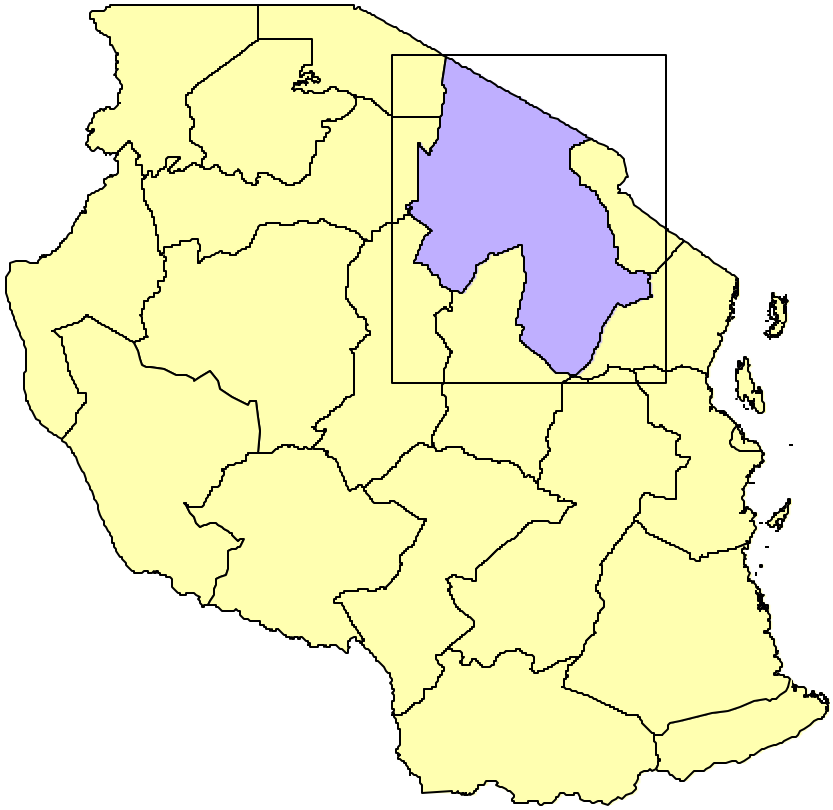
SAVE THE CHILDREN FUND (UK)
with support from **ECHO** and **WFP/DFID**

in collaboration with:
THE PRIME MINISTER'S OFFICE, TANZANIA,
represented by the **DISASTER MANAGEMENT DEPARTMENT**

THE UNITED NATIONS WORLD FOOD PROGRAMME

HOUSEHOLD FOOD ECONOMY ASSESSMENT ARUSHA REGION



Written by
Tanya Boudreau
Consultant, The Food Economy Group (F.E.G.)
August 1999

SAVE THE CHILDREN FUND – UK
P. O. Box 10414, Dar es Salaam
E-mail: scfdar@maf.org

Household Food Economy Assessment – Arusha Region -

The Household Food Economy Assessment in Arusha Region was undertaken within the frame work of the Emergency Support to Household Food Economy Assessments in Tanzania project. The project is a joint initiative of the Disaster Management Department (Prime Minister s Office), the World Food Programme and Save the Children Fund (UK). The overall project covers two additional regions of Tanzania, i.e. Singida and Dodoma, where similar assessments have been conducted.

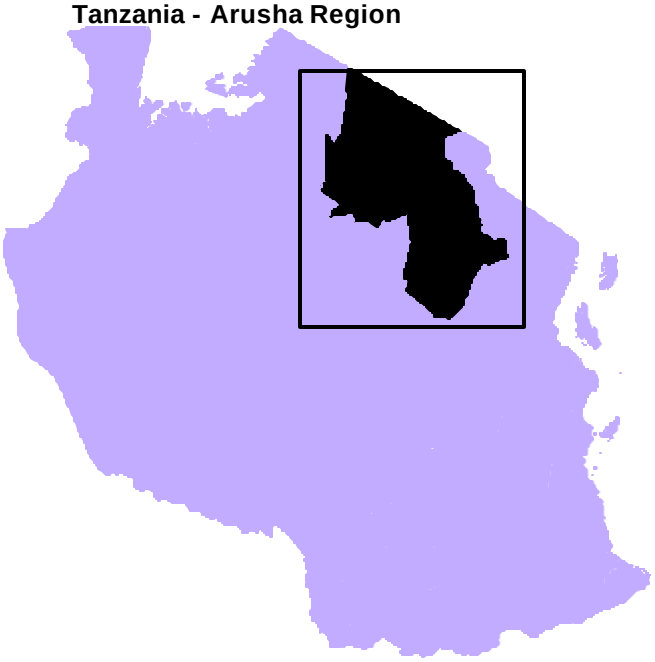
Arusha Region Field Team:

Tanya Boudreau, Team Leader, Consultant, The Food Economy Group (F.E.G.)
Jose Lopez, SCF (UK)
Gabriel Kimolo, Disaster Management Department (PMO)
Domina Kambanangwe, The World Food Programme, Kibondo
R.I. Samwi, SCF (UK)
Suleiman S. Mohamed, The World Food Programme/SCF (UK), Somalia

INTRODUCTION

The following report stems from two months of field study in Arusha Region, in May - July 1999, designed to establish baseline information on the livelihood patterns of rural households in different parts of the Region. The study was part of a larger initiative to establish a baseline food economy picture for three regions in the north and centre of Tanzania, including Arusha, Singida and Dodoma Regions. This joint project between the Prime Minister's Office, the World Food Programme and Save the Children Fund (UK) was funded by ECHO and WFP (with support from DfID).

Tanzania - Arusha Region



The motivation behind establishing these baseline pictures was two-fold:

- First, they will provide the necessary context for understanding the effects of drought- related shocks sustained in recent years thereby contributing a basis for making rational judgements with regard to the need for relief assistance. More importantly, this context helps decision-makers understand why people may be unable to cope on their own, helping to clarify the objectives, scope and time frame of a relief intervention.

- Second, the same context can be viewed as an investment in future planning, not only in the areas of early warning and response, but also for the purposes of mitigation and development assistance. Without a detailed and comparable baseline of how rural households in Tanzania obtain access to food and income, appropriate planning for livelihood support is not possible.

In short, the results of the work are intended to provide clear and compelling justifications for relief assistance if such assistance in necessary. They will also form the basis for a far more informed approach to targeting development assistance to mitigate against future emergencies and reduce absolute levels of poverty.

Methodology

Household Food Economy Analysis is a method for assessing food security and understanding rural livelihoods. The method is based upon developing an understanding of the various options people employ to secure *access* to food. It goes beyond traditional production-based assessments by exploring, in a systematic fashion, the other food sources people rely upon, and the extent to which these can be expanded in times of crisis.

A feature of the approach is that it is *household-based*, exploring how 'poor', 'middle' and 'rich' households obtain food and income. The concept of vulnerability inherent in the food economy framework is linked to economic circumstances, as opposed to being tied to pre-defined group parameters, such as 'women', 'elderly', 'disabled', etc. The situation of individuals cannot be considered in isolation from their economic circumstances or the economic circumstances of the households in which they live. Thus the objective of food economy work is to define just what it is that makes some households more vulnerable to food shortage than others.

In a rural setting, the task is to piece together the relative importance of different food and income options for different types of households ('poor', 'middle' and 'rich'). This estimation is based on an understanding of how much of each source a household may have access to over the year, and in turn a knowledge of that food's potential calorific contribution.[1] For instance, if we know that a household of 6 produces three 90 kg sacks of sorghum most years, we are then able to calculate that sorghum contributes around 25% to that household's total annual food income in a normal year[2]. The question then becomes, if people in that household are managing to survive, what makes up the other 75%?

The teams used a tiered approach to obtaining information, starting at the regional level, moving to the district, and finally to 'representative' villages, where the majority of time was spent. A wide range of standard PRA techniques may be used during village interviews, but for the most part, information was derived through rigorous semi-structured interviews. The percentage after each point represents the approximate relative amount of time spent interviewing at each level.

- At the regional level the teams acquired quite broad-stroke information about differences in general livelihood patterns and obtained a wide range of statistical data. (10%)

---

[1] 1900 kcals per person per day, used in this analysis, represents the minimum compatible with long-term subsistence. It is based on an estimate of minimum calories required for different age groups, averaged across an expected age distribution in developing countries.

