.00														
Consumer	0.35	1.00													
Producer	0.39	0.93	1.00												
Farm size	0.21	0.52	0.49	1.00											
Farm inputs	-0.04	0.20	0.15	0.28	1.00										
Farm machinery	0.02	0.25	0.19	0.37	0.39	1.00									
Crops grown	0.18	0.33	0.29	0.53	0.39	0.46	1.00								
Livestock units (L.u.)	0.13	0.29	0.26	0.13	-0.01	-0.02	-0.02	1.00							
Change in L.u.	0.15	0.26	0.28	0.06	0.02	-0.02	-0.06	0.50	1.00						
Standard of living	-0.11	0.35	0.27	0.34	0.17	0.33	0.23	0.07	-0.03	1.00					
Items owned	0.01	0.55	0.48	0.45	0.28	0.40	0.29	0.22	0.15	0.67	1.00				
Education	-0.44	-0.06	-0.10	0.02	0.15	0.13	0.05	-0.10	-0.14	0.25	0.16	1.00			
Products purchased	-0.28	0.10	0.08	0.13	0.18	0.18	0.08	-0.03	-0.07	0.30	0.26	0.32	1.00		
Self-employed	0.36	0.21	0.22	0.28	0.12	0.13	0.36	0.10	0.14	-0.07	0.02	-0.26	-0.28	1.00	
Employee	-0.34	-0.19	-0.19	-0.26	-0.10	-0.11	-0.33	-0.09	-0.13	0.08	-0.01	0.25	0.31	-0.96	1.00

Table 9:2. Factor Loadings for Manifest Variables, Rotated Factor Analysis

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Items owned	0.692	-0.154	0.230	0.306
Standard of living	0.612	-0.224	0.077	0.120
Farm machinery	0.611	0.078	0.043	-0.077
Crops grown	0.583	0.320	0.196	-0.172
Farm size	0.572	0.183	0.364	0.040
Farm inputs	0.485	0.084	-0.000	-0.044
Consumer	0.432	0.009	0.783	0.296
Products purchased	0.388	-0.374	-0.087	-0.009
Education	0.350	-0.317	-0.304	-0.057
Producer	0.336	0.029	0.807	0.277
Age	-0.149	0.367	0.564	0.038
Self-employed	0.150	0.934	0.108	0.097
Employee	-0.125	-0.926	-0.091	-0.097
Change in livestock units	-0.050	0.095	0.134	0.649
Livestock units	0.019	0.046	0.122	0.669

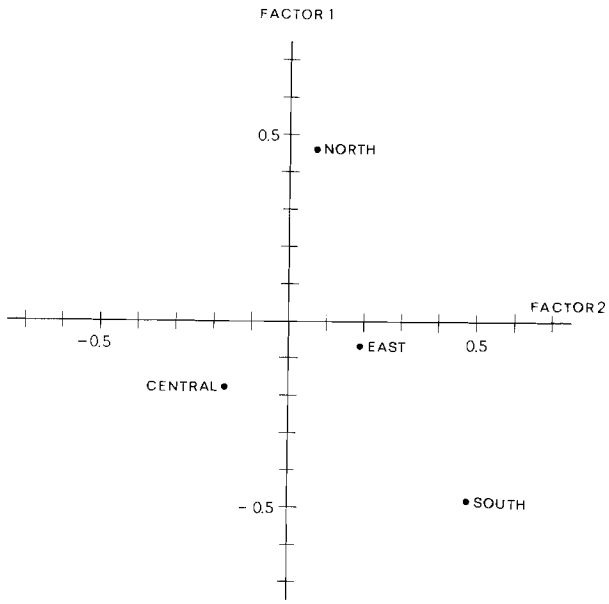

Figure 9:1. Ecological Zones Classified According to Factor 1 and Factor 2

NORTH A high standard of living and 'modern' agriculture. Off-farm work (wage-employment) is important for the economy in the area. Most wage-earners are in the 'higher' income brackets. Ownership of livestock is common and livestock is integrated with agriculture. Herds are generally small

CENTRAL Low standard of living. Off-farm work is important, especially in the 'low' income brackets - plantation work. Livestock has the same importance as in the north, but the distribution is more uneven.

EAST Relatively low standard, but at the same time rather 'modern' agricultural production. Agricultural and livestock economy is the dominant source of income. Off-farm work occurs, but domestic production is the main source of income. The livestock economy is more important than in the two previous ecozones.

SOUTH — Poor and 'non-modern' area. Domestic production dominates in this zone, with few opportunities for off-farm work. Livestock is the main source of income and agriculture has a supporting role.

When disaggregating the ecological zones into the 12 subareas (the base for classification in the Annex), the pattern obviously becomes more complex.

Four distinctive groups appear when the subareas are classified according to the scores of Factor 1 - 'modernity and standard of living' - and Factor 2 - 'main source of income' (Figure 9:2). The first, containing six subareas,[1] is characterized by a comparatively high standard of living and household production is the dominant source of income. The next group - Msaranga (1) - is also characterized by a high standard of living, but here off-farm work is an important source of income. The third group - Kahe Sisal (5), Kahe Station (6) and Soko (9) - is characterized by the importance of off-farm income, especially in Kahe Station (6). However, the wage-earners are plantation workers and therefore the households are relatively poor. This also holds for peasant-households. Finally, the last group is characterized by poor households where domestic production is dominant. This group contains Mwangaria (10) and Mawala (12), both located in the southern part of the area.

The variation between the households in four typical areas is shown in Figure 9:3. Msaranga (Figure 9:3A) represents the well-off area with significant involvement in the monetary economy, both in the form of off-farm work as well as the marketing of agricultural products. Kahe Station (Figure 9:3B) is the relatively poor area with great

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[1] This group contains the following subareas: Mandaka (2), Rau-River (3), Miwaleni (4), Lenduru (7), Kilototo (8), and Ghona (11).

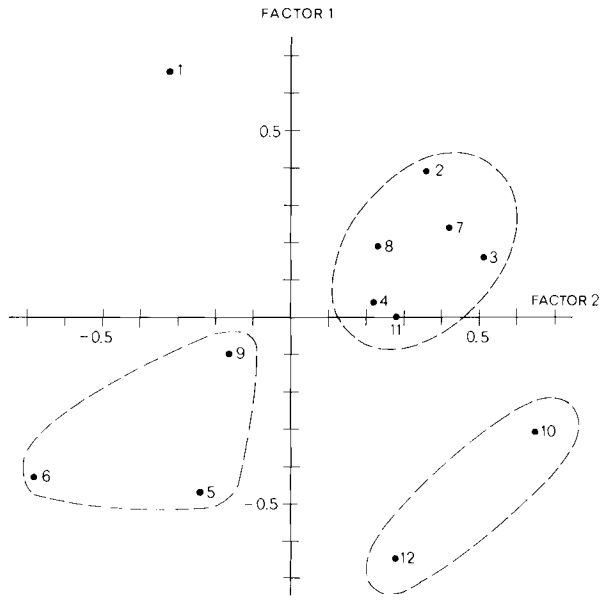


Figure 9:2. Subareas Classified According to Factor 1 and Factor 2

involvement in the monetary economy. Figure 9:3C represents the relatively well-off peasants with a non-regular involvement in the monetary sector, for whom off-farm work plays an insignificant role. The last diagram shows the distribution of the households according to the two factors in an area where the households are poor and where family production is unquestionably predominant. Integration into the monetary economy is only marginal.

When all four factors are taken into account the households can be classified into the following groups.

Well-off peasants	
Mandaka Rau-River Lenduru	Well-off households, household production is dominant and agriculture is the predominant sector. Off-farm work is insignificant and livestock holdings are small
Relatively well-off peasants	
Kilototo Ghona (Miwaleni)	Relatively well-off households, family production dominates and off-farm work is insignificant. Agriculture is the most important sector, but the livestock economy plays a vital role.
Poor peasants and wage-earners	
Kahe-Sisal Kahe Station Soko	Poor households; domestic production is dominant in agriculture. Wage-employment is important, primarily plantation work - unskilled. Many single-person households. The livestock economy is relatively important.
Well-off peasants and wage-earners	
Msaranga	Households are well-off. The agricultural sector is dominant and the peasants are integrated into a market economy. Off-farm work is important, mostly in the 'higher' income bracket - skilled jobs. Livestock is integrated with agriculture - mixed farming.

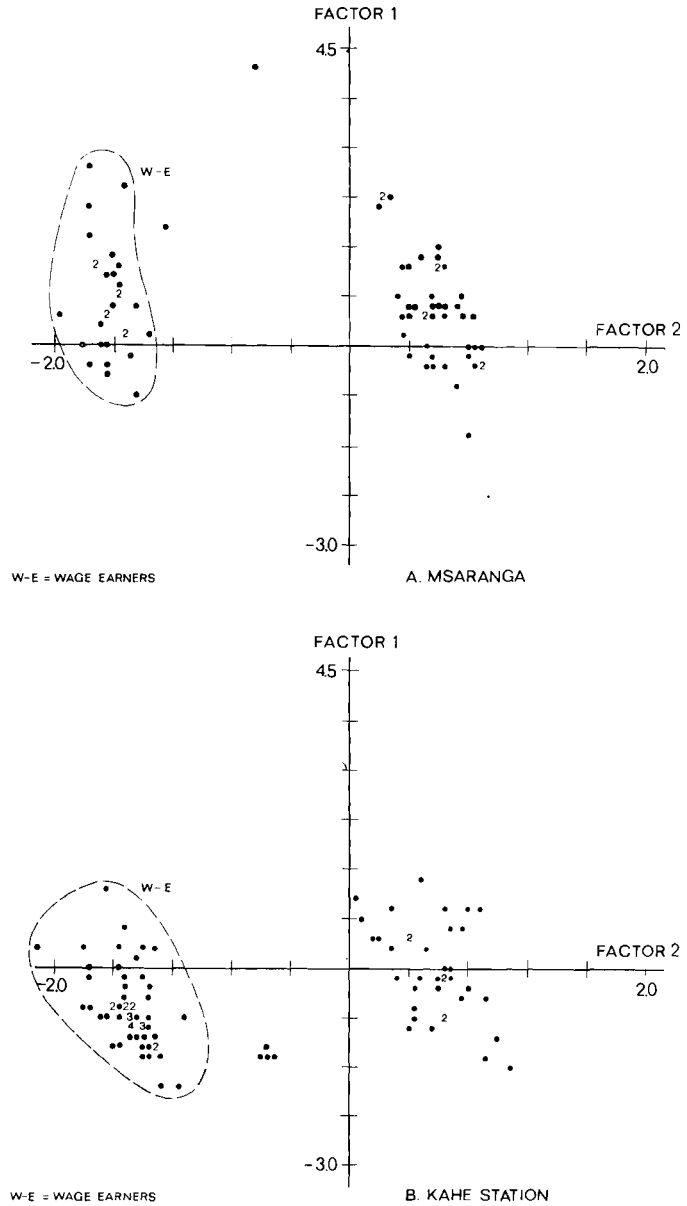
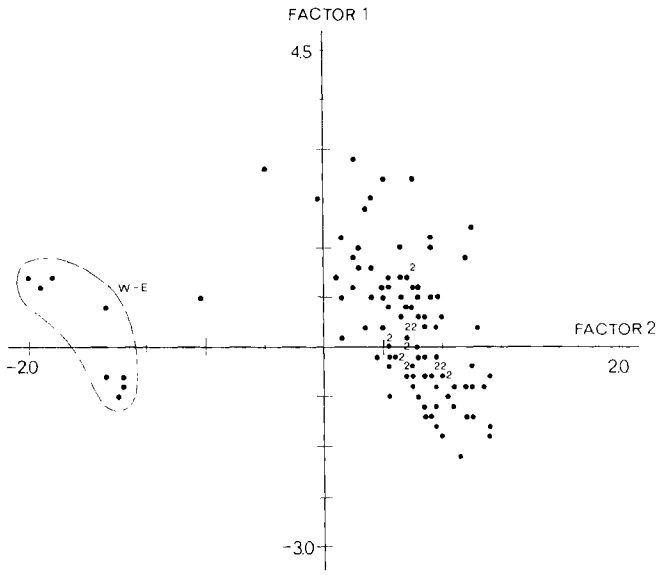
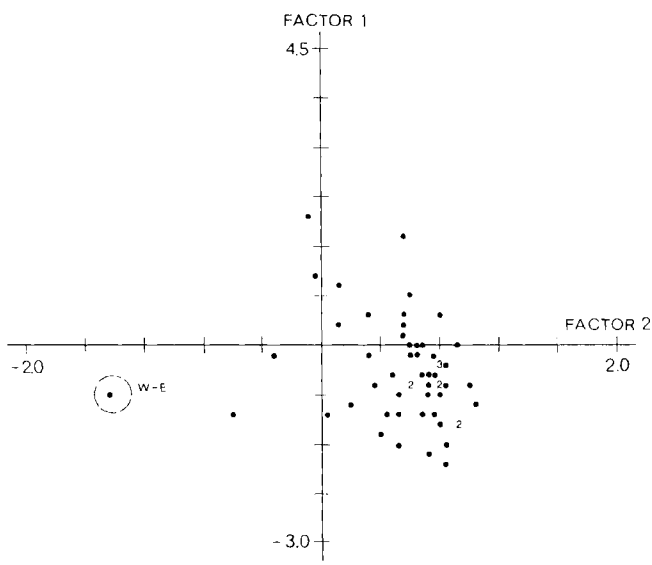


Figure 9:3A,B,C,D. Households in Four Typical Areas Classified According to Factor 1 and Factor 2



C MANDAKA, RAU-RIVER AND LENDURU



D MWANGARIA AND MAWALA

Poor peasants and pastoralists	
Mwangaria Mawala	Poor households. Household production is the dominant source of income. Livestock is almost the only source of income in Mawala. Families are relatively large. Off-farm work is insignificant.

CONCLUSION

Economic factors and agricultural technology are evidently the main determinants explaining the inter-area variations.[1] Factor 1 and Factor 2 both measure economic forces. The first can be characterized as involvement in the 'modern' way of life, since it measures standard of living by the possession of items mainly from outside a traditional society. In addition, factor 1 includes the usage of farm machinery and inputs which represent a more advanced technology than the traditional agricultural techniques.

The second most important factor in explaining the variation is the existence of off-farm income. Once again, this is an indication of an erosion of the traditional production pattern, which was geared to the subsistence of the domestic unit. In the studied society, off-farm income - by means of wage-employment - has become an important source for earning a living. In many cases the cash income is in fact more important than the production within the household.

The factor measuring the traditional sources of variation - family structure - is only third in importance in this study. Although a large share of the variation be-

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[1] In a study of modernization in Indian villages, Adelman & Dalton (1971) also found that economic forces explained most of the inter-village variation.

tween the households can be explained by the family structure, especially variation in farmland, the economic forces now penetrating the society are more important in explaining the differentiation.

Ecological factors naturally have an impact on the stratification. The importance of livestock (Factor 4) is an indication of the ecological influence. However, it is impossible to say on a basis of the present material whether ecological factors have more influence on the variation than economic forces.

There is no doubt that within the area the variation is great with regard to production, standard of living and opportunities for off-farm work. Close to Moshi the households are generally better off and members can work off the farm. The wage-earners are relatively well paid, since their place of work is in an urban area.[1] Agriculture is modern with the best potential. Livestock is common, but herds are generally small. Further south and east the standard of living becomes successively worse. Similarly there is less chance of obtaining off-farm work. At Kahe Station, which is the exception, the chances of getting a job as a plantation worker are relatively good, although only at a low rural wage.

Economic forces will continue to stratify this society. The differences between peasant households will increase, since those which are now in a transitional stage will seize the opportunity to produce more for the market, provided the infrastructure is extended and the marketing and supplying services function. Off-farm work will also increase the differences, since not everyone is able or willing to work as wage-earners. The pastoralists will become even more alienated and their very existence will be threatened.

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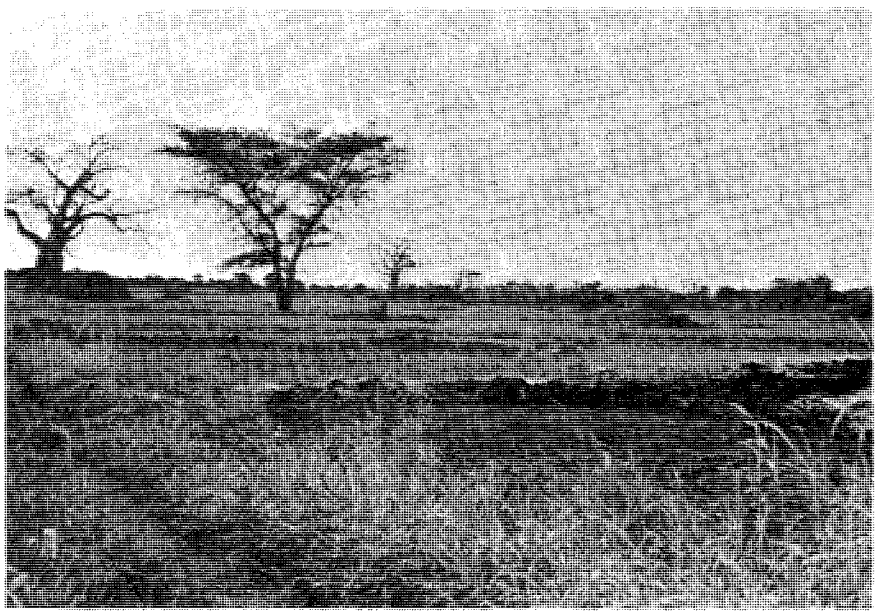
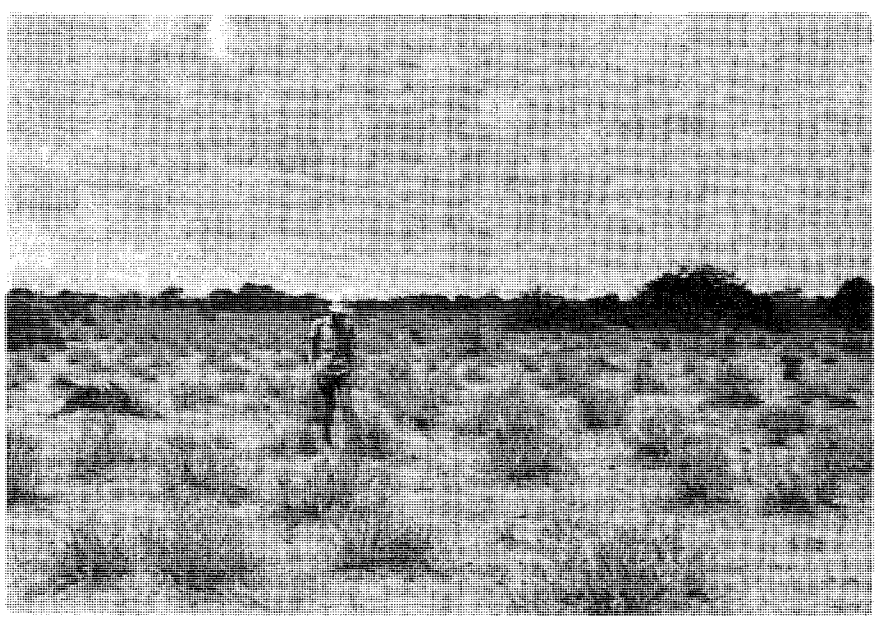
[1] In the first part of 1974 the minimum wage was TZS 300 in urban areas and TZS 170 in rural areas.



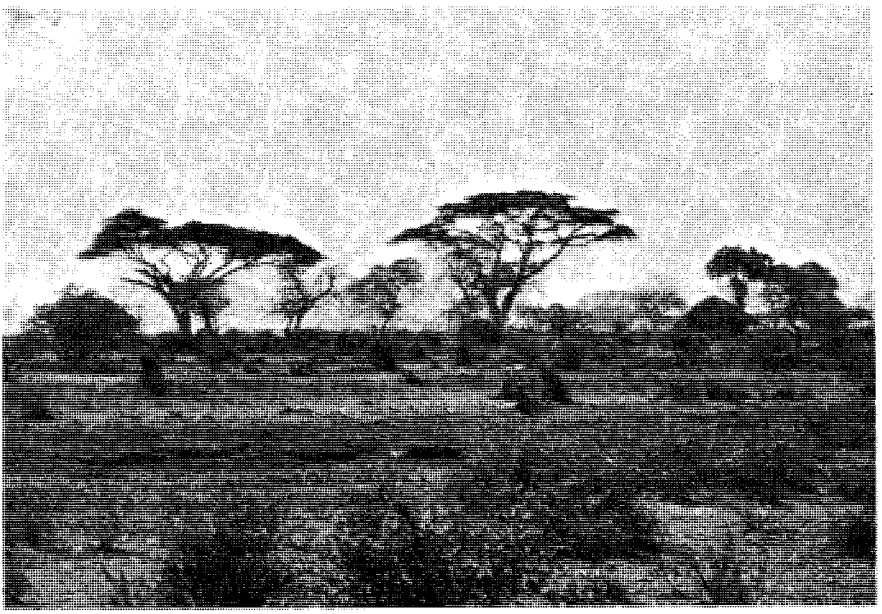
Intensive rice cultivation in the Rau-River area.



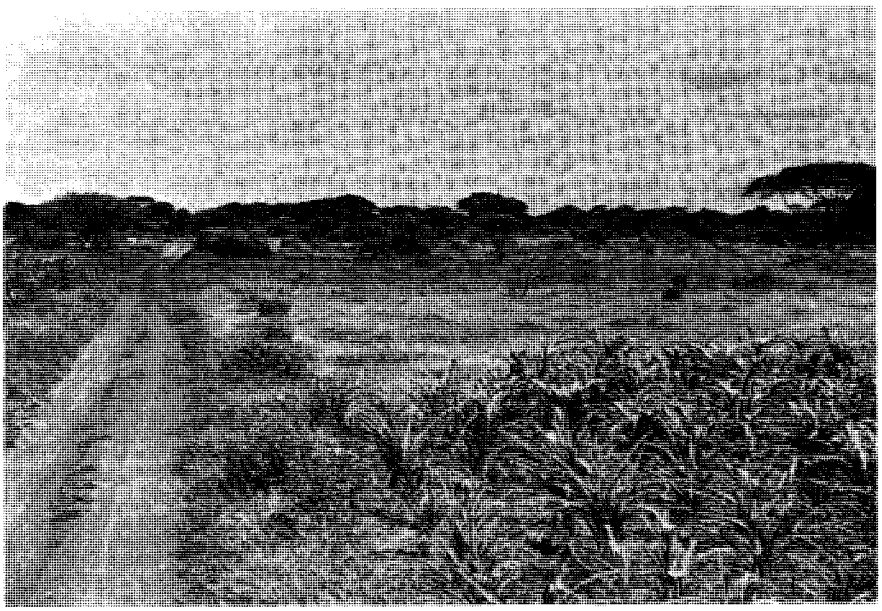
Example of serious overgrazing, the Mawala area.

PART THREE: THE WIDER PERSPECTIVE

Those who are the objects of policy should have the opportunity to participate not only in the specific decisions but in the definitions of the situation on which these decisions are based. This may be called cognitive participation
(Berger, 1977, p 13)



The Kiomu area during the short rains. Note the dust cloud.



The Kiomu area during the long rains.

10. RURAL DEVELOPMENT

> But a shift of resources to the rural sector, and within it to the efficient rural poor even if they do very little for urban development, is often, perhaps usually, the overriding development task.
> (Lipton, 1977, p 18)

Rural development has long been a major issue. The share of the development budget of the African countries allocated to rural agricultural projects varies between 10 and 30 per cent (Table 10:1). These figures should be regarded with caution for two reasons. (1) Budget allocation usually differs significantly from real allocation, mostly in favour of 'modern-urban' development. (2) Rural development projects are often included in sectors other than those accounted for in the table. For instance, many health and educational projects in Tanzania are directed into rural areas, but are included in the health and education sectors respectively. Only by identifying each project would it be possible to make a thorough analysis of budget allocations to the various sectors and purposes.

Tanzania is one of few Third World countries which has consciously devoted substantial resources to rural development. The rural-urban gap has been narrowed, not by decreasing living standards in urban places, but by increasing welfare in rural areas. Not many other developing countries have been as successful in steering the fruits of development to the poor as Tanzania has been.

Table 10:1. Planned Investment in Agricultural and Rural Development for Selected African Countries

Country	Plan Period	Currency Unit	Planned Investment (million) 1	Investment in Agricultural and Rural Development (million) 2		2 as per cent of 1
Botswana	1976-81	BWP	250.0	24.1	a	10
Cameroun	1976-81	XAF	725,232.0	70,450.0	a	10
				36,380.0	c	5
Gambia	1975-80	GMD	144.6	22.0	a+d	15
Ivory Coast	1976-78	XOF	584,162	220,047.0	a+d	38
Kenya	1973-76	KES	4,213.9	929.6	a+c	22
				9.5	e	2
Lesotho	1976-80	ZAR	111.6	36.4	a+b	33
Liberia	1976-80	LRD	415.0	80.0	a+c	19
Mali	1974-78	MLF	395,200.0	133,000.0	b	34
Maritania	1976-80	MRO	32,172.0	5,983.0	b	19
Mauritius	1975/76-1977/78	MUR	1,592.6	118.3	a+c	7
				60.6	b	4
Niger	1976-78	XOF	135,281.0	29,403.0	a+b+d	22
Nigeria	1975-80	NGN	20,000.0	2,400.0	a	7
Senegal	1977-81	XOF	385,000.0	111,000.0	b	29
Sierra Leone	1975-79	SLL	623.0	96,8	a	16
Somalia	1974-78	SOS	7,121.0	1,079.0	a	15
				228.0	c	3
Tanzania	1975-80	TZS	13,889.0	2,240.0	a+d	16
Togo	1976-80	XOF	250,000.0	56,169.0	b	22
Upper Volta	1977-81	XOF	208,666.0	27,852.0	a+b	13
Zambia	1972-76	ZMK	1,956.5	152,5	a	8

a = agriculture, b = rural development, c = forestry, d = livestock, e = land settlement

Source: Africa South of the Sahara 1979-80

The others would be: China, Israel, South Korea and Taiwan, and perhaps Sri Lanka in Asia, Malawi in Africa, and Guyana and Cuba in Latin America. The variety between these countries in experiences and preferences with regard to capitalism, foreign economic relations and population growth is striking (Lipton, 1977, p 74).

TRANSFORMATION OF PEASANT SOCIETIES

The aim of rural development is to raise the income of the rural population, mainly by the transformation of the traditional agriculture, i.e. the peasant mode of production. The productivity of the rural producers must increase, implying a change in the economic and social organization. Low income in the rural areas of the developing countries, especially in Africa, remains a problem of the level of output per producer rather than of income distribution. The search for alternative sources of income must be continued and intensified, together with efforts to increase agricultural productivity. Technological and institutional change does not necessarily mean that people employed in non-agricultural activities have to live in cities. The latest development in the industrial countries of the West is a spreading of economic activities from the large cities to smaller settlements, which has been made possible by new techniques (rural electrification, highway traffic, telecommunications, etc.) and which allows a more 'footloose' location of manufacturing industry and a decentralization of institutions and other activities.

The hypothetical 'inertia' of rural producers has often been studied. Resistance to change by peasants has long been interpreted and explained as 'irrational' behaviour, and the peasant 'subculture' has been described in terms of mutual distrust in personal relations, perceived limited

goods,[1] familism,[2] lack of innovativeness, fatalism, limited aspirations, a belief in luck rather than knowledge, etc. (Rogers, 1969). However, this view of an inverted and traditionalistic peasantry has been challenged (cf. Yapa & Mayfield, 1978; and Rogers, 1969). Schultz, for example, pointed out already in 1964 that peasants are economic people who respond to economic incentives. They are also willing to adopt new practices, provided that resources and services are available. They maximize the utilization of resources within the given technological limits. Despite the number and variety of empirical and analytical measures used, and the crops involved, the results point in one direction: there is overwhelming evidence that peasants do respond to economic incentives (Wharton Jr, 1971, p 567). But how they respond and to what degree varies greatly.

Some researchers blame the slow rate of peasant transformation on political and institutional barriers. Others argue that the peasants know more than the external agents of change, and that the crux of the problem is to be found in the nature of modern technology, in the agents of change rather than in their clients. The poor performance of extension agricultural services in developing countries is well documented. To some degree this can be explained by psychological factors. Extension officers are often young and recently qualified, and there is a communication barrier between them and the peasants. They tend to tell the peasants what to do, rather than sitting down with them to discuss and listen and benefit from their experience.

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[1] Peasants have the notion that all desirables in life exist in finite quantity, are always in short supply and cannot be increased in quantity by any means within the peasants' power (Rogers, 1969, p 28).

[2] The subordination of individual goals to those of the family (Rogers, 1969, p 30).

This apparently contradictory characterization of peasants stems from the ambiguous use of the very term 'peasant'. As shown above, this expression includes various groups of people, from those who are completely independent of external institutions and the national economy - primitive subsistence producers - to those who are completely subjected to the ruling class. They naturally respond differently to policy measures depending on their position on this scale. Some are responsive to economic incentives such as changes in producer prices (although their response is not necessarily the same), while others do not respond at all.[1] Some are unwilling to give up their autonomy by becoming involved in cash crop production. Others, already in contact with the market, are interested in better marketing and purchasing services and above all in transport to facilitate cash crop production.[2] Since the peasants constitute such a heterogeneous group, no universal model of their behaviour can be applied.

Traditional societies are not static. They have always been challenged and forced to readjust. Berry (1976) mentions two important sources of challenge: stress and opportunity. To these should be added coercion. The chief cause of stress is population growth, which upsets the ecological equilibrium. Opportunity came with the development of the market economy. Coercion has been used to accomplish transformation and 'development'. In Tanzania the Germans and the British, as well as the present government, have all tried in various ways to attract or force the peasants to become integrated into the national economy and to meet macro demands. Villagization is the latest example of this kind of policy.

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[1] In the present study, few mentioned low producer prices as an obstacle to selling. Annex, p A48.

[2] Transport problems were mentioned most often by peasants who marketed their products. Annex, pp A45-A48.

The various challenges have a common result: they upset the traditional balance. The contemporary picture of Africa is a mosaic of societies in transition as readjustments are taking place. In all societies change is met with reluctance. Inertia in perceiving the need for the necessary adjustments slows down the process. In most cases the old society seems more attractive than any of the alternatives. Old accustomed methods of production and modes of social organization have to be altered. Transformation and change are also perceived differently by different people and 'modernization' is not always regarded as an advantage. The group has to adjust to the adverse as well as the beneficial effects of challenge or 'modernization'.

The process of change may be spontaneous - generated internally within the society - or specific - planned changes, operating from outside (Berry, 1976, p 43).[1]

According to Berry adjustment and adaptation can take place through one or a combination of three alternatives: (1) space change, where a whole group shifts or expands its base; (2) system change, where a group adopts other production methods, including changes in crop structure within the same area; or (3) migration of individuals, temporary or permanent, from the traditional base.

If a group fails to adjust and adapt to the new circumstances, or if inertia is so strong that the transition process becomes too slow, overstress will result in economic hardship and the deterioration of the environment, e.g. soil erosion.

The first type of adjustment involves the least change and effort. The same organization of production of the economy and society can be maintained. This is why centri-

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[1] Knight (1974, pp 157 ff) discusses several sources of change..

fugal movements are important in primitive agricultural societies. A group's base can go on shifting so long as there is empty land. When population density increases, the shift or expansion of the base will eventually be prevented, and the other types of adjustments must be employed. This type of transformation is now being witnessed in Tanzania. Villagization effectively blocked the first option for the people. An artificial increase in population density was created by administrative fiat. However, if the peasants fail to adjust and adapt to the new situation by a system change, the result will be a deterioration in production and the environment. One way out of the dilemma - not acceptable to the government - would be migration from rural to urban areas, which is very common in developing countries. The young and educated are then particularly likely to leave the traditional base. This 'brain drain' in rural areas is serious, since the development process requires young educated people who are generally more willing to answer the challenge of the transformation of traditional agriculture.

Tanzanian agriculture is due for a system change, namely intervention and the breaking down of the peasant mode of production and the economy of affinity. This need was clearly recognized by the colonial governments as well as by the present one, the difference being that the former tried to establish a market economy, while the latter aims at a socialist transformation.

The transformation has so far been most successful in densely populated areas. In East Africa, e.g. in the Kenyan Highlands and in the Arusha, Kilimanjaro, Iringa, Mwanza and West-Lake areas of Tanzania, cash crop production by peasants has been established and it now constitutes an important part of the economy. In these areas the earlier mode of production was unable to produce enough for the subsistence of the peasants. Since the area was

already densely populated the base could not be shifted or extended. Thus a system change, involving individual migration, was needed to meet the challenge. Many peasants also took the opportunity offered by the introduction of the market economy since they anyway had to alter agricultural production. In less populous areas system change policies were resisted.[1] Here the peasants still had the option of shifting or expanding the base for their agricultural production, and they did not take the opportunity offered by the market economy since it implied a system change. They used their exit option and remained unsubjected.[2]

Risk Aversion

Risk and uncertainty[3] - and peasant perception of these - are viewed by many researchers as the key to an understanding of peasant behaviour. Wharton Jr (1971) makes a distinction between two cases relevant to peasant decision-making: (1) those future events to which he can assign probabilities based on experience or personal knowledge (risk), and (2) those which cannot be assigned probabilities or where the probabilities offered are derived not from personal experience but external knowledge offered by others, the agents of change (uncertainty).

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1 See discussion Chapter 3.

2 Yapa & Mayfield (1978, p 146) take the view that non-adoption of innovations is not a passive state caused by apathy or resistance; on the contrary, it is an active state arising out of the structural arrangements of the economy.

3 In the simplest terms risk is the probability of loss. Uncertainty cannot be quantified, it lacks probabilities. The definition of uncertainty advanced by Mors, et al. (1976, p 50), according to which a situation of maximum uncertainty would occur when one is sure of a loss is dubious.

Peasants have good knowledge of their local environment and the probabilities attached to their current farming system - experience and knowledge gathered over the generations. Knowledge relates to three major factors: (1) variability in yields depending on climate, soil, timing, vermin, etc.; (2) variability in the cost of inputs, of which some are required even by peasants using only household labour; (3) producer price variability and market access, vital to the choice of crops and crop-combinations or to the decision whether or not to produce any cash crop at all.

The main barriers to economic and social change in the traditional society are often treated as imperfections in the market - racial and ethnic discrimination, differential access to capital markets, traditional constraints on job choice, etc. Profit maximizing is a special case of the general behaviour of utility maximizing.[1]

Lipton (1968) suggests an analytical framework for explaining the 'optimizing' behaviour of the peasants. His 'survival algorithm' is a critique of the various marginalist theories previously employed in analysis and policy recommendations.

Since the peasant works under conditions of uncertainty, no resource has a unique marginal physical productivity (MPP). Instead there is a probability distribution of MPPs. In cases where the peasant has a strategy of 'marginal-to-expected value productivity' of money, which means maximizing profit in the long run, peasants are asked to learn from experience but not to learn the danger of learning from experience. In extreme cases the long-run-peasants die in the short run, if their risky experiment has a

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[1] That the peasant maximizes utility, i.e. does what he wants to do under given constraints, is a 'tedious tautology' (Lipton, 1968, p 329).

low outfall in the first years. This leads to a bundle of practices, some progressive and some conservative.

Lipton's analysis suggests the reason why peasants in identical environments may develop and inherit different, though rigid, farming practices. It explains 'rational' security-centred conduct, remote from the self-confirming test of collinear production functions but close to the peasants' account of their own conduct (Lipton, 1968, p 348).

Traditionally it has been thought that those who are willing to take risks will get a higher payoff and will be rewarded once they have succeeded. According to this view the wealthier peasants are those with a high propensity to innovate and take risks. Without answering in the old riddle - which came first, the hen or the egg? - it can safely be stated that both exist, as does the skewed income curve with a few relatively wealthy peasants and many poor ones. Inherent in the market system is a tendency for development benefits to be systematically distributed in favour of the wealthier groups (Weeks, 1970, p 28). Poor peasants cannot afford to take risks and will therefore be unable to achieve a higher payoff. If poor peasants take a risk, they are gambling with the lives of their families, and this explains their risk aversion.

The poor peasant may recognize the complexity of his farming system, but how is he to know which element to modify or which parts to change simultaneously? A stress situation forces the peasant to change, but scarcity sometimes provokes increasingly desperate measures rather than better allocative procedures (Lipton, 1968, p 341). If the degree of risk and uncertainty is measured in terms of the possibility of 'disaster', then the poor bear most of the risk and uncertainty and the rich peasant gain most of the benefits (Weeks, 1970, p 34).

Dependency

The transformation and development of a peasant society implies greater dependency on external institutions and consequently additional risk to the peasant. At the same time he loses his autonomy. However, his dependency on the physical environment decreases, at least in the long run, as he acquires an ability and a greater capacity for environmental engineering.

Two questions are crucial: (1) are the peasants willing to surrender their autonomy and increase their vulnerability to other social classes; (2) are they willing to barter their dependency on the environment for dependency on institutions and other social classes?

> They (blandishments of modern agricultural science) also expose the farmer, if he adopts them, to a state of utter 'vulnerability'; he becomes dependent on alien institutions controlled by non-farmers who, furthermore, are not held accountable for failing to provide the resources and services required to enable new innovations to be profitable.
> (Mors, et al., 1976, p 48)

The new sources of risk, dependency and vulnerability connected with 'modern' agriculture stem from the need for inputs such as improved seeds, fertilizers, insecticides and farm implements which cannot be supplied by the producer himself or from within his group. Thus he comes to depend on external suppliers. These inputs demand cash payments, which the peasant normally cannot obtain from domestic sources. He must use banks or private moneylenders. Due to the general land tenure system in Africa it is difficult for the peasant to borrow money from a bank, since he cannot offer the land he farms as collateral. Thus the private money lender is the remaining alternative for the poor peasant, and he costs more than bank loans, which the wealthier peasant can use.[1]

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[1] Cf. Griffin's (1974) model on biased innovation and social fragmentation of factor markets.

Transformation means that the peasant produces a surplus which he markets, and that he thus becomes part of the macro-economy. Producer prices are now an important element in his decision-making. He has no control over price policy and becomes dependent on national and international price fluctuations. The crops that he sells must be collected and transported from his farm. External institutions decide when to collect the harvest and what price to pay (market accessability).

Conclusion

Aversion to risk, dependency and vulnerability may explain why the African peasant has chosen to stay out of the national economy. He is of course vulnerable to variations in the physical environment. Even small climatic variations may result in famine. But this type of dependency and vulnerability is a natural part of the peasant's life. He could not envisage anything else.

The African peasant probably perceives the increase in risk and dependency, and thus in vulnerability, as something so negative that he will not voluntarily adopt a system change so long as the exit option remains open. He will remain free of the other social classes and will not participate in the 'development process'.

Since agriculture, on account of the above factors, will not be transformed until it is necessary in order to avoid environmental and economic deterioration, a situation of necessity must be created. This calls for a whole bundle of measures. As we have seen, the penetration of capitalism in Africa created constraints for its own development.[1] This also holds for the socialist expansion. A rural transormation must 'unblock' the barriers to a

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[1] Cf. above Chapter 3, and Mabogunje (1981) and Hydén (1980).

new system of production and social organization (Mabogunje, 1981). Furthermore, people must feel interdependent;[1] they must be prepared to sacrifice the autonomy of the family and the extended family and to become involved instead in a larger social and economic interaction.

Sooner or later this transformation (system change) will occur, especially if the present excessive population growth in Africa continues. To minimize the adverse effects of a system change and the integration of the peasants into the national economy - the replacement of the peasant mode of production and the economy of affinity by another system - it is important that the process is initiated as soon as possible to allow enough time for adjustment and adaptation.

'Rational' Utilization of Land Resources

The study shows that large parts of the area under study are agriculturally marginal and that the peasants and pastoralists have to cope with severe natural hazards in farming and livestock rearing. Due to rapid population increase in the Kilimanjaro and Pare areas, the population has expanded and shifted its base to marginal lands formerly used for grazing. This has resulted in the over-exploitation of scarce land resources, in other words in environmental deterioration.

The studied society is under stress because the farming and grazing systems have not been adapted to the present population density. Furthermore the national economy requires that the peasant should produce a surplus, which increases the land pressure even more; large areas are planted with cotton. This is a society in transition.

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[1] Cf. Rogers' (1969) concept of cosmopoliteness.

Some peasants have left the traditional agricultural system and have become involved in a wider society. They have changed their farming system accordingly.[1] However, the majority still persist in using traditional methods and marketing a marginal surplus only. They have managed to avoid becoming involved in national obligations.

The over-exploitation of the land is evident in the severe overgrazing of certain parts, and in the increasing extent of these parts.[2] Overgrazing causes wind erosion. During the dry season the lower slopes of Mount Kilimanjaro are covered with dust whenever there is a wind. The soil is also becoming less fertile, especially in areas with relatively intensive cultivation, i.e. in the northern parts of the study area. In some areas the peasants have changed to less demanding crops, e.g. cassava.

Do people recognize the severity of the situation? If the present trends continue, there is a great risk that land will become unsuitable for agriculture as well as for grazing.

Only a small proportion (12 per cent) regard the area as overgrazed. However, in the worst affected parts roughly one-third consider their area to be overgrazed (Table 10:2). A much smaller proportion (7 per cent) consider the area to be overstocked. The highest proportion in this case is in the southern parts, where the largest herds are found, while the proportion declines towards the north, which agrees with the decline in herd size.

Even if people recognize the problem of overgrazing and overstocking, most of them are reluctant to reduce the livestock numbers. The southern parts naturally resist livestock reduction most strongly. Here livestock is the

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1 See Chapter 6.

2 Compare Maps 6:1 and 6:2, which clearly show the expansion of the overgrazed areas.

main source of subsistence and income. In this area no household stated 'reduction of livestock herds' as a way of alleviating overgrazing. Instead they wanted more grazing land (they have lost large areas) or control of livestock migration - 'stop people from other areas using our land for grazing their cattle'.

Table 10:2. People's Perception of their Area of Residence (Percentages)

	ECOZONE				TOTAL	
	South	East	Central	North	N	%
Is the area overgrazed?						
Yes	31	18	11	4	64	12
No	69	82	89	96	488	88
Is the area overstocked?						
Yes	29	9	7	1	39	7
No	71	91	93	99	503	93
Is there a soil erosion problem?						
Yes	15	16	10	29	91	16
No	85	84	90	71	460	84
Is the soil declining in fertility?						
Yes	33	38	33	38	194	35
No	67	62	67	62	357	65
Is the area underdeveloped?						
Yes	56	64	68	65	362	66
No	44	36	32	35	189	34

The less dependent a household is on livestock, the more willing it will be to reduce stock to prevent overgrazing. But migration control is generally considered more important.

More than one-third of the households considered that the soil was becoming less fertile. A slightly smaller proportion cited soil erosion problems. Most of these

households lived in the northern parts, where the problems are greatest. The land there has long been intensively cultivated and the areas are also subject to floods as well as the usual droughts.[1] In the northern ecozone flood control is the most frequently mentioned remedy for declining soil fertility and, especially, for soil erosion. The use of manure and fertilizers was mentioned most often by households in the central zone.