[2] The calculation is as follows: 3 x 90 kg = 270 kg. An average adult needs .53 kg per day of sorghum to meet his/her 1900 kcal minimum requirement if sorghum is all he/she is eating. Thus to find out how many **total days** 270 kg of sorghum will last, divide 270 by .53. This gives you 509, which divided by the number of people in the family (6) is 84. 84 days is approximately 23% of a year.

- Further refinements of food economy zones take place during discussions with agricultural and livestock officers and marketing and planning personnel at the District level. Village selection also takes place at these meetings. (10%)

- At the village level the teams spend an intensive period of time interviewing different wealth groups within the population to obtain a detailed account of how specific income groups obtain food and income and what their expenditure requirements are. It is from these interviews that most of the critical findings derive. (80%)

Why Use the Food Economy Approach?

A multi-regional study is particularly challenging in the sense that in order for the results to be useful in a larger context, one needs the **capacity to compare findings from region to region and from sub-region to sub-region**. The tendency in this case would be to lean towards a large statistical survey with questionnaires and enumerators. But experience counsels that a rich understanding of the economic context, detailing how people obtain their food in most years, and more importantly how the whole economic system fits together with relation to intra- and inter- community exchange, is impossible to derive through traditional survey methods.

Food Economy Analysis counters the problem that most so-called qualitative assessments face (the problem being that they tend to produce information which may be detailed, but ultimately lacks the components which allow for comparisons to made from area to area - something which is critical in prioritizing both relief and development assistance) by utilizing rigorous quantitative analysis in both the field work and the final deductive process. **Because the Food Economy approach is based in large part on quantifying access to food, and in describing the links within and outside a community which determine this access, it allows for comparisons to be made between geographic areas and between economic groups**. It also enables analysts to estimate with an impressive level of confidence the level of 'shock' likely to create a food shortage.

Background

Tanzania possesses the most varied ecology of any country in Africa[3], and within Tanzania, Arusha Region possesses the most varied ecology of any of its regions. Arusha Region lies in the northeastern quadrant of Tanzania, sharing a border with Kenya to the north, and surrounded by the neighbouring regions of Kilimanjaro, Tanga, Dodoma, Singida, Shinyanga and Mara. As one of 20 mainland regions in Tanzania, it encompasses 82,429 square kilometres, or around 9% of the country's total land area. Arusha's size and geographic location provide a ripe context for its substantial diversity. The Rift Valley and its associated lowland areas, lakes, escarpments and plateaus, cuts a diagonal northeast/southwest path through the region; the plains of the Serengeti begin their endless expanse on its northwestern edge; Mount Meru, Hanang, and the Ngorongoro platform form the upper altitude ranges of the region, rising from sentinel points in the central northeast, southwest and north west. The population of Arusha Region is no less diverse; at least five significant ethnic groups are present, including the Iraqw, Arusha, Maasai, Meru, and Barbaig. There are also a number of minor groups such as the Sonjo, Gorowa, Rangi, Chagga, Pare and Nguu. The total population estimate for Arusha Region (1999 est.) is 2,031,919.[4]

In general terms, the rural economy of the Region can be classified into two categories: the pastoral areas and the agricultural areas. In actual fact, pastoral communities practice agriculture, and agricultural households keep livestock, but this classification suggests the predominant tendency of these groups, and the longer term aspirations of households within these communities. In the simplest terms, pastoralists aspire to own more livestock and cultivate so that they can increase or maintain herd sizes; agriculturalists aspire to cultivate more land and keep livestock to store wealth and protect their subsistence requirements in bad production years.

The pastoral areas are vast lowland plains, sparsely populated, but geographically extensive. The Maasai alone inhabit the greater part of Simanjiro, Monduli, Kiteto and Ngorongoro Districts, and small part of Arumeru District; these districts comprise 80% of the total land area of Arusha Region. The Barbaig, a much smaller but still significant pastoral group, occupy parts of Hanang and Mbulu Districts. Thus pastoralist communities live in significant portions of at least seven of the nine districts of Arusha Region. The combined population of the main pastoralist districts,[5] however, is relatively small, amounting to only 516,465 people, or 25% of the total population of Arusha region. Agriculturalists are the primary inhabitants of Arumeru, Babati, Hanang, Karatu and Mbulu Districts. Although these districts cover only 23% of the total land area of Arusha Region, they accommodate at least 1,299,840 people, or 64% of the region's total population.[6]

---

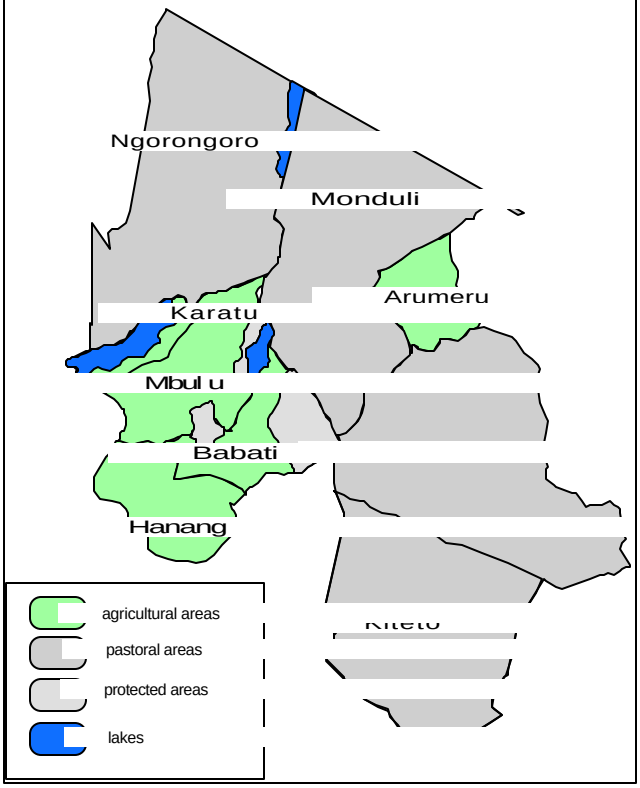
[3]Coulson, Andrew, Tanzania, A Political Economy, (Clarendon Press, Oxford, 1982) p. 6

[4]Arusha Regional Administration Office files, June, 1999.

[5]Simanjiro, Monduli, Kiteto and Ngorongoro.

[6]The remaining 11% of the population live in Arusha municipality.

Figure 1. Arusha Region

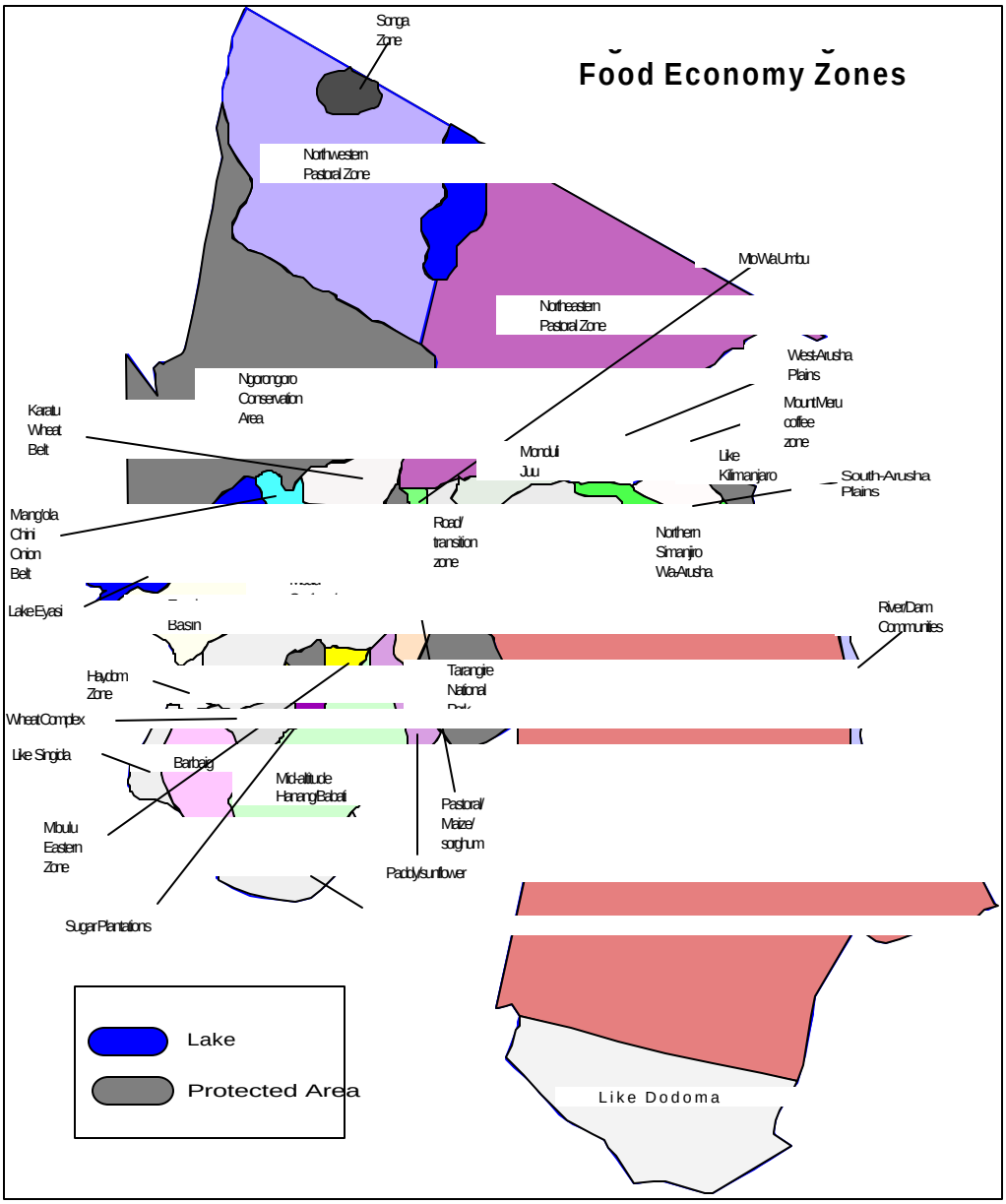


The particular geographic distribution of pastoralists and agriculturalists is not a random occurrence; a strong correlation exists between lowland districts and pastoral communities on the one hand and mid- to high- land districts and agricultural populations on the other.[7] The natural explanation for this co-variation is that upper altitudes associate themselves with higher precipitation, more consistent rainfall patterns, and better overall conditions for intensive agricultural production. Lowland areas encompass extensive plains with scattered lakes and watering holes formed from runoff from the higher altitudes: in other words, conditions which tend to allow for keeping large herds of cattle and goats.

The assessment from which this report stems covered significant portions of both pastoral and agricultural populations; field teams conducted interviews in Babati, Hanang, Karatu, and Mbulu (the agricultural areas) as well as Kiteto, Monduli, Ngorongoro and Simanjaro (the pastoral areas). Arumeru District and Arusha municipality were not included in this assessment because most of Arumeru District (which include semi-rural communities around Arusha town) is an extension of agro-economic areas found in neighbouring Kilimanjaro Region, and is more appropriate to analyse as part of a food economy assessment of Kilimanjaro Region.

[7] The Maasai living in an around the Ngorongoro Conservation Area provide one significant exception to this rule, although the northern portion of the district which falls outside of the NCA reverts back to this standard again.

The general classification of Arusha Region into pastoral and agricultural areas circumscribes the largest possible livelihood strata; within these broad categories it is possible to further define a number of sub-zones, or Food Economy Zones (FEZs). The map below presents a preliminary outline of these Food Economy Zones in Arusha.[8]



[8]These zones are preliminary in the sense that it will take more time to confirm the actual boundaries of them; they are based at the moment on intensive discussions with district-level officials and (in the areas where field work was conducted) some ground-truthing with villagers, combined with reference to Conyer s Agro-economic zonation of Tanzania.

The report that follows outlines the main findings of the recent assessment, detailing how rural households in six of the above food economy zones live in most years, how they respond to losses in a bad year, and how this year's conditions are likely to affect them. Where relevant, implications for planning and policy making are included.

THE PASTORAL ZONES

A number of mistaken beliefs about pastoralists form the core of official thought regarding Maasai herders. During the recent assessment, these preconceptions were echoed in official texts, and throughout discussions held with livestock and agricultural officers at national, regional and district headquarters; these misunderstandings make up, in fact, the basic body of common knowledge about pastoralists, and particularly the Maasai.

Typically one encounters the following set of statements about the Maasai: 1. all Maasai live in the same way; 2. they do not cultivate and rely exclusively (to their detriment) on cattle for food; 3. they purchase any and all grain that they eat; 4. they refuse to sell their cattle unless forced to do so in a bad year; 5. they do not eat meat.

Our experience parallels that of other researchers who encountered similar attitudes:

> *Talks with government officials confirmed the prevalence of ethnic stereotypes about pastoralists, and especially the Masaai, which may have hampered their ability to carry out their functions effectively and fairly. From regional to district level, officials informed us that - pastoralists do not cultivate....; pastoralists need to be taught/forced to sell their stock - livestock are kept as assets and not sold....; pastoralists do not care about education for their children....*[9]

The repetition of these 'facts' over many years, unsubstantiated by empirical evidence, has created a set of myths about pastoralists which arguably contributes to misinformed policies and an inappropriate set of guidelines for pastoral management and support. The basic thrust of past government policies regarding pastoralists has been to 'encourage' settlement, and promote agricultural production. But it is only by understanding how the Maasai in different parts of the region live currently, and how their lives are changing, that appropriate plans for supporting them in the future can be designed.

According to the findings of our assessment, *at least* three quite separate livelihood systems are in effect in traditional Maasai areas: 1. the Southern Pastoral Zone, comprising most of Siminjiro and the northern half of Kiteto, as well as some of the southern parts of Monduli; 2. the Northwest Pastoral Zone, essentially the northern half of Ngorongoro District; and 3. the Northeast Pastoral Zone, which includes most areas in Monduli District north of Monduli town and east of Mto wa Mbu.

The pastoral zones have experienced rapid changes over the past ten years and each is still in its own particular stage of transition.

C New and increasingly strong sources of alternative income, including agricultural

[9] The Crisis of Rural Food Security: The Case of Pastoralists in Ngorongoro district, by Marjorie Mbilinyi and Timothy Nyoni, University of Dar es Salaam; Institute of Development Studies, pg. 43

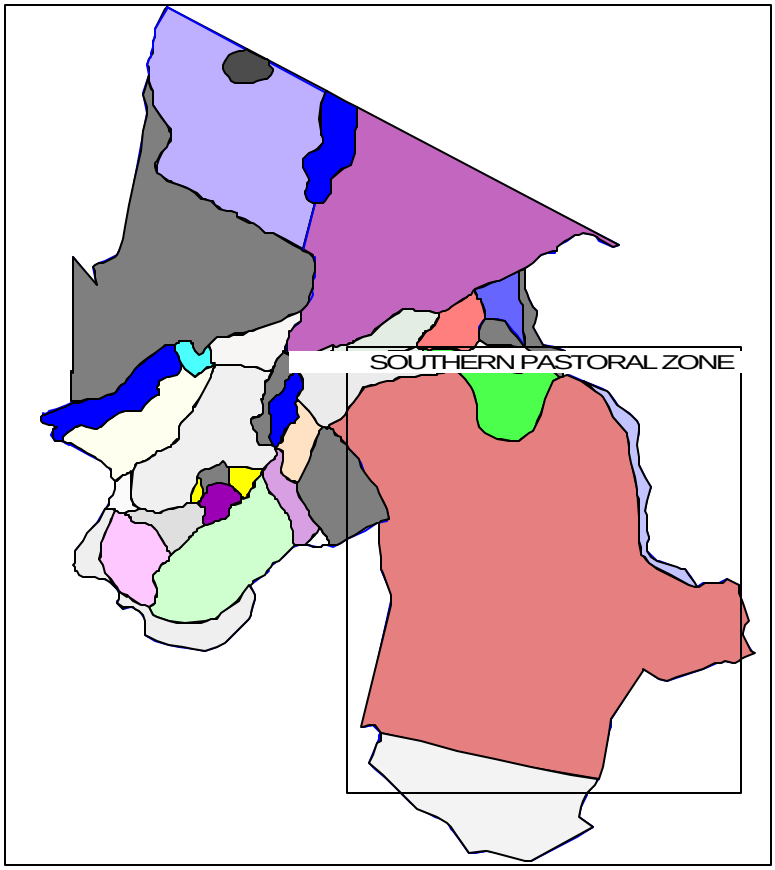
production and mining, have rooted themselves in typical livelihood patterns in the *Southern Pastoral Zone*, playing a fundamental role in the establishment of new herds for young men, the rapid increase in herd sizes for already-established bomas, and substantial resilience in the face of periodic shocks such as drought or livestock disease.