The few people who are aware of the area problems in agricultural and livestock production also recognize what measures would be necessary to alleviate the severe situation. But are they willing to change their production system and adjust to the new circumstances? That is a crucial question. And what is the majority willing to do? Will the process of transformation be quick and comprehensive enough to stop any further deterioration of the environment, which would bring greater poverty and further social stratification?

The problem of readjustment, adaptation and 'irrationality' in traditional societies will be discussed below, with examples from the debate on pastoral peoples keeping 'excessive' numbers of cattle.[2]

> Official criticism of the pastoralists is that (a) their lack of interest in exchanging cattle for cash prevents their obtaining the benefits of the cash economy in the form of consumer goods, and (b) their 'cattle complex' has led them in many areas to accumulate excessive numbers of cattle, endangering their environment through overgrazing.
> (Livingstone, 1977, p 209)

This view has been challenged on three counts. The first line of argument is that social objectives must be taken into account. Stocks are not necessarily excessive

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[1] See above Chapter 8.

[2] In the study area livestock population exceeded the maximum the area can support by 1.5 to 5 times (Annex, pp A12-A14).

if these other perfectly rational aims are considered. Social objectives include subsistence,[1] milk and meat; cattle as legal tender and as store values; the pastoralists' evaluation of risk; economic benefits from a wide social network; prestige and wealth; brideprice; and finally objectives connected with ritual (Livingstone, 1977). The second argument is 'economic': overstocking is the result of economic considerations, in particular the pursuit of private interests rather than social benefits. The third argument concerns the livestock-to-man ratio: overstocking may be a result of excessive population, since each family requires a minimum number of cattle for subsistence.[2]

The conflict between private interest and profit maximization on the one hand and social benefits on the other is discussed by Hardin (1973), with reference to the 'tragedy of the commons'. As long as the grazing land is commonly owned, as is the case in the study area, an individual livestock owner will maximize his benefit by adding more heads to his herd. Ultimately one additional head causes overgrazing, so that although a benefit falls to the owner, the adverse effects are shared by all. Thus, the marginal unit gives the owner an additional income which he does not have to share and which is greater than his part in the common negative effect.

This is the dilemma. Even if livestock owners are aware of the overgrazing problem and are told not to increase their herds, it is hard to provoke collective action. An owner who began to reduce his herd unilaterally,

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[1] The result from the case study shows that most owners have livestock for subsistence and security (Annex, Part I, Table I:24). In relation to marketing the trend was that the greater the role of livestock in an area, the larger the share of the households sell live animals or animal products (Annex, pp A65-A69).

[2] Cf. Dahl & Hjort, 1976.

in order to set a good example, would lose by it, while the rest would have better access to the commons.

> Sooner or later, consciously or subconsciously, he senses that he has received two communications, and that they are contradictory: (1, the intended communication) 'If you don't do as we ask, we will openly condemn you for not act-int like a responsible citizen'; (2, the unintended communi-cation) 'If you do behave as we ask, we will secretly condemn you for a simpleton who can be shamed into standing aside while the rest of us exploit the commons'.
> (Hardin, 1973, p 143)

A sense of interdependence is called for, leading to collective action which would benefit social interests. If people did not voluntarily readjust and reach a collec-tive decision, laws and regulations would have to be used, preventing individuals from behaving in certain ways.

Villagization in Tanzania might lead to a better cli-mate for collective action. Moreover, the commons are now more easily defined, since each registered village has surveyed boundaries. The available land is limited and definable. The people using the land are neighbours. The new registered villages must have an elected village coun-cil and among its responsibilities, alongside its function as a useful development tool is to be the establishment of conditions for collective action to prevent the deterio-ration of the environment and the economy.

The creation of villages may pave the way for a per-ceived interdependence among the peasants, a crucial fac-tor in voluntary collective action. However, the village should not be too large - the size of the group is impor-tant.

> Whether a group will have the possibility of providing itself with a collective goods without coercion or outside induce-ments therefore depends to a striking degree upon the number of individuals in the group, since the larger the group, the less the likelihood that the contribution of any one will be perceptible.
> (Olson Jr, 1965, p 45)

What it all comes down to is whether peasants and pastoralists are willing to trade their environmental dependence for a societal dependence. The creation of villages must be followed by the creation of interdependence among the peasants; they must give up their autonomy. They must all strive for the collective good, thus resolving the 'tragedy of the commons'. If this perceptible interdependence can be accomplished, it may be possible to transform and develop the peasant mode of production and finally to establish a different economic and social system better suited to solving the challenge that confronts the peasants. The 'exit option' of the peasants must be similarly blocked; a development strategy must be able to unblock the barriers preventing the replacement of the peasant mode of production and the economy of affinity.

11. RURAL DEVELOPMENT PLANNING

> The basic 'contextual' difficulties in systematically planning the development of the rural sector and indeed of achieving any advance in agricultural production are problems of scale. At one level, the peasant family farm as a production unit is usually so tiny that it offers but little opportunity for technological improvements in productivity. At the aggregate planning level it is difficult to formulate plans and to ensure their implementation when this depends on the response of a very large number of these separate peasant families. (Cliffe, 1971-72, p 77)

Is development planning a useful tool for achieving rural development? It was discussed in Chapter 3 that the limitations in developing planning were mainly determined by differences in 'rationalities' between peasants and planners (bureaucrats), the former being uninterested in joining the planning exercise. To this major problem should be added difficulties connected with scale and the large number of small units which must be included in the plan. Furthermore peasant agriculture is by no means homogeneous, and a development plan cannot therefore comprehend the whole spectrum of rural producers and the variations in their behaviour. Plans very often seem to imply that the units for which they are intended must first be transformed in order to fit the planner's picture. Cliffe (1971-72) implicitly reflects this view.

Initially, rural development plans simply emphasized agricultural production and productivity. However, many governments in the Third World have recently realized the

need for agricultural transformation within the context of a comprehensive rural development strategy. So far, rural development planning has had little impact on rural transformation. Growing knowledge and understanding have not resulted in new and realistic initiatives in this field (Mabogunje, 1981).

Most rural development programmes can be characterized as 'investment programmes approach', as opposed to 'popular mobilization'. The first type has been more attractive to African governments, according to Mabogunje (1981) for three major reasons: (1) the planning strategy emphasizes the technocratic rather than the popular orientation of development; (2) it enables the government to slur over internal ethnic and social problems which would have to be resolved if the alternative approach was adopted; (3) it enables the benefits from governmental intervention in rural areas to accrue mainly to the élite. It is clear that in many African countries the present rural development approach suits the powerful interest combination of bureaucracy, political leadership and rural élite.[1]

In many cases the technocratic planning approach to rural development - capitalistic as well as socialistic - has failed to appreciate the complexity and structural constraints of the peasant mode of production. The dependency issue has been neglected almost completely. Problems of risk aversion have been considered only marginally. It has been taken for granted that new techniques and ways of life would be positively viewed by the peasants. If

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[1] Cf. Lipton's discussion on urban-biased development.
'For instance, an urban-biased government will prepare rural projects less well than urban projects, will manipulate prices to render rural projects less apparently profitable (and hence less 'bankable') and will tend to cut down on its own efforts if donors step up theirs.'
(Lipton, 1977, p 15)

they did not change their production system, they were 'lazy', 'they did not understand their own good', 'they were irrational, uneconomic', etc. Since the technocratic planning approach omits the major issues and concentrates on those that can be handled by the planning procedure, it is not surprising that rural development planning has so far had only a marginal effect on the transformation of the rural areas.

Earlier sectoral planning has been replaced by 'integrated rural development planning' after the recognition of the interdependence between the sectors. To transform agriculture into a more productive industry it is necessary not only that peasants acquire new knowledge and better techniques and methods, but also that credit and marketing institutions are available and that various organizations provide the necessary inputs. Consumer goods must be available to purchase for the cash received from sales of crops, live animals and livestock products. This requires an infrastructure - transport, social and commercial services - and an administrative and organizational setting which the peasants can rely upon. All sectors of the economy must be developed and changed simultaneously, which is the logic behind the integrated approach. But this approach still implies a technocratic planning procedure by rural development programmes. Technocratic planning obscures the structural constraints of the African peasant mode of production, which is the central issue. As long as this remains unaltered, rural development planning is bound to show meagre results. Integrated rural development programmes have also wrongly assumed that the peasants and the bureaucrats are caught up in structural interdependence, with the latter having a leverage over the former for the purpose of bringing about development (Hydén, 1980, p 212).[1]

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[1] For a critical review of integrated rural development programme, cf. Ruttan (1975).

Although the large rural development programmes have been largely unsuccessful, there are examples of pilot projects that have succeeded. Mabogunje (1981) refers to cases where small projects have been successful due to a 'group organizational' or 'constituency organizations' approach. Such organizations were crucial in reaching the mass of low-income, low-status people in the rural areas. They make it possible to establish vigorous local institutions, which are vital to successful rural development. These organizations have to be linked by two-way flows of information, resources and influence with government institutions at the district, the regional and the national levels. The new organizations must involve new structures sponsored by public authorities. However, they can incorporate traditional and informal arrangements. The new village organization in Tanzania fits these characteristics well. Ruttan, referring to the same study as Mabogunje,[1] ascribes the success of many rural pilot projects to the intensity of human resources devoted to organization, management and technical assistance. When an attempt was made to generalize a pilot project on a national or regional scale, this intensity could not be maintained. Furthermore, when projects are generalized, access to higher governmental decision-makers and the administrative freedom to tailor programmes to local conditions are frequently sacrificed to administrative convenience (Ruttan, 1975, p 15); the experimental and flexible approach is lost.

TOWARDS A NEW APPROACH TO RURAL DEVELOPMENT

The limitations of past and present rural development planning have been discussed in light of several development

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[1] Lele (1975).

theories. The necessity of an ecological approach and the importance of demographic factors as determinants of development or change have been emphasized.

The conclusions drawn from the five major research questions discussed in separate chapters in Part II, are important to any attempt to achieve development planning that is relevant to the people concerned. The analysis of the field data shows that Chayanov's theory of the peasant economy offers significant insights and helps to explain the behaviour of the peasants in the study area. The household is the dominating producing and consuming unit, determining the level of output. The family structure or size largely determines the variation in farmland holdings between households.

The households, even the peasant households, are not homogeneous, as is often wrongly supposed. A clear stratification among the peasants is reflected in differences in farmland holdings, agricultural systems and access to off-farm work. The majority of the peasants are in a transitional state between the traditional economy - which is best analysed by concepts derived from the theory of peasant economy or Sahlins' concept of 'domestic mode of production' - and the 'modern' type of agriculture, dependent on regional and national institutions. Some have completely abandoned traditional agriculture, while others remain untouched by the 'modern' way of life. This holds especially for the pastoralists.

If employee-households are included, the stratification becomes even greater. Off-farm work constitutes an important source of income in the area. The majority of wage-earners are employed as plantation workers in unskilled jobs and are paid the minimum wage according to rural scales. The existence of large wage-earning sector in the economy distorts the analysis of the economy according to the theory of peasant economy.

The importance of ecological factors in explaining the production pattern in an area, and their impact on the differentiation between the peasants in the study area, is clearly shown. The peasants are frequently hit by natural hazards. They have little opportunity to control their physical environment, the main possibility being by irrigation. But due to the deforestation of the higher slopes of Mount Kilimanjaro, irrigation can only be implemented during or immediately after the rains, since the rivers have water for a short period only. The pressure on the land on the higher slopes has forced the peasants living there to move down into the lowlands and to cultivate the marginal lands on a permanent basis. This 'space change' has been going on for a long time, and even land that is unsuitable for cultivation has been opened up by peasants. The grazing area has thus been steadily reduced.

At present most land is cultivated and the 'space change' alternative for a peasant society under stress has proved inadequate in solving the tensions; a 'system change' has gradually been adopted. The land is being more intensively cultivated (cf. Boserup, 1966 and 1976). However, the crucial question is whether this 'system change' is rapid enough to cope with the increasing population density in the area. There are already signs of an over-exploitation of the cultivated land, and large parts of the area are being overgrazed. However, there are ecological constraints to the type of 'system change' the peasants can accomplish. For example, a change to high-yielding varieties of maize demands more rainfall or better irrigation facilities. Moreover the peasants will become dependent on regional and national institutions which are in conflict with the peasant mode of production.

In formulating a new approach to rural development planning these conclusions based on the earlier analysis must be taken into consideration. Together with more general factors such as the peasants' aversion to risk, their dependence on the physical environment, their aversion to becoming involved in a larger society and the interdependence between the three elements that characterize the domestic mode of production (small labour differentiation, simple technology and finite production objectives) these constitute the structural constraints on the peasant mode of production. When alteration occurs and the system is under stress, the tension is normally restored by returning to original equilibrium. Moreover, the penetration of an alternative economic system often creates barriers to its own expansion. The unblocking of these barriers should be an important feature of rural development planning. The new approach must also acknowledge the rationality of the peasants. When they refuse to change or adopt an innovation, this should be regarded as a perfectly rational decision and not be dismissed by claiming that peasants are backward, irrational, and so on.

We are dealing with a type of society that does not easily lend itself analysis in neo-classical or Marxist terms. There is great stratification among the peasants - the peasantry is not homogeneous - which means that individuals will respond differently to an incentive. In households where cash crop production is insignificant, price incentives are likely to affect the peasants only slightly or not at all, since absolute or relative producer prices are not an element in the decision matrix of these households.

The conceptualization of the necessity of 'system change' in the agricultural and livestock sectors is important. The material shows that this process is going on in the area. People have a good idea of their problems.

However, the process may be too slow to avoid environmental deterioration. To achieve a comprehensive 'system change' among all the peasants, more incentives must be used, and they must be seen to be relevant. A complication is that the change instruments must not be in too much conflict with the peasant mode of production, so long as the peasants have an exit option. History shows that both past and present rural development policies have been largely unsuccessful in achieving development among the peasants and especially in the poor strata. Thus the 'new development' policy must include a whole set of measures, each directed at a specific group of peasants. There should be a pluralistic and experimental approach.

The failure of past and present rural development planning does not mean that planning is completely irrelevant. The knowledge and experience acquired should be used to seek new strategies. The technocratic way of development, based on investment programmes, should give way to a participatory approach. The peasants have considerable knowledge of the problems that face them, and can thus become involved in rural development planning, provided the right strategy is used. One aim of a new development approach should be to help peasants to formulate their problems.[1] This approach does not necessarily have to be limited to situations in which the collective capacity of the groups or local communities has to be geared to the transformation of oppressive conditions; it can

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[1] Hydén (1980, p 216) is sceptical of the 'problematization approach', since the conditions for its successful application are not found everywhere. 'In a situation, for instance, like that of rural African where the process of marginalization has not yet begun to take a significant human toll and where the pre-capitalist economy is regarded as more human and socially acceptable than its modern alternative, the task of problematizing is bound to be a long and frustrating experience.'

also be applied where groups or villagers have to adjust to new circumstances and where the collective capacity of the group needs to be improved to ensure perceptible interdependence. For instance, villagization in Tanzania has blocked the peasant's exit option - the option of shift or expansion of the base - requiring a new set of actions and social organizations. What remains is a system change, with a new social and economic structure, in which the autonomy of the peasants has been sacrificed to interdependence.

The new rural development planning approach must include the following eight aspects:

1. The strategy should aim at the low status, low income strata in the rural areas. Participation of the women is an essential element.

2. Local variations must be appreciated, especially environmental factors. Of these the peasants have considerable knowledge.

3. The heterogeneity of the peasants must be recognized. Depending on where they are on the scale, they will react differently to the same incentive, being willing to alter their farming system voluntarily and to become engaged in collective action.

4. The rationality of the peasants must be recognized. Their behaviour is completely rational in terms of their information, their past experience and the socio-ecological setting.

5. A system of local taxes must be created. This will enable the peasants to embark on and be responsible for their own projects. It will guarantee the creation of local resources which may be locally invested.

6. The majority of the peasants are producing for subsistence. They consequently have a perception of risk in face of new methods that is different from that of the agent of change or of farmers who are already producing for a market. Risk aversion is an important problem to be considered in any attempt to understand peasant behaviour and, thus, in planning for the transformation of peasant agriculture.

7. Dependency is an important factor in peasant behaviour. Are the peasants willing to trade their environmental dependency, which permits autonomy, for societal dependency? History shows that they are not readily willing to do so. Only where the 'system change' option remains will they do so voluntarily.

8. As a consequence of the above the new approach must be flexible and must allow for experimentation. From this also follows that it is pluralistic. All the resources of rural development should not therefore be put into one basket. Past experience has shown this not to be a successful way.

The new approach has several implications for the developing countries as well as for the aid donors.

1. The localization of rural development must create new local organizations to secure popular participation. (This has already been accomplished in Tanzania.)

2. There must be a two-way flow of information, influence and resources between these new organizations and the higher level government organizations. Thus the bureaucrats' and the peasants' views of development must be harmonized, but not at the latters' expense.

3. Rural development must be organized so as to utilize the human resources available in rural areas, resources which are relatively unskilled and inexperienced in these types of tasks. From this follows that the

use of high-cost human capital must be extensive rather than intensive at both the planning and the implementation stages (Ruttan, 1975, p 16). This implies a shift of resources from the central to the local level.

4. National, regional and district administrations will be more engaged in the planning and implementation of projects related to the social and economic infrastructure necessary for the transformation of rural areas, than in the actual rural development projects.

5. It is necessary that these infrastructures - services and activities - should be available simultaneously to the rural population, when rural development projects are being implemented. This requires sectoral integration in planning and implementation.

6. Aid donors and governments must be more flexible and willing to experiment with various types of projects. In addition they must be willing to support a large number of small projects, which in turn will reduce their influence and control. These projects will also be more difficult to administer and identify.

The spatial content in this approach is important; the projects will be specific to the particular locations. The appreciation of the spatial content in rural development planning has motivated a redefinition of integrated rural development to integrated *area* development.

> The reason is that area is a key concept with regard to the development programme, which we have in mind. It is areas (not sectors) which primarily are the concern of the integrated rural/area development in the present context. (Claeson, 1979, p 1)

The area concept also enables to remove the contradiction between urban and rural, and to appreciate instead the interdependence between these. Successful rural development calls for linkages with urban areas. However,

according to Mabogunje (1981), the spatial context must have a territorial basis in order to ensure perceptible interdependence in the rural population, whose mobilization and active participation are crucial to any successful and self-sustaining programmes of rural development.

Because of its interdisciplinary nature and the importance of a spatial awareness, geography represents a useful tool and a major contribution to rural development studies. To be able to formulate problems and plan rural development, a large pool of knowledge and understanding and information is needed at the local level. Geography could assist in the creation of this pool by participating in the challenging task of creating real and sustained rural development in the Third World countries.

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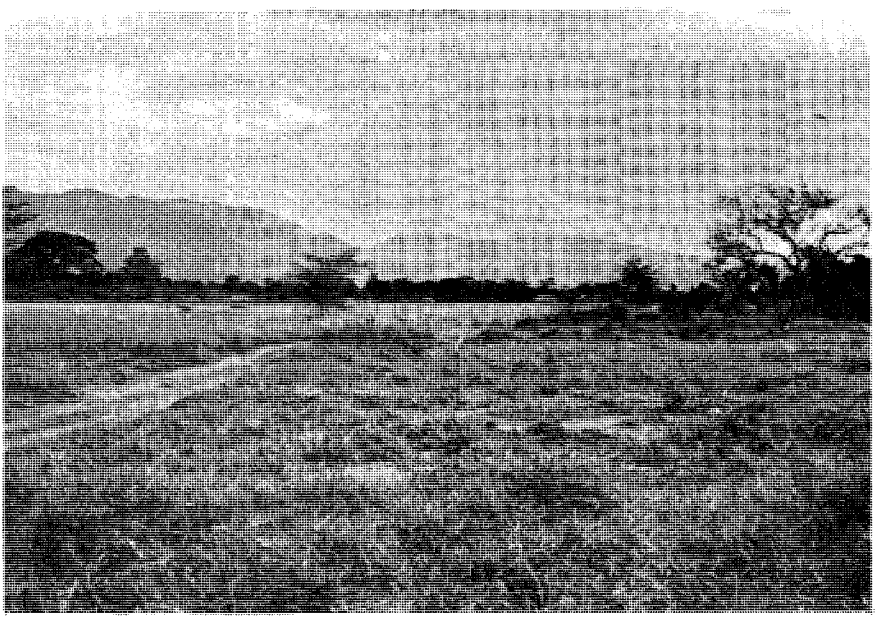
Mount Kilimanjaro

ANNEX

AREA AND SOCIO-ECONOMIC DESCRIPTION

My next stop was Kahe, an oasis of forestland in the valley to the south of Kilimandjaro, almost entirely surrounded by marshland or running water. The trees are tall, the forest dark, with here and there a sunlit glade dotted with doum and raphia palms. Well hidden in the thick vegetation lie the natives' huts. Unfortunately the climate is far from healthy. When the railway was being built and many Europeans were working here, hardly a day passed but some would succumb to malaria or black-water fever.
(Lindblom, 1926, pp 194-195, translated by N. Adler)

Maize farm after harvest, the Kilototo area.



Pastures in the Mwangaria area - the Pare mountains in the background.

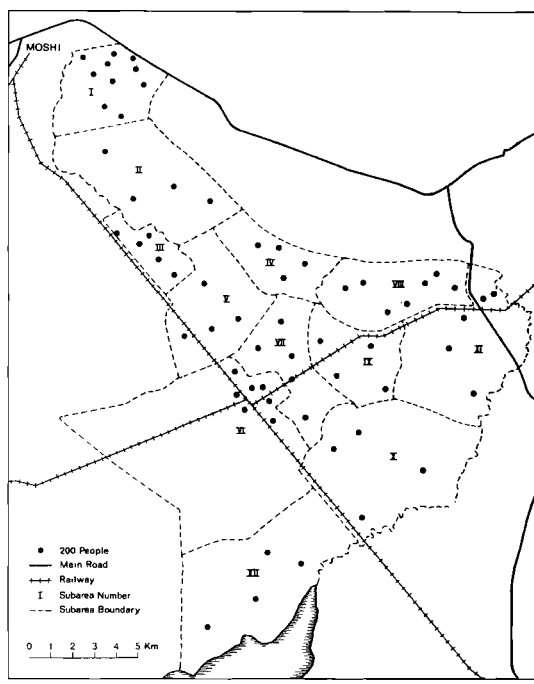
CONTENTS

PART I: RESOURCES, SETTLEMENTS, AGRICULTURE AND ANIMAL HUSBANDRY

PART I: RESOURCES, SETTLEMENTS, AGRICULTURE AND ANIMAL HUSBANDRY

INTRODUCTION

This part contains a detailed description of the agricultural and livestock sectors, as well as an account of the physical conditions and resources of the area. It focuses on the large spatial variation within a small area, which has to be taken into account when development plans are being prepared. For the spatial analysis the area is divided into twelve subareas (Table I:1 and Map I:1).



Map I:1. Population Distribution 1974 and Subarea Division

Table I:1. Subareas and Villages in the Study Area

Subarea Number	Subarea Name	Villages in the subarea
I	Msaranga	Msaranga Rauya Msaranga Ngambo
II	Mandaka	Mandaka Mkonga Mandaka Mnono
III	Rau-River	Rau-River Juu Rau-River Kati Rau-River Chini
IV	Miwaleni	Miwaleni
V	Kahe Sisal	Kahe Sisal Estate Mkonga Juu Mkonga Kati Ngambo ya Reli
VI	Kahe Station	Kahe Station (Oria) Kahe Kenaf Kizungo
VII	Lenduru	Kisangesangeni Longoni Lowiri Malindi Mkonga Chini Msengoni Opuruni
VIII	Kilototo	Kilototo Kiterini Kibaoni
IX	Soko	Soko Mbeu
X	Mwangaria	Mwangaria Kimala Kochakindo
XI	Ghona	Ghona Kiomu
XII	Mawala	Mawala

Note: Villages are clusters of houses, locally known by a name. The concept does not correspond to the ujamaa or planned villages, which have surveyed boundaries, legal status and consist ideally of some 500 households.

PHYSICAL CONDITIONS AND RESOURCES

Location and Topography

The area, some 300 km^2, is part of the Lower Moshi area, which constitutes part of the broad plain enclosed by Mount Kilimanjaro (5 895 m) to the north, Lelatema Mountain (1 500 m) to the west and the Pare Mountains (2 110 m) to the east.

It is situated on the lower slopes of Mount Kilimanjaro. The northern limit is only a few kilometers from Moshi town, latitude $3^{O}22'$ south and the southern at the Njumba ya Mungu Dam and the Pangani-Ruvu river. It reaches as far south as latitude $3^{O}35'$. The eastern boundary is the Himo river. The delimiting longitudes are $37^{O}21'$ and $37^{O}33'$ (Maps I:2 and I:3).

The area is a gently sloping plain with the highest latitude in the north (790 m) and the lowest at the Njumba ya Mungu Dam (690 m). The main settlement, Kahe Station, is situated at a latitude of 710 m. A few hillocks, composite volcanic cones, break the otherwise completely flat plain: at Kilototo (940 m), at Uchira (920 m), at Ghona (820 m) and just east of the old Kifaru Sisal Estate (780 m). No deep depressions exist.

The area is part of the transitional zone between the humid and fertile slopes of Mount Kilimanjaro and the dry Masai Steppe. It is transitional not only in physical terms but also in cultural, having long been the border between the agricultural Wachagga[1] and the pastoral Wamasai.

Geology and Soil

The lower Moshi is made up of Precambrian and volcanic rocks as well as superficial alluvial deposits. The volcanic rocks stem from the Kilimanjaro volcanic activity (Lema, 1977, pp. 13-14), which was contemporary with the Rift Valley formation in late geological time.

Considerable areas of lava were formed and a large number of individual and composite volcanic cones built up (Sampson, 1965, p. 118). Most of the soils of the northern part of the Lower Moshi are derived from the underlying volcanic rocks and are generally fertile. In the Kahe plain the soils are alluvial-colluvial deposits from turbulent rivers, as well as from Kilimanjaro volcanic activity (Lema, 1977, pp. 14-15). Most of the soils in the Kahe plain are: (1) brown to dark brown, mainly deep, silt loams and clay loams, (2) dark, reddish brown, deep-cracking,

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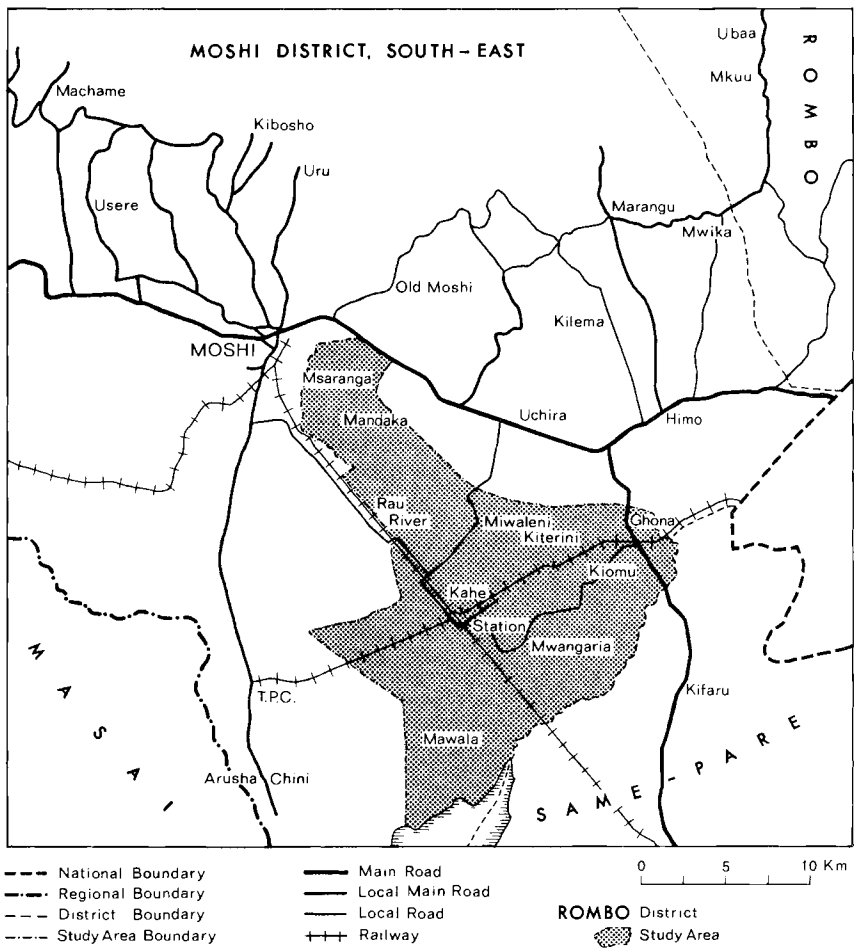
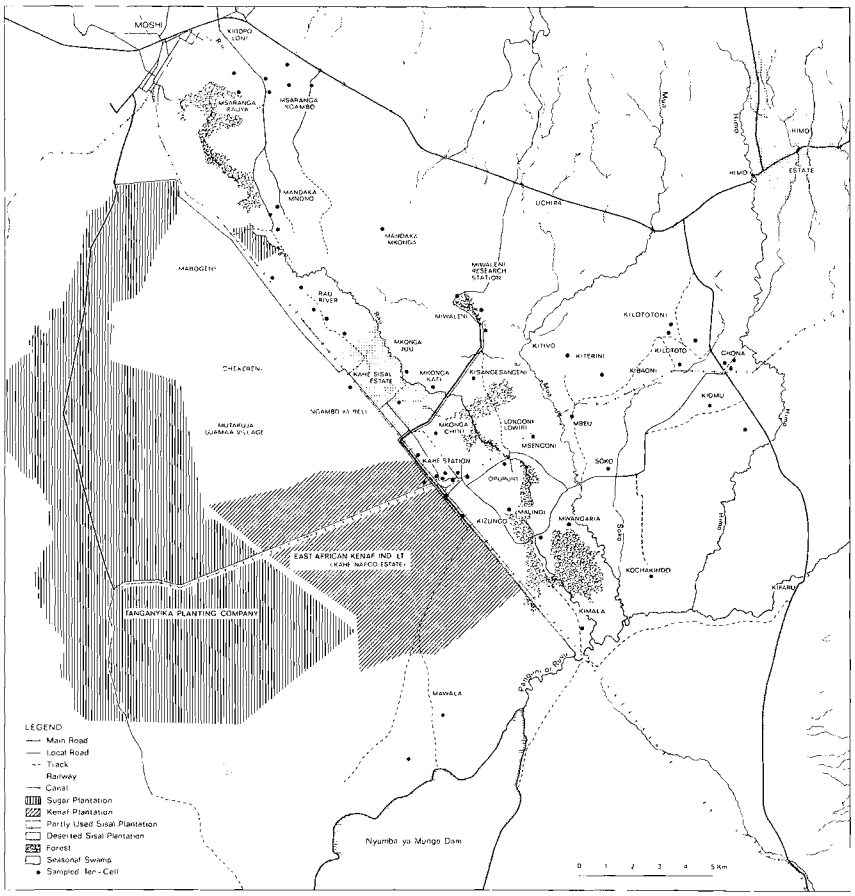
[1] The Swahili prefix Wa- means people; the Wachagga thus originates in the Chagga area.



Map I:2. The Moshi District

heavy clay-soils and (3) black or very dark brown over brown to greyish brown deep saline alkaline clay-soils (Map I:4). Large parts of the area are strongly affected by saline soils, especially the southern parts and the area between the Mua and the Soko rivers.



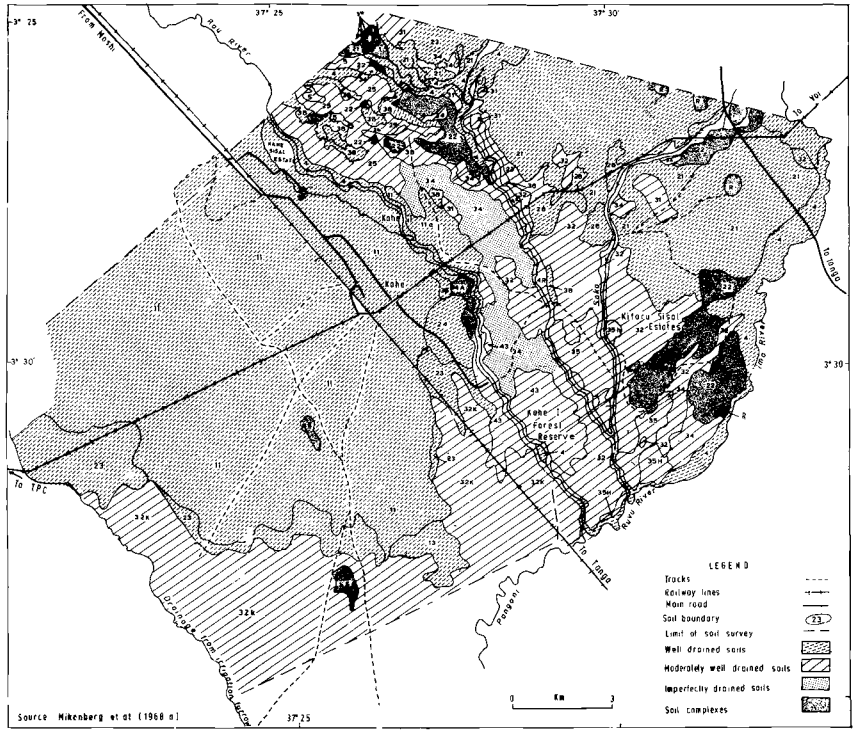
Map I:3. The Study Area

Climate and Drainage

Rainfall is generally low and varies considerably over time and space. In addition, the time of the rainfall is very uncertain. The norhtern parts receive the most rain, approximately 800 mm per annum. At Kahe Station, some 20 km south-east of Moshi, the precipitation is only 400 mm.

There are two rainy seasons: the long rains (mainly March - May) and the short rains (mainly October - December). The south-eastern parts of the area seldom experience any short rains.

Map I:4. Soil Map of the Kahe-Miwaleni Area



LEGEND

1 Very dark grey over dark greyish brown and brown, deep, saline and occasionally alkaline, silty clay loam soils. Subject to occasional shallow flooding.

4 Dark reddish brown deep non saline non alkaline recent alluvial clay loam and clay soils

4R Dark reddish brown deep saline and alkaline recent alluvial loam and clay soils.

11 Brown to dark brown, mainly deep silt loam and clay loam soils overlying calcium calcium carbonate cemented gravels. Shallow inclusions

11a Brown to dark brown and dark brown mainly deep, silt loam soils. Dark yellowish brown or reddish brown sub soil inclusion of very shallow and medium depth soils over cemented gravel layers

13 Very shallow phase of unit 11 overlying rock and consolidated gravels

21 Dark reddish brown deep deep cracking heavy clay soils of the alluvial slopes below Mount Kilimanjaro

23 Brown to dark brown to very dark greyish brown, mainly deep, sandy loam over gravel, saline – alkaline soils. Shallow inclusions.

24 Dark reddish brown to reddish brown, deep, silt loam over silty clay loam and gravely clay loam. Slightly saline sub soil

28 Dark reddish brown, deep, well developed, deed cracking, saline alkaline clay soils

28i Dark reddish brown, deep, well developed saline alkaline clay soils. Surface soil patches a distinctive site feature. Inclusions of similar non-saline non-alkaline soils

6 Very dark grey over dark reddish brown, deep clay soils subject to flooding

31 Brown over very dark greyish brown and dark brown, deep, lime accumulating saline-non-alkaline clay soils.

32 Black and/or very dark brown over brown and dark greyish brown deep saline alkaline clay soils. Surface salt accumulation common

32K Dark brown over dark greyish brown, mainly deep sandy loam with variable gravely sub-soil. Strongly saline and alkaline. Some shallow inclusions

35 Dark reddish brown over dark reddish grey and light brownish grey, deep, saline alkaline, clay loam over clay soils high surface salt accumulation with seasonal crustation

35H A shallow phase of the above soil overlying caliche like rock

43 Very dark brown over brown to dark brown, clay loam over clay forest soils with high organic surface and strongly calcareous sub soils.

34 Very dark grey or black over dark grey deep, clay soils with a high organic surface and highly calcareous subsoil. Subject to seasonal flooding.

22 A complex of well, moderately well and imperfectly drained, mainly dark reddish brown, clay soils

55 Undifferentiated local spring complex of mainly black and grey, non-saline non-alkaline soils, of poor and moderate drainage and fine texture fringed by black, grey and greyish brown, miscellaneous saline and alkaline soils

MA Undifferentiated miscellaneous alluvial complex, mainly dark brown and dark reddish brown poor imperfect and moderately drained clay textured non-saline non alkaline soils.

R Solid rock and lithosolic of the steeply sloping hills.

Source: Lema, 1977, p. 50.

The great variation in precipitation over the year and area is shown in Figure I:1.[1] The whole area suffers a large annual water deficiency, varying from 451 mm per annum at Kahe Station to 280 mm at Moshi. The water deficiency at Kahe Station is larger than the average annual rainfall.

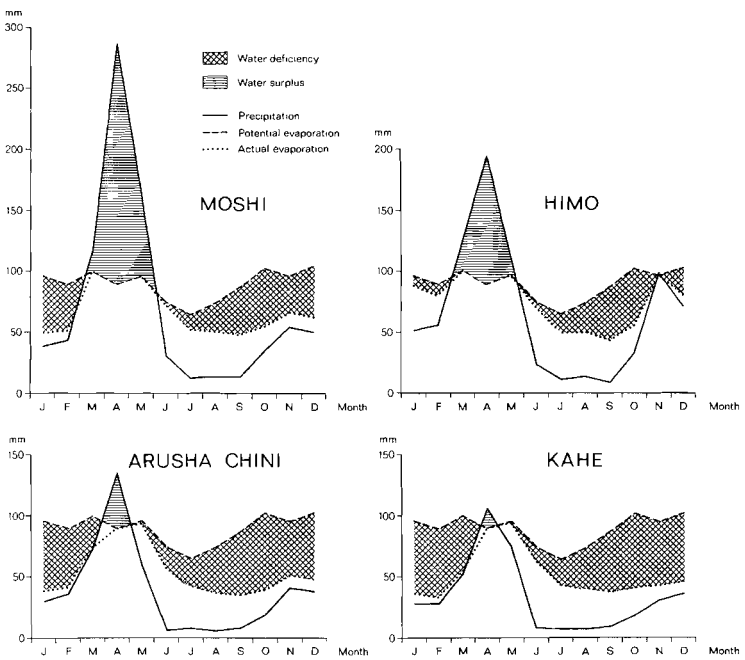


Figure I:1. Water Budget at Moshi, Himo, Arusha Chini and Kahe.
Source: Lema, 1977.

The water surplus varies between 280 mm at Moshi to only 16 mm at Kahe Station. In addition, the length of periods with water surplus shows considerable differences.

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[1] Only one of the four meteorological stations, in Figure I:1, is located within the study area. However, they provide a picture of the great variations in the Lower Moshi area. The Himo station cannot be used for an estimation of the precipitation of the eastern part of the study area.

On the average, Moshi and Himo record water surplus for three months, during the long rains. At Himo there is also a small surplus during the short rains. Further down the plain, at Kahe and Arusha Chini only one month, on the average, gives a surplus. Moreover, the short rains are very slight here.

The average monthly temperature varies between 20-30°C over the year. At Kahe meteorological station the maximum annual amplitude for the 1970-1974 period was 10.2°C. Daily amplitude range between 10 and 15°C (Table I:2).

Two rivers, drawing their water from Mount Kilimanjaro, are of major importance of the area: the Rau and the Himo-Pangani. The former traverses the area, while the second constitutes the eastern and southern borders (Map I:3). Two minor rivers, the Mua and the Soko, traverse the area, drawing their water from springs: the Miwaleni and Soko. In addition there are some ephemeral streams, carrying water only during or immediately after rainfall.

From an agricultural point of view, drainage is poor in most parts. Exceptions are the norhtern parts (Msaranga, Mandaka and Rau-River subareas), areas along the Rau-River south of Kahe Barazani and the Kilototo-Ghona area, where the drainage is fair. Water-logging is frequent during the rainy seasons.

Vegetation

Most of the vegetation has been influenced by man and very large parts are overgrazed. Long-time residents often comment that the area 40 years ago was almost completely woodland. There are two forest reserves: Rau Forest in the Msaranga subarea and Kahe Forest along the Rau-River at Kahe (Map I:3). Both are small and encroachment is taking place.[1]

Natural vegetation is characterized by the variation in rainfall and soils. In the north, trees and good grass are common, but in the south acacia trees characterize the landscape, especially in the old Kifaru Sisal Estate. The acacia is used for charcoal burning. On the saline soil the vegetation is composed of palms and salt-tolerant grass. Bush and scattered trees are common in the south.

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[1] Forest preservation is an old problem. 'The preservation of forest is a problem mainly in the north Kilimanjaro .... There is a constant tendency for Masai to graze their cattle within the forest, for Waarusha or Kikùyu cultivators to hack out small holdings for themselves within them, and for the firing of grass lands to destroy the forest perimeter.' (Page - Jones, 1948, p. 53).

Table I:2. Rainfall, Temperature and Evaporation at Kahe Meteorological Station, 1970-1974.

Rainfall (in mm)

	Jan.	Febr.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1970	82	11	102	94	14	nil	nil	nil	12	nil	1	56	372
1971	65	2	25	173	72	54	13	nil	nil	2	nil	37	437
1972	11	61	65	97	164	nil	nil	5	44	36	183	22	688
1973	114	26	nil	50	45	42	3	85	5	14	34	nm	418
1974	2	5	21	326	33	36	9	nil	nil	nil	6	19	457

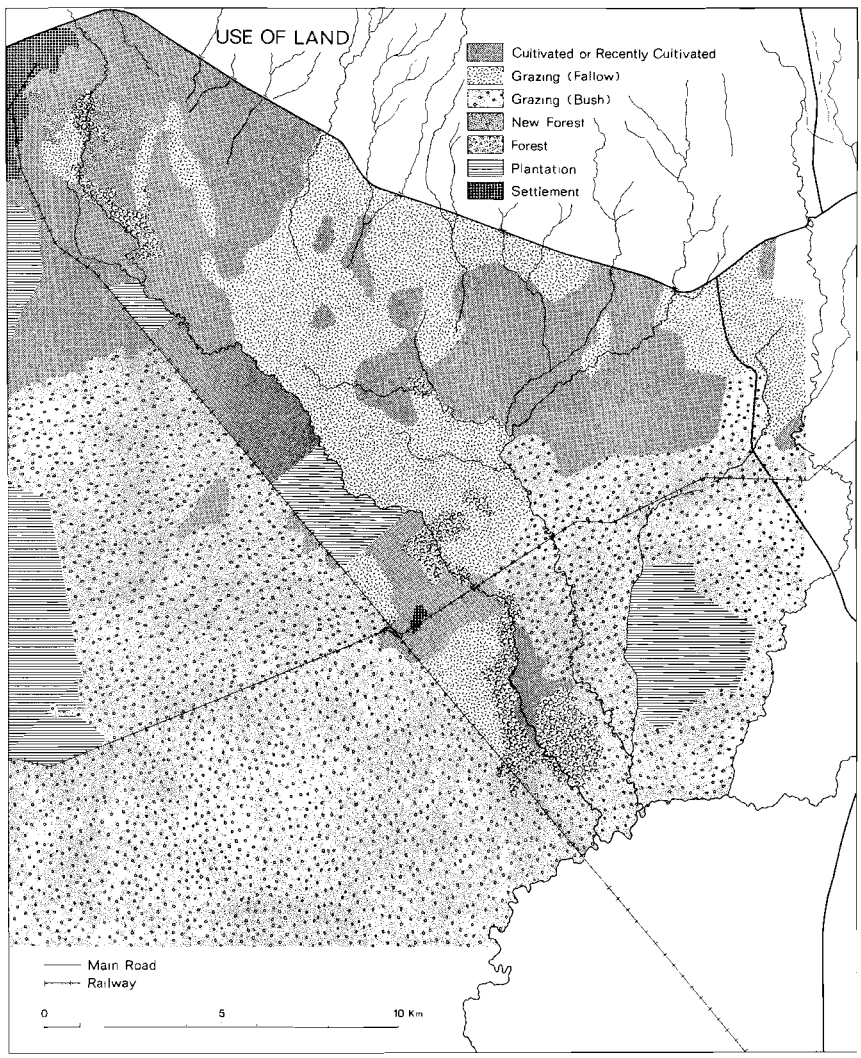
Temperature (^{o}C) at 3 P.M.