- The powerful Kenyan market provides a secure source of demand for cattle in the *Northwestern Pastoral Zone*. Assured livestock income and a growing reliance on agricultural production (to cover minimum food requirement in normal years) form a secure basis for obtaining food in most years. In bad years, (unlike in other parts of Tanzania, where livestock prices tend to decline as grain prices go up) livestock income in the Northwest Zone tends not to fluctuate because the Kenyan cattle market is tied to demand in Nairobi, not to markets in Tanzania. This market therefore, provides a buffer against bad years for pastoralists in this zone.

- Pastoralists in the *Northeast Pastoral Zone* share neither the Southern Zone's alternative income sources, nor the Northwestern Zone's access to secure cattle markets, and are therefore particularly vulnerable to intermittent shocks such as drought or livestock disease. As proof of this contention, the Northeast Pastoral Zone is currently in the process of recovering from severe cattle losses experienced in 1997 and 1998. These losses could not be offset by increasing agricultural production, or by turning to other sources of income, because few bomas cultivate or engage in off-boma activities. With access to only the flagging local cattle market, increased numbers of cattle had to be sold to cover basic food needs as cattle prices plummeted and grain prices rose.

THE SOUTHERN PASTORAL ZONE

Location

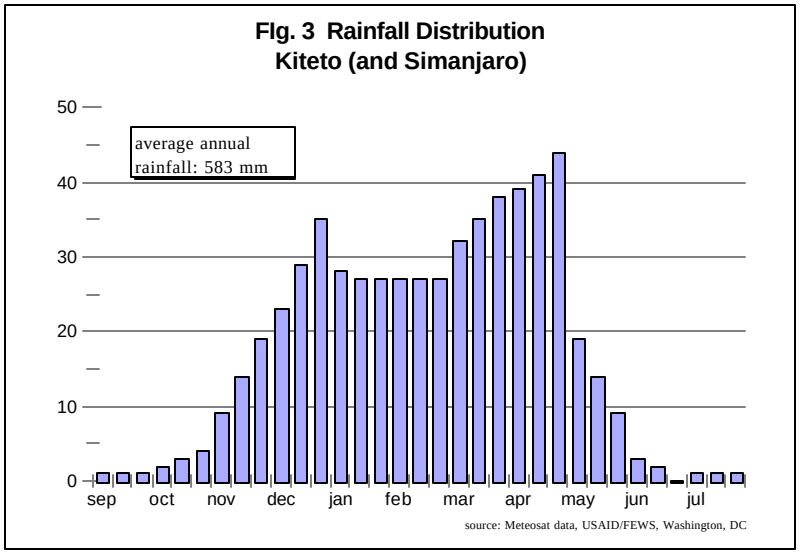


The Southern Pastoral Zone covers most of Simanjiro District and the northern half of Kiteto. Villages along the river on the far eastern border of Simanjiro, including Ruvu Remiti, and Oloiborsoit fall outside of the Southern Pastoral Zone, and are likely to be encompassed within a food economy zone found in neighbouring Same District. Similarly, we have excluded villages along the northeastern border with Hai District, including Lemkuna, Nyumba ya Mungu, Ngoruka, Magadini, Kirunani and Mbitu wa Tembo as the dam at Nyumba ya Mungu reportedly provides them with access to fish and other resources not available to the rest of Southern Zone pastoralists. In addition, five villages around the northern mining area of Meserani, including Kambi ya Chokaa, Naisinyai, Shambarai, Kilombera and Olbil are likely to be different from the rest of the Zone, as they contain a higher concentration of non-Maasai (mostly Wa-Arusha) tribes. Analysis of these villages should be considered at a future date.

All villages north of Kibaya town in Kiteto District are included in the Southern Pastoral Zone, as well as all villages in Naberera Division in Simanjiro. The description of livelihood patterns which follows applies to typical bomas in this area: it must be noted, however, that this particular description will not apply evenly in all parts of the zone. For instance, there is likely to be a higher concentration on agriculture in the northeastern corner of the zone, and a slightly higher reliance on cattle in the far southern reaches; localized variations in agricultural potential from village to village will also modify the description slightly. However, the **basic** pattern of livelihood and the fundamental 'rules' underlying the pastoral system are applicable in all areas of the zone.

Setting

The Southern Pastoral Zone encompasses lowland plains between 400 - 600 metres. The main vegetation throughout the zone consists of acacia-commiphora, woodlands, bushed grasslands, and thickets. Extensive plains, dotted with acacia trees and large herds of wildlife provide the typical landscape. The short rains are expected between November and January, with longer, more consistent rains falling during the months between February and May. Average annual rainfall oscillates between 500 and 700 mm.



Land grabbing in the late 1980s and early 1990s, following new investment provisions passed during Liberalization, has led to a number of contentious court disputes.[10] For the most part, these disputes centre on claims by pastoralists that commercial interests[11] - large-scale bean and flower farmers, hunters, mining companies, ranchers and conservationists - have overstepped the bounds of their original land allocations and are infringing on the remaining land of the pastoralists.[12] Diminishing resources have clearly played a central role in shaping the current context of the Southern Pastoral Zone, in both negative and positive ways. On the negative side, loss of prime pasture lands has strained a livelihood system that pivots on access to grazing and scarce seasonal water sources.

On the positive side, as evidenced by the legal actions themselves, this pressure to establish claims on land has created a new awareness among pastoralists in Simanjiro particularly - and they in turn have risen to the challenge and vigorously defended their rights. Through resistance against encroachment, new knowledge about rights and opportunities has grown. This new awareness, combined with an increasingly poor livestock market, encouraged most to begin claiming land themselves, and to begin cultivating to cover subsistence requirements.

---

[10] Anna Mgwira, a lawyer working with Oxfam in Arusha on a number of pastoralist claims.

[11] The majority (estimated at around 60%)are owned and operated by foreign corporations.

[12] Our informant estimated that the land remaining in pastoralist hands for the following Districts is as follows: Monduli: 15% pastoralist, 85% in commercial interests; Loliondo Division: 33% pastoralists, 66% commercial interests; Simanjaro: over 100,000 of the total available land in Simanjiro owned by commercial interests.

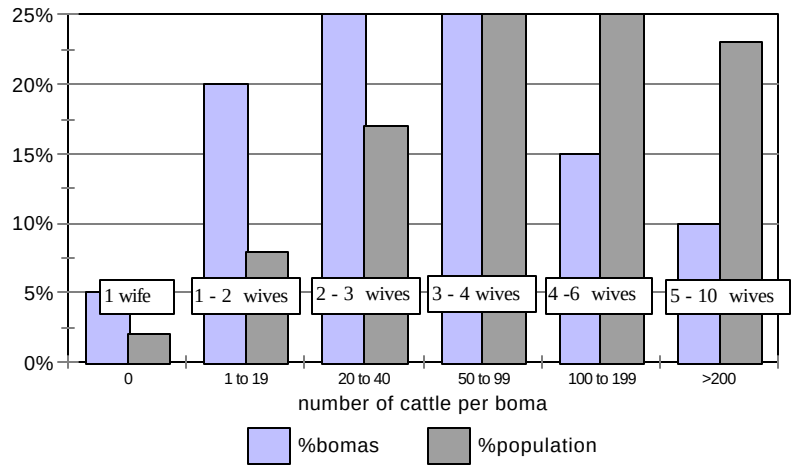
Wealth breakdown

In Maasai communities, cattle ownership and family size are the major determinants of wealth. The more cattle a man owns, the more wives he is likely to marry, the more children he tends to have and the bigger his boma.[13] Western thinkers may find this puzzling: surely limited resources shared among many people decreases individual wealth; but one Maasai elder put it this way: "A man with a lot of food but no one to eat it is not rich"[14]. The Maasai term which applies to a rich boma, *Orkasis*, combines material wealth with status, and effectively means that you have a lot of cattle **and** a lot of children. *Ortajiri* is a term used for those who have a lot of cattle but a small family, in which case, although food secure, the boma is not really 'rich' in local terms, and is not viewed as prestigious by the community.