1970	30.6	32.2	33.0	31.2	31.2	nm	29.9	31.2	29.5	31.4	33.5	33.4	
1971	32.8	32.6	34.9	30.7	28.7	29.8	28.1	22.6	28.0	29.9	31.5	29.6	
1972	27.0	26.8	27.0	29.8	27.4	26.7	23.9	23.4	28.8	27.7	29.2	29.4	
1973	26.9	30.1	30.7	29.3	26.5	25.5	26.1	26.3	28.6	28.4	30.5	nm	
1974	31.2	32.0	29.7	29.2	29.2	27.7	24.3	26.2	28.4	29.8	29.8	33.3	

Evaporation (mm) with Penman Class A pan

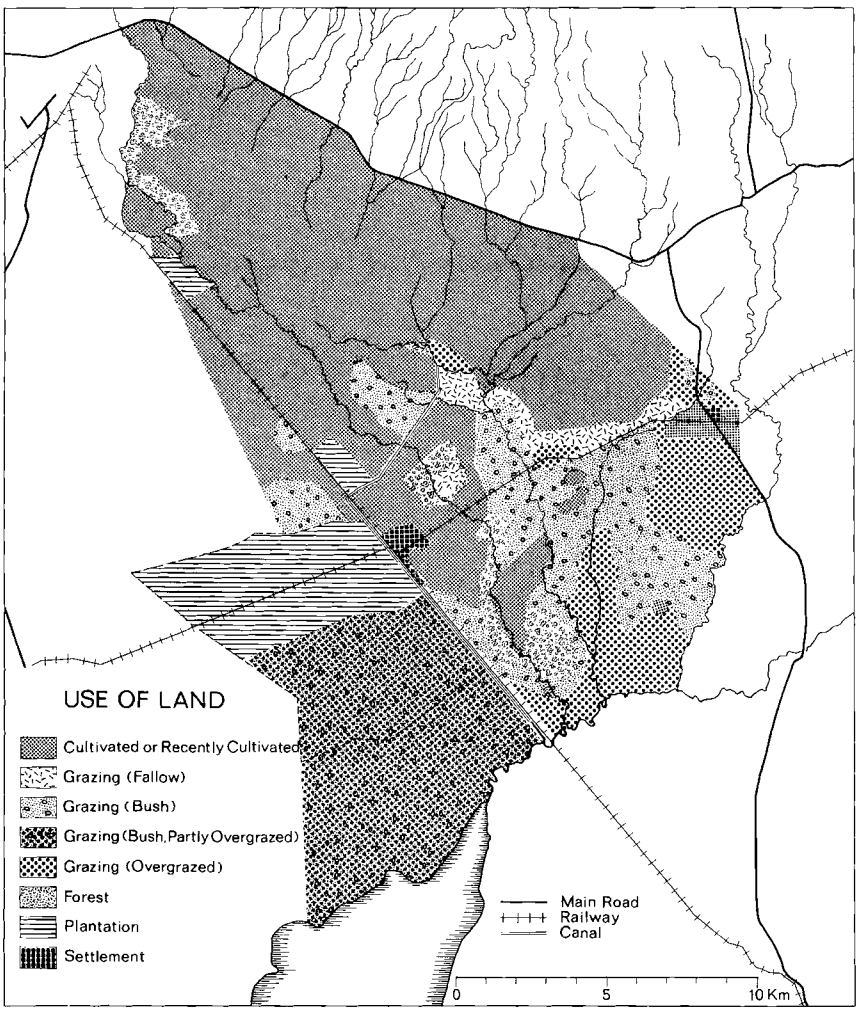
													$\bar{x}$
1970	4.9	5.4	5.5	4.3	4.2	nm	4.0	4.8	5.6	5.5	6.9	6.8	4.9
1971	5.9	6.2	6.7	5.5	3.8	4.8	4.2	4.5	5.2	6.4	7.6	5.7	5.5
1972	5.3	4.6	3.2	4.9	4.2	2.9	3.2	2.9	3.1	3.2	3.1	3.4	3.7
1973	3.3	3.7	nm	4.5	3.1	nm	3.2	3.6	3.9	nm	nm	nm	-
1974	5.5	5.9	5.1	nm	2.9	nm	2.7	3.4	3.8	4.5	6.1	5.9	4.5

Source: NAFCO, Kahe Estate.



Map I:5. Land Use 1962

Source: Aerial photography: 60-TN-2, 1962.01.14, plates 064-079, 136-138.
60-TN-7, 1962.02.01, plates 065-066.
60-TN-4, 1962.01.26, plates 041-044.



Map I:6. Land Use 1975

Source: Aerial photography: Hand camera, 1975.06.28

Land Use

Land use pattern shows marked variations, reflecting differences in precipitation and soils. Generally, the southern and eastern parts are used for grazing (Map I:6), while the northern and central parts are cultivated. There are also examples of plantation economies.

Cultivation con Grazing

Agriculture and animal husbandry are the main types of land use. The area has long been under cultivation by smallholder residents, as well as peasants from higher up the mountain.

> Practically every kihamba owner[1] also has his shamba holding in the hot dry lowland region. The soil in this region is uneven in quality and type - much of the land here is not arable at all. (von Clemm, 1964, p. 117)

Land shortage on the higher land has increased the immigration to the lowland and consequently more land is cultivated by resident peasants. In addition, more marginal land has been opened up for cultivation.

Between 1962 and 1975 no drastic change in land use occured. It is notable that peasants have been forced further into marginal land, formerly used exclusively for grazing (Maps I:5 and I:6). The trend is especially apparent for Kiomu, where large *block-farms* have been prepared by tractors and supplied with irrigation. The extension of cultivated land is not the major change, more important is the intensification of cultivation - shortening of the fallow period.

Livestock is grazed on land unsuitable for cultivation, on fallows and on sisal plantations. The area available for grazing has continuously decreased due to two factors working simultaneously. First, more land has been devoted to cultivation. The pastoralists expressed concern over the plantation expansion into traditional grazing area.[2] Second, fallow periods have been shortened. Peasants in the area state that land is left fallow only between the cultivation seasons.

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[1] Peasants living on the higher slopes of the mountain.

[2] Plantation production has changed, from sisal to kenaf and maize. The latter crops do not permit livestock grazing. East African Kenaf Industries Ltd. (EAKIL) has acquired some 4 000 ha, but only 1 400 ha have been developed. The remaining part can be used for grazing.

The diminishing availability of grazing land has adversely affected the land. In 1962 only parts of the Mawala and Kimala areas and the land between the Soko and the Mua rivers showed signs of overgrazing. But in 1975 most of the southern and eastern parts were overgrazed; especially in the Mawala, Kimala and Kiomu areas. The reduction in grazing land has not been accompanied by a comparable reduction in livestock, although, as will be shown below, a tremendous decrease in livestock occured during 1973 and 1974.

It is hard to precisely estimate the size of the grazing area. Roughly one third can be characterized as mainly pasture. In addition, land in fallow is grazed part of the year, adding another third of the total area. In total, the maximum grazing acreage is 15 000 - 20 000 ha.

In 1974 livestock population can be estimated at 13 400 units (lu).[1] Herders residing in Mawala graze their cattle outside the study area for large parts of the year. Their livestock excluded, the total would be 7 300 lu. On the other hand, non-residents graze their herds inside the study area during certain parts of the year. Residents often complain about this. Depending on how livestock and grazing area are estimated, the acreage per livestock unit was between 1 and 2 ha in 1974 (Table I:3).

Table I:3. Estimates of Existing (1974) Grazing Area Per Livestock Unit

	Livestock units (lu)	Grazing area (ha)	Ha/lu	Grazing area (ha)	Ha/lu
Whole study area	13 400	20 000	1.5	15 000	1.1
Whole study area, excl. Mawala	7 300	16 000	2.2	11 000	1.5

In a dry area the required acreage per livestock unit is 4 ha, to avoid overgrazing. Where the quality of the pasture is low, as in the study area, the required acreage may be set at 6 ha/lu. From this follows that the area can support between 5 000 and 2 500 livestock units with existing management and type of stock (Table I:4). The 1974 livestock exceeded the maximum the area can support by 1.5 to 5 times, depending on the number used for required grazing area per livestock unit and available grazing area.

[1] 1 livestock unit = 1 cow = 1 donkey = 5 goats = 5 sheep.

Table I:4. Livestock Carrying Capacity Estimates

Requirement ha/lu	Grazing area (ha) 20 000	15 000
6 ha	3 350 lu	2 500 lu
4 ha	5 000 lu	3 750 lu

The acreage of grazing land will continue to shrink in the future. This calls for strong action in the agricultural and livestock sectors. Quality rather than quantity in livestock must be emphasised. Moreover, the whole land use pattern must be reevaluated. Grazing instead of agricultural use may be the best for the land.

In the land use conflicts a clear trend has emerged, which is the same in all developing areas: pastoralists have had to yield to agriculturalists, causing a steady decrease in pasture acreage, even where the land is unsuitable for agriculture. Large state plantations represent the strongest interests. Pastoralists as well as smallholders always have to withdraw from land planned for plantation production.

Plantation Economies

Lower Moshi and Western Kilimanjaro are traditionally the major plantation areas in the region. To the west, just outside the study area is a heavily capitalized sugar plantation, Tanganyika Planting Company (TPC), and along the road to Moshi two old sisal plantations, now taken over by TPC for sugar cultivation.

Within the study area are also examples of plantation economies. Their development closely follows the general trend for plantations in Tanzania. The Kahe Sisal Estate was only partly used for sisal production in 1974. No replanting is done. Further, its eastern part is cultivated by peasants, although the land is legally under Kahe Sisal Estate. Kifaru (Soko) Sisal Estate is completely deserted and the land used for grazing.

During 1965/66 FAO had several pilot schemes for testing of various crops, including kenaf, in the Kahe area. In 1968 the construction of an irrigation canal from Miwaleni spring was started to supply irrigation to approximately 4 000 ha just west of Kahe Station. Originally the idea was to develop the scheme on an *Ujamaa* basis, where each family should be allocated a plot of 2.4 ha (6 acres). In an attempt to save foreign currency on imported gunny bags, the project was handed over to the National Development Corporation (NDC) on a commercial basis in 1970, and the East African Kenaf Industries Ltd.

(EAKIL) was established. The project included a plantation of some 4 000 ha at Kahe and a bag factory located at Moshi. By 1974 only 1 400 ha had been developed for kenaf cultivation due to saline soils and lack of funds. Maize was cultivated as a rotation crop and a dairy farm was established (EAKIL, 1974 and Whiteside, 1974). In 1975 cultivation of kenaf terminated and the plantation was handed over to the National Agriculture and Food Corporation (NAFCO) for maize cultivation and continuous operation of the dairy farm.

Between 1962 and 1975 (Map I:5 and Map I:6) the land owned by plantations increased from 7 per cent of the total area to 15 per cent. However, since the EAKIL only has developed part of the 4 000 ha, some 5 per cent only of the study area was under plantation economies in 1975. Thus, in terms of acreage occupied by plantations only marginal changes took place. The great alterations occurred in aspect to location and crops grown. The construction of the irrigation canal from the Miwaleni spring increased the competition for the scarce water resource.

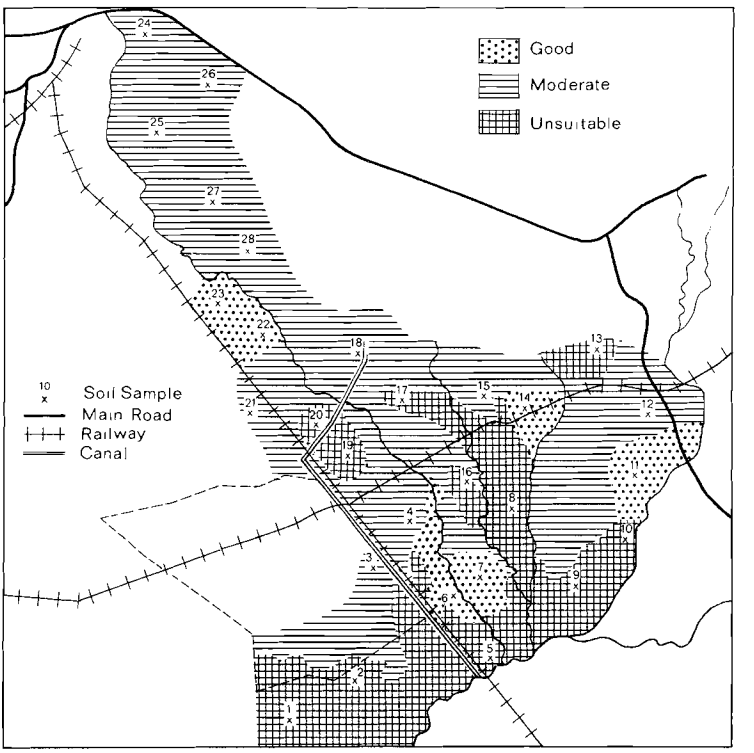
Agricultural Potential

To analyze the agricultural potential of the area, 28 soil samples were taken and investigated for 12 variables (Appendix 1). These analyses and existing soil maps were used for the construction of a map of the agricultural potential (Map I:7). The distribution by class of the agricultural potential closely follows the actual land use. Areas with high and moderate agricultural potential are cultivated. Areas of high potential are: forest reserves - which must not be used for cultivation - the Rau-River area, the Kibaoni area and the eastern Kiomu area. Land is cultivated in some areas, which according to the analysis are unsuitable, e.i. Mkonga Chini and certain parts of the Kilototo area. Here the land shows many signs of overexploitation and bad management (low organic material content, low moisture content and low field capacity).

Most of the important cultivated areas in the north have moderate agricultural potential. Here land shows signs of soil exhaustion (low pH and low organic material content). It is possible to restore the potential of these areas with certain inputs of lime, fertilizers, etc.

The unsuitability of the land is mainly due to the high salt content. Although most of this land is used for grazing, certain parts are cultivated.

Low precipitation and the relatively low agricultural potential of the soil make the area only marginally suitable for agricultural production. But still, more and more land is being put under permanent cultivation by smallholders and plantations, creating land shortage or overly intensive land use, given the present technology.



Map I:7. Agricultural Potential

Source: Appendix 1.

SETTLEMENT PATTERN

The majority of the people live in approximately 20 nucleated 'villages'.[1] An exact number is hard to determine, as one large settlement can be divided into smaller 'sub-villages'. In densely populated areas like Msaranga and Rau-River the population is not nucleated but evenly spread in small clusters of homesteads or scattered houses.[2]

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[1] For population estimates, see Chapter 4, and Annex pp. A73-A76.

[2] In 1975 resettlement had just started in the area. Discussion was going on to create five large villages.

The largest village is Kahe Station, with approximately 1 500 people. Kahe Station is also the market and administrative centre of the ward,[1] with ward office, court, railway station, post office and a weekly market, beside several shops, hotels and bars.

The tremendous increase in population in Kahe Station, starting at the end of the 1960s, is clearly shown in Map I:8A and B. From being only a minor settlement in 1962, it has grown to a major one. In 1958 several homesteads of pastoralists were close to Kahe Station, west of the railway line. By 1962 they had all disappeared. The pressure on pastoralists had already started by that time. The establishment of the EAKIL plantation caused a rapid growth. The workers at the estate were not provided with housing, but had to find their own accomodation, triggering off a real boom in house construction.

The acreage of cultivated land has grown along with the population. In 1958 almost no land was cultivated west of the railway line. In 1962 this area was beginning to be cultivated. With the establishment of EAKIL in 1970 change became radically. The whole area west of the railway was put under plantation cultivation.

To the east in the Kiomu - Ghona area, the number of houses have also increased rapidly between 1962 and 1975. In 1962 only a few houses existed in Kiomu, and in Ghona only one house. By 1975 Ghona had grown to a minor settlement with some 40 houses. In addition, homesteads were found all over the Kiomu area.

In the remaining parts, except for Miwaleni which is an expanding nucleated settlement, there has been an increase in the number of homesteads, but no real nucleated settlements have been created.

Age of Present Settlements

The method used for determining the age of the present settlements in the subareas was as follows: heads of household were divided into three groups: (1) born in the subarea of residence, (2) early immigrants, and (3) late immigrants. The dividing line between early and late immigration was set at 1960. This year was chosen because approximately 50 per cent of the immigrants had settled in their present village before that year.[2]

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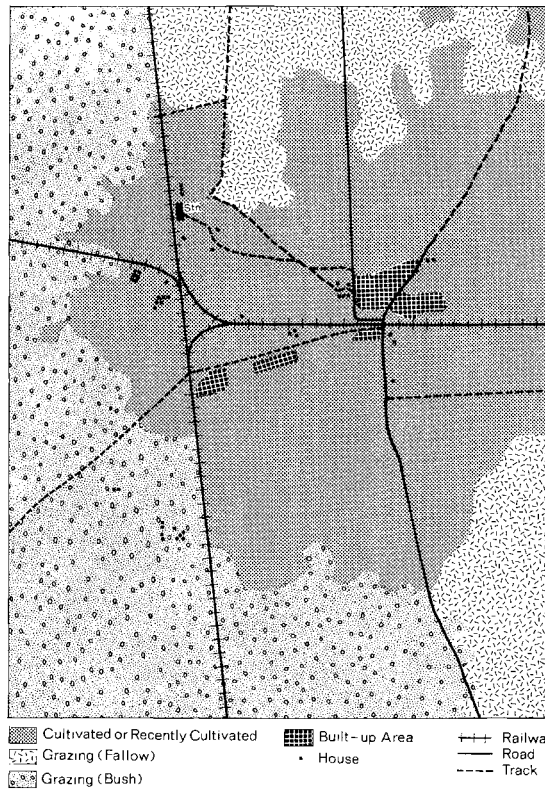
[1] A ward was the smallest administrative unit in 1974.

[2] Migration in the area is discussed on pp. A85-A94.

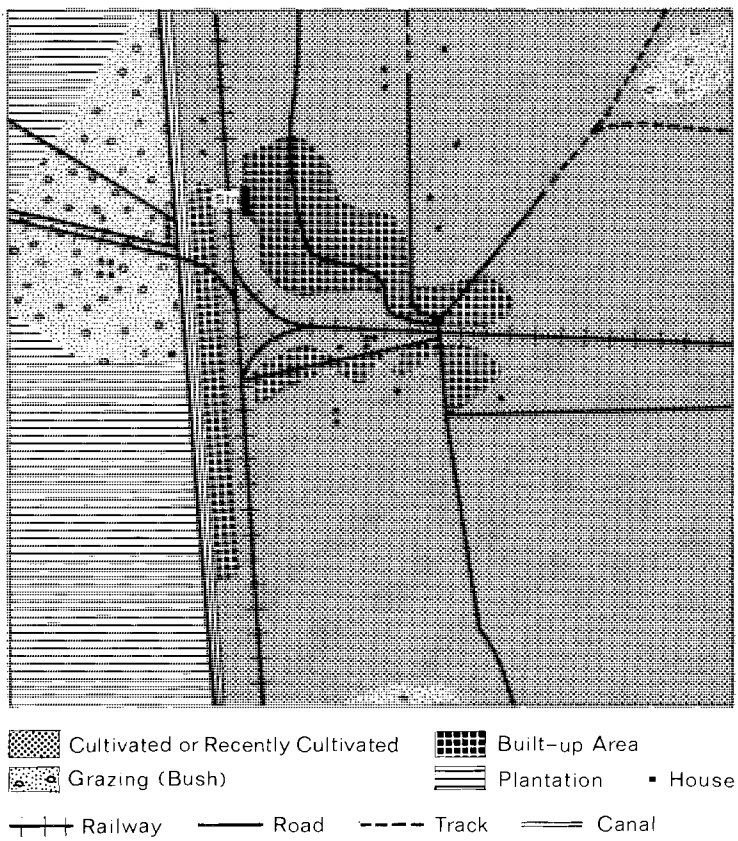


Map I:8A. Kahe Station 1962

Source: Aerial photography: 60-TN-2, 1962.01.14, plates 075-076.
60-TN-7, 1962.02.01, plates 065-066.

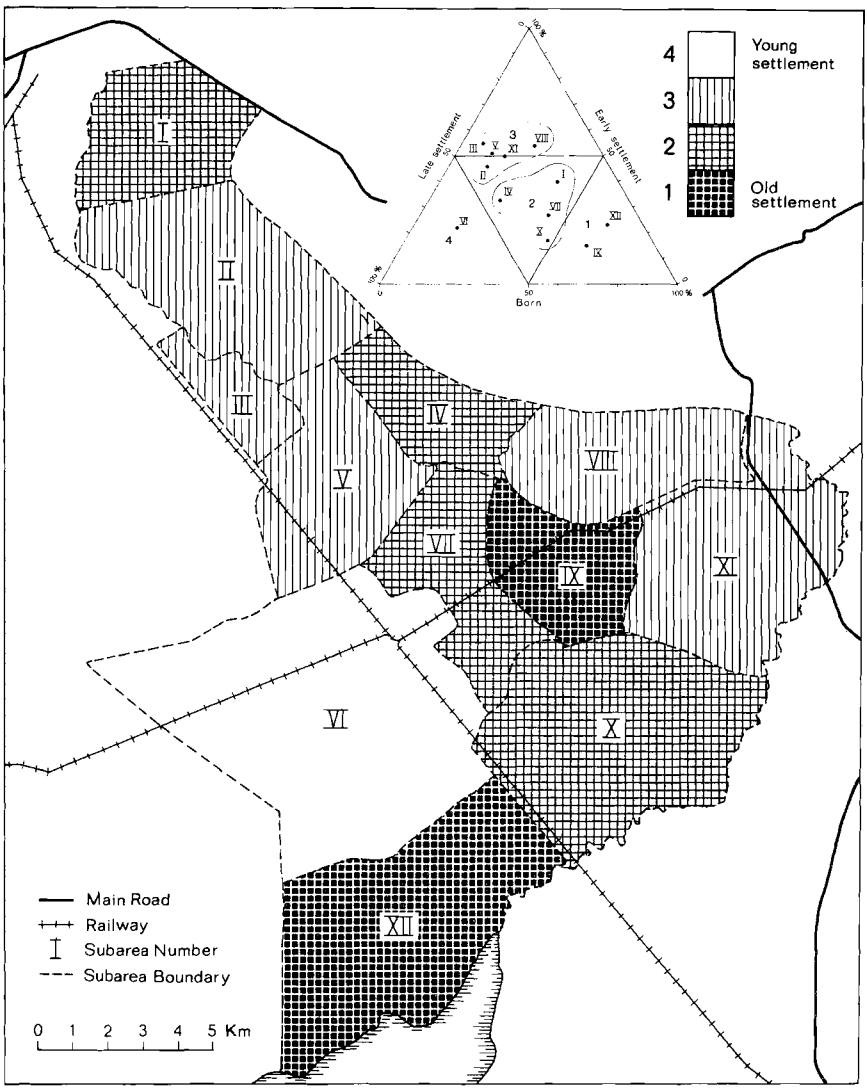
Map I:9 gives the age of the present colonization of the subareas. Early settlements were mainly in Mawala and Soko. Slightly younger are the settlements in Msaranga, Lenduru, Mwangaria and Miwaleni. The latest immigration has largely been directed to Kahe Station.

The pattern closely reveals the historic development of the area. Mawala for a long time was the home of the Wamasai. They are now being slowly pushed out of the area due to the expansion of the EAKIL and the TPC. In addition, land is being taken over for permanent peasant cultivation. The Lenduru-Soko area is considered to be the core region of the Wakahe, and Msaranga is also an old settlement.



Map I:8B. Kahe Station 1975

Source: Hand camera, 1975.06.28



Map I:9. Age of Present Settlements

Note: Individual villages differing from their subarea were: Kochakindo (X) with few locally born inhabitants and late immigrants. The Kahe Sisal Estate was more like Kahe Station than the other villages in subarea V. The two villages in subarea XI were alike in percentage born in the village of residence, but the immigation to Ghona was of later date than that of Kiomu.

Communication

Communications are relatively good. Two all-weather roads lead to Kahe Station. They may occasionally be closed for a day or two during the rainy season. All other roads are of inferior quality, mostly tracks, but there is no problem in passing with a saloon car, except during the peak of the rainy season. No settlement is more than three kilometers from a road where cars can pass (Map I:3). Several buses run each day between Moshi and Kahe Station, and the eastern part also has a regular bus service along the Moshi - Tanga road. However, no service connects the eastern part with Kahe Station. The railways from Mombasa and Tanga to Moshi converge at Kahe Station. A spur-line runs from Kahe Station to TPC. Between Kahe and Moshi are two rail services a day.

AGRICULTURE

Land Tenure

In Tanzania people are not entitled to own land but rather to the right of cultivation. However, hardly any peasant considers himself a tenant on land owned by the people of Tanzania, as is his legal status. Land as such cannot be traded, but the right to cultivate a piece of land can, provided that it has been improved upon or carries perennial crops. On the higher slopes of Mount Kilimanjaro one acre of land with coffee and bananas was worth about TZS 5 000 in 1974.

Since most people in rural Tanzania have the land they cultivate as their only source of income, they depend on it for their survival. The right to land is thus of great importance. This holds for peasants as well as for wage-earners. The latter usually have a piece of land for cultivation of staple crops, thereby reducing their dependence on purchased food. The right to land is also a factor of social differentiation in society. Although, Tanzania does not have any large landless class like countries in Asia or Latin America.

Private ownership of land was introduced during colonial times. The old land tenure system - the clan owns the land and individual plots are distributed among members according to need and ability to cultivate - still plays the most important role in Tanzania. It was in densely populated areas and especially those where cash crops were cultivated, like the Kilimanjaro area that private ownership of land was of great importance among peasants as well as for large estates. After the Arusha Declaration in 1967 private ownership of land was abolished.

In this study 'ownership' of land refers to the right of cultivation. Renting of land implies the right to cultivate land for a fee, the right of cultivation not being permanently transferred.

In the study area 73 per cent of the families own land, 8 per cent rent a piece of land and 4 per cent both own and rent land, while 14 per cent are landless. Only a small fraction of the households[1] 'borrow' land - rent with no payment involved. In this calculation all types of land are included: cultivated land, grazing land, house plots and idle land. Only a small fraction of the land is not classified as farmland.[2] Since communal grazing is the practice in this area, very few mentioned that they had land for grazing only.

Over 90 per cent of the land is 'owned'. The variation between the subareas is small, but the share of landless households varies considerably. Subareas with a large share of wage-earners or pastoralists have the largest share of landless households. The practice of renting land is not very common except in the Rau-River area, where 21 per cent obtained their land that way.

Acquisition of Land

Traditionally, the normal way to acquire a piece of land has been to obtain one from the local community, which distributes land among the families according to need and ability to cultivate. When a family shrinks or is unable to till its acreage, part of it is redistributed to families with greater need or ability to cultivate. This land tenure pattern is most common in subsistence societies. But it is slowly changing due to increase in the market sector, land shortage and socio-political changes.

It is now becoming quite common in Tanzania that families own their land irrespectively of their need or ability to cultivate. This also means that land can be inherited within a family and is no longer redistributed within the clan. In case of land shortage, the land, or rather the right to cultivate the land, is more and more being turned into a commodity that can be traded. Formally, however, the clan still retains its right to influence land transactions.

In the study area over half of the plots were given to the households by the local society (Table I:5). About 10 per cent were bought. Especially in Msaranga and Rau-River it is much more common to buy land than in the rest of the area. Some 20 per cent of the plots are inherited, mostly in early settled areas, like Msaranga, Lenduru, Soko and Mwangaria. Other ways of acquiring land are: by squatting - primarily in Mawala - and by borrowing.

Of the purchased plots 65 per cent are located in three subareas; Msaranga, Rau-River and Kahe Station. The first

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[1] Family and household are here treated as equal units.

[2] Seven heads of household owned land, but had no farm. Six had a small piece of land at their house and one had a piece of land for future use.

Table I:5. Acquisition of Land (Percentages)

Subarea	Number of plots	Bought %	Inher-ited %	Squatted on %	Given %	Other %	Total %
Msaranga	112	25.0	37.5	6.3	27.7	3.6	100
Mandaka	68	5.9	14.7	10.3	60.3	8.8	100
Rau-River	64	20.3	14.1	9.4	43.8	12.5	100
Miwaleni	51	7.8	15.7	3.9	68.6	3.9	100
Kahe Sisal	56	8.9	8.9	10.7	64.3	7.1	100
Kahe Station	90	12.2	22.2	12.2	43.3	10.0	100
Lenduru	63	7.9	30.2	15.9	41.3	4.8	100
Kilototo	94	3.2	14.9	6.4	72.3	3.2	100
Soko	58	0.0	37.9	15.5	43.1	3.4	100
Mwangaria	63	6.3	28.6	14.3	41.3	9.5	100
Ghona	54	5.6	11.1	5.6	72.2	5.6	100
Mawala	15	0.0	6.7	66.7	26.7	0.0	100
Whole area	788	10.2	22.1	10.9	50.5	6.3	100

two experience a land shortage and in the last many heads of household are wage-earners. At Kahe Station the local society is rather weak due to the great influx and rotation of people, predominantly workers at the EAKIL plantation, which may explain the great share of purchased land.

A rank correlation by subareas according to share of households having purchased land and the index of land shortage (Table I:6) gives the correlation coefficient 0.6. People experiencing a land shortage thus tend to buy land, consequently the old system of distributing land is replaced by private ownership. The shift from land owned by the clan to private ownership will sooner or later increase the socio-economic differences within the community. The poorer landholders with plots too small for subsistence will be forced to sell and become landless wage-earners. This group, besides being poor, have little education. The type of job they can get is agricultural work on estates or as temporary labourers on small farms. The economic differentiation just indicated is common in the Kilimanjaro area, where private ownership of land, land fragmentation and high dependence on the cash crop - coffee - is the rule.

Table I:6. Chances of Getting Land, by Households (Percentages)

Subarea	Hard	Fair	Easy	Total		Index		Landowners having bought land	
	%	%	%	N	%		rank	%	rank
Msaranga	80.5	18.2	1.3	77	100	179	1	32.4	1
Mandaka	63.2	23.7	13.2	38	100	150	4	10.0	7
Rau-River	66.7	19.0	14.3	42	100	152	3	26.8	2
Miwaleni	35.3	11.8	52.9	34	100	82	10	12.5	4
Kahe Sisal	34.7	14.3	51.0	49	100	84	9	9.5	8
Kahe Station	70.6	12.9	16.5	85	100	154	2	13.3	3
Lenduru	54.5	9.1	36.4	33	100	118	6	12.1	5
Kilototo	50.0	33.9	16.1	56	100	134	5	5.4	10
Soko	42.4	9.1	48.5	33	100	94	7	0.0	11.5
Mwangaria	22.5	25.0	52.5	40	100	70	11	11.9	6
Ghona	38.9	13.9	47.2	36	100	92	8	9.1	9
Mawala	6.7	20.0	73.3	15	100	33	12	0.0	11.5
Whole area	53.3	17.8	28.8	538	100	124		14.2	
W_i	2	1	0						

$$\text{Index} = \sum_{i=1}^{3} p_i w_i$$

Cultivated Land

No less than 15 per cent of the households are landless, the majority of these people are wage-earners (72 per cent). Only one pastoralist has a farm. Four heads considering themselves peasants have no farm.[1]

The size of cultivated land by households varies considerably between as well as within subareas. It is common to have two or more plots (*shamba*), some located outside the place of residence. On the average, the house-

[1] The four peasants have one feature in common, being divorced. Since the women are responsible for the agriculture in the subsistence economy, the four men may have lost the land when they were divorced.

holds had 1.3 plots (1.5 among the farm households only),[1] with small areal variations. The average plot size varied from 0.9 ha in Soko and Mwangaria to 1.6 ha in Kilototo and Ghona (Table I:7).

Table I:7. Number of Farm Plots *(Shamba)*, by Households (Percentages)

Subarea	0	1	2	3	4	Total		Avèrage size of the plots (ha)
	%	%	%	%	%	%	N	
Msaranga	5.1	51.3	37.2	6.4	0.0	100	78	1.3
Mandaka	0.0	50.0	40.0	10.0	0.0	100	40	1.3
Rau-River	2.4	64.3	26.2	7.1	0.0	100	42	1.2
Miwaleni	5.9	64.7	23.5	5.9	0.0	100	34	1.3
Kahe Sisal	18.0	58.0	24.0	0.0	0.0	100	50	1.1
Kahe Station	44.0	37.0	16.0	3.0	0.0	100	100	1.0
Lenduru	0.0	48.5	33.3	15.2	3.0	100	33	1.3
Kilototo	1.8	67.9	17.9	10.7	1.8	100	56	1.6
Soko	17.6	50.0	14.7	8.8	8.8	100	34	0.9
Mwangaria	7.5	60.0	25.0	7.5	0.0	100	40	0.9
Ghona	8.1	62.2	21.6	5.4	2.7	100	37	1.6
Mawala	58.8	23.5	11.8	0.0	5.9	100	17	1.1
Whole area	14.8	52.9	24.6	6.4	1.2	100	561	1.2

The great variation in average size of the farmland holdings between subareas are partly explained by the variation in non-farm households. (Compare the two last columns, Table I:8.) The average size of the land holdings of the farm households varies considerably, from 2.3 ha in Kilototo and Ghona to 1.3 in Mwangaria.

The variation within the subareas is also considerable. In the whole area 55 per cent of the farm households have 1.5 ha or less of farmland, 68 per cent in Mwangaria and 40 per cent in Kilototo (Table I:8).

Farmland in the study area, held by residents, is estimated at 3 500 ha, or approximately 12 per cent of the land surface. This is by no means the total area under cultiva-

[1] Farm households are those that cultivate land, whether their heads are peasants or wage-earners. Almost 60 per cent of the latter have a farm.

Table I:8. Size of Farmland, by Households (Cumulative Percentage)

Subarea	N	Ha 0 Acre 0 Cum. %	0.1-0.7 0.1-1.9	0.8-1.5 2.0-3.9	1.6-2.3 4.0-5.9	2.4-3.1 6.0-7.9	3.2-3.9 8.0-9.9	4.0-5.9 10.0-14.9	6.0-11.4 15-28	$\bar{x}$ All households (ha)	$\bar{x}$ Households with a farm (ha)
Msaranga	78	5.1	25.6	57.7	73.1	85.9	92.3	97.4	100	1.8	1.9
Mandaka	40	0.0	20.0	57.5	75.0	82.5	90.0	92.5	100	2.1	2.1
Rau-River	42	2.4	23.8	59.5	76.2	92.4	95.3	97.7	100	1.7	1.7
Miwaleni	34	5.9	23.5	55.9	73.5	94.1	97.0	97.0	100	1.7	1.8
Kahe Sisal	50	18.0	50.0	72.0	88.0	94.0	96.0	98.0	100	1.2	1.5
Kahe Station	100	44.0	57.0	82.0	91.0	97.0	99.0	100	100	0.8	1.4
Lenduru	33	0.0	9.1	42.4	66.6	84.8	87.8	93.9	100	2.2	2.2
Kilototo	56	1.8	10.7	41.1	66.1	75.0	83.9	98.2	100	2.3	2.3
Soko	34	17.6	41.1	61.7	76.4	97.0	97.0	97.0	100	1.3	1.6
Mwangaria	40	7.5	37.5	70.0	87.5	95.0	97.5	100	100	1.2	1.3
Ghona	37	8.1	18.9	54.0	70.2	86.4	86.4	91.8	100	2.1	2.3
Mawala	17	58.8	82.3	88.2	88.2	88.2	88.2	100	100	0.8	2.0
Whole area	561	14.8	33.3	62.2	78.1	89.3	93.2	97.3	100	1.6	1.8

tion; plantations and land cultivated by people living outside the area are not included. Moreover, some villages have communal farms, but they are of minor importance in size, output and economic impact.

Location of Farmland

A large share of the farmland of the households is located outside the subarea of residence (23 per cent). The majority of such land (8 per cent) is in the Moshi and Same/Pare Districts. Only 2 per cent is located outside the Kilimanjaro Region.

The variation between the subareas is great (Figure I:2). In Soko (IX) over half the farmland of the local households is outside the Soko area, most of it in the neighbouring subareas Kilototo (VIII), Lenduru (VII), and Ghona (XI). The centre of the study area shows a complex picture with large parts of the locally controlled farmland in neighbouring subareas. For example, in Lenduru about one third is outside this area, and at the same time many households in Kahe Sisal (V) and Kahe Station (VI) have land in Lenduru. Large parts of the farmland in Mandaka (II), Kilototo and Ghona are cultivated by residents of other subareas, in the case of Mandaka exclusively by Msaranga (I) residents. The land in these three subareas (Mandaka, Kilototo and Ghona) has been cultivated for a long time, but by outside residents. Only recently have people settled here permanently.

Households having arable land on the higher slopes of Mount Kilimanjaro live mostly in the northern subareas, while those with land in the Same/Pare District live in Kahe Station, Lenduru, Ghona and Mwangaria, close to the Same/Pare District.

The rationality of this land location must be studied further for a satisfactory explanation. Several reasons can be hypothesized, singularly or in combination. Lack of farmland in the place of residence? This would force a family wanting more land to look for it in other areas. Since more than 60 per cent of the farmland in the area was acquired by gift or squatting, this does not seem to be a likely explanation. Has the land been inherited? The land located outside the subarea of residence but inside the study area might have been inherited. Have families kept land in areas which they left to find more land for a growing family, or when the head found wage-employment? This seems to be the most realistic hypothesis, especially in cases when the wage-earning heads have left their families in their native villages.

Some farmland is good for one type of crop, while others are better for other types. This can explain some of the scattered land holdings. When coffee was introduced in the Kilimanjaro area, the best land was put aside

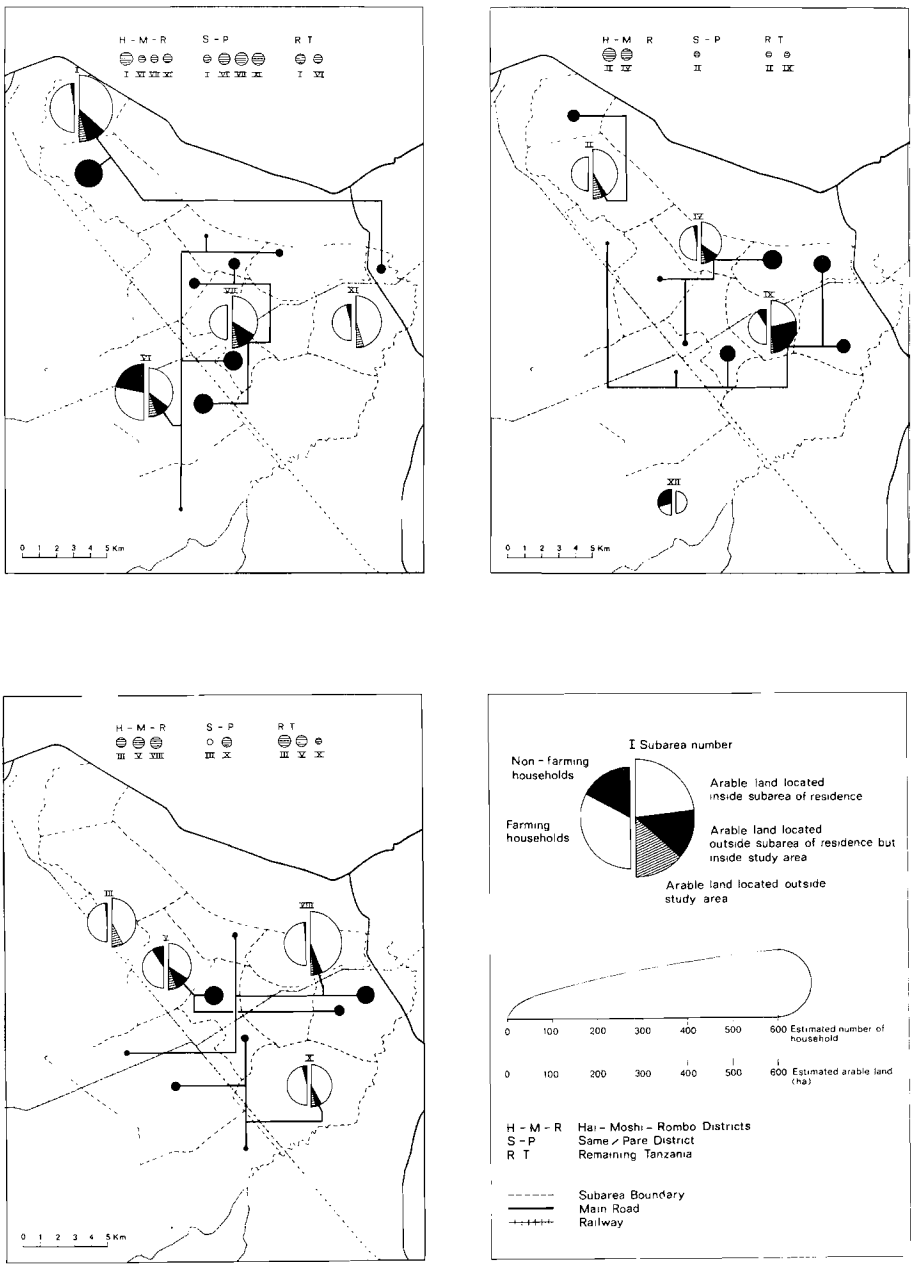

Figure I:2. Location of Farmland

for this crop with interplanting of bananas, which was the staple crop. The second most important food crop, maize, was then cultivated on the lower slopes of the mountain in areas not suitable for coffee cultivation, like Mandaka and Kilototo, former grazing areas. Thus, land in the lower areas was cultivated by non-resident people. However, the land shortage on the higher slopes of the mountain pushed people further down to settle permanently on the lower slopes. At present the land is cultivated by residents as well as by people living higher up the mountain.

The trend is that non-residents cultivating the land in Mandaka and Kilototo will move down permanently. Due to the land shortage, they cannot have land both on the higher and the lower slopes.

Agricultural Calendar

An agricultural calendar is a record of the crop cultivation activities during one year. The intensity and variety of these activities reflect the variations in agricultural practices and physical conditions.

To picture the variations and to monitor the activities of the farmers, the agricultural calendars for three areas were recorded by means of group interviews: the Rau-River area, the Kahe-Lenduru area and the Ghona-Kilototo area. The three areas represent various ecological zones and have different agricultural potentials.

Only major crops and activities from the calendar are included in Figure I:3. Clearing of furrows, irrigation, etc., together with information on intercropping, rotation, use of fertilizers, man-days needed for weeding, harvesting and land preparation, etc. are recorded in Appendix 2.

In the Ghona-Kilototo area no short rains cultivation is practised, since such rains are very light or non-existing. In the other two areas it is possible to get two crops a year, even three in the Rau-River area with good irrigation. Rice is only cultivated here and in Mandaka.

Generally, the activities on the farms decrease towards the south and east. In the Rau-River area the peasants are busy the whole year around, using the land intensively, while the activities are lesser in the Kahe-Lenduru area, with a more extensive cultivation system. Finally, in the Ghona-Kilototo area the peasants are not working on their farms large parts of the year. There might be a possibility for utilizing the slack months for improvements on agricultural infrastructure, like the irrigation system. A better irrigation system would make it possible to utilize the short rains for cultivation. The parts of the year with a low labour requirement in agriculture might also be used for a more intensive system of livestock raising. Such a system would not be as destructive to the environment as the present one.

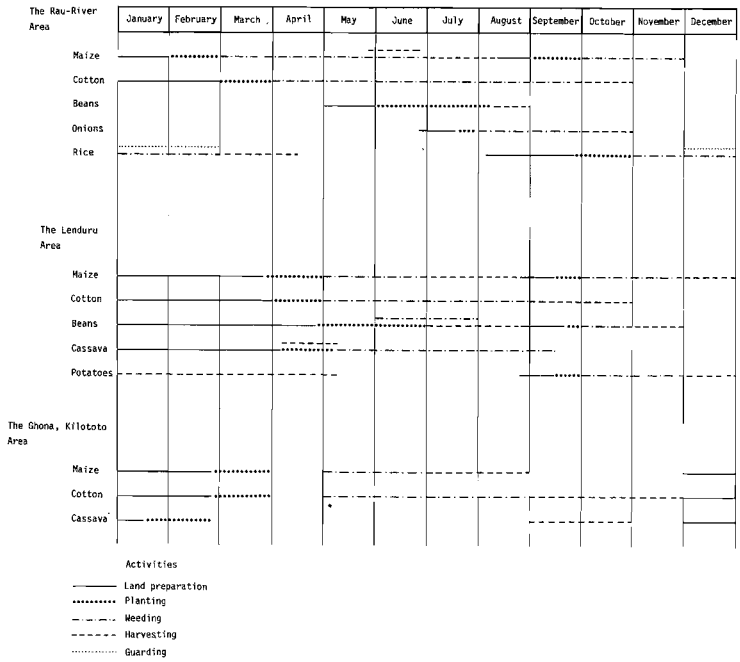

Figure I:3. Agricultural Calendar

Labour demand and supply for land preparation set the limit for a family's cultivated acreage. Labour requirement analysis of the agricultural calendar clearly shows that land preparation is the main bottleneck for the peasants. Mechanization has reduced this bottleneck, but only the well-off peasants can afford to rent a tractor with a plough.

Crop Structure

Crops Grown

Although agriculturally marginal, a rather high crop diversification is found in the study area. Some 20 crops are recorded in the sample; bananas, beans, coffee, cashewnuts, cassava, cotton, groundnuts, maize, millet, onion, potatoes, rice, simsim, sugarcane, sunflower, tobacco, vegetables (cabbage, peas, tomatoes), and fruits (oranges, mangoes). Local residents with farms outside the area also cultivate cocoa, coconuts, pyrethrum, tea and wheat on these farms.

The great diversity of the crops only applies to a small fraction of the farm households. Only four crops are cultivated by more than 10 per cent of the farm households (Table I:9); maize, staple crop, beans, bananas and cotton.[1] Beans are often intercropped with maize or, sometimes, onions. The cultivation of bananas is fairly evenly spread over the area, except in Kilototo, where it is grown by only 9 per cent of the farm households. Cotton is the second most important crop here. Generally, the further to the south and east, the more important is the role of cotton. It is unquestionably the most important cash crop, followed by maize and coffee (Table I:10). Coffee is of only marginal importance - due to the low altitude - not the major cash crop as on the higher slopes of Kilimanjaro. Local farm households marketing coffee have their coffee farms mainly on the higher slopes, outside the study area.

The low frequency of millet cultivation was not expected since this crop is more drought resistant than maize. However, taste and eating habits determine the choice of cultivation more than the risk of losing crop due to drought. A large campaign for maize cultivation has also been launched. Cassava is most common in areas which have been under permanent cultivation for a long time - Msaranga and Rau-River. The cassava cultivation may here be an indication of declining soil fertility. Cassava is less demanding than maize.

All the types of crops cultivated are shown in Table I:11. For each subarea the crops are divided into four groups; food and cash crops cultivated by residents of the subarea and by non-residents (from other subareas). Every crop mentioned is accounted for without reference to frequency. The non-residents as a rule cultivate the same type of crops, but not the same range as the residents. In Mwangaria and Soko only residents are cultivating. Few crops are grown in the Soko area, due to saline soil. As a rule the further south and east, the smaller the number of crops cultivated. Ghona being the only exception. The trend, naturally, closely reflects the decline in rainfall.

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[1] Only nine of the farm households did not cultivate maize. Bananas and rice are the main substitutes. On the average these households have small farms (1.5 ha). Place of residence, ethnic group, family size, ownership of livestock and occupation are not common features. Three were marketing their crops. In one case the peasant had completely specialized in beans for the market.

Table I:9. Major Crops Cultivated by Farm Households (Percentages)

Subareas	N	Maize	Beans	Bananas	Cotton	Rice	Vegetables	Cassava	Coffee	Millet	Sugarcane
		%	%	%	%	%	%	%	%	%	%
Msaranga	74	100	64.9	39.1	10.8	21.6	9.5	17.6	18.9	9.5	0
Mandaka	40	97.5	57.5	37.5	25.0	30.0	12.5	5.0	12.5	5.0	0
Rau-River	41	97.6	53.7	58.5	26.8	22.0	10.0	19.5	12.2	2.4	7.3
Miwaleni	32	100	50.0	25.0	15.6	0	12.5	0	3.1	0	6.3
Kahe Sisal	41	97.6	53.7	39.0	19.5	2.4	9.6	7.3	7.3	0	9.6
Kahe Station	56	92.9	25.0	33.9	39.3	1.8	10.7	8.9	3.6	3.6	3.5
Lenduru	33	100	45.5	54.5	45.5	0	9.1	3.0	3.0	12.1	3.0
Kilototo	55	100	40.0	9.1	80.0	0	1.8	1.8	0	3.6	1.8
Soko	28	92.9	50.0	50.0	35.7	7.1	0	3.6	0	0	0
Mwangaria	37	100	73.0	37.8	27.0	0	13.5	8.1	0	0	8.1
Ghona	34	100	29.4	14.7	58.8	0	2.9	5.9	0	0	2.9
Mawala	7	100	28.6	57.1	14.3	0	14.3	0	0	0	14.3
Whole area	478	98.1	49.2	35.8	34.3	8.6	8.6	8.2	6.5	3.8	3.8

Table I:10. Cash Crop Marketed by Farm Households (Percentages)

Subarea	N	Cotton %	Maize %	Coffee %	Bananas %	Beans %	Rice %	Vegetables %	Sugarcane %
Msaranga	74	10.8	4.1	18.9	1.4	0	6.8	1.4	0
Mandaka	40	25.0	7.5	12.5	0	0	10.0	7.5	0
Rau-River	41	26.8	12.2	12.2	4.9	2.4	7.3	4.9	7.3
Miwaleni	32	15.6	12.5	3.1	0	3.1	0	0	6.3
Kahe Sisal	41	19.5	9.8	7.3	4.9	2.4	0	4.9	7.3
Kahe Station	56	39.3	23.2	3.6	12.5	8.9	0	3.6	1.8
Lenduru	33	45.5	15.2	3.0	18.2	6.1	0	0	3.0
Kilototo	55	80.0	5.5	0	0	0	0	0	0
Soko	28	35.7	10.7	0	10.7	3.6	0	0	0
Mwangaria	37	27.0	2.7	0	0	2.7	0	0	0
Ghona	34	58.8	5.9	0	0	0	0	2.9	0
Mawala	7	14.3	0	0	14.3	0	0	0	0
Whole area	478	34.3	9.6	6.5	4.6	2.5	2.5	2.3	2.1

Table I:11. Crop Structure

Subarea	R/N-R *	Food Crop	Cash Crop
Msaranga	R	Bananas, beans, cassava, maize, millet, potatoes, rice, vegetables	Bananas, cassava, cashew-nuts, coffee, cotton, fruits, maize, millet, rice, tobacco, vegetables
	N-R	Bananas, beans, maize, rice, vegetables	Coffee
Mandaka	R	Bananas, beans, cassava, maize, millet, rice, vegetables	Cotton, maize, rice, vegetables
	N-R	Bananas, beans, cassava, maize millet, rice, vegetables	Maize, rice
Rau-River	R	Bananas, beans, cassava, maize, potatoes, rice simsim, sugar cane, vegetables	Bananas, beans, coffee, cotton, fruits, maize, rice, sugar cane, vege-tables
	N-R	Rice	
Miwaleni	R	Bananas, beans maize, vegetables	Beans, cotton, maize, sugar cane, tobacco
	N-R	Maize, millet	Cotton
Kahe Sisal	R	Bananas, beans, cassava, maize, sugar cane, vege-tables	Bananas, beans, coffee, cotton, maize, sugar cane, vegetables
	N-R	Bananas, beans, maize	Bananas, sugar cane

* R = Residents
N-R = Non-Residents

continued...

Subarea	N/N-R	Food crop	Cash crop
Kahe Station	R	Bananas, beans, cassava, groundnuts, maize, millet, potatoes, sugar cane, vegetables	Bananas, beans, cotton, maize, tobacco, vegetables
	N-R	Bananas, fruits, maize	Cotton
Lenduru	R	Bananas, beans fruits, maize, millet, vegetables	Bananas, beans, cotton, maize, millet, sunflower, tobacco
	N-R	Bananas, beans, maize, vegetables	Bananas, cotton, maize, sugar cane
Kilototo	R	Bananas, beans, cassava, maize, vegetables	Cotton, maize, millet
	N-R	Beans, maize	Beans, cotton, maize
Soko	R	Bananas, beans, maize, rice	Bananas, cotton, maize
	N-R		
Mwangaria	R	Bananas, beans, cassava, maize, potatoes, sugar cane, vegetables	Beans, cotton, maize
	N-R		
Ghona	R	Bananas, beans, cassava, maize, potatoes, sugar cane, vegetables	cotton, maize, sunflower, vegetables
	N-R	Bananas, beans, maize, vegetables	Cotton, maize, vegetables

continued...

Subarea	N/N-R	Food crop	Cash crop
Mawala	R	Bananas, beans, maize, sugar cane, vegetables	Bananas, cotton
	N-R	Bananas, beans, maize	
Hai District	R		
	N-R	Bananas, maize	Coffee
Moshi District (Remaining parts)	R		
	N-R	Bananas, beans, cassava, maize, potatoes, rice	Bananas, coffee, cotton
Rombo District	R		
	N-R	Bananas	Coffee
Same/Pare District	R		
	N-R	Bananas, beans, cassava, maize, millet, potatoes, sugar cane	Bananas, coffee, cotton
Tanga Region	R		
	N-R	Bananas, beans, cassava, fruits, maize, rice	Bananas, cassava, coconuts, coffee, maize
Remaining Tanzania	R		
	N-R	Bananas, beans, cassava, maize, rice, wheat	Cashewnuts, cocoa, coffee, groundnuts, millet, pyrethrum, tea, wheat

Crop Combinations

On the average the farm households cultivate 2.6 crops. Rau-River has the highest diversification and Miwaleni the lowest (Table I:12). The low number of crops grown in Miwaleni is interesting since the area has a relatively high agricultural potential. However, the livestock economy plays a strong part here.

Table I:12. Number of Crops Grown by Farm Households (Percentages)

Subarea	1 %	2 %	3 %	4 %	5 %	6 %	7 %	Total	$\bar{x}$
Msaranga	12	19	36	26	5	1	0	100	3.0
Mandaka	10	30	38	15	5	3	0	100	2.8
Rau-River	12	22	29	17	10	5	5	100	3.2
Miwaleni	34	25	31	9	0	0	0	100	2.2
Kahe Sisal	27	22	32	17	2	0	0	100	2.5
Kahe Station	21	39	25	11	4	0	0	100	2.4
Lenduru	9	39	24	15	9	3	0	100	2.8
Kilototo	18	38	29	11	2	2	0	100	2.5
Soko	18	39	29	14	0	0	0	100	2.4
Mwangaria	14	24	41	16	3	3	0	100	2.8
Ghona	24	44	15	15	3	0	0	100	2.3
Mawala*	29	29	29	14	0	0	0	100	2.3
Whole area	18	30	30	16	4	1	0.4	100	2.6

* only seven observations

Monoculture is practised by 18 per cent of the farm households, almost always maize.[1] Monoculture may be expected among farm households where the heads are wage-earners, but it is practised as much among peasants. Monocultural farm households on the average have smaller acreage than the average for the area (1.1 ha compared to 1.8 ha). The material also clearly indicates that the monoculture farm households have a lower standard of living.

Both Kahe Sisal and Kahe Station have more than their share of monocultural farms, but as mentioned, this cannot be explained by their large proportion of wage-earners.

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[1] Only one farm household in the sample cultivated beans only.

The largest share of such farms is found in Miwaleni, almost twice the average. Below average are Lenduru, Mandaka, Msaranga, Rau-River and Mwangaria. These areas have the highest agricultural potential.

The most common crop combination is maize and beans (Table I:13). Other common two-crop combinations are maize-bananas and maize-cotton. In Rau-River and Lenduru bananas are more important than beans. In Kilototo cotton is the most important second crop.

Table I:13. Major Crop Combinations by Farm Households

Crops	N	%
Maize only	82	17
Maize and beans	58	12
Maize and bananas	21	4
Maize and cotton	50	10
Maize, beans and bananas	35	7
Maize, beans and cotton	31	6
Maize, bananas and cotton	14	3
Maize, bananas and coffee	5	1
Maize, beans, bananas and cotton	31	6
Maize, beans, bananas and coffee	16	3
Maize, beans, bananas and rice	8	2
Maize, beans, bananas and cassava	7	1
Maize, beans, bananas and vegetables	7	1
Maize, beans, cotton and rice	5	1
Maize, bananas, cotton and cassava	6	1
Maize, bananas, cotton and vegetables	7	1
Maize, bananas, coffee and cassava	7	1
Maize, bananas, coffee and rice	6	1
Others	82	17
Total	478	100

The same share of the farm households (30 per cent) cultivates two or three crops. The most common three-crop combination is maize-beans-bananas, followed by maize-beans-cotton.

A four-crop combination is as frequent as monoculture. Maize-beans-banana growers mostly cultivate cotton as the fourth crop (32 per cent) or coffee (17 per cent). Rice and cassava are important only as the fourth crop and in combination with maize, bananas and coffee. Only 5 per cent of the farm households grow more than five different crops.

Acreage Under Cultivation by Crop

So far the crop structure has been analyzed with the farm households as the base. In this section the share of the cultivated land devoted to individual crops will be estimated. The analysis faces several difficulties. The material includes only cultivated land by resident farmers, thus the total acreage cannot be assessed. Further, several crops can be grown on the same field, either by intercropping or subdivision of the field, and in some areas two crops a year is harvested. However, despite these difficulties the analysis may come close enough for its purpose. The analysis is summarized in Table I:14. The classification presented by Yeats (1968, pp. 30-40) has been used.

The whole area is a four-crop area with maize, bananas, beans and cotton as the main crops. The dominating role of maize has been reduced compared to the previous section. Still it is the major crop, grown on 37 per cent of the cultivated land.[1] Rau-River (six-crop area) is most diversified, Miwaleni, Ghona and Mawala (two-crop areas) the least. Especially in Mawala but also in Ghona, livestock plays an important role, which explains the rather weak emphasis on agriculture. The small degree of diversification in Miwaleni poses problems. As stated earlier, the area has a rather good agricultural potential. The livestock economy does not play the same important role as in Ghona and Mawala, but still it is much more important than in neighbouring subareas, which may explain the low degree of diversification.

Changes in Crop Structure

The respondents were asked if they had made any changes in the crop structure during the preceding five years or if they planned to make any changes. The latter question was expanded to include increases or decreases in the cultivated area for various crops.

Very few, 6 per cent, have changed, mainly stopping cultivation of cotton and starting with maize instead. Some have stopped growing cotton and not substituted any other crop for it. At the same time, more farm households have started to grow cotton.

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[1] Cultivated land of plantations and communal farms was excluded.

Table I:14. Crop Structure, Shares of Cultivated Land

Subarea		Main crops	% of cultivated land
Whole area	Four-crop area	Maize	37
		Bananas	21
		Beans	17
		Cotton	14
Msaranga	Three-crop area	Maize	34
		Beans	24
		Bananas	14
Mandaka	Four-crop area	Maize	41
		Beans	17
		Rice	17
		Bananas	12
Rau-River	Six-crop area	Maize	33
		Bananas	19
		Beans	16
		Cotton	8
		Cassava	7
		Rice	7
Miwaleni	Two-crop area	Maize	59
		Beans	13
Kahe Sisal	Three-crop area	Maize	37
		Beans	22
		Bananas	20
Kahe Station	Three-crop area	Maize	45
		Cotton	19
		Bananas	17
Lenduru	Four-crop area	Maize	38
		Cotton	22
		Beans	17
		Bananas	16
Kilototo	Three-crop area	Maize	46
		Cotton	29
		Beans	19
Soko	Four-crop area	Maize	39
		Beans	20
		Bananas	18
		Cotton	18
Mwangaria	Three-crop area	Maize	38
		Beans	28
		Bananas	18
Ghona	Two-crop area	Maize	44
		Cotton	28
Mawala	Two-crop area	Maize	56
		Bananas	22

With respect to food crops, about the same number of farm households as for cash crops have made changes, mainly to maize and beans from a large variety of crops, indicating a tendency to concentrate on a smaller number of food crops.

The reasons given for the changes vary, none can be singled out as the most important. Among non-changers 25 per cent state that 'No other crop will grow here' and more than 10 per cent maintain that 'drought' was the reason.

For planned changes, the picture is different. More than 60 per cent of the farm households plan some changes. How many will actually be implemented is hard to tell. In the light of changes already made, it can be assumed that only a small fraction will be carried out. Of planned changes very few involved dropping a cultivated crop or decreasing the area under cultivation. About 40 per cent intend to grow a new crop; most frequently mentioned was cotton, followed by beans, coffee and millet. The most common reasons for adding a new crop are either to get more cash or more food. Some mention 'for experimenting', but interestingly enough very few mentioned 'increase in producer prices'. A smaller fraction of the farm households (29 per cent) plan to increase the cultivation of some existing crops. In this case the crops do not vary by type to the same extent as in the previous case. Over 80 per cent plan to increase their cultivation of maize, beans (28 per cent) and cotton (23 per cent). However, the reasons are the same: more food or cash.

Farming Practice

Irrigation

Irrigation is vital. Two factors have had a great impact on the irrigation possibilities of the peasants. (1) The decline in the water volume of the rivers traversing the area is a long time phenomenon which has become increasingly serious over the years. The rivers dry out quickly after the rains because of the deforestation of Mount Kilimanjaro. In large parts of the area irrigation can only be practised during and directly after the rains, when the need for irrigation is low. (2) The construction in 1972 of the irrigation canal which takes water from the Miwaleni spring to the EAKIL Estate diminishes the available quantity of water for the peasants.

Irrigation is practised all over the area. Almost 60 per cent of the farm households irrigate their land. The spatial variation is small (Table I:15). Only Mandaka and to some extent Msaranga differ from the general pattern. The low shares, especially in Mandaka (15 per cent), are explained by the low irrigation potential in these sub-areas. Here water flushes down during the rainy seasons,

causing floods when the water cannot be contained in the rivers and rivulets. Soon after the rains they become dry, the Rau being an exception. Further downstream the Rau river at Njoro and Moshi Forest, the water is dammed and stored in a natural reservoir. In this area there is also a spring. The reservoir and the spring at Njoro allow the Rau river to supply water downstream, which can be used for irrigation.

Table I:15. Farm Households Using Irrigation (Percentage)

Subarea	%
Msaranga	45
Mandaka	15
Rau-River	63
Miwaleni	72
Kahe Sisal	54
Kahe Station	66
Lenduru	76
Kilototo	73
Soko	75
Mwangaria	60
Ghona	74
Mawala	(57)*

* Only seven observations

Eight of the twelve subareas are dependent on water from the Rau river for irrigation: Msaranga, Mandaka, Rau-River, Miwaleni, Kahe Sisal, Kahe Station, Lenduru, and Mwangaria. Over 50 per cent of the farm households practising irrigation use that river, which shows its vital role for the agricultural development. When the Rau river dries out, which happened in 1975, the result is crop failure.

The eastern parts of the study area are dependent on the Mabungo-Mua and Himo (Ghona) rivers for irrigation. However, some minor springs are also found, i.e. Kibaoni and Soko.[1]

Irrigation is not primarily used to increase the variety of crops, but to make possible maize cultivation, which otherwise would be risky since the rainfall is inadequate.

[1] Water from drilled wells is not suitable for irrigation due to its high salt content.

Storage of Crops

To store the harvested crops well is important to reduce wastage caused by vermin etc. The practice of storage is widespread; over 80 per cent of the farm households store their crops in some way or other. The spatial variation is small, ranging from some 60 per cent in Kahe Station to 97 per cent in Msaranga and Mandaka. However, few households use a specific storage, but keep the crops in the ceiling of the house. This means that the crops are not protected from vermin. Only 5 per cent use bags or sacks, and 1 per cent tins or tanks. Only in Kahe Sisal, Kahe Station, Lenduru, and Soko a special store house, *ghala*, is used by over 10 per cent of the farm households.

Processing of Crops

As for processing of crops before marketing,[1] hand ginning[2] (cotton), pulping[3] and drying (coffee) and grading (cotton) are the most commonly mentioned. Others are: squeezing (sugar cane), shelling (maize), cleaning and removing dirt (rice and cotton).

Overall 66 per cent of those who marketed their products process the crops. The spatial variation is great with the highest share in Kilototo (69 per cent) and the lowest in Miwaleni (16 per cent). As can be expected, cotton and coffee areas have the highest shares.

Agricultural Inputs and Machinery

The following farm inputs and machinery to increase production/productivity have been analyzed: manure, fertilizers, certified seeds, tractor with plough,[4] sprayer, cart and other machinery.

A common feature is to rent a tractor with a plough during the period of land preparation (Table I:16). The cost in 1974 was TZS 55 per acre.[5] Certified seeds are used by almost 30 per cent, mostly hybrid maize.

Other types of farm inputs are uncommon. Only 10 per cent use manure, although cattle are frequent. Albeit fertilizers are subsidized and 35 per cent of the households

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1 Processing is defined as alteration of the product after harvest to increase its value. The question was asked to assess what the peasant does to improve the income from his crop and this applies only to cash crops.

2 Ginning is to remove the lint from the seeds.

3 Pulping is to remove the beans from the pulps.

4 Oxen for land preparation is not used in the area.

5 See next page, note 1.

consider the land declining in fertility, only 4 per cent of the farm households use them. One respondent owns a cart (none was rented) and seven own or rent some other type of machinery.

Table I:16. Use of Farm Inputs and Machinery by Farm Households (Percentages)

Subarea	Manure	Fertilizer	Certified seeds	Tractor with plough (owned or rented)	Sprayer (owned or rented)
	%	%	%	%	%
Msaranga	30	3	19	88	3
Mandaka	5	3	15	55	3
Rau-River	10	0	24	61	10
Miwaleni	9	0	34	69	6
Kahe Sisal	5	5	34	22	5
Kahe Station	13	5	29	21	4
Lenduru	6	18	27	39	21
Kilototo	0	2	49	65	5
Soko	4	0	29	54	4
Mwangaria	0	3	32	28	0
Ghona	9	3	29	41	3
Mawala*	14	0	29	14	0
Whole area	10	4	29	51	5

* Only seven observations

Spatial variations are considerable. Manure is most commonly used in Msaranga, fertilizers in Lenduru, certified seeds in Kilototo, tractors with ploughs in Msaranga

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(Note 5 from foregoing page)
The tractors with plough were mainly supplied by farmers from the Mwanza and Shinyanga regions, mostly by large land owners and cotton growers, who after having prepared their own land went to the Arusha region on their tractors and later to the Kilimanjaro area to plough for the smallholders. This efficient system uses the tractors to the maximum and makes it possible for smallholders to cultivate larger farms and have them ploughed by a tractor that they could never afford themselves.

and sprayers in Lenduru. None uses more than five of the eight analyzed farm inputs (Table I:17). The farm households in Msaranga on the average use more inputs. Above average use of farm inputs was also recorded for Kilototo, Miwaleni, Lenduru and Rau-River.

Table I:17. Number of Farm Inputs and Machinery Used by Farm Households (Percentages)

Subarea	N	0 %	1 %	2 %	3 %	4-5 %	Total %	$\bar{x}$ *
Msaranga	74	9.5	51.4	25.7	12.2	1.4	100	1.5
Mandaka	40	42.5	42.5	10.0	2.5	2.5	100	0.8
Rau-River	41	36.6	29.3	22.0	9.8	2.4	100	1.1
Miwaleni	32	28.1	34.4	28.1	9.4	0	100	1.2
Kahe Sisal	41	53.7	31.7	7.3	4.9	2.4	100	0.7
Kahe Station	56	51.8	30.4	12.5	5.4	0	100	0.7
Lenduru	33	48.5	27.3	6.1	3.0	15.2	100	1.2
Kilototo	55	18.2	43.6	36.4	1.8	0	100	1.2
Soko	28	35.7	46.4	10.7	7.1	0	100	0.9
Mwangaria	37	51.4	32.4	16.2	0	0	100	0.6
Ghona	34	47.1	32.4	14.7	2.9	2.9	100	0.9
Mawala	7	57.1	28.6	14.3	0	0	100	0.6
Whole area	478	36.4	37.4	18.4	5.6	2.0	100	1.0

* The difference between the subareas is significant at the 0.01 level.

Marketing

Almost half the farm households sell some of their agricultural products. In the survey three ways of marketing were analyzed: sales directly on the farm, at a market place, and at a cooperative. Very few use more than one mode of marketing (Table I:18).

The variations in the marketing habits are great: from 80 per cent of the farm households in Kilototo to 29 per cent in Kahe Sisal (Table I:18, col. 3).

Subareas with low standard of living also have a low share of marketing farm households. Although Msaranga is located closest to the markets at Moshi and Kiboroloni, relatively few sell their products, but to a higher than average extent directly on the farm and slightly less at the market place. The great difference is in sales to

Table I:18. Marketing Structure

Subarea	Number of farm households (F.H.)	% of farm households marketing	Marketing modes: Sales on farm % of F.H.	Sales on farm Crops	Sales on local market(s) % of F.H.	Sales on local market(s) Marketplace	Sales on local market(s) Crops	Sales to cooperative % of F.H.	Sales to cooperative Cooperative	Sales to cooperative Crops	Types of marketing problems	Number of marketing modes used by marketing households 1 %	2 %	3 %	Total %	N
Msaranga	74	39.2	8.1	RICE FRUITS Banana Cashewnuts Vegetables	8.1	Moshi Kiboroloni	MAIZE Rice Banana Cassava Fruit Vegetables	27.0	Old Moshi Uchira Uru Kidia K.N.C.U	COFFEE Cotton Rice	Transport	82.8	17.2		100	29
Mandaka	40	52.5	5.0	Maize Rice	12.5	Moshi	VEGETABLES Cotton Maize	42.5	K.N.C.U Old Moshi Uru	COTTON Rice Coffee Maize	Transport Low prices	85.7	14.3		100	21
Rau-River	41	43.9	14.6	RICE Banana Sugarcane	22.0	Kahe Moshi	MAIZE Vegetables Banana Beans Fruit Groundnuts Millet Sugarcane	31.7	Kahe K.N.C.U Kibosho	COTTON Coffee Groundnuts Maize Millet	Transport Low prices	50.0	44.4	5.6	100	18
Miwaleni	32	31.3	9.3	SUGARCANE Beans Maize	6.3	Kahe Uchira	Maize Tobaco	18.8	Kahe Uchira Uru	COTTON Coffee	Transport	90.0	10.0		100	10
Kahe-Sisal	41	29.3	7.3	SUGARCANE Maize	4.9	N.I.	Vegetables Sugarcane	22.0	Kahe Kibosho	COTTON Coffee Maize	Transport	75.0	25.0		100	12
Kahe Station	56	50.0	10.7	BANANA Maize Sugarcane	17.9	Kahe Moshi	MAIZE Banana	42.9	Kahe K.N.C.U Uchira	COTTON Coffee Maize Banana Cashewnut Pyrethrum Wheat	Transport Low prices	71.4	14.3	14.3	100	28
Lenduru	33	57.6	6.1	VEGETABLES Tobaco	21.2	Kahe	BANANA Beans Fruit Vegetables	51.5	Kahe Uchira	COTTON Maize Banana Beans Sugarcane Sunflower	Transport	73.7	21.1	5.2	100	19
Kilototo	55	80.0	0		5.4	Ghona Moshi	MILLET Maize	80.0	Kahe Ghona Kilema	COTTON Sunflower Maize	Transport Low prices	93.2	6.8		100	44
Soko	28	42.9	7.1	MAIZE Beans Cassava	3.6	Kahe	Banana	39.3	Kahe	COTTON Maize Beans	Transport	83.3	16.7		100	12
Mawala + Mwangaria	43	30.2	7.0	Banana Beans Maize	4.7	Kahe	Banana Beans	27.9	Kahe	COTTON	Transport	76.9	15.4	7.7	100	13
Ghona	34	55,9	5.9	MAIZE	0			52.9	Kahe Ghona Kilema Kiomu	COTTON Sunflower	Transport	94.7	5.3		100	19
Whole Area	477	47.2	7.3		9.9			40.0	Kahe K.N.C.U	COTTON Rice Maize	Transport	80.9	16.0	3.1	100	225

F.H. = Farm Households
N.I. = No information
MAIZE = Main crop marketed

cooperatives.[1] That this share is low may be explained by Msaranga's location in a zone suitable for neither coffee nor cotton; the two main cash crops.

Sales of products directly on the farm are of minor importance, concerning only 16 per cent of the marketing households. The same holds for sales at the market place, 20 per cent. Only in Rau-River and Lenduru were these of any significance (Table I:18).

Crops sold directly on the farm are maize, bananas, sugarcane and rice (87 per cent), of which maize is most important. Crops sold at the market are maize, bananas, vegetables and beans (92 per cent). In this case maize is even more dominant.

The main market place in the area is obviously Kahe Station. Over half of the market sellers use this market. Second in importance is Moshi, while Ghona and Uchira are of little importance. None in the sample used the Himo market, one of the largest in the vicinity.

Sales to cooperatives are unquestionably the most important mode of marketing (84 per cent of the marketing households).[2] The products consist to 95 per cent of cotton (81 per cent) and coffee, but a great variety of crops are sold (Table I:18). Most important in the area is the Kahe Cooperative. Over 50 per cent of the marketing households deliver their crops here. Next in importance is the Kilimanjaro Native Cooperative Union (KNCU), the dominating cooperative in the whole Kilimanjaro area, but only 7 per cent of our marketing households sell their products here. They originate mainly in Msaranga and Mandaka.

Quantities of cotton sold at the Kahe Cooperative have varied considerably over the years (Figure I:4): a good year followed by a bad is the common feature. The same picture, although not so pronounced, holds for the Kilimanjaro Region as a whole. According to agricultural officers, the variation is mainly due to climatological changes. A good harvest is dependent not only on yearly rainfalls, but also on precipitation distribution over the year. The serious droughts in 1973-1974 are clearly reflected in Figure I:4. Producer prices on cotton set by the government, have been included in the figure to show their limited impact on quantities delivered to the cooperative.[3]

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[1] It should be observed that the analysis is concerned with the households living in a specific subarea. They may be selling products cultivated on their farms in other areas.

[2] All primary cooperative societies were abolished in 1975. The next year all secondary societies were closed down.

[3] To make this analysis complete, the relative rather than absolute producer prices should be used.

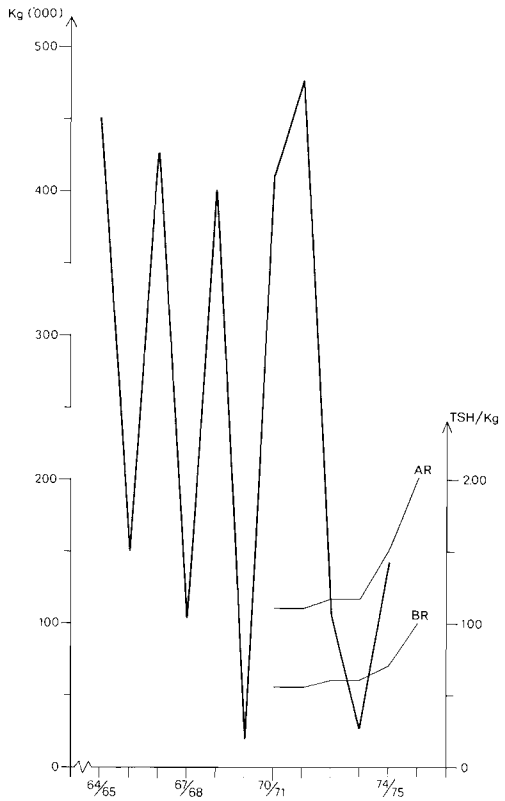


Figure I:4. Cotton Sales at Kahe Growers Cooperative and Producer Prices

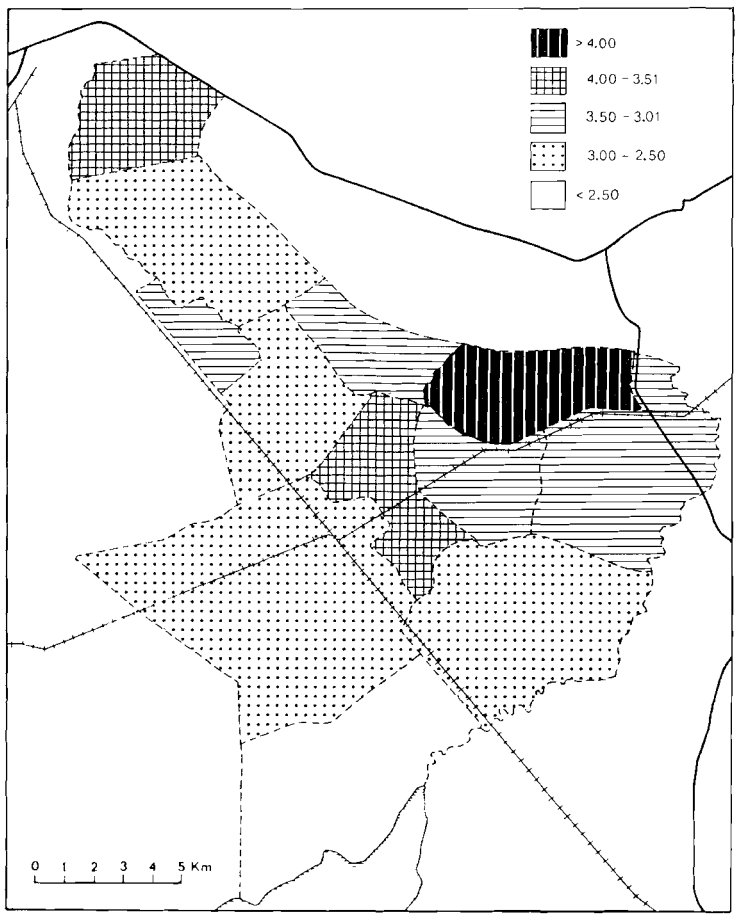
Sources: District Agricultural Office, Moshi and Kahe Growers Cooperative.

The marketing households were asked to state any problems they might have had in marketing their products. Unfortunately, the frequency of non-respondents was great and no conclusions can be drawn. The respondents mostly mentioned transport problems. A few gave low producer prices as the main problem.

'Modernity' of the Farm Households

To summarize the analysis of the farm households, the following variables have been aggregated in an index: irrigation, manure, fertilizers, farm inputs and machinery (5 variables), processing of crops, storage of crops and

marketing.[1] All variables are given the same weight. The maximum score for a household is 11. The average for the area is 3.3, the highest (Kilototo) 4.5, and the lowest (Mawala) 1.7 (Map I:10). The difference between the sub-areas is significant, at the 0.01 level.



Map I:10. 'Modernity' of Farm Households

[1] Marketing households will be slightly favoured since the variable 'processing of crops' only applies to them.

Subareas with the highest share of 'modern' farms roughly coincide with those having the highest share of marketing farms. Miwaleni is an exception from the general trend, with the lowest share of marketing farms, but quite 'modern' farms according to the index. The low score for Mandaka was not expected, since it is close to Moshi, and has about the same physical environment as Kilototo. The 'backward' areas Mwangaria and Kahe Sisal rank low in the index.

Summary

The traditional land tenure system, where land is owned and distributed by the clan, still plays a dominating role in the study area, even though eroded in densely populated subareas. Increasing private ownership of land will eventually enlarge the currently relatively small socio-economic differences.

Among farm households it is common to own several plots located in different places. The aggregate size of land varies considerably. The small fraction of non-farm households consists mostly of wage-earners and naturally of pastoralists.

Maize is the staple and cotton the leading cash crop. Also beans and bananas are important. A large variety of lesser crops are grown, but only by a small fraction of the farm households. Those residing in the south-eastern parts grow less crops and practise a more extensive cultivation system. Most farmland is cultivated every year. In most parts double-cropping is possible by the use of irrigation. In the northern parts even three crops a year may be grown, provided the fields are irrigated.

Irrigation is vital, since rainfall is low and unreliable. However, the irrigation potential of the area is decreasing due to the deforestation of Mount Kilimanjaro. The majority of the farm households practise irrigation. The Rau river is the main water source.

The median farm household markets its crops, primarily cotton, through a cooperative union. A rented tractor with a plough is the most commonly used implement beside the hoe. Fertilizers are used only marginally, although many consider that the area is declining in fertility. Households in subareas with land shortage or where marketing is common use the largest variety of farm inputs.

ANIMAL HUSBANDRY

The livestock economy is of great importance. In some parts, especially in Mawala, it provides subsistence and is the dominant source of income; in others it is a supplement to agriculture and an insurance against 'rainy days'.

Traditionally, the area was an important grazing district. Since more and more of the land has been put under permanent cultivation by peasants and plantations, the grazing land has diminished considerably. Approximately 30 per cent of the surface can be characterized as grazing land. However, the quaility of the pasture is generally low and varies considerably over space and time. Large parts of the area are overgrazed.

Estimated Livestock and Poultry Populations in 1974

The livestock population was estimated at 13 400 units.[1] Cattle and goats predominate. In 1974 the cattle population was estimated at 10 700 heads, goats at 9 900, sheep 3 100, poultry 4 900 and other types 600. The latter includes donkeys - kept only by the Wamasai - ducks and a few pigs. The very small number of pigs in the area is due to the Muslim influence. Pigs are quite common in the Christian areas higher up the mountain.[2]

Variations between the subareas are great (Table I:19 and Map I:11). Almost half of the livestock, measured in livestock units, are owned by Mawala residents. Other subareas with a large livestock population are Mwangaria, Kilototo, Msaranga, Ghona, and Miwaleni. The rather large number of livestock in Msaranga is due to its high population density compared to the other subareas.

On the average the households have only 2.8 livestock units compared to almost five in Miwaleni and Kilototo, eight in Mwangaria and over 70 in Mawala.

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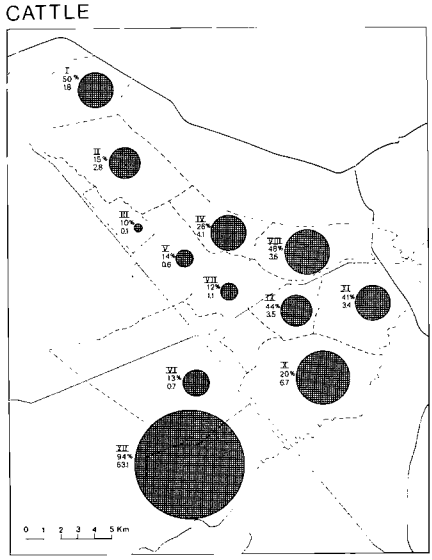
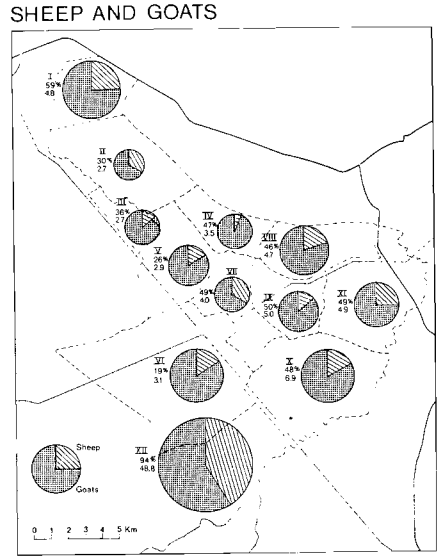
[1] 1 livestock unit = 1 cow = 1 donkey = 5 goats = 5 sheep.

[2] Inspite of favourable conditions for raising pigs, these are not common. They are only found in Msaranga probably among people who have moved from areas higher up the mountain. The Muslim influence in the area not only implies that pigs are not raised by this group of people, but also that the Christians in the area do not raise and eat pigs out of respect for their Muslim neighbours.