Children are not just status marks, however, as significant economic benefits may accrue with having a large family. When girls marry the parents are paid in cattle; in addition, older sons may earn substantial income of their own, channeling it back into the boma later; they provide a kind of insurance policy, delivering support and assistance to elderly parents.

The wealth breakdown above presents the percentage of the total zone falling into different

Fig. 4 Wealth Breakdown:
Southern Pastoral Zone -1999



wealth categories, defined both in terms of cattle numbers and number of wives. Because in general, the number of people in a boma depends on the cattle wealth of that boma, both the percentage of bomas in the zone as well as the percentage of the population falling into each wealth group is presented.

[13]The boma is the fundamental economic unit in Maasai society. A boma is a physical settlement comprised of a man, his wives, their children and their associated livestock.

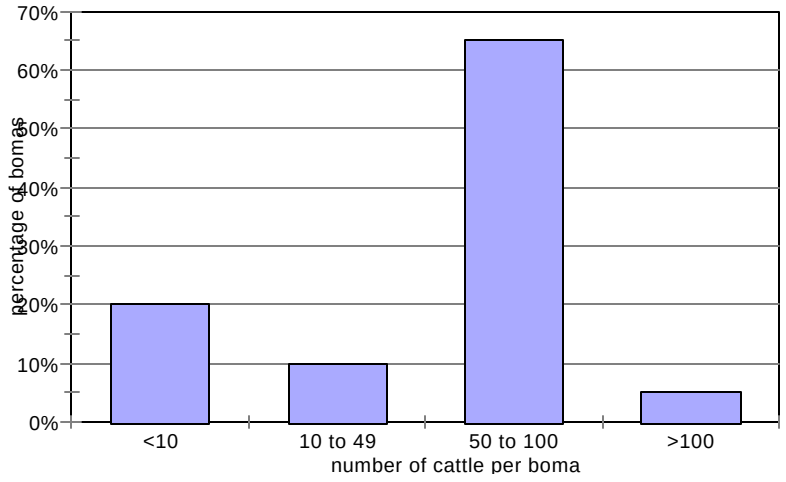
[14]Maasai elder in Kitwai village, Simanjiro, May, 1999

This positive correlation between cattle ownership and boma size challenges the traditional assumption that access to food increases in direct proportion to wealth. In fact, a middle Maasai man with two wives and 50 cattle will have just as much *food* as a rich Maasai man with 200 cattle and 8 wives. The number of milking cows in relation to wives is the same in both cases.

The major difference (aside from status) is the viability of the herd: in other words, the man with 200 cattle is far safer than the man with 50 cattle since he can dramatically increase the absolute size of his herd through natural herd reproduction alone, whereas the man with 50 cattle tends to have a lower rate of natural increase and is closer to the 'viability threshold', or the margin separating those who (if reliant on herd reproduction alone) are likely to lose cattle from those who are likely to gain cattle. This threshold is widely accepted amongst our pastoralists informants as being around 50 cattle.

Traditionally the man with 50 cows was more vulnerable to external shocks than the man with 200 cattle. **However, the present means that 'poorer' pastoralists in the Southern Zone have for protecting themselves from this vulnerability is precisely what distinguishes this zone from other pastoral areas**. Although cattle ownership signifies wealth, it has not been the engine of economic growth in the Southern Pastoral Zone during the past five to ten years; instead, sales of surplus crops and remittances from mining generate the majority of income. These alternative sources of income have led to increasing growth in the Southern Pastoral Zone, as a comparison between the wealth breakdowns in Figures 4 & 5 illustrates. In essence, those with fewer cattle *before* 1996 have found the means of establishing viable herds, and those who already had viable herds have managed to maintain their wealth, despite a reportedly bad year in 1997.[15]

Fig. 5 Wealth Breakdown: Southern Pastoral Zone - 1996



source: SCF-UK RiskMap report, September 1996

[15] A comparison between the two graphics indicates that more bomas currently have over 100 cattle, but a larger percentage have fewer than 50 - this is explained by the fact that a large proportion of the population is young, reflecting a skewed age distribution. Based on our findings, this population is transiting quickly through this stage in their process of wealth accumulation, but it will always be a relatively significant category, because of the

This trend has inspired a curious phenomenon: poorer bomas earn/generate more cash income (per capita) annually than richer bomas. The explanation for this phenomenon is that richer bomas need only enough cash to cover boma expenditure requirement and they can count on cattle sales alone to obtain this income. Poorer bomas, on the other hand, are striving to obtain more cattle, and need to earn enough cash to cover minimum boma expenditure requirements as well as to purchase cattle. The result is that poorer bomas quickly move out of the lower wealth categories; in other words, the lower category represents a transition group, comprising mostly young men and women who are moving up the wealth scale. Older people who no longer keep as many cattle may also be represented in this group, but most of this latter group tends to be supported by their younger relatives or the wider clan and are not considered an economic category on their own.

A Normal Year

The general picture presented in the report below describes a typical pattern of access to food and income for Southern Zone pastoralists in a normal year, or a year like 1996. 1996 was widely considered the last 'normal' year by informants in the Southern Pastoral Zone. 1997 was a very bad year; and 1998 was in many cases too good to be considered *normal*.

The basic argument for the southern pastoral zone is that crop production and mining generate substantial income for poorer bomas, allowing them to build herds quickly and sustain/regain significant numbers of cattle in the face of periodic drought or disease outbreaks. Thus, poorer bomas concentrate heavily on agriculture and mining, whereas those at the very top of the spectrum concentrate almost exclusively on livestock to obtain food and income.

To illustrate these points, analysis (including normal year sources of food and income and expenditure patterns) is presented for four wealth groups: 1.) bomas with fewer than 10 cattle, 5 acres and one wife; 2.) bomas with 50 cattle, 10 acres and two wives; 3.) bomas with 100 cattle, 15 acres and 4 wives; and 4.) bomas with 400 cattle, 4 acres and 8 wives. These categories represent typical bomas along a continuum of wealth corresponding to cattle numbers and family size. The number of acres per wife (not per boma) reveals a steady decline in the importance of agricultural production after reaching a point somewhere around the 'viability threshold', between 50 and 100 cattle.

However, given the transitory nature of this zone, both in terms of external factors, such as available income opportunities, and in terms of internal movement between wealth groups, the following descriptions of wealth groups should be considered as snapshots meant to illustrate important points about the livelihood system operating in the Southern Pastoral

---

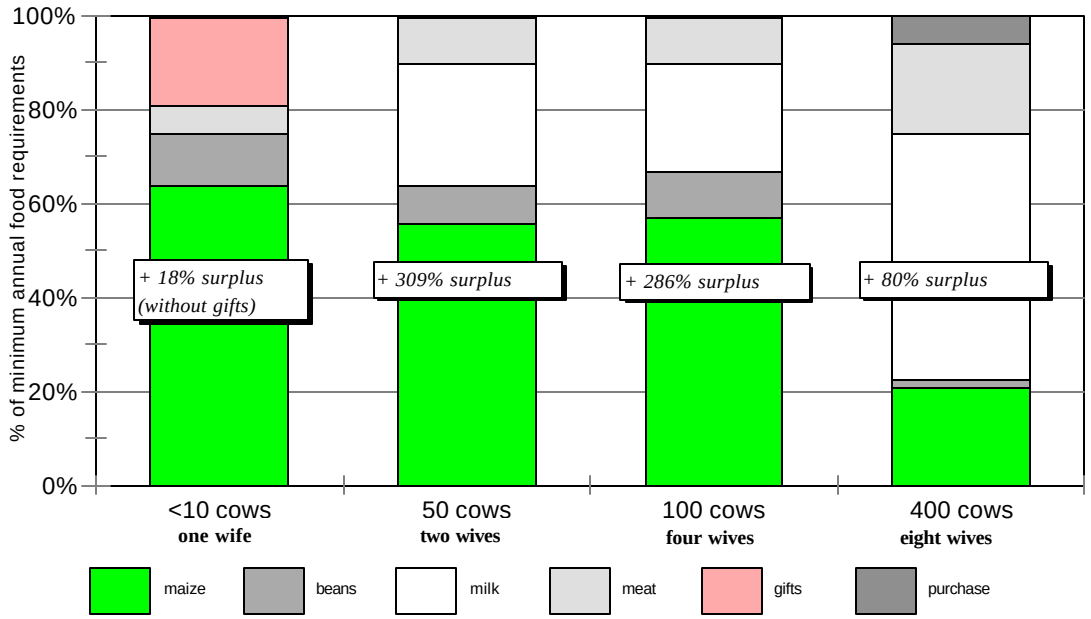
geometric population growth rate.