CATTLE



SHEEP AND GOATS



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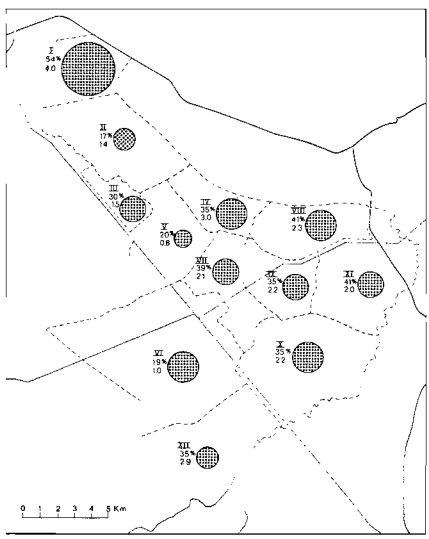
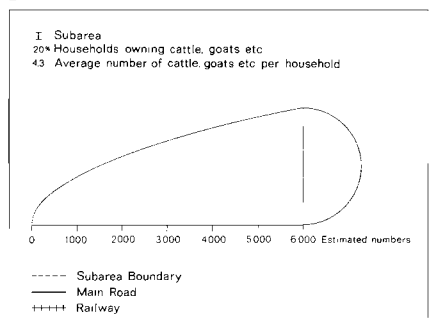


LEGEND



Map I:11. Estimated Number of Cattle, Sheep and Goats, and Poultry in 1974

Table I:19. Estimated Livestock Population in 1974 (Livestock Units)

Subarea	Livestock units N	%	$\bar{x}$ all households
Msaranga	890	6.7	2.8
Mandaka	504	3.8	3.3
Rau-River	130	1.0	0.7
Miwaleni	695	5.2	4.8
Kahe Sisal	265	2.0	1.2
Kahe Station	549	4.1	1.4
Lenduru	291	2.2	1.9
Kilototo	1 059	7.9	4.6
Soko	586	4.4	4.5
Mwangaria	1 567	11.7	8.0
Ghona	711	5.3	4.3
Mawala	6 110	45.7	72.7
Whole area	13 357	100	5.6

Households in the three subareas to the south and east - Mawala, Mwangaria, and Ghona - have 67 per cent of the cattle, 60 per cent of the sheep, 41 per cent of the goats, but only 20 per cent of the poultry. This pattern clearly shows the increasing role of livestock in the south-eastern parts.

Possession of Domestic Animals in 1974

Possession of livestock is based on individuals. Ownership of livestock varies considerably between individuals as well as between subareas. In total over half of the households in the sample lack livestock, ranging from 6 per cent in Mawala to 79 per cent in Kahe Station. A few livestock owners have very large herds (Figure I:5 and Table I:20). They are mainly found among the Wamasai in Mawala.

When the subareas are analyzed according to the two variables; (1) percentage of households possessing livestock and (2) average number of livestock units owned by owning households, the subareas can be divided into four groups describing the role of livestock (Figure I:6).

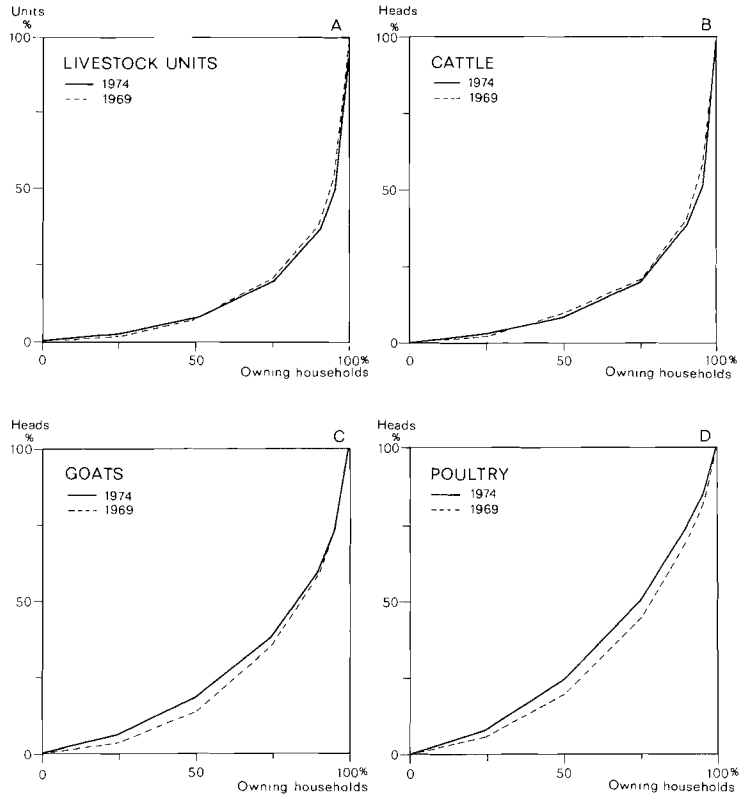


Figure I:5. Distribution of Domestic Animals, by Owning Households

Table I:20. Possession and Distribution of Domestic Animals in 1974

	Livestock units	Cattle	Goats	Sheep	Poultry
Owning households (%)	43.7	29.1	40.5	23.0	33.3
$\bar{x}$ all households	5.2	4.1	4.0	1.4	2.1
$\bar{x}$ owning households	11.9	14.5	9.9	6.0	6.2
Share of total owned by 50 % of the owning households (%)	9.9	11.5	24.6	15.8	32.2
Share of total owned by the top 5 % of the owning households (%)	50.2	49.2	27.3	38.8	15.4

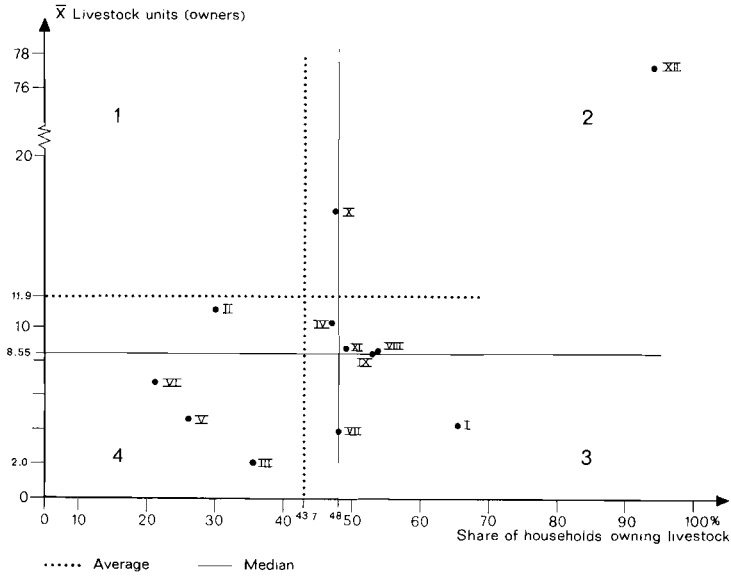


Figure I:6. Role of Livestock Economy, by Subarea

I. Livestock economy plays the dominant role - above average (median) on both variable (Quadrant 2 in Figure I:6). This group is represented by Mawala (XII) and to some degree Mwangaria (X). Mawala is exceptional from the other areas, since the Wamasai, who constitute the majority of the Mawala residents, are exclusively dependent on livestock for their subsistence and income.

II. Livestock supplement crop agriculture (Quadrant 3). This group is represented by Msaranga (I) and to some degree Lenduru (VII).

III. Livestock economy is of minor importance (Quadrant 4). This group is represented by three mutually different subareas: Kahe Sisal (V) and Kahe Station (VI) and to some degree by Rau-River (III). The physical conditions and the role of livestock in Rau-River are more like the situation in Msaranga and Lenduru than in Kahe Station and Kahe Sisal. Moreover, in Rau-River the share of livestock owning households has decreased between 1969 and 1974, while at the same time it has increased in Msaranga and been constant in Lenduru. All these facts taken together indicate that Rau-River should actually

belong to group II. In the case of the two other subareas, wage employment plays an important role.

IV. Livestock economy is generally of minor importance, but those who have livestock own a large number (Quadrant 1). This group is to some degree represented by Mandaka (II).

The remaining four subareas Miwaleni (IV), Kilototo (VIII), Soko (IX), and Ghona (XI) represent the average.

Cattle are the most important domestic animals, playing a diversified role: supply of milk and meat, representing security and, for some, status. Cattle are of the ordinary East African Zebu-type which can stand rather harsh conditions, but their milk production and calving-rate are low. Only a few hybrid cattle were found in the area, excluding the dairy farm at the EAKIL Estate.

The percentage of cattle-owning households varies considerably between the subareas, from 94 per cent in Mawala to 10 per cent in Rau-River (Map I:11). In general, relatively good agricultural subareas have a low share of cattle-owning households, except for Msaranga. But here the households own fewer heads than in the south-eastern subareas. The relatively high cattle-owning frequency in Msaranga may be explained by its high proportion of 'rich' households. Cattle are more expensive than smaller livestock.

The distribution of cattle over the owning households are extremely uneven. A few cattle owners have very large herds, mostly Mawala residents (Figure I:5 and Table I:20).

Goats are the most commonly owned and most evenly distributed livestock in the area (Figure I:5 and Table I:20). They give a lower economic return than cattle, but they are more resistent to drought. Moreover, they multiply faster and represent a lower investment than cows. Among the domestic animals owned by households not possessing a cow, goats are unquestionably most important.

Sheep are kept for the same reason as goats: provision of milk and meat. Meat yield is the same for both types, but goats produce more milk. Sheep are more difficult to herd (Dahl & Hjort, 1976, pp. 210-212, 250). These facts may explain the minor importance of sheep in the area (Table I:20). The only subarea with a large sheep population is Mawala. Here the average household has 20 heads, while in the remaining parts of the study area the average number of sheep per household varies between 0.2-1.3.

As in the case of smaller livestock, poultry are mainly kept for meat. Eggs cannot be collected in an organized way, since the hens stray freely around the house. As they are easy to keep and represent a small investment, it is strange that only approximately one third of the households keep chickens. However, the distribution over the owning households is quite even (Figure I:5 and Table I:20).

Changes in Number of Domestic Animals Owned by Interviewed Households

The sample does not allow any estimate of the total livestock and poultry populations in 1969 and changes between 1969 and 1974. But it is possible to see changes in livestock holdings and numbers owned that have taken place during the five-year period for the households interviewed in 1974. This analysis provides some indication of the overall changes in the area.

The households own less livestock and poultry in 1974 compared to five years earlier. On average, households' livestock herds have diminished by 35 per cent. However, the share of non-owning households did not increase. Thus, the owners on the average had smaller herds in 1974 than in 1969 (Table I:21).

Table I:21. Distribution of Number of Livestock and Poultry Owned by Households in 1974 and 1969 (Percentages)

Number of units/heads	Livestock units		Cattle		Goats		Sheep		Poultry	
	1974 %	1969 %	1974 %	1969 %	1974 %	1969 %	1974 %	1969 %	1974 %	1969 %
0	56.3	56.9	70.9	71.3	59.5	61.7	77.0	79.7	77.7	74.3
1 - 5	27.3	4.3	17.7	10.0	20.3	10.0	17.6	8.6	18.4	5.9
6 - 10	7.3	3.4	4.8	7.5	11.8	7.3	3.7	4.6	11.1	7.0
11 - 20	3.7	7.3	2.7	5.0	4.6	8.4	0.7	3.9	3.6	7.0
21 - 50	3.4	11.6	2.7	2.3	3.6	10.0	0.7	2.3	0.2	5.2
51 - 100	1.2	7.1	0.5	2.5	0.0	2.0	0.2	0.7	0.0	0.7
> 100	0.7	9.4	0.7	1.4	0.2	0.7	0.0	0.2	0.0	0.0
Total	100	100	100	100	100	100	100	100	100	100
$\bar{x}$	26.1	52.3	4.1	8.0	4.0	9.0	1.4	3.2	2.1	4.1

The way reduction occurred is important. Which groups have lost most, those with large herds or those with small? Did some households increase their herds, while others diminished the herd size considerably? Figure I:5 shows that the overall distribution of livestock, as well as the various types, did not change much during the five-year period.

The overall reduction in livestock has been proportional, since the richest 5 per cent of the households accounted for approximately half of the livestock units both in 1969 and 1974 (Figure I:5). However, this is true only when individual households are not analyzed.

Almost half of the households did not record any change in livestock holding between 1969 and 1974. However, these households almost exclusively consisted of non-owners (Table I.22). Among those who experienced changes, the majority (77 per cent) have reduced their herds - lost animals.[1] On the average, these households have got their herds diminished by 85 per cent. Within this group it is very hard to find an overall trend. However, total losses have mostly affected households with small herds in 1969.

Less than 20 per cent of the households have increased their livestock holdings or have acquired livestock since 1969. Households increasing their herds have on the average enlarged them by 161 per cent. The 1969 non-owners with livestock in 1974 have acquired only a small number of livestock, 50 per cent have eight units or less. But one head of household has managed to acquire not less than 140 units, which is more than five times the average holding in the area. The share of new-owners is almost the same among wage-earners as peasants.

The percentage losses have been greater for older heads than the younger ones. Conversely, the increase in livestock holding has been mainly among younger heads of household.

The spatial variation in percentage reduction of livestock is considerable (Map I:12). The largest reduction is not in the predominant livestock subarea Mawala, but rather in areas where both livestock and agriculture are important. The highest reduction is in Ghona, an area that is highly affected by overgrazing. Here the reduction in livestock is almost 70 per cent. The reduction in the most important type of livestock - cattle - shows greater spatial variation than livestock as a whole.

Domestic Animal Combinations

Domestic animals serve different purposes and represent different values. They vary in their resistance to adverse physical conditions and diseases. They also differ in reproduction; small stock having a greater reproduction than cattle. Various combinations of domestic animals have implications for diet composition (small stock produce milk during the dry season when cattle produce small quantities only), as well as for ecology and labour requirements.

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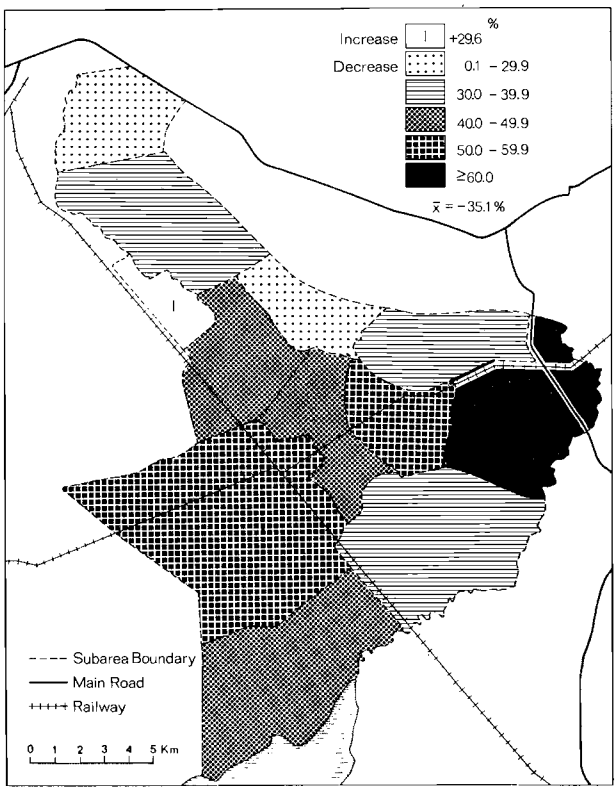
[1] The sample does not allow a diversification between voluntary reduction and losses.

Table I:22. Change in Livestock Units Owned 1969 - 1974 (Percentages)

Livestock units 1969	Decrease						No change	Increase			Total	
	100 %	80 - 99 %	60 - 79 %	40 - 59 %	20 - 39 %	<20 %		<50 %	50 - 99 %	≥100 %	N	%
0.1 - 2.0	57.1									42.9	7	100
2.1 - 4.0	16.7		16.7						50.0	16.7	6	100
4.1 - 8.0	30.0				5.0		15.0	10.0	10.0	30.0	20	100
8.1 - 12.0	41.2			17.6	5.9		5.9		17.6	11.8	17	100
12.1 - 16.0	17.6		5.9	5.9	5.9	11.8	5.9	17.6	11.8	17.6	17	100
16.1 - 30.0	29.3	7.3	9.8	9.8	19.5	4.9	2.4	7.3	4.9	4.9	41	100
30.1 - 80.0	17.1	14.3	28.6	15.7	4.3	10.0	2.9	1.4	2.9	2.9	70	100
> 80	3.1	21.9	29.7	25.0	7.8	4.7		7.8			64	100
Livestock owners	19.4	11.2	18.6	14.5	7.9	5.8	3.3	5.8	5.8	7.9	242	100
0							84.3	15.7			319	100



Map I:12. Percentage Change in Livestock Units Between 1969 and 1974 (Owners in 1969)

> Herd diversification offers advantages in terms of spreading the available food resources over the year, and that the slower growth of herds of large stock can be alleviated by their exchange for small stock. In addition, a herd owner with different types of stock is not as vulnerable as one with only one major species; misfortunes are more likely to hit all animals, if they are liable to get the same diseases, use the same type of ecology, etc.
> (Dahl & Hjort, 1976, p. 237)

In this section combinations of four main types will be analyzed: cattle, goats, sheep and poultry. The sample represents all possible combinations (Table I:23). In 1974 combinations of three types were the most common, within which 'cattle, goats, poultry' was most important. Combinations of two types, within which 'goats, poultry' was most frequent, were only slightly more common than the combination of four types. Goats are more common than sheep because the 'cattle and sheep' combination is less advantageous than the 'cattle and goats' in respect to complementary of demands and yields.

Table I:23. Domestic Animal Combinations

Livestock	1969		1974	
	N	%	N	%
Cattle	8		4	
Sheep	2		0	
Goats	30		15	
Poultry	16		11	
Sub total, Single	56	21.7	30	11.7
Cattle, Sheep	0		2	
Cattle, Goats	30		18	
Cattle, Poultry	14		8	
Sheep, Goats	10		7	
Sheep, Poultry	1		3	
Goats, Poultry	18		29	
Sub total, Combination of 2 types	73	28.3	67	26.2
Cattle, Sheep, Goats	34		23	
Cattle, Sheep, Poultry	2		1	
Cattle, Goats, Poultry	28		42	
Sheep, Goats, Poultry	20		28	
Sub total, Combination of 3 types	84	32.6	94	36.7
Cattle, Sheep, Goats, Poultry	45	17.4	65	25.4
Sub total, Owning Households	258	100.0	256	100.0
None	303	54.0	305	54.4
Total	561		561	

Goats are most common among households owning one type of domestic animals only. Among new-owners small stock are unquestionably more common than cattle. Almost all households within this group have goats, while half of them have sheep and cattle. Ownership of sheep is much more common within this group than on the average. Generally, households beginning to raise domestic animals start with the small stock. Later when the herd have reproduced and means are available to acquire larger animals, cattle are included. However, no substitution of cattle for small stock was observed when herd size increased.

The overall net change in livestock and poultry combinations was great. In spite of the general reduction in domestic animal production, a clear trend towards greater diversification was recorded, indicating an effort by the households to get more types of domestic animals.

For individual households the changes (gross changes) were even greater (Figure I:7). Almost 40 per cent of the households changed their livestock and poultry combination between 1969 and 1974.[1] If only households having domestic animals in 1969 or 1974 are included, the share of those who changed combination increases to 64 per cent. The majority of the changes were only 'one step', e.g. from one to two types.

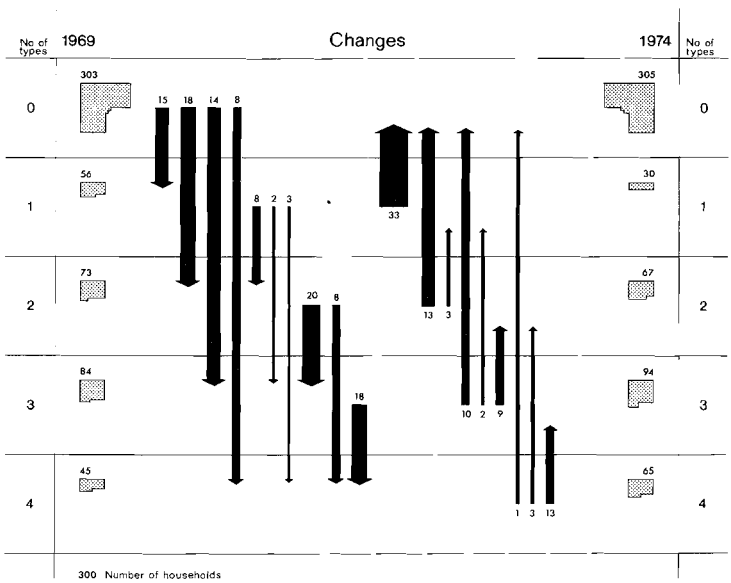


Figure I:7. Changes in Domestic Animal Combinations Between 1969 and 1974

Future Changes in Livestock Holdings

As seen above, changes in livestock composition and numbers owned have been considerable. The reasons for these changes are mainly losses, due to starvation and diseases, and to some extent slaughtering and natural increases. Only a small fraction of the changes can be classified as trade in livestock, dowry, gifts, etc.

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[1] Includes new-owners and households with domestic animals in 1974.

Do people have any plans or wishes for the future regarding their animals? Roughly half of the livestock-owners stated that they wanted to change their livestock composition in some way. The most common plan was to change to hybrid cattle. Half of these households lived in Msaranga. Other types of plans were to have 'cattle', 'more cattle' or 'larger herds'. In these cases the households were evenly spread over the subareas. Some wanted dairy cattle, most in Kilototo.

From this it can be seen that the majority of the households planning a change to hybrids and dairy cattle are to be found in areas where livestock has started to become part of the market economy, Msaranga and Kilototo. The reasons stated for change in livestock were few but logical: 'produce (more) milk', 'to get higher production or income'.

The above reasons differed very much from those given for not planning any changes in livestock composition. If the former can be characterized as plans looking ahead, the latter can be a sign of resignation, since most people stating that they had no plans gave the following reasons: 'no reason to change and no plans', 'no time to look after the livestock', 'disease and lack of pasture'.

Role of Livestock and Poultry

A common notion holds that livestock owners keep their animals as status symbols; the more he owns, the higher the status of the owner. This role of livestock is irrational from the point of view of maximum utilization of livestock resources and pastures. The question arises whether livestock owners in the area are rational in respect to the efficient utilization of their livestock. The domestic animals serve several functions. To distinguish among them and to obtain information on how people in various areas value the functions, the respondents were asked to state what types of functions listed the domestic animals serve. Another purpose of the questions was to obtain information on the rationality of livestock ownership.

Generally, domestic animals represent several values in terms of utilization. Over 90 per cent of the owners have domestic animals for their own consumption, 63 per cent for security reasons, 29 per cent for sale of products, and 25 per cent for sale of animals.[1] Since there are no draft animals in the area; the only type of livestock used for work is donkeys, employed by the Wamasai to carry products to and from the market place (Table I:24).

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[1] A person can have livestock for several reasons, i.e. the sum of the percentages may exceed 100.

Table I:24. Role of Domestic Animals (Percentages)

Subarea	N	Subsistence %	Security %	Sale of Products %	Sale of Livestock %	Status %	Work %
Msaranga	51	94	83	18	20	0	0
Mandaka	11	100	82	27	27	0	0
Rau-River	15	87	53	13	13	0	0
Miwaleni	17	94	47	18	12	0	0
Kahe Sisal	13	100	38	46	23	0	0
Kahe Station	21	100	14	24	19	0	0
Lenduru	16	88	44	25	13	0	0
Kilototo	29	93	62	52	48	0	0
Soko	18	83	50	22	22	0	0
Mwangaria	18	100	89	22	6	0	0
Ghona	18	100	72	33	33	0	0
Mawala	16	94	81	63	63	44	50
Whole area	243	94	63	29	25	3	3

Poultry and smaller livestock are most important for subsistence, providing meat and to some extent milk. For security and sale of livestock, cattle and goats play the most important role. Very seldom is a cow slaughtered only for household consumption, but rather when a larger group celebrates.

Only one group - the Wamasai - stated that livestock had a status value. However, the other functions were more important, e.g. provision of products, such as meat for consumption or for sale, sales of livestock and representing security.[1]

The variation between the subareas is small concerning the role of livestock for domestic consumption. In other respects the variations are great. Only 14 per cent of the livestock owners at Kahe Station have livestock for security, but 89 per cent in Mwangaria. Can the difference among the households that keep livestock for security be explained by variations in cattle-holdings among the households? Cattle represent higher security than goats and sheep. There is a correlation between the share of households in a subarea owning cattle and the percentage having livestock for security reasons (rank correlation coefficient = 0.52).

Selling animals or products is most common in Mawala and Kilototo, while in Rau-River slightly more than 10 per cent keep livestock for marketing, and the same share for selling products.

Do the households consider that they receive enough products from their animals for subsistence? Table I:25 shows that meat is the best supplied product, followed by milk and eggs. Butter is used only to a limited extent. Hides are sold. The market for this product is large, which explains why no household feels that it obtains enough hides from its livestock. Mawala is unquestionably best supplied with meat, followed by the rest of the south-eastern subareas. The same is true for milk, although in this case Msaranga has a relatively good position. The supply of eggs is the best in the two northern subareas, together with Mwangaria and Kilototo.

To obtain a general picture of the provision of animal products, an index has been constructed (excluding butter), with 100 for the whole area (Table I:25, last column). The subareas fall naturally into three groups: the first, best provided with animal products (index > 110), includes Mawala and Kilototo. The group with the smallest supply (index < 90), contains Kahe Station and Lenduru.

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[1] The question whether a person has livestock as a status symbol or not is very sensitive. How many Swedish car-owners would state that they own a Mercedes to acquire higher status? If no respondent had answered 'yes' on the status question, I would have been extremely sceptical. However, the group that gives livestock a status value answered the question positively. For this reason I am inclined to state that for the other groups in the sample, the livestock has little or no status value.

Table I:25. Provision of Products by Households Owning Domestic Animals (Percentages)

		Meat			Milk			Egg			Butter			Hides			
		Enough	Some	None	Enough	Some	None	Enough	Some	None	Enough	Some	None	Enough	Some	None	Index
	N	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	I
Msaranga	51	0	78	22	0	80	20	4	65	31	0	2	98	0	24	76	99.5
Mandaka	11	0	64	36	0	55	45	9	55	36	0	0	100	0	36	64	98.8
Rau-River	15	0	87	13	0	47	53	0	67	33	0	0	100	0	33	67	97.2
Miwaleni	17	6	70	24	0	65	35	6	59	35	0	1	94	0	18	82	89.5
Kahe Sisal	13	8	69	23	8	54	38	0	31	69	0	0	100	0	38	62	91.8
Kahe Station	21	14	72	14	0	62	38	0	48	52	0	10	90	0	14	86	79.8
Lenduru	16	12	38	50	6	25	69	6	13	81	0	12	88	0	19	81	57.0
Kilototo	30	27	63	10	13	80	7	0	73	27	0	10	90	0	40	60	132.8
Soko	18	22	61	17	11	78	11	6	11	83	0	6	94	0	33	67	98.5
Mwangaria	18	17	72	11	0	83	17	0	72	28	0	6	94	0	22	78	105.8
Ghona	18	6	88	6	17	66	17	0	50	50	0	17	83	0	22	78	99.3
Mawala	16	44	56	0	44	56	0	0	31	69	12	44	44	0	50	50	141.3
Total	244	12	70	18	7	67	26	2	52	46	1	9	90	0	28	72	100.0

$$I = \frac{\sum_j \sum_i p_{ji} n_{ji}}{4}$$

ni = (2-0) enough = 2, some = 1, none = 0

pi = per cent of households

j = (1-4) type of products; meat, milk, egg, hides

Livestock and Poultry Bought, Sold and Slaughtered

For a more detailed picture of the use of livestock and poultry and their relative importance to the households' subsistence and cash income; sales, purchases and slaughters during a one year period were studied.

Over one third of the households owning livestock and poultry did not buy, sell or slaughter any animal in that period. The largest share is found in Msaranga (61 per cent) and Soko (50 per cent) (Table I:26). Among remaining households, slaughter is most common (26 per cent), followed by sale and slaughter (16 per cent). The share of households involved in transactions of domestic animals amounts to 23 per cent, while those who slaughtered account for 46 per cent.

The largest number of livestock and poultry were slaughtered, almost 400 heads among the interviewed households. Livestock sold amounts to more than 250 heads, of which approximately 60 per cent originated in Mawala, Ghona and Kilototo. Only 54 animals were bought during this period, mostly by people from Miwaleni, Kilototo, Rau-River, Mandaka, and Msaranga; goats predominated.

Marketing

The preceding section does not completely cover the marketing situation. Households may be marketing animals although they have not done so in the last twelve months.

Due to the large share of non-respondents, the fraction of households selling their livestock and poultry can only be roughly estimated. The highest share is found in Kilototo and Mawala (55-75 per cent) and the lowest (14 per cent) in Kahe Station (Table I:27).[1]

Almost 40 per cent market animal products, almost exclusively milk and hides.[2] The highest share is in Mawala, followed by Kilototo and Mwangaria. Very few households sell eggs and butter.

Besides selling to neighbours, the most common way of marketing products is by sales at market places, inside as well as outside the study area. The market areas are clearly defined. Households from the northern subareas use the markets in Moshi or at Kiboroloni. Uchira is most important for Miwaleni and Kilototo, Himo for Ghona, while Kahe Station is the principal market for the remaining subareas.

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[1] Generally, the share of households that actually market live animals is much higher than the share of households stating they have domestic animals for marketing reasons, i.e. in Mwangaria 6 per cent of the households state that they have livestock for marketing reasons, while at the same time 33-39 per cent say that they have sold live animals (Table I:24 and I:27).

[2] In the whole area 29 per cent of the households owning domestic animals stated that they have them to sell the products.

Table I:26. Livestock and Poultry Bought, Sold and Slaughtered by Households (Percentages)

	Total households owning livestock and poultry		Bought only	Sold only	Slaughtered only	Bought, sold	Bought, slaughtered	Sold, slaughtered	Bought, sold, slaughtered	Neither bought, sold, nor slaughtered
	N	%	%	%	%	%	%	%	%	%
Msaranga	50	100	2	2	22	2	4	6	0	61
Mandaka	11	100	0	9	27	0	18	18	0	27
Rau-River	15	100	13	0	27	0	13	13	0	33
Miwaleni	17	100	18	12	18	0	6	12	0	35
Kahe Sisal	13	100	8	15	31	0	0	15	0	31
Kahe Station	21	100	0	0	52	5	5	5	0	33
Lenduru	15	100	13	0	40	0	0	20	0	27
Kilototo	29	100	7	31	10	0	0	21	3	28
Soko	18	100	0	6	22	0	11	11	0	50
Mwangaria	18	100	0	0	44	6	6	28	0	17
Ghona	18	100	6	28	6	0	6	22	0	33
Mawala	16	100	0	13	25	0	0	44	6	13
Whole area	241	100	5	10	26	1	5	16	1	37

Table I:27. Marketing of Live Animals and Products. Percentages of Households Owning Domestic Animals.

		Live animals	Products
	N	%	%
Msaranga	51	31-35	33
Mandaka	11	45	27
Rau-River	15	20-27	47
Miwaleni	17	18-29	29
Kahe Sisal	13	46	31
Kahe Station	21	14	24
Lenduru	16	31-44	31
Kilototo	30	57-73	50
Soko	18	28	33
Mwangaria	18	33-39	44
Ghona	18	39-44	50
Mawala	16	56-75	63
Whole area	244	35-42	39

Households marketing animals were asked whether they had any problems. Among those answering only 10 per cent stated 'yes'. The most commonly mentioned problems are: 'no market nearby' and 'low prices'.

Husbandry

The way in which livestock is cared for has great consequences for productivity and survival. Veterinary service is lacking. Some livestock-owners in contact with the dairy farm at EAKIL can get help with injections. Dips, an important preventive measure against ticks, East-African Fever, etc. are very few in the area. Moreover, sometimes they do not function due to lack of water or medicine.

Half of the livestock-owners keep their livestock in covered sheds - a construction with walls, sometimes open, and a roof. The same fraction use a corral when the livestock are not grazing - an area fenced with thorny bushes. Covered sheds are most common in the northern subareas and are not used at all in Mawala and Ghona. Corrals, on

the other hand, are most common in Mawala, Ghona and Kilototo subareas, where the largest livestock herds are found.

Livestock owners face several problems, grazing being the most commonly mentioned, followed by diseases. Only a few respondents mentioned 'lack of dips and medicine'. The area is overgrazed during the dry season. Moreover, the north-eastern parts are grazed by non-residents.

Quite a large proportion of the livestock owners mentioned problems with forage for their animals, almost no fodder is produced. The share increases towards the south and east. In Mawala 75 per cent mentioned problems in getting enough fodder. In Ghona and Kilototo the corresponding figures are 62 and 63 per cent, in Mwangaria only 5 per cent. This part is one of the best grazing areas.

Very few livestock-owners buy any fodder or collect hay during the dry season. Those who buy feed are mostly poultry-owners. Gathering of hay can be seen in the area. However, the hay is transported up the mountain, where large parts of the livestock are stable-fed. There is hardly no information about hay being gathered and stored for the dry season.

Grazing land is commonly owned and includes all land except cropfields. In some villages livestock is grazed on cropfields after harvest. Large livestock owners graze their animals separately, while households having small herds may graze them together. Grazing of livestock could be expected to take place in areas where the grass is best at a given time. Generally, livestock owners do not cover long distances with their animals to find suitable grazing land, but use areas close to the place of residence of the owner. In most communities the livestock are grazed by small boys. In the case of the Wamasai the grazing of the cattle is the responsibility of a certain age group of men, thus, these animals can be far away from home.

To find out if people knew of better grazing areas than those they usually exploited, and to see if people considered some areas to be better for grazing than others, a question was included about where the best grazing areas were to be found. Surprisingly enough, the majority of the respondents stated that their area of residence also was the best grazing area. Areas outside the place of residence - but inside the study area - most commonly mentioned as best were: Soko-Mbeu, Mawala, Kahe Station and Mkonga. However, only a small fraction of the respondents mentioned these areas. To find better grazing areas than around one's home, one would have to go outside the study area, according to the answers.

This result can be interpreted in two ways. Either people have little knowledge about the area outside the place of residence, or the study area is quite uniform in respect to grazing. Thus, in order to find a better

grazing area than in the immediate vicinity of home, one must travel a long distance, making it possible to return home for the night.

One is inclined, for several reasons, to believe that the second alternative is most plausible: (1) The area is quite small and people should have information about the grazing situation within the area. (2) People travel to the market and to Moshi and must know the areas outside their place of residence. (3) The whole area is mostly cultivated and the livestock population is larger than the optimum, which makes the grazing situation - lack of pasture - rather uniform.

Location of Livestock

Residents in some subareas have large parts of their cattle in other areas. For example, at Kahe Station over half of the cattle-owners have their animals in other places, mostly in the Same/Pare District. These cattle-owners are probably heads of household who have moved to Kahe Station in order to get wage-employment and left the cattle behind in their native village. In Lenduru 33 per cent of the cattle-owners have their herds in the Same/Pare District. At Kahe Sisal the same share of the cattle-owners have their cattle in neighbouring subareas or in the Hai, Moshi and Rombo Districts. In Mawala only one fourth of the cattle-owners have their animals outside the place of residence, mainly grazing on the Masai Steppe.

As for the smaller livestock - goats and sheep - only in Mawala are they found outside the place where the owners reside. In this case they are grazed together with the cattle far away from home.

It must be noted that although most of the goats and sheep are at the same place as the owners, it does not mean that they are grazed in the vicinity of home. The grazing areas are, however, close enough to bring the livestock home for the night.

Summary

The estimated number of livestock units were slightly more numerous than the human population in 1974. Both in number and importance, cattle are the major livestock. They are of the ordinary East African Zebu-type. Only a few hybrid cattle are found in the area. Veterinary service is lacking and only a few dips exist. Sometimes they do not function due to lack of water or medicine.

Livestock are owned by individuals, but grazing lands are held in common. The livestock economy is most important in the south-eastern parts. The number of units owned varies considerably among households and subareas.

Pastures generally are of low quality and usually overgrazed. Most livestock owners have problems in getting enough fodder during the dry seasons, especially where seasonal migration is impossible. The competition for land between cropping and grazing has increased over the years.

Interviewed households, on the average, experienced a large decrease in herds between 1969 and 1974. On the average, herds were diminished by 35 per cent. The relative losses were proportional among the owning households, while increases mainly took place among households having no livestock or very small herds in 1969. The no-livestock households constituted the same fraction in 1969 as in 1974.

Simultaneously with the large reduction in herds, a diversification took place. Households owned, on the average, more types of livestock in 1974 than in 1969, indicating an effort to spread the risks.

Livestocks were kept mostly for consumption and for security, the latter consideration being specially related to cattle. Almost half of the owning households sold live animals and roughly the same fraction, animal products.

PART II: SOCIO-ECONOMIC STATUS

INTRODUCTION

This part of the Annex contains a description and analysis of the socio-economic status of the study area. The socio-economic variables are analyzed vertically and horisontally. By the latter is meant the spatial variation within the area. Vertical differentiation refers to variations in socio-economic status between self-employed (mainly peasants) and wage-earners, between low-paid and high-paid employees, and between non-migrants and short- and long-distance migrants. The heads of household which constitutes the analyzed population will also be agglomerated into five standard-of-living groups.

This part differs from the previous one in two respects. Firstly, it contains an analysis of the manifest variables and tries to explain some of their variations. Secondly, it relates the study area to the Kilimanjaro Region and rural Tanzania[1] whenever possible.

The spatial variation in socio-economic status concentrates on the unravelling of the great differences within a small area that on first sight seems uniform. This analysis is carried out by means of 12 subareas (Table I:1, p. A2 and Map II:1).

DEMOGRAPHIC CONDITIONS

Population Size, Growth and Density

The population of the area was estimated at 12 600 people in 1974, and in Kahe Ward at 9 800 (Table II:1). The 1973 survey of Kahe Ward (February-March) estimated the population at 9 200 people; a yearly increase of 6.5 per cent between 1973-1974 for Kahe Ward. In the 1973 survey report

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[1] Equal to rural *mainland* Tanzania if not otherwise stated.

Table II:1. Population Size 1974, by Subareas

Subarea	Sub-area no.	Estimated number of households[a]	Estimated average size of households	Estimated size of population
Msaranga	I	322	6.1	1 964
Mandaka	II	151	5.6	846
Rau-River	III	190	5.2	988
Miwaleni	IV	146	4.9	715
Kahe Sisal	V	224	3.6	806
Kahe Station	VI	402	3.8	1 528
Lenduru	VII	154	6.0	924
Kilototo	VIII	231	6.2	1 432
Soko	IX	130	5.4	702
Mwangaria	X	195	4.1	800
Ghona	XI	164	6.8	1 115
Mawala	XII	84	9.2	773
Total		2 393	5.3	12 593
Kahe Ward		1 920	5.1	9 783

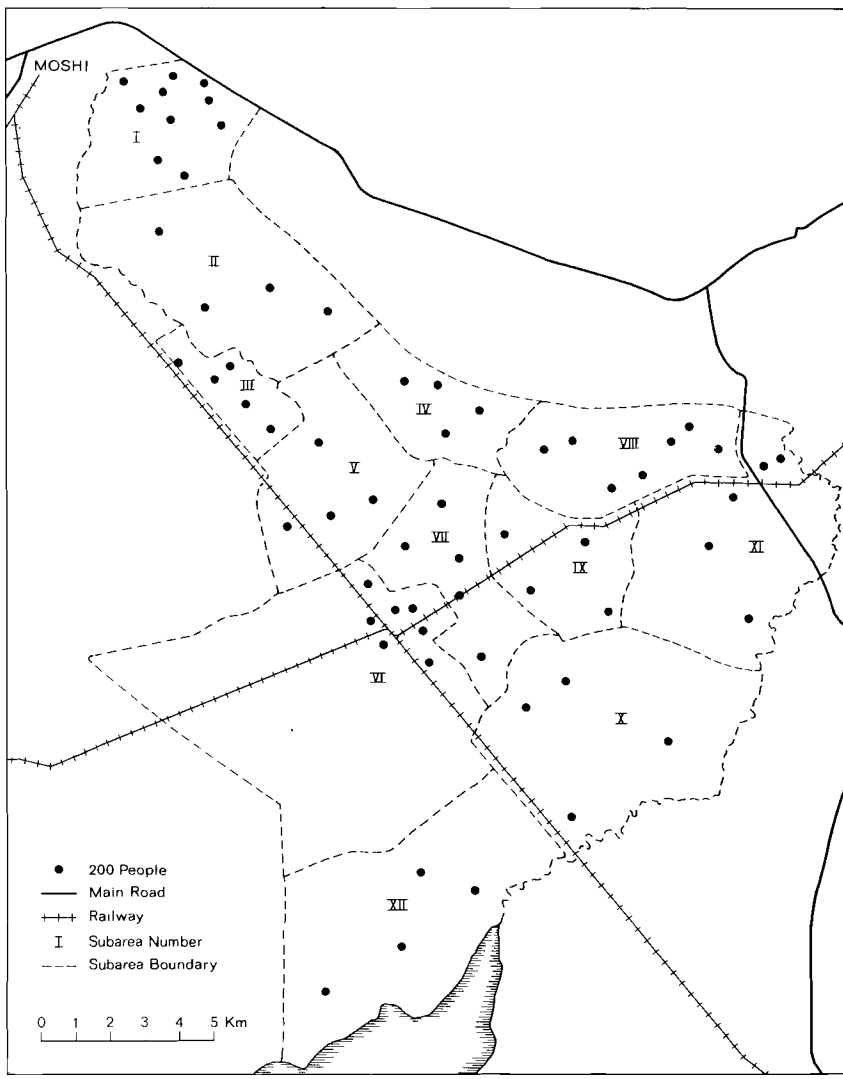
a See Table 4:2.

the yearly increase of the population in the ward was estimated at 7 per cent between 1967 and 1973 (Rudengren, 1975, p. 11).

In Msaranga and Mandaka, as in Kahe Ward, it is hard to estimate the population increase, due to boundary changes of enumeration areas. However, a rough estimate of the population increase in these subareas indicates a rate of increase of about a third of that for the Kahe Ward.

The annual population growth between 1948 and 1967 for Tanzania was 2.5 per cent and for urban areas almost 7 per cent. During the same period the population increase in the Moshi-Rombo-Hai District[1] was 3.2 per cent and for urban Moshi 6.5 per cent (Egerö-Henin, 1973, pp. 288 and 84).

[1] The Moshi District (formerly the Kilimanjaro District) was divided into two districts 1975; the Moshi District and the Rombo District. In 1977 the Moshi District was once again divided into the Moshi District and the Hai District. In this study the three districts are treated as one unit.



Map II:1. Population Distribution 1974

Source: Table II:1.

Note: the population is distributed according to the distribution of huts on the 1:50 000 scale map and recent air photographs.

The whole area has experienced an annual growth comparable to urban areas in Tanzania. The northern parts near Moshi have a lower growth rate than the average for the area, more like that of rural Tanzania. The fastest growth is in the Kahe Station area.

It is remarkable that areas close to Moshi have a lower growth than the rest of the area. The reasons for this are the following:

1. Msaranga and to some extent Mandaka are old settlements. Moreover, the area has been cultivated for a long time by people living higher up the slopes of Mount Kilimanjaro, which means that it is hard to find new land to cultivate.

2. Many people that migrated to this area have been cultivating there before; they have now moved into the area on a permanent basis.

3. Only 8 per cent of those who migrated to Msaranga have moved here in order to find employment. This indicates that those who look for employment in Moshi settle in the town itself or in Kiboroloni when commuting is not possible.

4. Moshi has a slower growth than the average for urban Tanzania, partly explained by its high rate of commuters. They live higher up the slopes of Mount Kilimanjaro in their native villages. The Kilimanjaro area has a good bus service, which makes commuting possible.

Population density in the area in 1974 was roughly 42 inhabitants/km^2. In 1967 the density in the Moshi-Rombo-Hai District was 95 inhabitants/km^2, and for the Same/Pare District and Tanzania 19 and 14 respectively (Egerö-Henin, 1973, p. 255).

The density of the study area is three times that of Tanzania, but low in relation to that of the higher altitude of the Kilimanjaro area. The low population density indicates that the area is marginal to the rest of the district.

Area variation in population density is closely related to annual rainfall. The more to the south and east, the lesser the rainfall and the lower the population density. The steady decrease in population density is only interrupted by the Kahe Station, the largest settlement in the area (Map II:1).

Size of Household

On the average the households have 3.8 children.[1] No child is reported for 19 per cent of the households, of which 42 per cent are in Kahe Sisal and Kahe Station.[2] In order to decide the size of a household, children that have left were excluded, and other dependents included. Accordingly, the average household has 3.0[3] children and 0.5 other dependents. These, together with the head of household and spouses give 5.3 as the average size of household.

Spatial variations of the size of the households are great. The smallest average size is in Kahe Sisal and Kahe Station, 3.6 and 3.8 respectively, and the largest in Mawala, 9 persons. In this subarea one household includes 20 members. Single person households are mostly found in Kahe Sisal and Kahe Station. This is explained by several factors: Firstly, heads of household are younger, from which follows that many are unmarried. Secondly, many heads have left the family (or part of it) in their native village.

Age Structure

The average age of the heads of household is 42 years. Kahe Station differs from the rest (Figure II:1) in that over 50 per cent are younger than 35 years. Lenduru and Mwangaria also have different distributions; on the average heads are older.

Kahe Station shows another age distribution among the heads than Kahe Sisal, although in both cases many work on plantations. The Kahe Sisal Estate is old and in the process of closing down while the EAKIL in the Kahe Station subarea is newly established. It has a newly recruited labour force, with almost 50 per cent under 25 years of age (Mascarenhas & Rudengren, 1973, p. 3).

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[1] The approximate age structure of the children is: 45 per cent under 7 years of age, 25 per cent between 7-15 and 30 per cent over 15 years of age.

[2] One man has 28 sons and 8 or 10 daughters. He knew exactly how many sons he had, but had to think quite a while trying to remember the number of daughters.

[3] In some cases children are attending school far away from home but are still considered as living in the household.

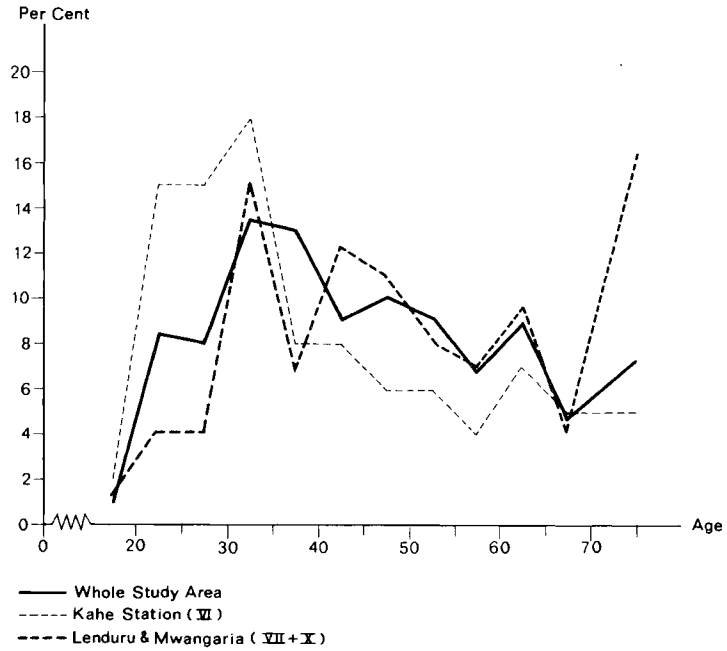

Figure II:1. Age Distribution of Heads of Household

Marital Status

The interview material includes 561 heads of household, of whom 77 per cent are married, 10 per cent single and 13 per cent widowed or separated (6.6 per cent are females). Single person households are most common in the plantation subareas (Kahe Sisal and Kahe Station).

Polygami is practised by 16 per cent of the married men. However, it is not common to have more than two wives. Only 3 per cent of the married men have more than two wives. Two men in the sample have five wives. In several cases the married man has left the family behind in his old village when he moved into the area. Some 7 per cent of the households belong to this group, of whom over 60 per cent are in Kahe Sisal and Kahe Station.

ETHNIC CHARACTERISTICS

Discussions of tribes[1] are likely to be controversial, but

> Use of tribes as a reference point in social interaction does not necessarily involve tribalism, here taken to have a negative connotation in so far as it inspires ethnic chauvinism and unjustified localism in a day of nationbuilding. (Lucas & Philippson, 1973, pp. 156-157)

In the 1967 census some 130 tribes were registered in Tanzania. The largest - Wasukuma - accounted for 9 per cent of the African population. The tribal mixture is pronounced and the five largest groups represent only one quarter of the population. The corresponding figure for Kenya in 1962 was over 60 per cent (Berry, 1971, Table 49). The minority groups account only for 1 per cent of which those of Asian origin are most numerous followed by those of Arabic origin.

Ethnic Composition

The tribal affiliation of the people in the study area is analyzed for several reasons. Together with the analysis of the migration pattern, it highlights the great immigration to the area and the great tribal mixture of the population. The tribal origin of the people to some extent also shows their mode of life, customs, traditions, etc.

The tribal composition is extremely mixed. Some 50 groups are included in the sample (Appendix 4). However, most of them are represented by few observations only. The indigenous people - the Wakahe - comprise 16 per cent. The largest group - the Wapare - do not constitute more than 24 per cent, and the second largest - the Wachagga - 21 per cent.

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[1] Tribe and ethnic group are not synonymous. Lucas and Philippson (1973, p. 157) have the following working definition of a tribe: '... a group of persons who share the same cultural system, including language, who claim a common origin and live on the same territory, very often with a common political system.' They further state that none of these criteria are totally unambiguous. Ethnic group, on the other hand: '... suggests something more fundamental than the lose association of people which are customarily designated tribes' (Berry, 1971, p. 112). The concept of ethnic group is debatable. Currently, it has been common to view ethnic groups as people with a common interest. Another definition; a group of people which is forged together by the solidarity among its members (Gerholm, 1977) is very loose and ambiguous. In Encyclopaedia of the Social Sciences no differentiation is made between ethnic groups and ethnic communities. The latter is defined as '... groups bound together by common ties of race, nationality or culture, living together within an alien civilization but remaining culturally distinct'.

In order to classify the area as mono-, bi-, or multi-ethnic, a method used by Yeats (1968, pp. 30-40) was applied. Accordingly, the area can be classified as multi-ethnic (seven groups gave the lowest variation).

The spatial differences are considerable; no subarea can be classified as mono-ethnic. In Table II:2 the subareas are grouped according to degree of heterogenity and the dominating groups in each are given.

Table II:2. Subareas by Ethnic Heterogenity

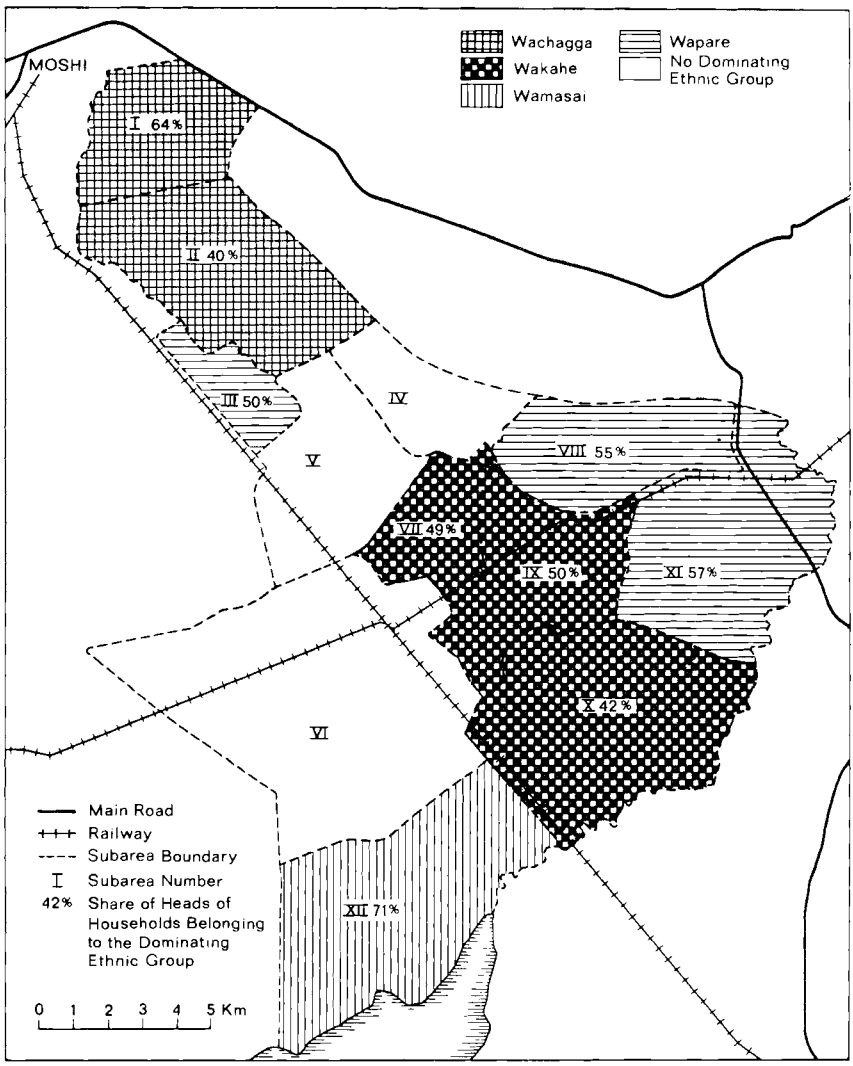
	Subarea		Dominating group	%	Second largest group	%
"Two group area"	XII	Mawala	Wamasai	71	Wapare	29
	I	Msaranga	Wachagga	64	North[a]	18
	XI	Ghona	Wapare	57	Wakahe	22
	VIII	Kilototo	Wapare	55	O.T.[b]	25
	III	Rau-River	Wapare	50	Wachagga	29
"Three group area"	IX	Soko	Wakahe	50	Wapare	15
	II	Mandaka	Wachagga	40	North[a]	25
	IV	Miwaleni	Wapare	38	O.T.[b]	24
"Five group area"	VII	Lenduru	Wakahe	49	Wapare	12
	V	Kahe Sisal	O.T.[b]	31	Central[c]	20
"Six group area"	X	Mwangaria	Wakahe	42	Wachagga	13
"Seven group area"	VI	Kahe Station	Wapare	19	Wachagga	16

Notes: Except for Wachagga, Wakahe, Wapare and Wamasai the other groups are aggregates of several tribes (Appendix 4).

a North = Tribes from northern Tanzania
b O.T. = Tribes from outside Tanzania
c Central = Tribes from central Tanzania

Generally, the most homogeneous areas are located at the periphery. The north is dominated by the Wachagga, the southwest by the Wamasai, and the east and southeast by the Wapare. The central area around Kahe-Forest is also rather homogeneous. It is the core area of the Wakahe, the only one where they play a dominating role (Map II:2).

Groups originating in other regions or outside Tanzania are mostly found at the plantations. The only exceptions are those coming from the Arusha or Tanga Regions, who to a large extent have settled in the northern part.



Map II:2. Dominating Ethnic Group by Subareas

MIGRATION

In prehistoric times tribes and groups of people moved over long distances. These movements were predominantly slow. Groups were mixed with each other, some were assimilated by other groups, some, i.e. the hunting people, were pushed into more and more inhospitable areas.

Although some tribes lived in isolation, these mass movements caused continuous interaction. For example, the Swahili culture on the East-African coast is a product of interaction between several peoples, mainly of Bantu and Arabic origin.

Julius Isaac (1947, p. 1) classifies human mass movements into four groups, invasion, conquest, colonization and migration.[1] Migration can be either forced or voluntary. Examples of the former are: refugees, slave trade, deportation, forced labour, etc. Another case, which can be classified forced migration is the recently terminated village settlement scheme in Tanzania. Labour migration in colonial time was forced as men, to be able to pay tax, had to leave their home villages with no means of cash income for areas where wage-employment was possible. Whole families must move from the home village because of famine, i.e. the people of the Sahel. The examples indicate the difficulty in distinguishing between voluntary and involuntary migration.

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[1] The concepts of migration and mobility are discussed at great length by Mabogunje (1972):

"The critical idea in this definition of migration (given in Encyclopaedia of the Social Sciences) is that it relates to a change of residence. Indeed, all studies of migration concentrate on this aspect of the movement and, to a greater or lesser extent, consider what the migrants do at their new domicile. But mobility need not imply any 'intention of abandoning .... former homes'. Indeed, if any intention can be deciphered, it is that of making the former home a better place to return to periodically or at the end of the foreign sojourn."(Mabogunje, 1972, p.15-16)

Moreover, other ideas are implicit in the concept of mobility: horizontal and vertical mobility. The former is migration of people or shifting and diffusion of cultural objects. Vertical mobility is movements between different social strata. In this respect horizontal mobility comes very close to regional mobility. The only difference is that whilst the definition of migration ignores the existence of frontiers and boundaries, mobility recognizes their importance.

As in prehistoric times, millions of Africans have left their homes and families during the past centuries, in search of a profitable way of making a living. These migrants can cover long or short distances. The migration can be seasonal or permanent. Trade and colonial rule, later followed by independence, have eased the movements for individuals, while mass movements are hampered by administrative control.

> A great part of the population is involved in the practice of migrant labour. Our figures show that those away from home at any one time are quite a small proportion of the total, though in many areas virtually every able-bodied male is involved at some time in his life. Far fewer women are involved, but those who do go tend to stay away longer than the average man. (Southall, 1961, p. 190)

The high frequency of individual movements and the small proportion of mass movements in present Africa make Isaac's classification inadequate for a description of the contemporary complexity of African mobility. A more comprehensive typology of African mobility is offered by Prothero (Mabogunje, 1972, pp. 40-42). Prothero first distinguishes between economic and non-economic mobility. The latter includes such groups as refugees and pilgrims. The economic mobility is divided into three main groups: rural, labour and urban. Each of these have subgroups that characterize the type of movements, i.e. nomadism, fishery, trading, resettlement. All types of the various movements are found in Tanzania today.

Migration in Tanzania

The analysis of the 1967 census material reveals great mobility. The general picture of the migration is a number of major interregional flows towards the coast, signifying long-distance labour migration (Egerö, 1974 b). In the northwestern part of the country five regions have an intensive exchange (Egerö, 1974a, p. 2).

The great regional difference in migration is shown in Table II:3. The highest mobility is found in the Tabora Region where over 60 per cent of the population live away from the place of birth. At the other extreme is Kilimanjaro, 22 per cent. The population stability of Kilimanjaro is remarkable in the light of the results of this study.

Claeson (1974) draws the following conclusions, among others, from his analysis of the migration in Tanzania based on the 1967 census:

1. Strong dominance of rural destinations

2. Rapidly declining migration volume with increasing length of movement

Table II:3. Spatial Mobility of Regional Populations

Region of origin	Intraregional migration (Same Region)			Interregional migration (Other Regions)			Intra- & Inter-regional migration		
	%	Sr_1	Sr_2	%	Sr_1	Sr_2	%	Sr_1	Sr_2
Tabora	45.0	88	84	16.9	127	120	61.9	98	93
Shinyanga	47.9	92	86	12.3	109	103	60.2	96	89
Singida	40.4	74	69	14.8	148	137	55.2	90	83
Ruvuma	38.1	75	71	12.7	177	169	50.8	93	88
Mara	37.3	81	77	6.5	143	136	43.8	88	83
West Lake	36.1	65	58	6.1	137	121	42.2	73	65
Kigoma	31.5	68	64	11.0	219	206	42.5	92	87
Mtwara	36.0	90	86	5.8	160	155	41.8	98	94
Arusha	36.4	95	92	4.7	124	113	41.1	98	94
Morogoro	30.6	99	94	9.8	143	136	40.4	108	102
Coast	30.5	93	91	6.6	136	132	37.5	100	97
Tanga	29.6	93	89	7.7	146	137	37.3	102	98
Mbeya	30.2	84	80	6.7	176	169	36.9	96	91
Dodoma	26.9	87	82	7.1	142	133	34.0	97	91
Iringa	17.9	94	86	8.3	184	169	26.2	116	106
Mwanza	12.1	96	94	14.1	108	106	26.2	102	100
Kilimanjaro	14.3	70	67	8.1	193	184	22.4	101	96
All regions	30.8	85	81	9.2	142	135	40.0	96	91

Sr = sex ration, Sr_1 = propensity to move, Sr_2 = actual proportion in migration flows

Source: Claeson (1974, 109)

3. Growing role of urban destination with increasing length of movement

4. Larger proportion of young adults among urban than rural migrants

5. Larger proportion of young adults among long-distance than short-distance migrants

Migration in the Study Area

Migration is here restricted to resettlement, i.e. change of place of residence. Thus, seasonal migration of the pastoral people, mainly the Wamasai, as well as other transhumance movements - the movements of smallholders between their different plots of land (that can be tens of kilometers apart) - will not be investigated. Nor will movements for trading and fishing and seasonal labour migration be studied as long as they do not imply a change of place of residence.

The behavioral aspect of the migrants and their propensity to migrate is only briefly touched upon. In general, the propensity to migrate grows with increases in the perceived gap between social and economic opportunities in the place of residence and elsewhere. This generalization seems to apply to most forms of migration - change of place of residence (Connell, et al., 1974, p. 1.1).

In the present study I tried to investigate motives for the migration. The interviewees were asked why they moved. However, no studies were made of their former place of residence in order to relate the pattern of migration to the difference in social and economic opportunities.

Naturally, the material is limited to heads of household who lived in the area 1974. It includes those who were born in the area, those who have migrated into the area and those who have moved out and back again.[1] The out-migration is not covered.

To get more information on the migration pattern, and to some extent the sequence of movements, two more control points were included beside place of birth and place of residence in 1974, i.e. place of residence in 1958 and 1968.

Place of Birth

Only 29 per cent were born in their 1974 home subarea, 4 per cent elsewhere in the study area, 15 per cent elsewhere in the Moshi-Rombo-Hai District,[2] 20 per cent in the Same/Pare District, 7 per cent in neighbouring regions (Arusha, Tanga), 17 per cent elsewhere in Tanzania and 8 per cent in another country (Table II:4).

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[1] Of those who were born in the area, 3 per cent had moved out of the area and back again. All types of migration are represented by this group, from intradistrict to international.

[2] 81 heads of household were born in the Moshi-Rombo-Hai District but outside the study area, of these 36 per cent were born in Kibosho and Uru.

Table II:4. Place of Birth (Percentages)

Subarea	Same Subarea %	Moshi-Rombo-Hai District (rest) %	Same/Pare District %	Neighbouring regions %	Remaining Tanzania %	Outside Tanzania %	Total N	Total %
Msaranga	38.5	35.9	10.3	14.1	1.3	0.0	78	100
Mandaka	12.5	30.0	10.0	25.0	7.6	15.0	40	100
Rau-River	7.1	33.3	42.9	4.8	7.1	4.8	42	100
Miwaleni	24.2	21.2	27.3	0.0	12.1	15.2	33	100
Kahe Sisal	12.0	16.0	0.0	2.0	40.0	30.0	50	100
Kahe Station	14.1	18.2	18.2	10.1	34.3	5.1	99	100
Lenduru	51.5	12.1	12.1	12.1	12.1	0.0	33	100
Kilototo	26.8	8.9	39.3	0.0	12.5	12.5	56	100
Soko	61.8	5.9	14.7	0.0	14.7	2.9	34	100
Mwangaria	53.8	10.3	2.6	2.6	23.1	7.7	39	100
Ghona	16.2	10.8	54.1	5.4	8.1	5.4	37	100
Mawala	76.5	0.0	23.5	0.0	0.0	0.0	17	100
Total	28.5	19.0	20.3	7.3	16.7	8.2	558	100

Those born in the Moshi-Rombo-Hai District, but outside the study area, to a large extent settled in three subareas: Msaranga (35 per cent), Kahe Station (16 per cent), and Rau-River (14 per cent). Those from the Same/Pare District mainly settled in four subareas: Ghona, Kilototo, Kahe Station and Rau-River (16-18 per cent in each), those from the Tanga and Arusha Regions in Msaranga, Mandaka, and Kahe Station (25 per cent in each). Almost 60 per cent of those who originate in the rest of Tanzania settled in two subareas: Kahe Station (37 per cent), and Kahe Sisal (22 per cent). One third of those who migrated from other countries settled in the Kahe Sisal subarea.

Long distance movements, to a large extent labour migration, naturally is directed to subareas dominated by plantation economies, i.e. Kahe Sisal and Kahe Station. People from the neighbouring regions settled either in the best agricultural subareas, Msaranga and Mandaka, or in subareas with plantation economies. In the Arusha and Tanga Regions the plantation economies are of great importance from which follows a high degree of labour migration. They are also good agricultural areas and like the Kilimanjaro and Pare mountains experience a great population pressure on the land.

Categories of Migrants

The registration of movements at four check points in time makes it possible to differentiate between direct and indirect migration to the area. Multi-step migration is registered for roughly 20 per cent of those born outside the study area. Many have moved three times, the maximum number of steps shown by the data.

The migrants, as registered at four check points in time, are classified as follows:

Migrants	Did change place of residence at least once
1. Within subareas	Migration between villages within a subarea, no boundary crossing
2. Between subareas	Migration between subareas, within the study area. Only crossing of subarea boundary
3. Between the study area and the Moshi-Rombo-Hai District	Crossing study area but not a district boundary
4. Within district	1 + 2 + 3

(contined on next page)

5.	Between districts	Migration between the Moshi-Rombo-Hai and the Same/Pare Districts. Crossing district, but not regional boundary
6.	Within region	4 + 5
7.	Between regions	Crossing regional boundary
8.	International	Crossing national boundary

Spatial mobility is great. Over 75 per cent of the heads of household changed place of residence at least once (Table II:5); 26 per cent are intradistrict and 54 per cent intraregional migrants. The interregional migration is larger than the intradistrict. Long distance migration has about the same magnitude as short distance measured in absolute numbers, which is explained by high mobility of plantation workers. However, to relate the influence of distance to the volume of migration, the relative, instead of the absolute, number of migrants should be analyzed. The conclusion is: the share of migrants decreases sharply with increasing length of movements. This result agrees with Claeson's (1974) findings on the migration pattern of Tanzania.

Table II:5. Categories of Migrants

		N	%
Migrants			
1. Within subareas		6	1.1
2. Between subareas		21	3.8
3. Between S.A. and M-R-H	District	83	14.9
4. Within district	Subtotal	110	19.8
5. Between districts		118	21.1
6. Within region	Subtotal	228	40.9
7. Between regions		139	24.9
8. International		59	10.6
Non-migrants		132	23.7
	Total	558	100

S.A. = study area
M-R-H = Moshi-Rombo-Hai

The international migration has a relative high frequency, 14 per cent of the migrants crossed an international border; this is explained by the proximity of Kenya. Many plantations are located close to the border on the Kenyan side. Together with the Tanzanian plantations, they create a regional plantation economy. Up to the beginning of the 1970s a free labour market existed within the East African Community. Lately, the national border has increasingly become a barrier within the former free labour market.

Interregional and International Migration

Of the international and interregional migration, to the place of residence in 1958, 76 per cent were directed to the Kilimanjaro Region, 10 per cent were from that region and 14 per cent were between remaining regions or to other countries. The region receiving most migrants beside Kilimanjaro was Tanga (Map II:3A). Almost no migration was in other directions than towards Kilimanjaro. Those moving out of that region, with a few exceptions, moved to the neighbouring regions or to Kenya.

The migration between 1958 and 1968 (Map II:3B) did not have such a pronounced direction as in Map II:3A. Arusha rather than Tanga was the second-most important receiving region. Movements directed to Kilimanjaro were smaller, 62 per cent. Some 8 per cent moved out of the Kilimanjaro Region. The remaining 30 per cent was migration within the rest of Tanzania or abroad.

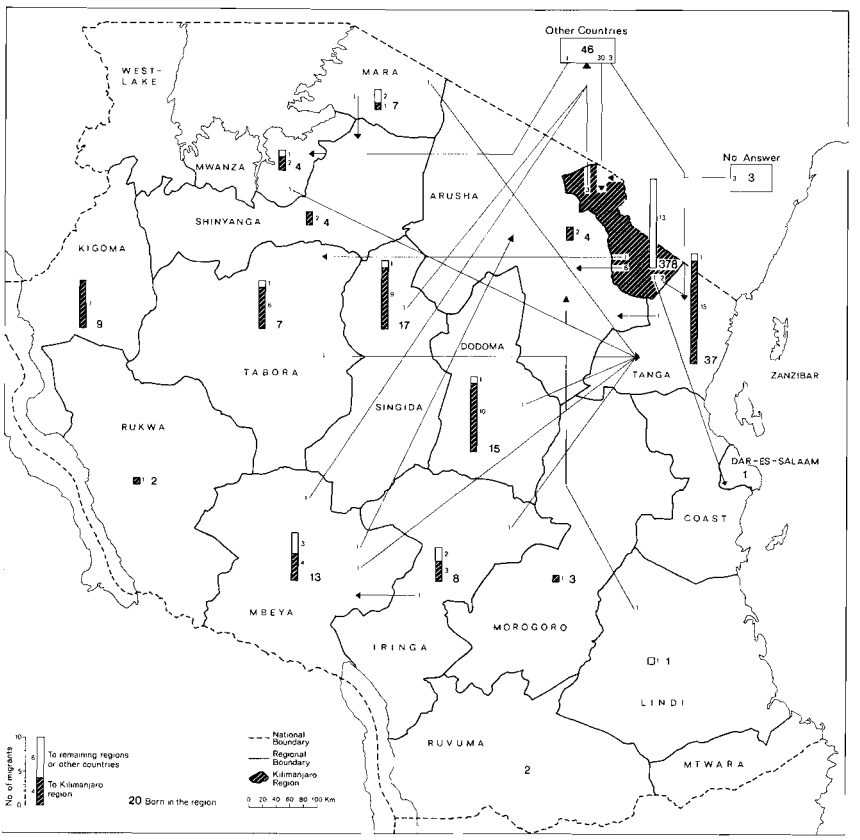
The plantation economies of Tanga and Arusha make them receiving regions. Most interregional movements are labour migration. During colonial times many plantation workers were recruited in the Tabora, Kigoma and Mbeya Regions, as seen in Map II:3A. In addition, many migrants came from the Dodoma and Singida Regions.

Age and Social Structure

The age structure of the migrants in Tanzania has been analyzed with the 1967 census as the source:

> Those born in Same Locality are dominated by young people and the migrants by adults, more so the longer the distance of the move. It should be stressed however that the first category is rather specific in its composition, containing all children born to the migrants after the move took place. This category therefore consists of a mixture of first and older generations of settlers in a way which makes it of little value for the reconstruction of a truly non-migrant population of an area. (Claeson & Egerö, 1973, pp. 72 and 74)

The lack of information of heads of household in the 1967 census makes it impossible to compare the result of this survey with condition in Tanzania as a whole. This



Map II:3A. Interregional and International Migration: Place of Birth - Place of Residence 1958

study shows no statistical difference in age structure between migrants and non-migrants. The average age for the two groups is 43 and 39 years, respectively. Migration takes mainly place within a relatively narrow age group, 25-35 years. The early settlers, however, are much younger, indicating they followed their parents.[1] No statistical age differences between long-distance and short-distance migrants are observed (cf. conclusion 5, p. A84).

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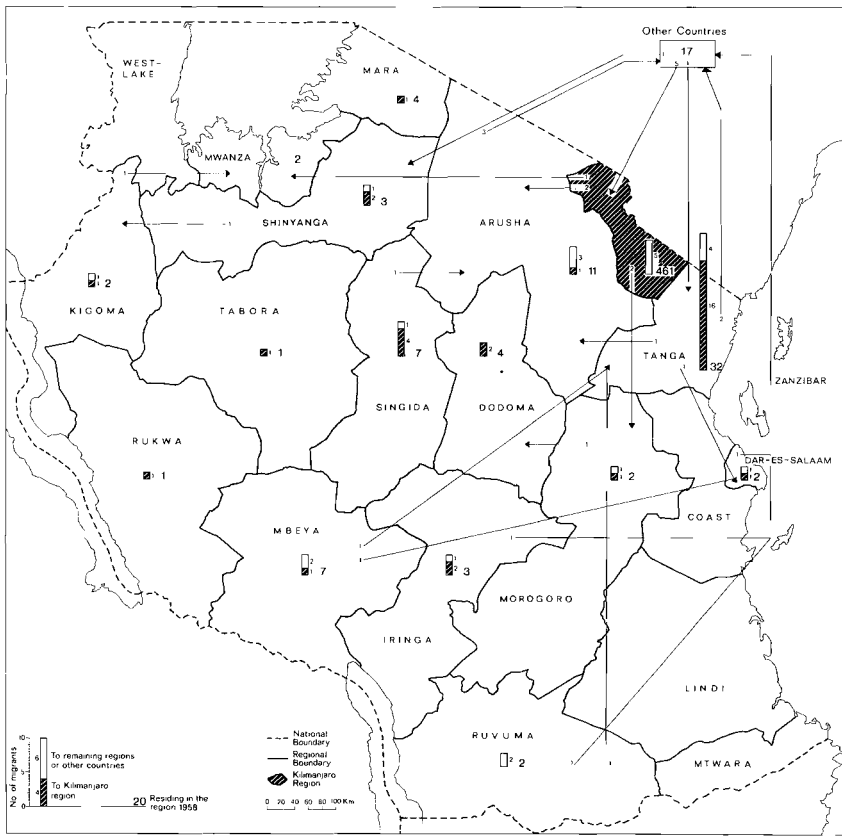
[1] Within the group 'followed relatives', 55 per cent came before 1950. The corresponding figure for 'came to cultivate' and 'for wage-employment' is 30 per cent and 17 per cent, respectively.



Map II:3B. Interregional and International Migration: Place of Residence 1958 - Place of Residence 1968

Wage-earners migrating into the area are younger than those who came to cultivate. This is due to the rapid increase in labour migration in the early 1970s caused by the establishment of the EAKIL plantation. Peasants, on the other hand, have come to the area in a fairly steady stream for a long time. As migrants are in roughly the same age group when migration takes place, this explains why the labour-migrants are younger than the peasant-migrants.

Although more than three quarters of the heads of household are migrants, there is a pattern in the social structure, as 75 per cent of the wage-earners are migrants, compared to 65 per cent of the self-employed (peasants).

The difference in fact is even larger, as many peasants once were plantation workers.

The social differentiation between migrants and non-migrants is apparent among wage-earners. Among low-paid fieldworkers 81 per cent are migrants, but only 57 per cent of the administrative personnel.

When heads of household are divided into three groups - non-migrants, intraregional and interregional/international migrants - the following social differentiation pattern appears:

- *Wages* (employees only): 44 per cent of the non-migrants, 62 per cent of the intraregional and 84 per cent of the interregional - international migrants have a wage of less than TZS 300 per month.

- *Education*: 29, 39 and 44 per cent respectively have no formal education.

- *Standard of living*: No significant difference exists between the first two groups, but the interregional - international migrants have a much lower standard of living than the rest.

Time of Immigration and Reason for Migration

Those living away from their place of birth were asked to state the year they moved to the present place of residence. Peasants who opened up the area for permanent cultivation have a rather stable rate of immigration. The 1970-1974 boom is due to the establishment of the EAKIL plantation (Table II:6).

Table II:6. Year of Migration to Place of Residence

Year	-1929	30-39	40-49	50-54	55-59	60-64	65-69	70-74	Total
N	18	39	72	45	29	36	55	104	398
%	4.5	9.8	18.1	11.3	7.3	9.0	13.8	26.1	
Cum. %	4.5	14.3	32.4	43.7	51.0	60.0	73.8	99.9	

The migrants were asked to state the reason for their migration. Most migrants moved to the area to find a place to cultivate (Table II:7). But almost 30 per cent moved for wage-employment. The latter largely settled in the plantation subareas, Kahe Sisal and Kahe Station.

There is evidence that early migrants to a larger extent were looking for a place to cultivate. The late migrants were dominated by job hunters. The change is explained by the establishment of the EAKIL plantation in the early 1970s.

Table II:7. Reason for Migration (Percentages)

Subarea	For cultivation %	For employment %	Followed relatives %	Other %	Total N	Total %
Msaranga	60.4	8.3	22.9	8.3	48	100
Mandaka	70.6	17.6	8.8	2.9	34	100
Rau-River	63.2	7.9	21.1	7.9	38	100
Miwaleni	44.4	22.2	25.9	7.4	27	100
Kahe Sisal	22.7	75.0	2.3	0	44	100
Kahe Station	20.7	62.2	12.2	4.9	82	100
Lenduru	63.2	10.5	15.8	10.5	19	100
Kilototo	53.5	0	44.2	2.3	43	100
Soko	15.4	46.2	23.1	15.4	13	100
Mwangaria	57.9	15.8	21.1	5.3	19	100
Ghona	50.0	16.7	26.7	6.7	30	100
Mawala	33.3	0	33.3	33.3	3	100
Total	45.0	29.8	19.5	5.8	400	100

Migrants belonging to ethnic groups originating outside the Kilimanjaro Region moved to the area mainly for jobs.[1] Exceptions are groups from the Arusha and Tanga Regions who moved largely to find a place for cultivation. A similar pattern exists for those who originated in the Kilimanjaro Region.

Time of migration analyzed by ethnic affiliation shows a similar pattern. Late immigrants - after 1960 - mainly came from outside the Kilimanjaro Region. But the Wachagga are an exception. Although, originating in this region they came late (65 per cent after 1960) and moved mainly to find a place for cultivation. Their late migration has two explanations: (1) the population pressure on the slopes of Mount Kilimanjaro has increased over the years,[2] (2) some Wachagga took the opportunity to get a job at the EAKIL plantation. It is very hard to find employment in Moshi.[3]

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[1] In the 1960s the sisal plantations experienced a depression due to falling prices. Many sisal plantations closed down or worked below capacity. Many workers lost their jobs.

[2] In 1974 a law was passed that no more land fragmentation was allowed in the Kilimanjaro Region when the farm had reached a fixed minimum acreage.

[3] The Kilimanjaro Region had one of the highest unemployment rates registered in Tanzania 1967, 5 per cent of the total population 15 years and older (Census, 1967-4, Table 310).

Home Area

The percentage of the residents in a village considering the village to be their home is an indication of the stability of the population in an area. Table II:8 shows little difference between the subareas in this respect. In most subareas the percentage is between 79 and 95 per cent. However, subareas Kahe Sisal and Kahe Station differ from the rest. Only 38 per cent consider Kahe Station as their home village. People living there only plan to stay as long as they earn some money at the plantation and do not see any better opportunity.[1] However, in other subareas, where the overwhelming majority are peasants, with a few exceptions, people intend to stay.

Table II:8. Percentage of the Heads of Household that Consider the Place of Residence as Their Home

Subarea	%
Msaranga	94.9
Mandaka	90.0
Rau-River	83.3
Miwaleni	88.2
Kahe Sisal	64.0
Kahe Station	38.0
Lenduru	90.9
Kilototo	91.1
Soko	79.4
Mwangaria	80.0
Ghona	86.5
Mawala	94.1

ECONOMIC ACTIVITIES

In Tanzania over 90 per cent of the economically active population were engaged in agriculture in 1967. The majority of the agricultural population worked on their own account (80 per cent) and 86 per cent of the households were classified as 'farming households' (Koley, 1973, pp. 149-151).

[1] In 1975 when the cultivation of Kenaf stopped at EAKIL and many workers lost their jobs, large parts of Kahe Station were deserted.

Occupation

In the study area 84 per cent of the heads of household work in agriculture. The vast majority are peasants (69 per cent) (Table II:9). However, the proportion of wage-earners (28 per cent) is quite high compared to the Kilimanjaro Region as a whole (20 per cent) and even more so when compared with rural Tanzania (7 per cent).[1]

Table II:9. Type of Employment (Percentages)

Subarea	Peasant	Wage-earner	Pastoralist	Other self-employed	Unemployed	Total	
	%	%	%	%	%	N	%
Msaranga	61.5	38.5	0	0	0	78	100
Mandaka	95.0	5.0	0	0	0	40	100
Rau-River	92.9	7.1	0	0	0	42	100
Miwaleni	76.5	17.6	0	2.9	2.9	34	100
Kahe Sisal	52.0	48.0	0	0	0	50	100
Kahe Station	36.0	59.0	0	1.0	4.0	100	100
Lenduru	90.9	9.1	0	0	0	33	100
Kilototo	82.1	17.9	0	0	0	56	100
Soko	64.7	35.3	0	0	0	34	100
Mwangaria	95.0	0	0	2.5	2.5	40	100
Ghona	86.5	10.8	0	0	2.7	37	100
Mawala	29.4	5.9	64.7	0	0	17	100
Total	68.8	27.5	2.0	0.5	1.2	561	100

Beside representatives of the two main economic activities there are also a small number of pastoralists and other self-employed. The latter group includes retail trade, fishing and charcoal burning.

The fishermen and pastoralists are found in the southern part of the area, towards Njumba ya Mungu Dam. The latter consist exclusively of the Wamasai. Their main source of income is livestock.

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[1] Figures for the Kilimanjaro Region and Tanzania are from 1967. They were calculated as percentage of employees of the total economically active population, 20 years of age and older.

Another activity in the area, not included in the sample, is salt production. Kahe Ward is an old and important salt producing area. The salt is derived from the saline soil (Kjekhus, 1977, p. 100). It is still possible to buy salt from Kahe at the Himo market.

The largest percentage of wage-earners are naturally found in the plantation subareas Kahe Sisal and Kahe Station, but also in Msaranga and Soko wage-employment play a significant role.

The unemployment rate was found to be roughly the same as for mainland Tanzania (1 per cent).[1] But the concept is vague. Many people consider themselves unemployed when they lack wage-employment. I was particular conscious of this problem and tried to make certain that those who considered themselves unemployed really had no source of income from work.

Place of Work

The EAKIL is the largest employer in the area (Table II:10). The second important employer is the Kahe Sisal Estate. In Msaranga by far most of the wage-earners have their place of work in Moshi, primarily in government services.

Most farm workers (65 per cent) live in Kahe Station and Kahe Sisal and those engaged in administrative work mainly in Msaranga (50 per cent). Some 68 per cent of the wage-earners earn less than TZS 300 per month, of whom 71 per cent live in plantation subareas. In Msaranga, on the other hand, live almost 50 per cent of those who earn TZS 300 per month and more.

Side Income

The interviewees were also asked to state any side income or occupation.[2] In total, 16 per cent said that they had one, and several had two or three extra jobs.[3] The most important is agricultural work (26 per cent), probably seasonal work at a plantation. Other important activities

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1 In the 1973 survey of Kahe Ward the respondents were also asked to state the number of unemployed members in the households, 15 years of age and older. When these persons were accounted for, the estimated unemployment rate was 6 per cent.

2 Peasants had side income to a higher degree than other groups.

3 In this group the following activities are included: agricultural work, labour, teaching, charcoal burning/selling, handicraft, mechanical work, tailoring, carpentry, driving, retail-business, running of a bar, selling fish and brewing.

Table II:10. Employees by Place of Work (Percentages)

Subarea	EAKIL %	Kahe Sisal Estate %	Kahe Station %	Moshi %	Other %	Total N	Total %
Msaranga	0	0	0	83.3	16.7	30	100
Mandaka	0	0	0	0	100.0	2	100
Rau-River	66.7	33.3	0	0	0	3	100
Miwaleni	33.3	0	0	0	66.7	6	100
Kahe Sisal	4.2	87.5	4.2	0	4.2	24	100
Kahe Station	88.1	3.4	5.1	1.7	1.7	59	100
Lenduru	33.3	0	33.3	0	33.3	3	100
Kilototo	30.0	10.0	0	30.0	30.0	10	100
Soko	50.0	0	50.0	0	0	12	100
Mwangaria	0	0	0	0	0	0	
Ghona	50.0	0	0	0	50.0	4	100
Mawala	100.0	0	0	0	0	1	100
Total	45.5	16.2	7.1	18.8	12.3	154	100

are labour (unspecified) (23 per cent), and charcoal burning (14 per cent). The respondents were also asked to state if they considered the side income essential for the household budget. The majority of them find it very essential (34 per cent) or essential (61 per cent).

HOUSING CONDITIONS

Ownership

In this section all types of houses are included. If a household has one house for residential use, a second for kitchen and a third for storage, by definition it owns three houses. The types of usage listed by the respondents were: residence, kitchen, storage and animal shelter. Only 14 per cent of the houses are non-residential, half of which are kitchens.

Subareas differ only slightly on the matter of houses owned by households (Table II:11). In the Msaranga and Mawala subareas there are a relatively high proportion of households that have four houses or more. In Msaranga two households own seven houses. In Mawala the houseowners on the average have 2.3 houses (no household without a house), while for the other subareas the average is 1.0 - 1.4. Polygamy is more common in Mawala than in the other subareas, over 50 per cent of the married men have more than one wife.

Table II:11. Number of Houses Owned by Households and Number of Tenant Households (Percentages)

House / Subarea	0	1	2	3	4	5-7	Total		Tenant	
	%	%	%	%	%	%	N	%	N	%
Msaranga	1.3	44.9	34.6	9.0	5.1	5.1	78	100	3	3.8
Mandaka	2.5	52.5	32.5	7.5	2.5	2.5	40	100	3	7.5
Rau-River	2.4	59.5	28.6	4.8	4.8	0	42	100	1	2.4
Miwaleni	5.9	64.7	26.5	2.9	0	0	34	100	2	5.9
Kahe Sisal	32.0	54.0	8.0	2.0	2.0	2.0	50	100	18	36.0
Kahe Station	36.0	53.0	10.0	1.0	0	0	100	100	36	36.0
Lenduru	3.0	69.7	15.1	9.1	3.0	0	33	100	2	6.1
Kilototo	0	67.9	28.6	3.6	0	0	56	100	0	0
Soko	14.7	58.8	17.6	5.9	2.9	0	34	100	5	14.7
Mwangaria	5.0	62.5	17.5	10.0	5.0	0	40	100	2	5.0
Ghona	13.5	67.6	2.7	13.5	2.7	0	37	100	5	13.5
Mawala	0	29.4	41.2	11.8	0	17.7	17	100	0	0
Total	12.5	56.9	20.9	5.9	2.3	1.7	561	100	77	13.7

In Msaranga and Mandaka a relative high proportion of the houses are located outside the subarea of residence, which explains why many households have two houses or more. These are probably double homes.