Zone, rather than absolute and static statements about how things are. It is likely that any current description will soon be overrun by one or more of the dynamic changes taking place in this zone.

Sources of Food

The traditional pastoral diet, consisting of seasonal fluctuations in the consumption of milk, purchased grain, meat and occasional blood no longer describes the typical pattern of access to food amongst Southern Zone pastoralists. Nowadays, production of own crops (maize and beans) supplies the major component of the diet in almost all wealth groups (with the exception of the very rich, who continue to purchase part or all of their grain). Milk and meat still play a substantial role in the pastoral diet, although they tend to supplement rather than dominate the diet now. The current pattern of access to food in a normal year is illustrated in the figure below.

Fig. 6 Annual Sources of Food: Southern Pastoral Zone - a normal year



The surplus in the above figure represents food produced above minimum consumption requirements, based on a household mean of 1900 kcal per person per day, including crop, milk, and meat production. There are two reasons that surplus production decreases after a certain level of wealth, and therefore appears smaller for 400-cattle bomas than for 50-cattle bomas. First, as explained later, bomas with more cattle wealth tend to cultivate less, and therefore produce less surplus in terms of crops. Second, these richer bomas have more mouths to feed, and although produce more milk and meat, consume more as well.

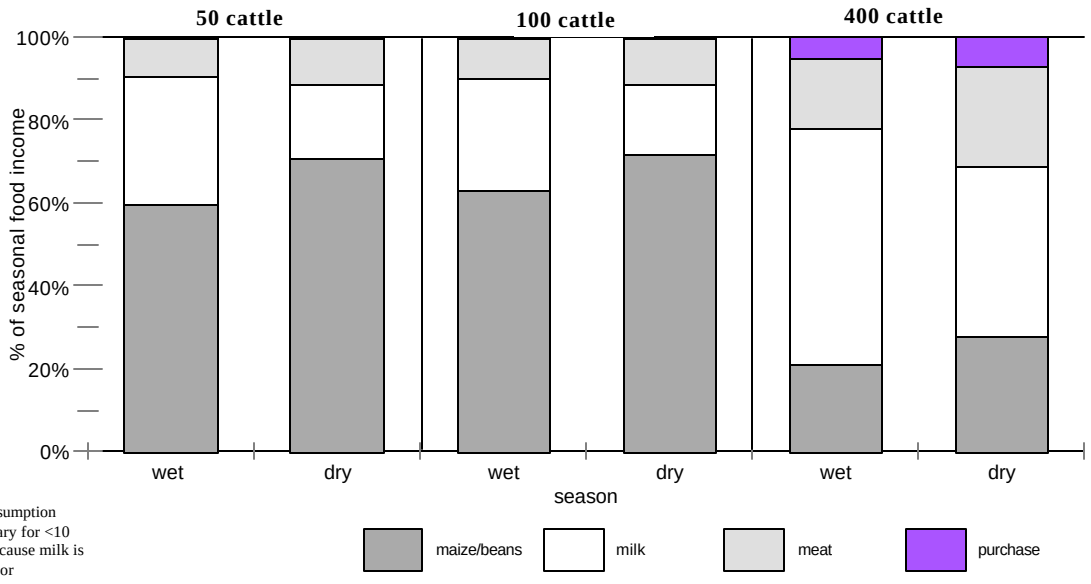
Food is managed at the household level. Each wife is allocated a particular number of

cattle for which she is responsible; the milk from these cattle is fed to her children and any surplus is sold or given away.[16] The husband distributes grain to each of his wives from a boma-wide store, and is required to purchase grain for the boma if the store runs short for any reason.

Before crop production gained prominence, grain consumption (from purchases) used to supplement milk production, increasing in the dry season to compensate for decreasing milk yields and receding in the wet season when milk was more available. The traditional pattern of seasonal fluctuation in grain consumption reflected an absolute limit on cash resources as well as a tendency towards the preferred food, which was milk.

Now, however, since most bomas grow their own maize and tend not to purchase in most years, grain is available on a more reliable basis and is consumed throughout the year more consistently. Since eating grain is not tied to selling a cow, it is now a more acceptable and standard part of the annual diet. There is still a slight seasonal variation in grain consumption, reflected in Figure 7, but this indicates a relative increase in milk

Fig. 7 Seasonal variation in food consumption: Southern Pastoral Zone



availability during the wet season, rather than a substantial decrease in access to grain. Milk still provides the primary source of food for young children and older boys and men continue to drink large amounts of it (both fresh and curdled), especially in the wet season, when yields are highest.

[16] A standard milk yield for wet and dry seasons was used in the analysis: 1 litre/cow/day in the dry season (including both morning and evening milkings) and 2 litre/cow/day in the wet season (both milkings). The wet season was calculated to last 210days (7 months); the dry season 155 days (5 months).

The roots of crop production

Crop production amongst the pastoralists of the Southern Zone dates back to the late 1970s when pastoralists were encouraged to settle and cultivate as part of the national villagization programme associated with Ujamaa policies initiated during the Arusha Declaration of 1967. During this time pastoralists were given access to seeds, tools and some extension support. However, crop production did not begin in earnest until the 1990s, when pastoralists began to see a steady decline in livestock prices in relation to grain prices. Relying exclusively on cattle sales to obtain grain made less and less economic sense in an environment where grain prices were steadily rising over time and cattle prices were not always keeping pace.

The early 1990s also coincided with increasing land pressure associated with an intense period of land grabbing by large multinational interests and the sale or allocation of huge tracts of traditional grazing land to various capital interests, including large bean and flower farmers and private hunters. The loss of grazing land which resulted during this period created a renewed sense of urgency amongst pastoralists, who saw crop production as a means of securing access to land, as well as a way of offsetting the need to sell cattle.

Almost all pastoralists in the southern zone cultivate at least some land at the moment, primarily planting maize and beans. Both crops are planted for food and commercial purposes, although beans are a higher value crop, and tend to be sold more extensively. Tractors are a common sight, as well as ox ploughs. Labour for cultivation is hired from the neighboring areas, particularly Dodoma and Singida Regions, as the Maasai still concentrate most of their labour force on livestock husbandry.

Sources of Income

Crop production, cattle wealth and cash income

As a general statement, there is an inverse relationship between how much a boma cultivates (per wife) and how many cattle it owns. This is particularly true at the extremes: young bomas with few cattle cultivate as much as they can, whereas older bomas with hundreds or thousands of cattle cultivate very little, if at all.

However, this relationship does not always hold true for the middle and lower categories: a boma with 100 cattle and 3 wives may be cultivating more than a boma with 10 cattle and 1 wife because it has the capacity to hire more labour and because it is pushing hard to increase its herd to a more comfortable “milking cow to wife” ratio. As a rule, though, **what is particular about the Southern Pastoral Zone** in relation to the other pastoral zones is that **cultivation is used as a means of increasing cattle wealth**, and since those with the fewest cattle will be working hardest to obtain more, they also tend to be the ones cultivating the most.