The highest proportions of non-houseowners are in Kahe Sisal and Kahe Station. In the former, all live and work at the Kahe Sisal Estate and are provided with free housing by the company. In the latter, non-houseowners are found among the EAKIL workers, who by and large live in the Kahe Station area. However, the company does not provide them with housing. They must rent a house or a room, or build their own house.

Other subareas with a relatively high proportion of non-houseowners are Soko and Ghona. In Soko there are many wage-earners, which may explain the large number of non-houseowners. However, this does not apply to Ghona.

Renting

In the study area, 77 households are tenants, 7 houseowners rented a room. All 36 tenant households in Kahe Station are non-houseowners. The vast majority of the 77 tenant households (78 per cent) are renting a room only. Free

housing is enjoyed by 41 per cent. Those who pay, average a TZS 26 a-month rent. No household pays more than TZS 50. The minimum wages for workers in rural areas at the time of the interviews (April-June 1974) was TZS 200 a month. Since most tenants earn that amount, it means that 13 per cent of their salary is used for housing. This is slightly more than what is paid by government employees, renting a flat or a house from the state.[1] In the 1973 survey rents were around TZS 25 a month, the same as was paid in 1974 (Rudengren, 1975, p. 20). The general inflation during that period was approximately 20 per cent. The food prices for minimum wage-earners increased by 31.2 per cent during the same period (1973-1974) (URT, 1976, Table 1). Despite the great inflation, plantation workers were better off in 1974 than the year before as the minimum wages increased by 70 per cent. The workers at the Kahe Sisal Estate are in an even better position, as they are provided with free housing.

Social Differentiation

Employees are tenants to a larger extent than self-employed, 36 and 3 per cent respectively. Among the few self-employed tenants (12), over half have free housing, as a rule provided by the extended family. Slightly more than one third of the employee tenants have such housing.

Some 30 per cent of the wage-earners rent a room only, but very few (7 per cent) among administrative personnel. A differentiation according to wages shows that 53 per cent earning less than TZS 300 per month live in their own houses, compared to 82 per cent of those earning more. The social stratification is even more pronounced for those who rent a room. In the first group under TZS 300, 41 per cent rent a room, but in the second group only 14 per cent.[2] No difference between the two groups concerning free housing was observed.

In conclusion: low-paid people are to a large extent tenants. They must use part of their wages to cover the cost of housing, while higher-paid heads of household mostly live in their own houses and thus do not have a monthly cost for housing.[3]

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[1] Low-paid government employees renting a house or a flat from the state are paying 10 per cent of their salary, which is deducted.

[2] Very few wage-earners rent a house or several rooms. Totally only five heads of household rent a house and only one of them pays a rent. Of eight heads of household who rent several rooms, five pay a rent.

[3] The majority of the houseowners finance and build their houses themselves. It is considered important to own your house. Accordingly, housing has a very high priority in the household budget.

However, it should be remembered that the field-workers, those with the lowest wages, are also the youngest[1] and may be staying temporarily in the area and therefore may not have found it worthwhile to get themselves a house.

The picture described here does not differ much from other parts of the world. It is interesting that the stratification is so clear in such a poor society. The study area is one of the poorest in the Kilimanjaro area.

Location of Private Houses

In this and the following sections only residential houses are included. The location of the private houses is interesting for several reasons. As approximately 70 per cent of the heads of household were born outside the area and 23 per cent do not consider it as their home, it might be expected that many own houses outside their place of residence. Moreover, many workers at the EAKIL plantation who live at Kahe Station, have left their families behind in their home villages.

Figure II:2 shows that, contrary to expectation, only few owned houses outside their subarea of residence. In Msaranga, Mandaka and Rau-River (I, II and III), where they are most common (not in Kahe Station as expected), approximately 10 per cent belong to this category. Most are found in other villages in the Moshi-Hai District, higher up the slopes of Mount Kilimanjaro and some in Moshi.

With the exception of the first three subareas, most of the houses located outside the subarea of residence are found inside the study area, and especially in Kahe Station. Probably these houses are built with the sole purpose of renting rooms to plantation workers.

In Miwaleni and Soko (IV and IX) no household owns any house outside the subarea of residence, and in Kahe Station, Lenduru, Kilototo and Mawala (VI, VII, VIII and XII) only one household in each owns a house outside the subarea of residence. All of these houses are located at Kahe Station (VI) with the obvious exception of Kahe Station, where the house is situated in Old Moshi.

House Quality

The quality of the residential houses is measured by three variables: floor, wall and roof material. To make a more complete picture of the housing quality, the availability of three amenities are in addition assessed: piped water, electricity and latrines.

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[1] Of the non-houseowners 62 per cent were younger than 35 years.

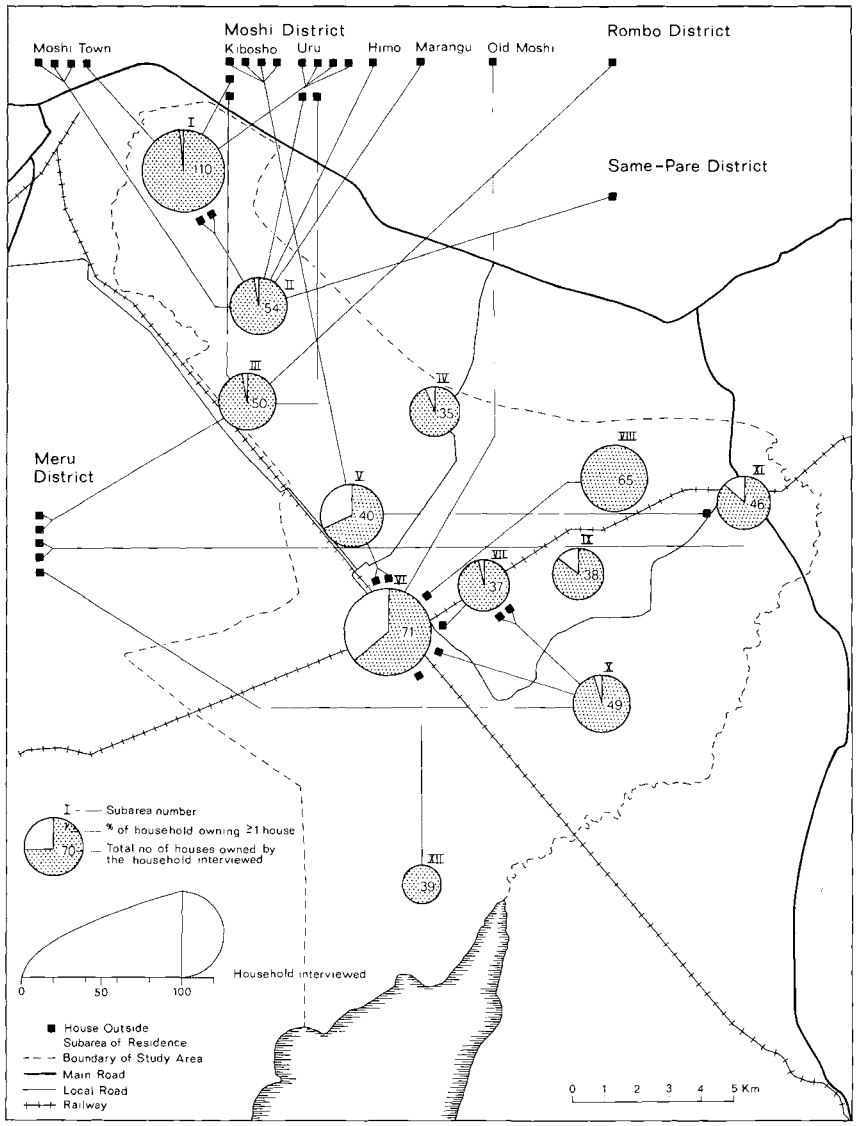

Figure II:2. Number and Location of Private Residential Houses

The *floor material* to a very large extent is stamped earth. This means that there is no real foundation of the house. Most houses with a cement floor (10 per cent) lack a foundation. The foundation question is important, as several villages face a great risk of flooding.

As for *wall material*, the area differs considerably from the rest of rural Tanzania. Mud bricks (burnt bricks) are used to a smaller extent than in rural Tanzania as a whole (Table II:12). This means that the houses have a shorter lifetime (some five years). On the other hand, an above-average percentage of the houses were made of cement blocks, which has two reasons: Msaranga, Mandaka and even Kahe Ward are relatively well off and the Kahe Sisal Estate uses cement blocks in the workers' quarters.

As for *roof materials*, the study area differs even more from the rural average than for wall materials. The proportion of houses with thatched roofs is much lower, although Kahe Ward was very much like the whole of rural Tanzania. The greatest difference relates to roofs of corrugated metal sheets. This type of roofing is much more common here than the rural average.

The subareas differ very little in wall materials (Figure II:3). As mentioned earlier, Msaranga and Kahe Sisal (I and V) have higher proportions of houses with walls of cement blocks. In Rau-River and Miwaleni (III and IV), all the houses have walls of poles and mud.

In Msaranga (I) almost 80 per cent of the houses have a roof of corrugated metal sheets, while in Soko, Mwangaria and Mawala (IX, X and XII) no house has such a roof. Other subareas with a relatively high proportion of houses with roofs of corrugated metal sheets are Mandaka, Kahe Sisal and Kahe Station (II, V and VI). All houses at the Kahe Sisal Estate have roofs of corrugated metal sheets.

To summarize:

- Houses are of better quality in the study area than in rural Tanzania, especially for roof material.

- Msaranga and Mandaka have houses with better quality than the rest of the area, with the exception of the Kahe Sisal.

Amenities

In the area 20 per cent of the households have access to piped water. These households were almost entirely located in three subareas. Msaranga, where 97 per cent have access to piped water, Mandaka, 33 per cent and Kahe Sisal, 38 per cent (Table II:13). In the latter subarea only the workers at the estate have this facility. In the rest of the area only a few households have piped water. They get the water either from the railway station, at Miwaleni, or at the dispensary at Kahe Barazani.

Table II:12. Quality of Residential Houses Owned and Rented by Households

Wall material	Study area		Kahe Ward		Outside the study area		Rural Tanzania
	N	%	N	%	N	%	%
Poles and grass	24	3.6	23	4.4	1	3.8	36.9
Poles and mud	480	71.1	405	77.9	15	57.7	44.0
Poles and mud, covered	99	14.7	48	9.2	5	19.2	
Subtotal		89.4		91.5		80.7	80.9
Mud, covered	6	0.8	3	0.6	1	3.8	
Mud, bricks (covered)	20	2.9	12	2.3	0		15.2
Cement blocks	34	5.0	20	3.8	4	15.4	1.7
Others	12	1.8	9	1.7	0		2.2
Total	675	100	520	100	26	100	100

Roof material	Study area		Kahe Ward		Outside the study area		Rural Tanzania
	N	%	N	%	N	%	%
Thatched	385	57.1	358	69.0	7	26.9	73.0
Roofing paper	40	5.9	39	7.5	0		
Flattened tin-container	23	3.4	5	1.0	2	7.7	
Corrugated metal sheets	226	33.5	117	22.5	17	65.4	13.1
Others	0		0		0		13.9
Total	674	100	519	100	26	100	100

Note: Kahe Ward consists of all the twelve subareas, except I and II. The column outside the study area shows the quality of houses owned by people living inside that area. The last column shows the quality of the houses in the whole of rural Tanzania. (Source of the last column: Mascarenhas, 1975, Table 1.)

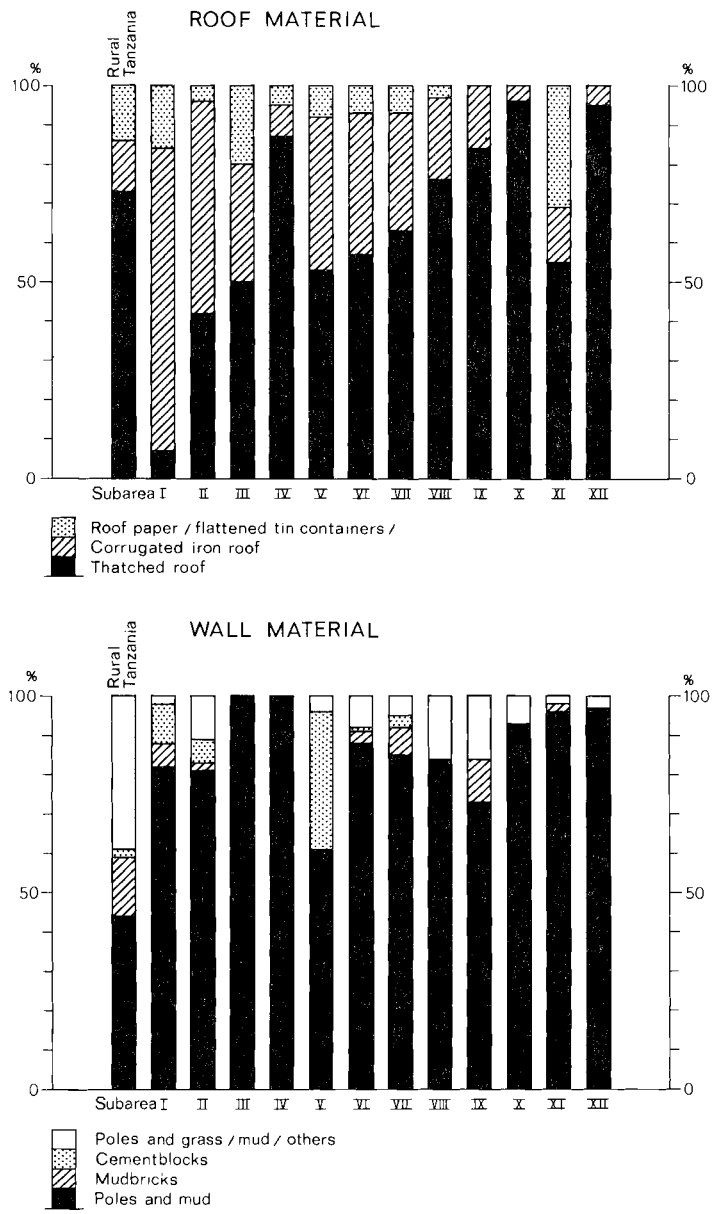

Figure II:3. Roof and Wall Material of Residential Houses, by Sub-areas

Table II:13. Per Cent of Household with Access to Piped Water and Latrines by Subarea

Subarea	Piped water %	Latrine %
Msaranga	97	64
Mandaka	33	56
Rau-River	0	57
Miwaleni	3	68
Kahe Sisal	38	61
Kahe Station	1	57
Lenduru	0	83
Kilototo	0	66
Soko	6	48
Mwangaria	0	60
Ghona	0	67
Mawala	0	11
Total	20	59

In Kahe Ward, where 95 per cent of the households lack piped water, people must take water for their domestic use from rivers, streams, or canals. As it is infected by several diseases (Dysentery, Bilharzia, etc.), provision of clean water obviously has high priority. A pipeline was under construction in 1975 that will provide the Rau-River area with clean water.

It should be noticed that households with access to piped water very seldom have a tap at home, but generally share it with a lot of people. The distance to the tap is often long.

Kahe Ward is a typical example of water facilities in rural Tanzania. The 1969 Household Budget Survey showed that 96 per cent of the 'farm households' got their water from rivers, lakes, springs, riverbeds or shallow wells (HBS, 1969-3, p. 48). An aggrevating condition in Kahe is the risk that water obtained by drilling may be too salty, making it unsuitable for human consumption.

The Msaranga-Mandaka area, on the other hand, where 76 per cent of the households have piped water, is much more like urban Tanzania where 72 per cent have access to piped water, in Moshi 81 per cent have access to piped water (Mascarehas, 1973, p. 108).

Around 60 per cent of the households in the study area have a latrine. The variation between the subareas is small. The only striking exception is Mawala, where only 11 per cent of the households use a latrine (Table II:13). The highest percentage (83) is found in Lenduru. Subareas close to Moshi do not differ from the rest.

Some 45 per cent of the farm households in Tanzania had a toilet or a latrine in 1969 (HBS, 1967-3, p. 49). Thus, the study area is better off in this respect than Tanzania as a whole. However, it must be remembered that in a large health campaign in 1974,[1] among other things, the use of latrines was taught.

Only two houses had electricity; both are located in Moshi.

STANDARD OF LIVING

The standard of living of the households is hard to estimate by questions about income. It is difficult to obtain correct information about cash-income, and subsistence production constitute a major element in the economy, here as in the rest of rural Tanzania. The 1973 survey of Kahe Ward showed that a better way of estimating the standard of living was by queries about items owned by the households.

Because of the 1973 findings, no questions about income were asked in 1974, except for wages from employment. The list of the owned items was instead extended and in total included 16 objects (Table II:14): locally produced ones, i.e. wooden bed, matress, lantern, or more sophisticated articles, i.e. bicycle, radio, watch, etc. Owners of the latter objects have purchased them at the local markets/shops or mostly in Moshi, i.e. they are involved in the monetary economy.

Spatial Differentiation

The four items in Figure II:4 represent different categories. The wooden bed is locally produced. The torch is a non-sophisticated product from the modern sector. The radio set and the bicycle are more sophisticated products and roughly of the same value. When the average number of radios in a subarea is correlated with its distance from Moshi, the coefficient -0.5 was obtained.

For assessment of the standard of living, ownership of four durable consumer goods is analyzed: radio, bicycle, watch and a house with a roof of corrugated metal sheets. The four selected items are common enough to provide a meaningful differentiation between the households. The

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[1] Mtu ni Affya (Man is health).

Table II:14. Households Owning One or More Pieces of the Listed Articles

Article	%	N
Wooden bed	79	446
Lantern	60	335
Cotton/kapok/sisal matress	54	304
Torch	50	281
Bicycle	36	200
Metal bed	29	163
Radio	27	153
Watch	19	107
Umbrella	19	106
Kerosine stove	14	78
Pressure lantern	6	35
Foam matress	5	31
Clock	2	9
Salon car/pick-up/lorry	1	6
Sofa	1	6
Motorcycle	1	4

possession of the items implies status to the owner. It furnishes a measure of the household's standard of living and indicates their involvement in the monetary sector in respect of durable consumer goods. This standard of living concept does not necessarily coincide with the local definition, although it comes rather close. People have been exposed to the modern society and to a large extent accepted some of its norms, especially in relation to the possession of goods.

Households are grouped according to ownership of the four items: owner of none (1), of one (2), of two (3), of three (4) and of four (5). Appendix 5 lists ownership by the five groups and by subareas as well as a standard-of-living index. The subareas fall into four groups according to the index (Map II:4), with the highest values in Msaranga and Mandaka (I and II), and the lowest in Kahe Sisal and Mwangaria (V and X). The two latter have in common a deserted or partly deserted sisal estate within their boundaries. In Lenduru and Kilototo (VII and VIII) the distribution by households is quite uneven, which explains their relative high index values, though nearly 50 per cent of their households lack all four items.

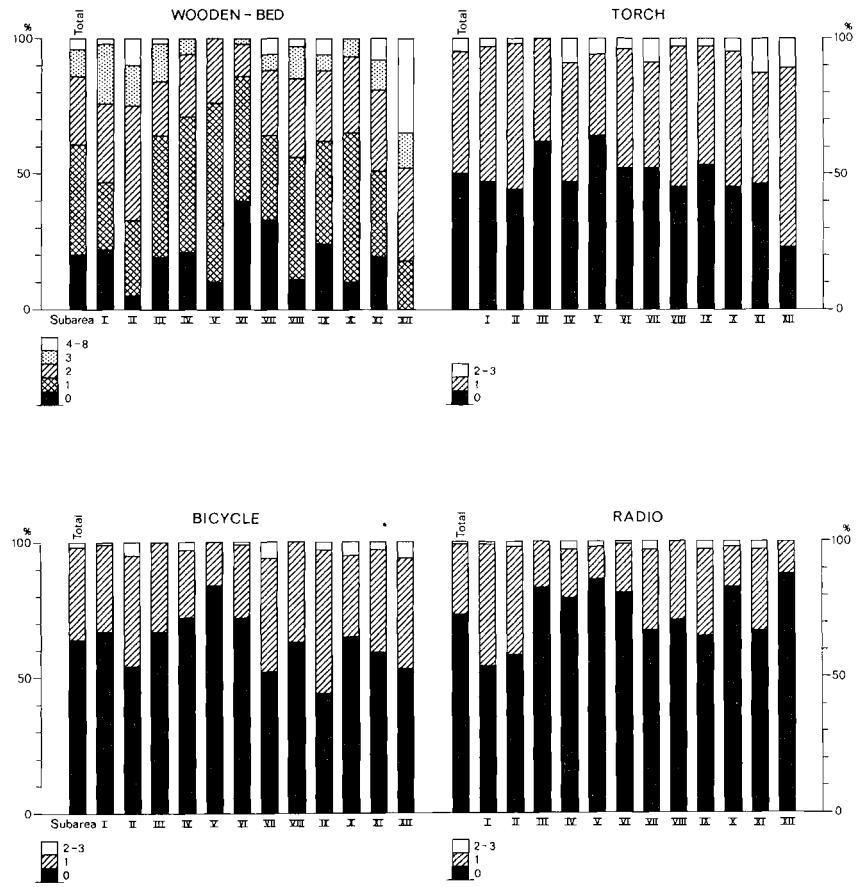
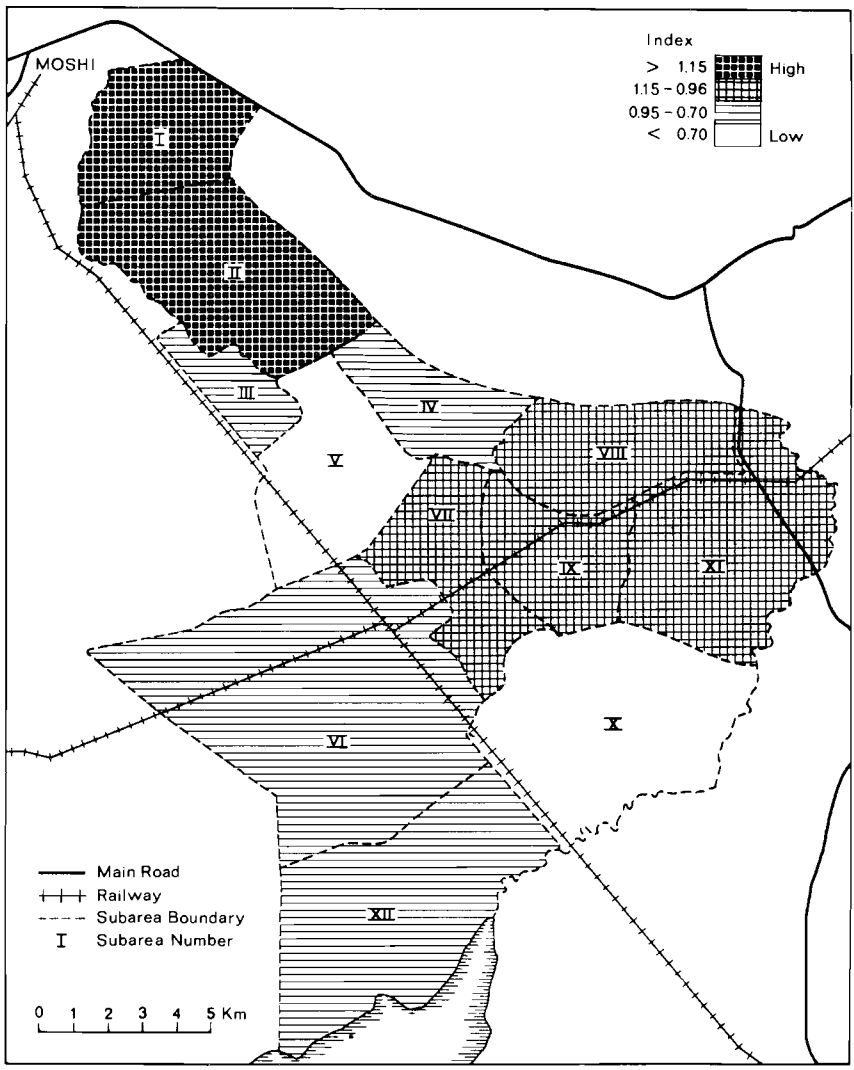


Figure II:4. Households Owning Wooden Bed, Torch, Bicycle and Radio Set, in percentages

Social Differentiation

The method for the social analysis is the same as above, set at 1.00 for the whole area. The results are as follows:

- Wage-earners have higher standard-of-living index (1.14) than self-employed (0.94)
- Among wage-earners there is a great difference between those who earn less than TZS 300 a month (0.56) and those who earn more (1.91).



Map II:4. Standard of Living

- Livestock-owners have a higher standard of living (1.37) than non-owners (0.71). This explains the relatively favourable position of Mawala and Ghona (XII and XI), where the livestock economy is important.

EDUCATION

Education is another dimension of development, necessary at all levels to enable people to realize their potentials and to enable them to participate in the development process of their society. The importance of education is understood in Tanzania. Great efforts have been made, and large sums are allocated to this sector. Between 1967/68 and 1972/73 approximately 14 per cent of the total annual government expenditure was directed towards education. The same sector accounted for 17 per cent of the recurrent expenditure in 1970/71 and 19 per cent in 1973/74. (URT, 1975, Tables 17 and 15; and SIDA, 1975a, Table 14.) The enrollment to standard 1 has increased by 60 per cent or by approximately 5.5 per cent annually between 1964 and 1973, roughly twice the population increase (URT, 1975, Table 69). In the end of the 1970s universal primary education was established in Tanzania.

This section focuses on four aspects of the educational complex: formal education, literacy and other types of training of the heads of household, as well as school enrollment of children in school age, 7-15 years. Explanations of the variations and interrelations between these variables are also sought.

Formal Education

To put the local educational status into a regional and national context poses great problems. The 1967 census does not provide any information on the heads of household. However, if non-student males, 20 years and older, are taken as representatives, the following estimates can be done: in the Moshi-Rombo-Hai District 48 per cent lacked formal education within this group and 44 per cent had 1-4 years of primary schooling in 1967. Corresponding numbers for rural Tanzania were 66 per cent and 24 per cent (Census, 1967-4, Table 305).[1]

In the study area 37 per cent of the heads of household lack formal education, 38 per cent have 1-4 years of primary education. However, spatial variations are great (Table II:15). One extreme is represented by Mawala where hardly 20 per cent have formal education. The other is Kahe Station and Msaranga, with 81 per cent and 73 per cent. These two areas are also leading with regard to people with more than four years in school, as well as

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[1] In Kahe Ward 52 per cent of the heads of household lacked formal education and 29 per cent had 1-4 years schooling in 1973 (Rudengren, 1975, p. 21). Corresponding numbers in 1974 were 38 and 34 per cent. The difference may be explained by the fact that Kahe Station was underrepresented in the 1973 survey. This area had the highest educational status in the 1974 estimates.

those with secondary education. The latter total 7 in the sample. Kahe Station has the highest educational status, explained by the low average age of the heads of household and the high percentage of wage-earners, in spite of the fact that most long distance migrants normally with little formal education have settled here.

Table II:15. Number of Years of Formal Education and Literacy of Heads of Household (Percentages)

	Formal education					Literacy				
	No formal education	1-4 years	5-12 years	Total		Illiterate	Read only	Read and write	Total	
Subarea	%	%	%	N	%	%	%	%	N	%
Kahe Station	19	42	39	100	100	11	5	84	99	100
Msaranga	27	33	40	78	100	18	11	71	77	100
Soko	32	41	27	34	100	32	6	62	34	100
Miwaleni	32	41	27	34	100	35	3	62	34	100
Lenduru	36	52	12	33	100	33	0	67	33	100
Kahe Sisal	38	52	10	50	100	33	12	55	49	100
Rau-River	43	29	28	42	100	29	7	64	42	100
Mwangaria	45	43	12	40	100	43	5	52	40	100
Mandaka	46	41	13	39	100	31	8	61	39	100
Kilototo	50	27	23	56	100	41	7	52	56	100
Ghona	54	32	14	37	100	41	19	40	37	100
Mawala	82	12	6	17	100	77	0	23	17	100
Total	37	38	25	560	100	30	7	63	557	100

The analysis indicates that 24 per cent of the wage-earners and 43 per cent of the self-employed lack formal education.[1] An increase of educational status with higher standard of living is also shown. Heads of household in the two lowest standard-of-living groups have lower education than the rest. For the three highest groups no significant difference was observed.

[1] No formal education is recorded for 26 per cent of the wage-earners earning less than TZS 300 a month and for 18 per cent of the higher-paid. Over half of the heads in the latter group have 5-12 years of schooling.

Among the ethnic groups, the Wachagga have higher education than the rest. A marked difference between young and old adults was observed, the former having more education than the latter (Table II:16).[1]

Table II:16. Formal Education and Literacy of Heads of Household by Age Groups (Percentages)

Age group	≤25 %	25-34 %	35-44 %	45-54 %	55-64 %	≥65 %	Total
No formal education	6	16	30	49	57	73	209
1-4 years	36	51	38	36	35	21	212
5-12 years	58	33	32	15	8	6	138
Total	100	100	100	100	100	100	559
Illiterate	4	11	26	35	43	51	167

Literacy

The measurement of literacy is very intricate and complicated. When asked, respondents tend to overrate their ability to read and write, which suggests that these results are inflated. Many authors have made the same reservations (e.g. Dey & Mogil, 1973). Literacy among male adults, 20 years and older in 1967, was as follows: 56 per cent in the Kilimanjaro Region and 36 per cent in rural Tanzania (Census, 1967-4, Table 306).

In the study area 70 per cent of the heads of household consider themselves literate and 7 per cent state that they can read only. The spatial variation in literacy is the same as for education. One extreme is found in Mawala, where only a quarter of the heads are literate. The other extreme is in Kahe Station (Table II:15). Social, age and ethnic variations are the same as for formal education.

Other Training

Other types of training may also indicate involvement in the 'modern' sector. They include on-the-job training, as well as training for another job.

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[1] To control the age influence of the variation in education among ethnic groups, employment groups, subareas, etc., the average age for these groups was checked. No difference was found for ethnic groups nor for employment groups. However, in Kahe Station the average age was lower than for the rest of the subareas (Figure II:1).

On-the-job training, mostly led by parents or other relatives, is the most common way to acquire skills in rural Tanzania. For a person who wants to improve his skill, government agencies play the most important role (Rudengren, & Swantz, 1976).

In the area, 10 per cent of the heads of household have acquired some type of further training, but only a small fraction have attended more than one course. The most common types are mechanical courses for drivers, and in masonry. The high frequency of the 'modern' type of training is worth noting. It is remarkable that only two persons mentioned adult education - literacy classes. Such classes are given in the area, but people might not consider them as proper training.

School Enrollment

By 1967 few children started school at the age of seven, although that was the official age for enrollment in standard 1. The enrollment increased in the following age groups reaching a maximum for the eleven-year old children (Figure II:5). The difference between the sexes was small. However, the drop from the peak is much faster for girls than for boys, showing that boys have longer education than girls.

School enrollment among children in the districts of the Kilimanjaro Region was the same in 1967. However, they differ much from rural Tanzania. Education for a long time has been considered important in the Kilimanjaro Region. Some 60 per cent of seven-year olds in Tanzania were enrolled in standard 1 in 1975/76. Regional variations were great, with the Kilimanjaro Region in the highest group (74 per cent). Dar-es-Salaam had almost the lowest enrollment, 43 per cent (SIDA, 1975b, p. 27).

In the study area, 70 per cent of the children of school age (7-15 years old) were enrolled in 1974.[1] A small fraction of the children (63) older than 15 years are enrolled in primary and secondary education. Approximately the same number of children in school age have left, which means that they have not completed their primary education.

Enrollment in the study area is about the same as for the Kilimanjaro Region as a whole, or slightly less. When compared to rural Tanzania it is very much ahead.[2]

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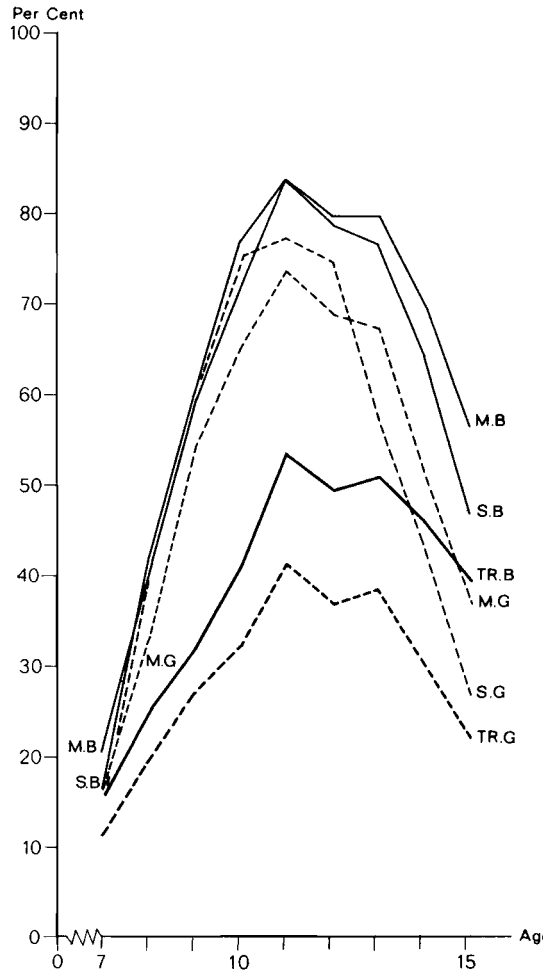
[1] Of the school-age children in Kahe Ward, 68 per cent were enrolled in 1973 and 67 per cent in 1974.

[2] The discussion refers to enrollment. Number of years in school and number of days present in a school year are not taken into consideration, although obviously of great importance. However, the wastage rate in primary education has been gradually decreased. At present it is estimated at 20 per cent over the seven standards in primary school education (SIDA, 1975a, p. 26).



M.B = Moshi-Rombo-Hai District, Boys Average school enrollment 7-15 years (Ase)=59%

M.G = Moshi-Rombo-Hai District, Girls Ase = 50%

S.B = Same/Pare District, Boys Ase = 55%

S.G = Same/Pare District, Girls Ase = 51%

TR.B = Tanzania, rural, Boys Ase = 37%

TR.G = Tanzania, rural, Girls Ase = 27%

Figure II:5. School Enrollment in 1967, by Age

Source: Census, 1967 - 4, Table 303.

The spatial variation within the area is considerable (Table II:17). The twelve subareas fall naturally into three groups: the first group, Msaranga, Mandaka and Miwaleni where school enrollment is above 80 per cent; the second group with 54-77 per cent consists of seven subareas; the third group with less than 40 per cent contains two subareas, Mawala and Mwangaria.

Table II:17. Children 7-15 Years of Age Enrolled in School (Percentage)

Subarea	Children enrolled in school %
Msaranga	81
Mandaka	82
Rau-River	54
Miwaleni	82
Kahe Sisal	69
Kahe Station	75
Lenduru	77
Kilototo	72
Soko	75
Mwangaria	39
Ghona	69
Mawala	23
Total	70

Factors Affecting Children's School Enrollment

In the 1973 survey of the Kahe Ward, some factors that affected children's school enrollment - parents propensity to send their children to school - were examined. In 1973 and 1974 formal education (primary, secondary, etc.) was not free of charge.[1]

Economic as well as cultural and social factors play a role for parents' decisions about their children's education. In the economic calculation, school fees and costs of clothes are not the only factors influencing the parents, and may not even be the most important ones. In

[1] Primary school fees were abolished in Tanzania 1975. However, the cost of the school uniform is still important.

subsistence households, children take an active part in all facets of household work. In communities wholly or partly based on cattle-keeping, boys represent an indispensable labour input to the household economy. Girls are usually responsible for nursing younger children and for helping women in other domestic work. Thus, the opportunity cost of sending a child to school - the loss of labour input - might be a greater constraint on a household's budget than school fees.[1]

Some variables related to children's school enrollment will be examined briefly:

Educational status of the heads of household - It is commonly assumed that the educational level of the heads of household influences their propensity to send their children to school. In the 1973 survey no such relationship was found. However, in this survey it can be seen, even if it is not strong. Surprisingly, the difference is not between educated and non-educated, but rather between those with no education or with 1-4 years on the one hand and those with 5-12 years of formal education on the other. In the first group 66 per cent of the children in school age are enrolled in school and in the second 80 per cent.

Literacy is very closely correlated with educational status. Illiterate heads of household have 65 per cent of their children in school age enrolled in school and literate ones 72 per cent.

Standard of living of a household - The same pattern as in the 1973 survey appears (Rudengren, 1975, p. 25). Those with the lowest standard of living send 63 per cent of their children to school, while in the other households 74 per cent were enrolled. The only statistical difference is between the lowest group and the rest.

Employment and wages - Children from peasant or pastoral households go to school less frequently than children from wage-earning households, 66 per cent and 80 per cent. Among employees there is also a difference. Those earning TZS 300 or more a month send their children to school more often than those earning less, 88 per cent and 78 per cent.

Number of children in school age in a household - No difference in children's school enrollment existed between households with many children and those with few.

Distance to school - The 1973 survey reported no difference in school enrollment for households situated 0-3 km from a school and those 3-6 km (Rudengren, 1975, p. 22). The only village more than 6 kilometers away was Mawala.

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[1] For a more detailed discussion on attitudes and expectations in relation to education, see e.g. Mbilinyi, 1973.

The largest proportion of non-students are found in this village. However, distance to school can hardly be the crucial factor in Mawala, but rather matters related to livestock economy and culture.

Many socio-economic variables have been shown earlier to be interrelated. Several authors have examined these educational relationships and reached the same conclusion (e.g. Mbilinyi, 1973). Spurious correlation and confounded influences are common. It is not possible to single out one variable as being most responsible for the variations in children's school enrollment.

PURCHASING PATTERN OF THE HOUSEHOLDS

The involvement of the households in the monetary sector can be measured by their purchases of daily consumer goods. The respondents were asked to state how many of 22 listed articles the households had purchased during the preceding four weeks.[1] Since the purpose of the question was only to get a rough picture of the purchasing pattern, a simple question was considered sufficient. A more detailed account would have required a diary of the households' purchasing activities. It is doubtful if the result had justified the effort. The low educational level in the area had probably been a considerable obstacle.

The purchases of the listed articles are generally made in small quantities at a time. As in most developing countries, the supply of non-local goods is unreliable, which leads to periodical shortage. Important non-local goods are: kerosine, sugar, tea, cooking-oil, clothes, soft drinks, and to some extent, maize flour.

Beer for several reasons is not included. It was considered a sensitive topic since a campaign aginast beer-drinking had been launched. A distinction must also be made between local beer and products from the state breweries. Only purchases of the latter type would have been interesting.

The listed articles fall into three rather distinctive groups according to purchasing habits.[2] The most frequently purchased articles are bought by 95 per cent to 75 per cent of the households (Table II:18).

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[1] For a more comprehensive account on retail service and consumers' behaviour in the study area, see Rudengren, 1975b.

[2] Purchasing habit of an article is defined as the percentage of the households that had purchased the article at least once in a four-week period.

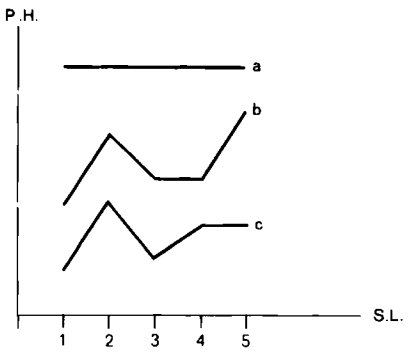
Table II:18. Percentage of Households Having Purchased the Listed Articles in a Four-Week Period (N = 560)

Article	%
Kerosine	95
Sugar	89
Tea	87
Cooking oil	81
Fish	80
Maize flour	79
Meat	75
Banana	55
Maize cob	42
Bread	40
Fresh milk	39
Vegetables	27
Clothes	22
Fruit	20
Rice	19
Soft drinks	13
Charcoal	9
Shoes	9
Condensed milk	6
Cassava	3
Egg	3
Firewood	1

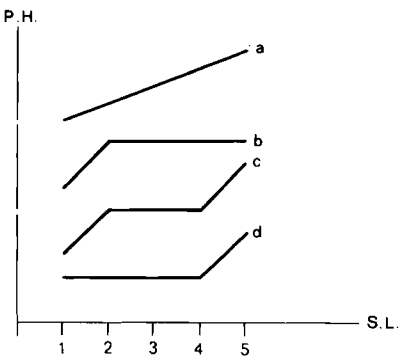
The middle group contains four items. The least frequent articles are purchased by less than 30 per cent of the households.

When purchasing habits (P.H.) for individual articles are correlated with standard of living (S.L.), three trends appear: (1) stable or no trend, (2) increasing, and (3) decreasing (Figure II:6). Fresh milk, rice and clothes belong to the first group (no trend). Kerosine and maize flour are equally frequent for the five standard-of-living groups. Kerosine is essential for cooking and light in the house. Maize is the staple food, but remarkable is the large number of households that had bought maize, since most of them own a plot of land where maize is cultivated. However, it must be remembered that the survey was conducted in April-June when the new harvest had just been planted and the stock were getting low. The area had also experienced a bad harvest the previous season, like the rest of the Kilimanjaro Region.

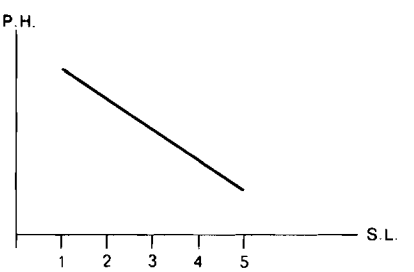
The next group, containing most of the articles, shows an increasing purchasing habit with higher standard of



1. Stable P.H. or no trend
   a Maize flour, kerosine
   b Fresh milk
   c Rice, clothes



2. Increasing P.H.
   a Bread, cooking-oil, fish, meat, shoes, soft drinks
   b Sugar
   c Banana, fruit, maize cobs, tea
   d Vegetables



3. Decreasing P.H.
   Charcoal

Note: The level of a curve is of no significance. The five standard-of-living groups are discussed on pp. A106-A109, and in Appendix 5.

Figure II:6. Relations Between Purchasing Habit (P.H.) and Standard of Living (S.L.)

living. However, individual articles do not follow the same trend. For example, sugar increases from the lowest to the second group, but then remains stable, indicating that sugar is considered an essential commodity. Vegetables show a slightly different trend. The increase in purchasing habit appears first in the highest standard-of-living group. Purchasing habit for bananas, fruit, maize cobs and tea are like a stair case, and the rest of the commodities in this group show a steady increase with higher standard of living.

The only article showing a decrease is charcoal, indicating that with higher standard of living people will use a kerosine stove instead of one fired by charcoal. The hypothesis of kerosine substituting charcoal with higher standard of living is supported by the observation that in the subareas with the highest standard of living, Msaranga and Mandaka, kerosine stoves are most common.

Spatial Differentiation

The difference in purchasing pattern among the subareas is presented in Map II:5. The index represents the average number of articles the households have bought.[1] A high index means a large number of articles purchased by the households. Thus, the index is an indication of the households' involvement in the monetary economy in relation to daily consumer goods.

As expected, subareas with a high standard of living or a high degree of wage-earning households have a high index. The involvement in the monetary economy decreases with increasing distance from Moshi. The only exception is Kahe Station (VI), but it should be remembered that this area is the largest settlement, with over half the households headed by wage-earners. The two most isolated subareas, Mawala and Mwangaria (XII and X), are least involved in the monetary economy according to the index.

For the analysis of the spatial differentiation among groups of articles, three groups were singled out. The first, argicultural products, consisted of maize flour, maize cobs, rice, bananas and vegetables. The second group, animal products: meat, fish and fresh milk. The third, a mixture of less frequently purchased articles: clothes, shoes and soft drinks.

Since the first group contained articles that to a certain extent were substitutes for each other, the subareas have been ranked according to the percentage of households that bought at least four of the five articles (Table II:19). For the two other groups the subareas have been ranked according to S_j, where:

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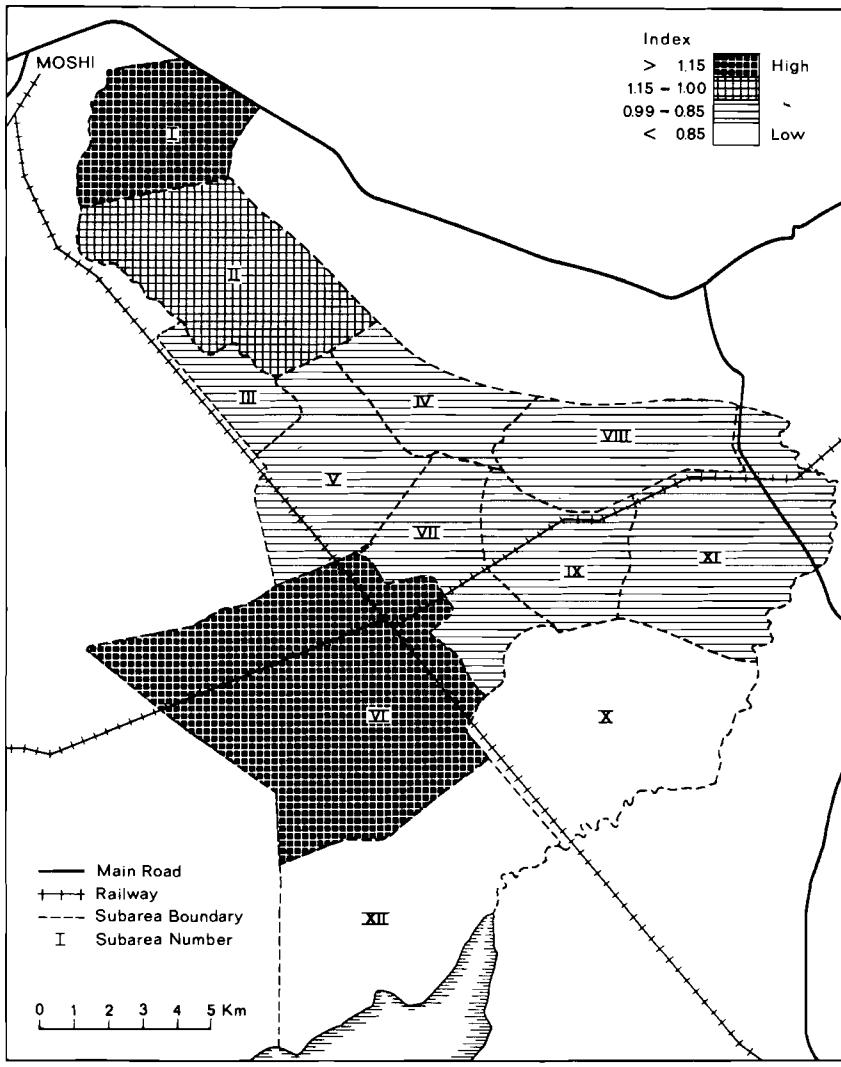
[1] The calculation of the index is presented in Appendix 6.



Map II:5. Households' Involvement in the Monetary Sector, by Subareas

$$S_j = \sum p_{ij} n_i$$

S_j = Sum for subarea j (j=1-12)

P_{ij} = Percentage of households in subarea j that have purchased n_i articles

n_i = Number of articles purchased (n_i=0-3)

Table II:19. Purchase Frequencies for Three Groups of Articles, by Subareas

Subarea	Agricultural products 1.	Animal products 2.	Clothes, shoes, soft drinks 3.
Kahe Station	high	high	high
Msaranga	medium +	high	high
Lenduru	medium -	medium +	high
Mawala	high	low	medium +
Mandaka	low	high	low
Kilototo	medium +	medium +	medium -
Rau-River	low	medium +	medium +
Kahe Sisal	medium -	medium -	medium -
Soko	medium -	low	medium +
Miwaleni	low	medium -	medium -
Ghona	medium +	low	low
Mwangaria	medium -	low	low

In Table II:19 the subareas have been grouped into three frequency groups for the three types of articles: high, medium and low. High are approximately the first quartile, medium the second and third (a plus indicates above the median, a minus below) and low is the lowest quartile.[1]

The following conclusions can be drawn:

1. Areas with a high degree of wage-earners have a high purchasing habit in every group. An exception from this general trend is Kahe Sisal.

[1] In some cases the subareas fall naturally into groups. Thus, in Table II:19 there are not always three subareas in every 'quartile'.

2. Areas suitable for agricultural production have a low frequency in group 1. However, Msaranga is high, although one of the best areas for agricultural production. Its deviation from the general trend is explained by its relatively high share of wage-earners.

3. Prominent livestock areas have a low frequency in group 2.

4. From 2 and 3 follows that subsistence production plays an important part.

Social Differentiation

The self-employed are engaged in the monetary economy to a smaller extent than wage-earners. Among the latter, the difference is small between those earning less than TZS 300 a month and those earning more.

The purchasing habits for individual articles are also analyzed for the above three groups. The self-employed have lower frequencies for every article and especially for rice, vegetables, fruit, fresh milk, meat, fish, charcoal, and clothes. Among wage-earners, the lowest paid group have lower frequencies for the following articles: maize, rice, meat, bread, and soft drinks. They had higher for vegetables, fresh milk, and charcoal. It was remarkable that the lowest paid have higher frequencies for vegetables, as this article is more common only in the highest standard of living group (Figure II:6).

CONCLUDING REMARKS

In the section on standard of living, it was suggested that the index used, beside measuring the standard of living, also gave an indication of the households' involvement in the monetary sector in respect to durable consumer goods. When the two variables, standard of living and involvement in the monetary sector (measured by purchase of daily consumer goods) are correlated by subareas, the coefficient is 0.44. Thus, the indices do not measure the same features. They partly reflect different factors explaining the involvement in the monetary sector.

An analysis by individual subareas of their position in respect of the two variables, standard of living and involvement in the monetary economy, is interesting in regard of the following four combinations: high-high, high-low, low-high, and low-low.

Msaranga represents the first combination. A rather high share of the heads of household are wage-earners, mostly in the highly-paid group. The area also has one of the best agricultural potentials. The next group is

represented by Lenduru, with few employee-households and a relatively good agricultural potential. Few people in this area have to buy their daily needs of food. The third group is represented by Kahe Station, with over half of the heads of household engaged in wage-employment, mostly in the low income bracket. The agricultural potential is fairly low and moreover, many wage-earners lack a plot of land for their subsistence cultivation. Thus, they must buy their daily consumer goods. The last group is represented by Mwangaria, with no registered wage-earner and with a low agricultural potential especially in the two villages Kimala and Kochakindo.

The employee-households in Kahe Station can be characterized as the proletarian, with a low standard of living and forced to buy their daily consumer goods. The contrasting group is the relatively well-off peasants and wage-earners in Msaranga. The peasants in the Lenduru area belong to the middle group and those from the Mwangaria area are the poor peasants, especially in the case of Kimala and Kochakindo.

Socio-Economic Status of the Area

Spatial Differentiation

The spatial differentiation of some of the variables analyzed in this study is summarized in Table II:20. The subareas are aggregated into three groups for each variable; high, medium and low. High roughly corresponds to the first quartile and low to the last. The last column picturing the sum of the variations in socio-economic status between the subareas, is a summary of columns 4-9. The socio-economic status concept is naturally limited to the six variables included. Thus, it does not aspire to give the complete account of the socio-economic status, but rather an approximation. A general trend in the variation of socio-economic status was observed: the higher the socio-economic status of a subarea, the closer to Moshi (Map II:6).

Social Differentiation

1. Self-employed (peasants) versus wage-earners
   - Self-employed are to a smaller extent migrants
   - Self-employed own houses to a much higher extent
   - Self-employed have formal education to a smaller extent
   - Children's school enrollment is smaller among self-employed households
   - No difference in standard of living is observed
   - Self-employed are to a smaller extent involved in the monetary economy.

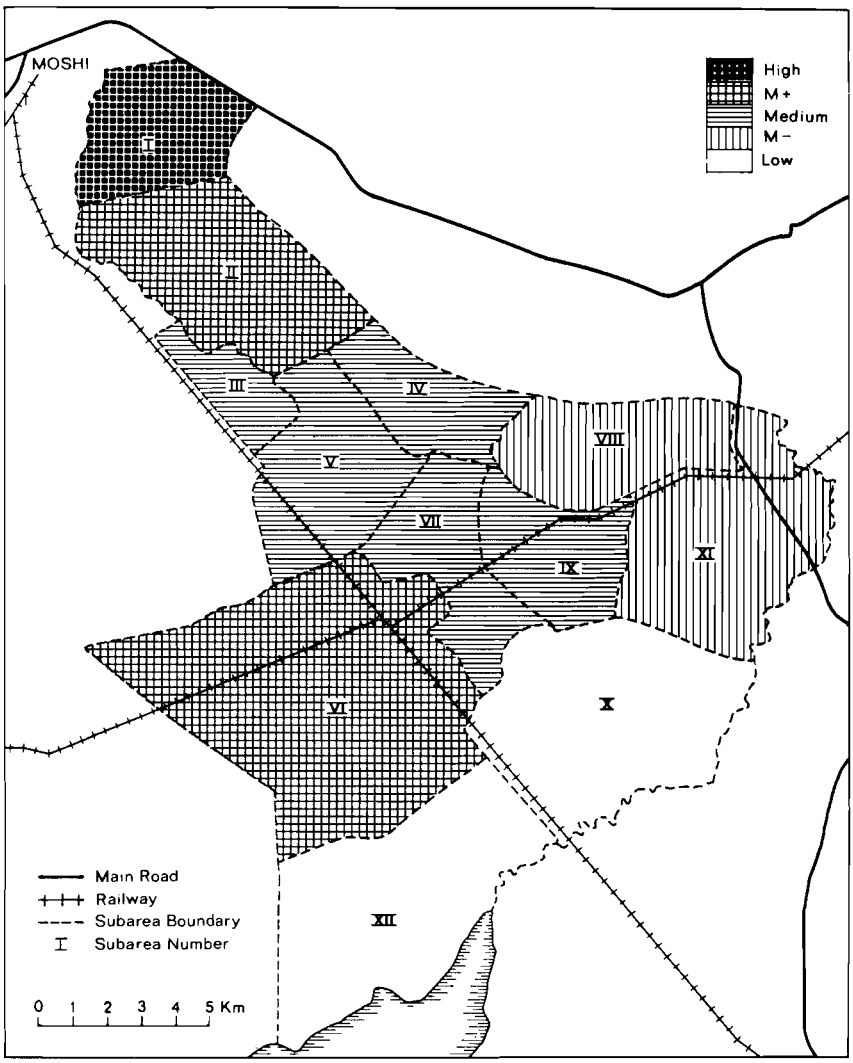
2. Wage-earners having less than TZS 300 a month versus those earning more
   - Low-paid employees are migrants to a higher extent
   - Low-paid own houses to a smaller extent
   - Low-paid have lower educational status
   - No difference in children's school enrollment
   - Low-paid have a much lower standard of living
   - Only a small difference concerning involvement in the monetary economy.

3. Short-distance versus long-distance migrants
   - Short-distance migrants have higher educational status
   - Short-distance migrants have a higher standard of living.

Table II:20. Summary: Spatial Differentiation of Socio-Economic Status

Subarea	Ethnic mixture (1)	Percentage of heads of household born in the subarea of residence (2)	Percentage long distance migrants (3)	Percentage wage-earners (4)	House quality (5)	Standard of living (6)	Involvement in monetary sector (7)	Percentage of children in school age enrolled in school (8)	Percentage of heads of household with formal education (9)	Socio-economic status (summary of column 4-9)
Msaranga	low		low	high	high	high	high	high	high	high
Mandaka		low		low		high	high	high		m+
Rau-River	low	low								m
Miwaleni					low			high	high	m
Kahe Sisal		low	high	high	high	low				m
Kahe Station	high	low	high	high			high		high	m+
Lenduru		high								m
Kilototo	low				low				low	m-
Soko		high		high	low				high	m
Mwangaria	high	high		low	low	low	low	low		low
Ghona	low	low							low	m-
Mawala	low	high		low	low		low	low	low	low

Medium = blank



Map II:6. Socio-Economic Status, by Subareas

Source: Table II:20, column 10

APPENDIX 1

ANALYSIS OF SOIL SAMPLES

The 28 randomly selected soil samples taken in 1974 were analyzed by 12 variables affecting agricultural potential. The first group of 7 variables constitute a description of the area, while the remaining concern chemical analysis.

1. Soil drainage: determines the relative ease of water and air circulation within the soil. In poorly drained soils, plant roots tend to suffocate. The samples were classed as:

   Good
   Fair (affects only plants with deep roots)
   Poor (poor drainage causes water logging)

2. Risk of erosion: strong erosion affects agriculture adversely. Generally, the area is not affected by soil erusion except sheetwash. During the dry season wind erosion is frequent in the eastern parts.

3. Stones: rocky areas affect the possibility of mechanized agriculture. No rocky or stony areas were found in the area.

4. Topography: differentiation was made between macro and micro features. The former refers to the landscape, e.g. steep slopes increase the risk of erosion and affect negatively the possibility of mechanization. On the micro level, termite hills adversely affect mechanization, and cracks in the soil destroy the roots.

5. Distance to river: indication of irrigation potential.

6. Actual land use: indicates agricultural capability and suitability of the area. By agricultural capability is meant the inherited character of the land, while suitability also involves man's activities.

7. Natural vegetation: indicates fertility and water table level.

8. Soil moisture: amount of water retained in the soil. High moisture lessens the risk of drought. The retention capacity depends on soil texture and soil depth.

9. pH: affects plant nutrient availability, as well as soil organisms. It indicates the natural soil fertility. High as well as low pH means low fertility. Natural (pH=7) or slightly alkaline soils are good. Low pH-values here indicate that soils are exhausted. In addition, in this area a high pH-value is an indicator of saline soils (pH 8.0 or above).

10. Organic material: affects soil structure and water retention and supply of plant nutrients.

11. Color: indication of fertility
    Red soil: acid, low fertility
    Whiteish soil: saline
    Grey soil: poor drainage
    Brown-grey soil: naturally high fertility (brown soil in areas with low rainfall can be saline).

12. Water retention (field capacity): the potential capacity of the soil to retain water. For high crop yields the soil must have a relative high water retention.

(1) = SOIL SAMPLE NUMBER (Map I:7)

Mawala (1)

1. poor
2. none (sheetwash)
3. none
4. very flat
5. 1 km from Njumba ya Mungo Dam
6. grazing
7. scrub, partly open
8. 15.6 %
9. 8.0 (saline)
10. 1 %
11. light brownish grey
12. 11.5 grams (gm)

Mawala (2)

1. poor
2. none (sheetwash)
3. none
4. very flat
5. 3 km from the Rau river
6. grazing (overgrazed)
7. scrub, partly open
8. 6.0 %
9. 6.5
10. 1 %
11. light brownish grey
12. 4.0 gm

EAKIL Estate (3)

1. poor
2. none (sheetwash)
3. none
4. very flat
5. 100 m to irrigation canal
6. grazing
7. scrub, partly open
8. 16.0 %
9. 6.0
10. 2 %
11. dark yellowish brown
12. 9.5 gm

Malindi-Opuruni (4)

1. fair
2. none
3. none
4. very flat
5. 600 m to the Rau river
6. old maize shamba
7. grass, bush, trees
8. 11.2 %
9. 7.0
10. 2 %
11. dark brown
12. 8.5 gm

Kimala (5)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 10 m from the Rau river
6. grazing
7. scrub and trees
8. 10.2 %
9. 8.0 (saline)
10. 1 %
11. brown
12. 8.5 gm

Kahe Forest (6)

1. fair
2. none
3. none
4. flat
5. 100 m to the Rau river
6. forest reserve
7. natural forest
8. 24.0 %
9. 7.0
10. 5 %
11. dark greyish brown
12. 24 gm

Mwangaria (7)

1. fair
2. none
3. none
4. flat
5. 200 m to the Rau river
6. grazing
7. grassland, bush, trees
8. 21.9 %
9. 7.0
10. 4 %
11. dark greyish brown
12. 27.3 gm

Soko (8)

1. poor
2. sheetwash
3. none
4. flat
5. 100 m to the Mua river
6. grazing (overgrazed)
7. bush, palm trees "Burussas"
8. 12.5 %
9. 8.1 (saline)
10. 5 %
11. dark grey
12. 21.4 gm

Kochakindo (9)

1. poor
2. sheetwash
3. none
4. flat
5. 2 km to the Mua river
6. grazing
7. grassland, old sisal estate
8. 27.7 %
9. 8.0 (saline)
10. 4 %
11. light brownish grey
12. 18.7 gm

Kifaru Sisal Estate (10)

1. fair to poor
2. none
3. none
4. flat
5. 1 km to Himo river
6. grazing (charcoal burning)
7. grassland with scattered trees
8. 13.9 %
9. 8.0 (saline)
10. 1 %
11. dark greyish brown
12. 11.2 gm

Kiomu (11)

1. poor
2. sheetwash
3. none
4. very flat
5. 1.5 km to the Himo river
6. grazing (overgrazed)
7. scrub, palm trees
8. 11.0 %
9. 6.5
10. 6 %
11. dark brown
12. 18.7 gm

Kiomu (12)

1. fair
2. none (sheetwash)
3. none
4. very flat
5. 2 km to the Himo river
6. grazing (overgrazed)
7. scrub
8. 9.2 %
9. 6.0
10. 3 %
11. dark reddish brown
12. 16.6 gm

Kilototo (13)

1. fair
2. none (sheetwash)
3. few volcanic
4. flat (between two hills)
5. 1 km to seasonal river
   3 km to the Himo river
6. old maize field
7. scrub, Baobao trees
8. 7.8 %
9. 6.0
10. 3 %
11. dark reddish brown
12. 7.0 gm

Kiterini area (14)

1. poor
2. sheetwash
3. none
4. flat
5. 1 km to the Soko river
   (Soko Spring)
6. grazing (overgrazed)
7. scrub, palm trees
8. 12.4 %
9. 6.5
10. 7 %
11. dark greyish brown
12. 10.8 gm

Kiterini area (15)

1. poor
2. seepage, cracking surface
3. none
4. flat
5. 1 km to the Mua river
6. grazing
7. scrub, scattered trees
8. 13.9 %
9. 6.5
10. 5 %
11. dark reddish brown
12. 9.0 gm

Mbeu area (16)

1. poor
2. none
3. none
4. flat
5. 1 km to the Mua river
6. grazing
7. woodland, palm trees
8. 26.0 %
9. 8.0 (saline)
10. 5 %
11. brown
12. 12.6 gm

Kisangesangeni (17)

1. fair to poor
2. none
3. none
4. flat
5. 2 km to the Rau river
6. forest reserve
7. woodland
8. 15.0 %
9. 8.5 (saline)
10. 5 %
11. brown
12. 7.2 gm

Miwaleni (18)

1. poor, flooded during rains
2. none
3. none
4. flat
5. 50 m to irrigation canal
6. grazing
7. grass- and woodland
8. 7.2 %
9. 7.0
10. 2 %
11. brown
12. 5.2 gm

Mkonga Chini (19)

1. fair
2. none
3. none
4. flat
5. 2 km to the Rau river
6. maize
7. bush and shambas
8. 3.8 %
9. 6.0
10. 1 %
11. brown
12. 9.9 gm

Kahe Sisal Estate (20)

1. poor
2. none
3. none
4. flat
5. 1 km to irrigation canal
6. old sisal plantation (grazing)
7. overgrown sisal
8. 6.6 %
9. 6.0
10. 1 %
11. dark brown
12. 9.6 gm

Ngambo ya Reli (21)

1. poor
2. none
3. none
4. flat
5. 5 km to the Rau river
6. grazing
7. grassland, scattered trees and bush
8. 4.2 %
9. 6.0
10. 2 %
11. dark brown
12. 8.1 gm

Rau-River Chini (22)

1. fair
2. none
3. none
4. flat
5. 1.5 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 11.0 %
9. 6.0
10. 2 %
11. dark yellowish brown
12. 15.1 gm

Rau-River Juu (23)

1. fair
2. none
3. none
4. flat
5. 1.5 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 11.8 %
9. 6.0
10. 3 %
11. dark brown
12. 14.6 gm

Msaranga Rau ya (24)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 0.5 km to seasonal river, 2.5 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 13.4 %
9. 6.0
10. 2 %
11. dark reddish brown
12. 13.4 gm

Msaranga Rau ya (25)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 3 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 13.5 %
9. 6.0
10. 2 %
11. dark reddish brown
12. 10.4 gm

Msaranga Ngambo (26)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 200 m to seasonal river, 6 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 12.5 %
9. 6.0
10. 1 %
11. dark reddish brown
12. 12.9 gm

Mandaka Mnono (27)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 3 km to the Rau river
6. maize shamba
7. cultivated with scattered trees
8. 13.4 %
9. 5.5
10. 3 %
11. dark reddish brown
12. 14.4 gm

Mandaka Mkonga (28)

1. fair
2. none (sheetwash)
3. none
4. flat
5. 2.5 km to the Rau river
6. maize shamba
7. cultivated
8. 13.2 %
9. 6.0
10. 1 %
11. dark reddish brown
12. 13.9 gm

AGRICULTURAL POTENTIAL CLASSIFICATION (Map I:7)

Soil sample	Moisture	pH	Organic material	Color	Water retention	Agricultural potential
1	M	U	U	S	M	U
2	U	S	U	S	U	U
3	M	M	M	S	U	M
4	M	S	M	S	U	M
5	M	U	U	S	U	U
6	S	S	S	M	S	S
7	S	S	S	M	S	S
8	M	U	S	M	S	U
9	S	U	S	S	M	U
10	M	U	U	M	M	U
11	M	S	S	S	M	S
12	U	M	M	U	M	M
13	U	M	M	U	U	U
14	M	S	M	M	M	S
15	M	S	S	U	U	M
16	S	U	S	S	M	U
17	M	U	S	S	U	U
18	U	S	M	S	U	M
19	U	M	U	S	U	U
20	U	M	U	S	U	U
21	U	M	M	S	U	M
22	M	M	M	S	M	S
23	M	M	M	S	M	S
24	M	M	M	U	M	M
25	M	M	M	U	M	M
26	M	M	U	U	M	M
27	M	M	M	U	M	M
28	M	M	U	U	M	M

Moisture (variable 8)

Suitable (S)	> 20 %
Marginal suitable (M)	10 - 20 %
Unsuitable (U)	< 10 %

pH (variable 9)

S	6.5 - 8.0
M	< 6.5
U	> 8.0 (saline)

Organic material (variable 10)

S	$\geq$ 4.0 %
M	1.1 - 3.9 %
U	$\leq$ 1.0 %

Color (variable 11)

S	Brown
M	Grey
U	Red

Water retention (variable 12)

S	> 20.0 grams
M	10.0 - 20.0 grams
U	< 10.0 grams

Agricultural potential

Suitable (S)	No unsuitable property (variables 8-12)
Marginal suitable (M)	Maximum 2 unsuitable properties (variables 8-12)
Unsuitable (U)	3 or more unsuitable properties, or pH 8.0, or above (variables 8-12)

APPENDIX 2

AGRICULTURAL CALENDAR

Agricultural Calendar: The Rau-River Area

There are two main cultivation seasons, both dependent on the rainfall: the long rains and the short rains seasons.

Long rains: March to June, maximum in April
Short rains: September to December, maximum in November.

January

People start preparing maize and cotton plots, main emphasis on the former. The two crops are not mixed on the same piece of land. The preparation of land includes slashing and cutting of grass and tilling of the soil. Usually a how is used for land preparation. Some people hire a tractor, especially when their farm is large.

February

The main activity is sowing of maize. It is important that the maize farms are ready when the long rains start, which could be in February. By the mid of this month the planting of maize should be completed. Land preparation of the cotton fields continues.

March

Most of the long rains are received during March and April. In March cotton is planted. For people with farms in fertile valleys or with irrigated farms, March is the time for harvesting rice, planted in October of the previous year. Weeding starts on maize farms.

April

Weeding of cotton and maize farms. Normally, maize farms are weeded twice and cotton farms three times.

May

Land preparation for bean fields start. Areas preferred are those with a low degree of salinity. Sometimes beans are intercropped with maize. Maize is ready (in green form) and one variety (Katumani) is ready for harvesting.

June

Planting of beans. It is now slightly drier and much cooler, which is conducive for beans. Towards the end of June people start preparing onion plots. These farms are usually located near the streams and irrigated. Some are also harvesting maize.

July

Main period for maize harvest, both Katumani and hybrid varieties. Land preparation for onions continues. Sometimes onions are interplanted with beans. Onions are also planted in July.

August

Maize harvest is completed in early August. In mid August beans are harvested. Since harvesting does not take much time, people start to prepare land for the short rains. Paddy farms are also prepared during this time. Areas cultivated are those near streams on very fertile land, which enables the crop to grow during the short rains.

September

Preparation of paddy fields continues. Maize of Katumani variety is planted (Katumani can be harvested after only 75 days). Planting of paddy-rice also takes place. Early harvest of cotton.

October

Actual planting of paddy-rice continues in early October. Harvesting of cotton and onions. Short rains at maximum.

November

Main activity is weeding of maize and paddy fields. Paddies need to be weeded four to five times.

December

Guarding the rice fields from bird attacks. Harvesting for maize. In late December land preparation of maize fields before the long rains begin.

It is possible to intercrop maize and beans. Rice is never intercropped. Rice plots can be used for maize when rice has been harvested.

Weeding

Cotton - three times

Maize - twice

Rice - four to five times

Weeding (one person, one acre)

Maize - four days

Beans - four days

Maturity

Maize, Katumani 75 days

Maize, hybrids 90 days

Katumani is preferred

Fallow System

Maize plots are planted with maize only once a year. After harvest the land remains fallow till the next long rains.

The land cannot sustain two maize crops per year. Bean plots are planted with beans in June. In September the beans are harvested and the plots replanted with beans to utilize the short rains.

Rice plots could be planted with maize if the area is irrigated or not too dry.

In the Rau-River area virtually no plots are left fallow. Every season the land is cultivated. It is prohibited by the Ministry of Agriculture to graze livestock on crop land. Certain areas are set aside for grazing.

Labour Requirement

Cultivation: with a hoe; on the average 15 days are needed to till one acre for one man.

Sowing: One person needs one to one and a half day to sow one acre with maize or beans.

Harvesting: It takes one man two days to harvest one acre of maize. It takes one man two days to harvest one acre of beans. It takes one man about four days to harvest one acre of rice in a dry place. It takes one man up to 30 days to harvest one acre of rice in a flooded place.

Manure and Fertilizers

Fertilizers are mostly used, especially on maize. Manure has recently been introduced by the government, and is given free. Peasant's reaction toward chemical fertilizers is that they increase salinity. Therefore animal dung (or green manure) seems to be preferred.

Agricultural Calendar: The Kahe - Lenduru Area

January

Preparation of maize, beans, cassava and cotton farms. Normally, cotton is planted in a different field from all the other crops. Maize and beans are planted in the same plot due to water shortage - intercropping.

February

Continuation and finalizing of land preparation.

March

Long rains start in mid or late March. Late March planting of maize starts. Some land preparation still continue.

April

Cotton is planted with the beginning of the long rains. Maize, some beans and cassava are planted.

May

Sowing of beans is the main activity. The rains are gradually decreasing. Weeding of maize and cotton fields. Cotton is weeded four times and maize twice.

June

Continuation of sowing of beans and weeding of maize and cotton fields.

July

Katumani maize is harvested. Beans sown early are also harvested. Banana farms are weeded.

August

Harvesting of hybrid maize and to some extent local varieties. Maize is left on the farm until it is completely dry to reduce the risk or destruction during storage. The final weeding of cotton and cassava fields. Prepara-

tion of maize (Katumani) fields for the short rains start. Also land for beans, peas and sweet potatoes is prepared, but mostly in areas where irrigation can supplement the short rains.

September

Earliest harvesting of cotton. Sowing of maize (Katumani), beans, peas and sweet potatoes, etc. for the short rains.

October

Actual period for cotton harvest. Grading and selling of cotton. Weeding of maize and bean fields, etc.

November

Harvesting of beans. In late November maize is harvested, as well as sweet potatoes.

December

The actual harvesting of the short rains maize. Sweet potatoes are harvested. Irrigation of cassava fields and the not yet harvested sweet potatoe fields.

Cassava is harvested in the following April. Three varieties of sweet potatoes are cultivated, i.e. those maturing after four, five or six months. Therefore, potatoes are harvested from November into December and the last harvest is as late as April.

Long rains are more important than the short rains or irrigation system.

Yields

Maize per acre (bags, 1 bag = 90 kg).

Season	"Modern" agriculture and irrigation	Traditional
Long rains	10 bags	4-5 bags
Short rains	4-5 bags	1.5-2 bags

Labour Requirement

It takes one man 15 days to till one acre by hoe.
It takes one man 1-2 days to till one acre by plough.

Fallow System

No fallow due to land shortage. Every season the land is prepared and planted. However, after harvest of e.g. cotton, nothing is planted until the next season, a period of

some four months. Rotation is practised. A plot previously planted with beans will have maize the following year, etc. Normally, the same type of crop is not planted on the same plot for consecutive years.

Salinity

Alkaline soils extend from the Ghona stream towards TPC. Scattered patches exist in Kahe Barazani, although the problem is greater in the Mbeu area. In Kahe Barazani trees, bananas and grass are grown on saline soils, although they do not do very well, especially not bananas. Saline soil is mostly left for grazing.

Grazing

After the maize harvest, livestock are grazed on the farms. When the peasant has few cattle or goats he cuts grass and remains from the maize plants and puts them in the *boma* for the livestock. Dry season feeding: those with dairy cattle cut hay and store for dry season feeding. This work is not frequent since it is considered labourious. Some also grow lucern (alfalfa) and elephant grass.

Agricultural Calendar: The Ghona-Kiomu-Kilototo Area

January

Preparation of maize and cotton fields. They are planted on separate fields. Sometimes maize and beans are intercropped.

February

Some land preparation continues. In late February, maize and cotton are planted. In some places cassava is intercropped with maize. Furrows for irrigation are cleared.

March

Sowing of cotton is normally done in March, continuation of maize planting for those who are late.

April

Irrigation of farms. Some rains are received.

May and June

Weeding.

July

Maize is harvested. Nota bene, in this area only the Katumani variety is grown, due to unreliable and inadequate rains.

August

Maize harvest.

September and October

Harvesting of cotton and cassava. In early September some people may still be harvesting maize.

November

Cotton harvest.

December

Land preparation for the coming season starts.

Short rains are hardly experienced in this area. Therefore no short rains cultivation. Finger millet is sometimes planted at the same time as maize, but in separate plots. Cassava can be harvested in September if planted in January-February.

Weedings

Maize is weeded 3 times, cotton 4-5 times.

Fallow System

No rotation is practised. Some plots are cultivated yearly. Manure is used. No fallow system exists.

Salinity

Salt deposits exist in the southern part of Kilototo.

Critical Problems

Irrigation water: a seasonal stream which can provide water all year around in Kilototo. The Ghona furrow (canal) is very small due to large stones at the mouth. Peasants requested state help for this problem.

APPENDIX 3

EXTRACT FROM AN INTERVIEW WITH I. MWIDADI IN MKONGA CHINI, 26 SEPTEMBER, 1975

The interviewee was not included in the sample. He is an example of a peasant who has been able to cut loose from the traditional way of farming and raising livestock. The interview also shows that he has been quite successful.

Since he has been able to earn more than enough for the subsistence of the family, he can also experiment with various crops and hybrid cattle. If he is successful, he will make more money, and a failure would not be followed by an inability to feed his family. This is one of the conditions that has to be fulfilled before a peasant would be prepared to take the step towards a more modern agricultural system, including hybrid seeds and livestock. This man is also fortunate enough to have contacts with the dairy farm at NAFCO Kahe Estate (EAKIL), where he can get fodder, help with injections and advice.

Ismali Mwidadi had three graded cows. One was pregnant in the 7th month, one in the 5th month and the last was still young. His two cows produced approximately 10 liters of milk per day. He sold about 7 liters a day at TZS 2 per liter. The remaining 3 liters were used within the household. He had 10 goats, 3 of them were graded, bought from West Kilimanjaro. The rest were of local varieties. One of the graded goats used to give up to 5 liters of milk per day, but was at present ill. The goats are kept for the households own consumption and not for any commercial purpose.

Mr Mwidadi kept 37 chickens. He got between 30-33 eggs daily, if chicken feed was available. Otherwise he got as little as 10 eggs per day. He sold eggs to his neighbours, usually for TZS 0.60 a piece. Sometimes he sold his eggs in Moshi. However, he has a problem of

securing a market. The supply of chicken feed is sometimes a critical problem. The main supplier is the Tanganyika Farmers Association (TFA) in Moshi.

For the cows he grew lucern (alfalfa) after having secured seeds from the NAFCO (EAKIL) farm, where he used to buy the fodder for his cattle. The lucern he grew is not enough for his stock. He also feeds them with grass which is obtained locally. The cows are washed at least once a week with chemical bought from the TFA.

Mr Mwidadi ownes 4.5 hectars of cropland, 2 hectars currently planted with maize, 0.4 hectars with cotton and the remaining with bananas and fruit trees, beans, etc. Each crop is planted separately. He rents a tractor for TZS 55 per acre for tilling the land. Usually, he gets up to 50 bags of maize per hectar if the rains come normally. He also gets 30 bags of maize per hectar in the second cultivation season, the short rains. He harvests TZS 2 200 - 3 000 worth of cotton per hectar. He uses fertilizers, an average of 5-6 bags every season. Each bag costs TZS 27.

Present producer prices (September 1975):

One bag of maize (90 kg) TZS 65

Cotton grade AR TZS 1.5-2.0 per kg

Cotton grade BR TZS 0.6-1.0 per kg

The main problem is frequent livestock diseases, which could be explained by the lack of cattle-dips in the area.

APPENDIX 4

ETHNIC GROUPS REGISTERED IN THE SAMPLE

Chagga
Kahe
Masai
Pare

South

Bena	Mwangi	Safwa
Bungu	Ndamba	Nyika
Fipa	Ngindo	Yao
Makonde	Ngoni	Zamaro
Mkinga	Nyakyusa	

Central

Gogo	Nyaturu	Rangi
Hehe	Nyiramba	Sukuma
Nyamwezi		

Lake

Ha	Mwazi	Vinza
Haya	Ngurimi	Zanaki
Kerewe	Tende	Ziba
Kuria		

North

Arusha	Digo	Sambaa
Bondei	Mangati	Zigua

Outside Tanzania

Baganda	Luya	Rabai
Hemba	Malawi	Rundi
Kamba	Nyarwanda	Songa
Luo	Nyasa	Taita

APPENDIX 5

STANDARD OF LIVING INDEX

Number of Objects Owned / Subarea	0		1		2		3		4		Total		I_j
	N	%	N	%	N	%	N	%	N	%	N	%	
Msaranga	6	7.7	26	33.3	19	24.4	17	21.8	10	12.8	78	100	1.79
Mandaka	9	22.5	10	25.0	8	20.0	6	15.0	7	17.5	40	100	1.62
Lenduru	14	42.4	8	24.2	4	12.2	3	9.1	4	12.2	33	100	1.12
Soko	12	35.3	10	29.4	8	23.5	4	11.8	0	0	34	100	1.01
Kilototo	28	50.0	10	17.9	4	7.1	12	21.4	2	3.6	56	100	1.00
Ghona	14	37.8	13	35.1	5	13.5	3	8.1	2	5.4	37	100	0.97
Mawala	8	47.1	6	35.3	1	5.9	1	5.9	1	5.9	17	100	0.80
Miwaleni	18	52.9	6	17.6	6	17.6	4	11.8	0	0	34	100	0.79
Rau-River	18	42.9	15	35.7	5	11.9	2	4.8	2	4.8	42	100	0.73
Kahe Station	57	57.0	25	25.0	7	7.0	5	5.0	6	6.0	100	100	0.70
Mwangaria	25	62.5	9	22.5	2	5.0	2	5.0	2	5.0	40	100	0.61
Kahe Sisal	32	64.0	13	26.0	3	6.0	1	2.0	1	2.0	50	100	0.47
Total	241	43.0	151	26.9	72	12.8	60	10.7	37	6.6	561	100	1.00

$$I_j = \frac{\sum_{i=1}^{i} n_i \cdot p_{ij}}{\sum_{i=1}^{i} n_i p_i}$$

n_i = number of objects owned (i=0-4)

p_{ij} = percentage of households in cluster j owning i objects (j=1-12)

p_i = percentage of households in the area owning i objects

I_j = index cluster j

APPENDIX 6

Subarea	N	Number of articles purchased 0-5 %	6-8 %	9-11 %	12-19 %	I_j
Msaranga	78	3.8	20.5	39.7	35.9	1.17
Mandaka	39	10.3	35.9	17.9	35.9	1.06
Rau-River	42	21.4	33.3	35.7	9.5	0.89
Miwaleni	34	8.8	47.1	32.4	11.8	0.94
Kahe Sisal	50	24.0	32.0	24.0	20.0	0.91
Kahe Station	100	7.0	15.0	39.0	39.0	1.18
Lenduru	33	21.2	30.3	33.3	15.2	0.92
Kilototo	56	16.1	23.2	51.8	8.9	0.97
Soko	34	11.8	44.1	32.4	11.8	0.93
Mwangaria	40	25.0	52.5	17.5	5.0	0.77
Ghona	37	16.2	29.7	43.2	10.8	0.94
Mawala	17	29.4	47.1	17.6	5.9	0.76
Total	560	14.1	30.2	34.3	21.4	1.00
Average number of articles purchased		3.6	7.1	9.9	13.5	
Weight		1	2	3	4	

$$I_j = \frac{\sum p_{ij} w_i}{\sum p_i w_i}$$

I_j = index subarea j (j=1-12)

p_{ij} = percentage of households in subarea j that have purchased articles (i=0-5, 6-8, 9-11, 12-19)

p_i = percentage of households in the whole area that have purchased i articles

w_i = weight for groups of number of articles purchased (w_i=1-4)

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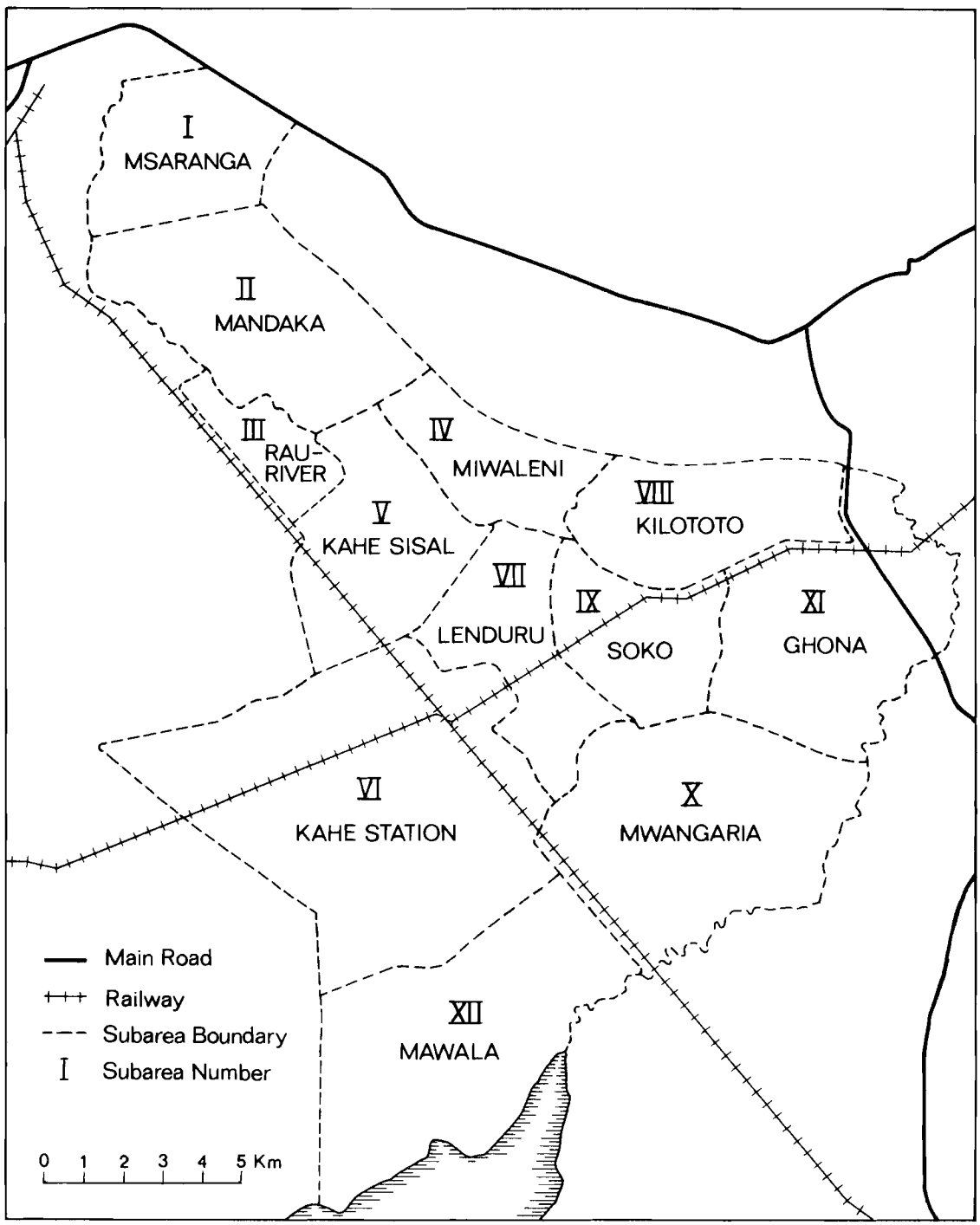
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