Two reasons underlie the tendency to cultivate less land with the accumulation of more cattle: 1.) Above a certain threshold (around 300 or 400 cattle) a boma’s cattle herd naturally reproduces at a rate sufficient to ensure that its needs are fully met in most

years, and there are enough 'surplus' cattle to provide for a safe margin of loss in a bad year. It simply does not make sense to expend energy on cultivation for the purposes of increasing cattle numbers incrementally when calving rates alone ensure 100 new cattle or so every year;

and 2.) it requires a great deal of time and energy to care for 400 cattle. The dry season is particularly difficult, as the men travel long distances with the livestock to find grazing and water. During the wet season, when the herd returns, the animals occupy less labour time, but as one elder stated: "not only is it difficult to cultivate more than ten acres when you have a lot of livestock, but there is little point in doing so".[17]

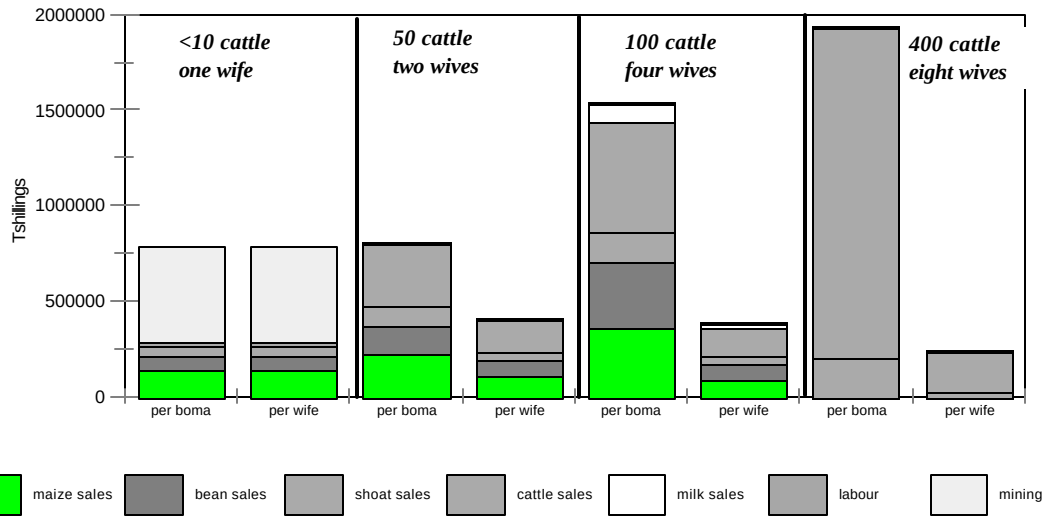
Those without livestock, therefore, have the time, energy and motivation to maximize the amount of land they cultivate. But one might ask, since they are 'poor', how do they obtain the resources to cultivate large tracts of land? A typical young Maasai man borrows plough oxen from his father and, joining together with one or two men in his age set, prepares large areas of land for each of them. They receive financial assistance from relatives to hire labour for the first year until they garner sufficient resources to hire on their own. It is not unheard of to find one man cultivating up to thirty acres; however, five to fifteen is far more common.

The returns in a normal year can be quite profitable. One elder explained a typical scenario to us: with 20 acres you can easily harvest 20 sacks of beans. With one wife and one child, you keep five sacks for home consumption and seed, and sell 15 bags, each at 35,000 Tshillings. *Your gross income is 525,000 shillings from which, after subtracting the cost of inputs and other expenses, you could comfortably buy 20 cows in one year.* In three years, therefore, a man relying on agriculture alone can build his herd from 0 to well over 60 cattle.

Thus, paradoxically, cash income from crop sales is higher for 'poorer' pastoralists than for 'richer' ones. Figure 8 depicts sources of income for the lower end of the scale within each of these boma types. The lower end is illustrated in order to reflect an average picture for the zone as a whole, including both the higher production areas in the northwest of the zone and the lower production areas of the south. It is also worth noting that, since bomas in the higher wealth categories contain more people, it is misleading to compare income for one wealth group to another without standardizing it per household (or wife); therefore, both boma income and household income are shown.

[17] Elder with 2,000 cattle, Loiborsoit village. Ten acres with 8 - 10 wives is a relatively small amount of land per person in the boma.

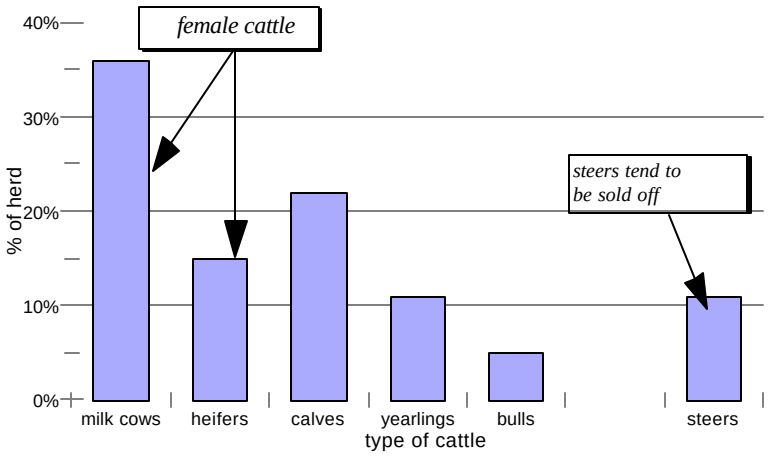
Fig. 8 Annual Sources of Income
Southern Pastoral Zone - 'normal' year



Livestock Income

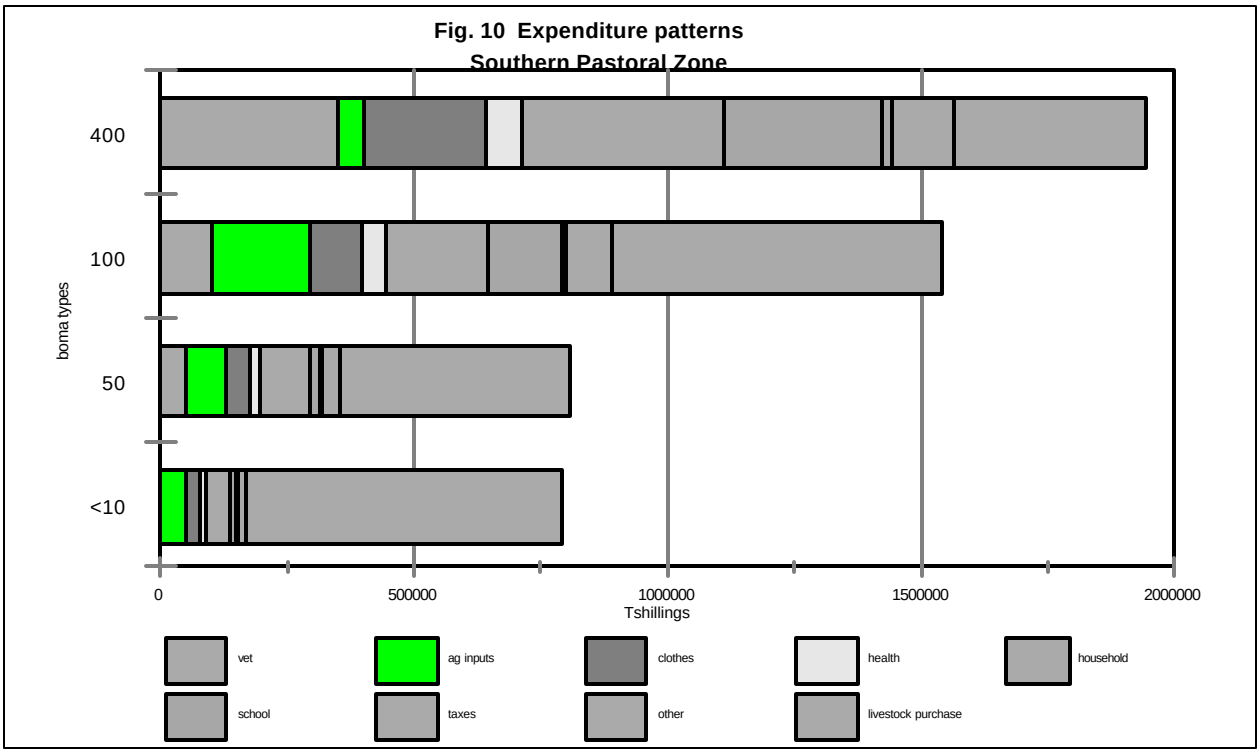
It is clear in Figure 8 above that livestock sales as a source of income increase in direct relationship to the number of cattle owned. Cattle are sold for two reasons: 1. To maintain a desirable herd composition; and 2. To raise cash for immediate expenditure requirements.

Fig. 9 Typical Maasai Herd Composition



A typical Maasai herd is female heavy, to maximize both milk production and livestock reproductive rates. Figure 9 illustrates this tendency. The bars on the left half of the chart (the milk cows and heifers) make up 50% of the total herd. In addition, around half the yearlings and the calves will be female, comprising an additional 16%. To keep this balance, boma leaders sell off the majority of steers each year, and weed out additional cattle that reduce the herd's vitality, such as old bulls or unproductive females.

Since richer pastoralists have to sell more steers (in absolute numbers) to keep the herd desirably weighted, their income from cattle sales will naturally be higher than poorer pastoralists. A herd of 400 cattle, for instance, contains on average 35 - 45 unproductive steers, most of which will be sold at some point during the year. The money from these sales will be used in part to cover minimum requirements for the boma (food, household items, school fees, etc.), and in part to purchase younger female cows. Typical expenditure patterns in most years for different boma types are presented in Figure 10, below.



Cattle make up only part of livestock income, the other part deriving from shoat sales and milk/ghee sales. In general, the poorer the boma, the higher the relative importance of shoats as a source of livestock income. Traditionally, shoats played an important role in building cattle herds. Two or three goats could be sold to purchase a small cow. But in addition, sales of shoats allowed the boma to raise cash without selling cattle. With growing reliance on other avenues for building herds (crop sales and mining), shoats may no longer play as important a role in building an initial cattle herd. However, as shoat herds reproduce quickly, doubling every two or three years (if left unhindered), they continue to provide a steady and dependable source of income once the herd is established.

Mining income

Mining makes up a significant portion of 'poor' boma income, playing much the same role as crop sales by providing a relatively fast track to obtaining a viable herd. (See Figure 8.) At least one man from every poor young boma typically goes for six months to a year to the mining areas in the north of Simanjiro, where he tends to make money through various

forms of petty trading. Reportedly, it is unusual to find Maasai men digging in the mines; instead they act as go-betweens for the miners and the traders. Men from all over Simanjiro, Kiteto and beyond travel to the mines in Meserani. The typical income derived from a 12-month stint can be as high as 1,000,000 Tshillings, well above the minimum required for starting a healthy herd.

Only those from the poorer categories tend to work in the mining areas, as this type of work is not desirable and requires men to be away from their families for long periods of time. In addition, most limit their work in the mines to one or two years only, just long enough to raise enough money to buy their 'starter' cattle.

Implications of the new sources of income

Cattle form the foundation of Maasai society. Traditionally they were the main source of food (as milk, meat and blood) and cash (to purchase grain and household goods), and the only means of savings and investment (a kind of bank). In addition, they provided an important social adhesive helping to settle disputes, bind marriages and strengthen complex social networks. Thus, a young Maasai man was not considered a full member of his society until he owned and managed his own herd. Traditionally, young men received small numbers of cattle from their fathers to begin their adult lives; a herd would increase or decrease depending on the management skills of the young man and the vagaries of the weather.

With the recent infusion of significant cash income from mining and agriculture, herds are acquired more quickly, and more independently. There are a number of implications to consider regarding this recent trend.

On the positive side, it takes less time and fewer community resources to obtain a viable herd. Since 'starter' cattle used to come from within the community, and now tend to be obtained from outside, there is less of a drain on community resources and ultimately an increase in the community's total wealth. As discussed later, because of traditional sharing mechanisms, the wealth of the whole community is the most appropriate measure of food security in Maasai society, and thus an increase in total wealth corresponds to an increase in every boma's food security.

However, it is worth asking at what price this new wealth is attained. What are the implications of mining and crop income for traditional social bonds? Will these new means of acquiring cattle undermine traditional patterns of rights and obligations? Are the new sources of income held accountable to the traditional sharing practices? In other words, even though the community's total resources appear to be flourishing, will the traditional bonds that ensured 'emergency' access and support to the needy continue to function?

A Bad Year

Bad years in pastoralist societies tend to correspond to years of poor rainfall (which affects

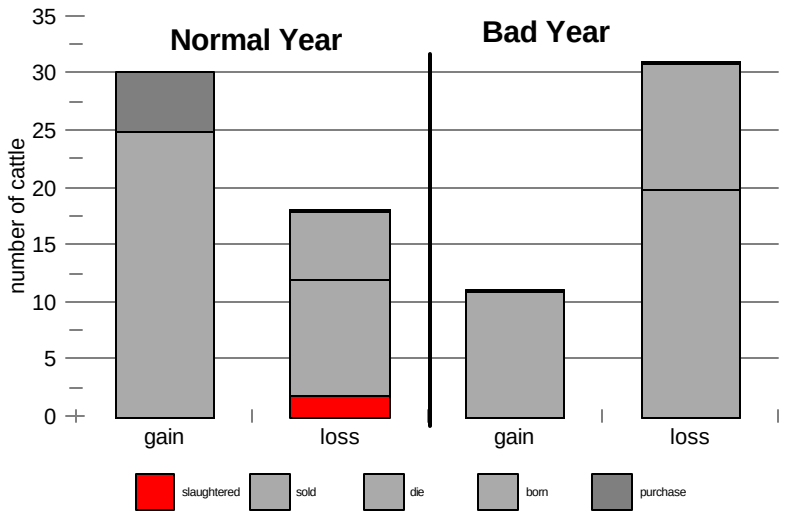
grazing) or high disease incidence. Often the two are related, since reduced grazing opportunities lead to increased disease outbreaks when animals concentrate around available watering or grazing patches or as the reduction in pasture leads to weakened livestock condition and heightened susceptibility to sickness.

Herd sizes decrease for two main reasons: 1. Increased numbers of cattle die from disease or under extreme conditions, starvation; and 2. Increased numbers of cattle are sold to cover proliferating cash needs in a bad year. Cash requirements swell because more grain is purchased in a bad year (to make up for both a loss in production and a loss of milk due to lowered milk yields and cow deaths) and often health and vet expenditures increase. Terms of trade tend to be unfavorable as well, forcing pastoralists to sell more livestock for the same amount of grain.

It is difficult to calculate a standard rate of loss in a bad year, since this rate is determined by a number of variable factors, including just how bad the year is, how many cattle die naturally, or are sold, slaughtered, born, purchased, given away and received as gift. The rate of loss is also likely to be different for different wealth groups, depending on each group's capacity to protect its herd with vet services or through long-distance migration.

However, as a starting point, it is possible to estimate that the normal year increase for a herd of 100 cattle will be around 12 cattle; whereas the loss in a bad year is likely to be closer to 20 cattle.[18] Figure 11 depicts this process[19].

Fig. 11 Herd increase/loss rate



Of course, the herd gain/loss rate depicted in this figure assumes no additional sources of income to augment purchases in a bad year. Mining income, however would tend to reduce the rate of loss in a bad year, since cattle could be replaced quickly. In addition, crop production (even if it is less than normal) would reduce the need to purchase all of the boma's grain, therefore reducing the amount of cattle sold. Paradoxically, these alternative income sources tend to make poorer pastoralists (who exploit these options) more resilient

[18] Compiled from field notes from the southern pastoral zone.

[19] Gifts have been left out, as they tend to be reciprocal for this wealth group if you take into account both what is given out and what is received.

in bad years and less vulnerable to external shocks than richer pastoralists (who rely exclusively on cattle for income).

The role of clan assistance in a bad year

Those with particular problems obtaining food request assistance from their clan. These requests are almost never denied and it is up to the clan leaders to determine how the necessary resources will be obtained. Usually food is collected through a 'harambe' of sorts, with an appropriate contribution expected from all bomas that can afford to make one. The recipient is counseled by the clan leaders on how to avoid his circumstances in the future, and often required to prove that he is maximizing his income opportunities[20].

Providing assistance to those in need is not simply an act of good will: there is an obligation associated with being rich, because the richest members of the community spend the most communal 'capital'. For instance, grazing land, considered communal property, is a limited and very precious resource. Increasingly, constraints on cattle ownership are linked to a steady loss of grazing land. This trend, the natural consequence population growth, was magnified in the late 1980s and early 1990s when large commercial interests rapidly occupied many of the best grazing areas (also the most productive agricultural areas).[21] A boma with 2,000 cattle takes more than its fair share of grazing land. One way to return the profits to those who take less, is to assist them in times of need.

This form of community assistance is a vital part of Maasai society. Not only does it act as a safety net, catching those who falter one year, but it also tends to reinforce a standard of self-reliance in other years. In other words, in return for assistance, one is obliged to work as hard as possible to avoid a future shortfall. Continued community support depends on it.

Because deficits are absorbed by the larger community, the important determinant of food security in this society is whether or not a sufficient number of bomas have enough surplus to support the portion of the population that has a deficit.[22] [23]

---

[20]Key informants, Southern Pastoral Zone.

[21]One elder was particularly vehement about the current situation, challenging, you try taking your cattle to Nabarera (the site of the largest commercial bean farm in the District) and see what happens! .

[22]On this basis, the following equation has been devised as a useful measure of determining relative food security for pastoral areas: $Y_1 = X_2/ (X_2 + X_1\text{-}1) * 100$

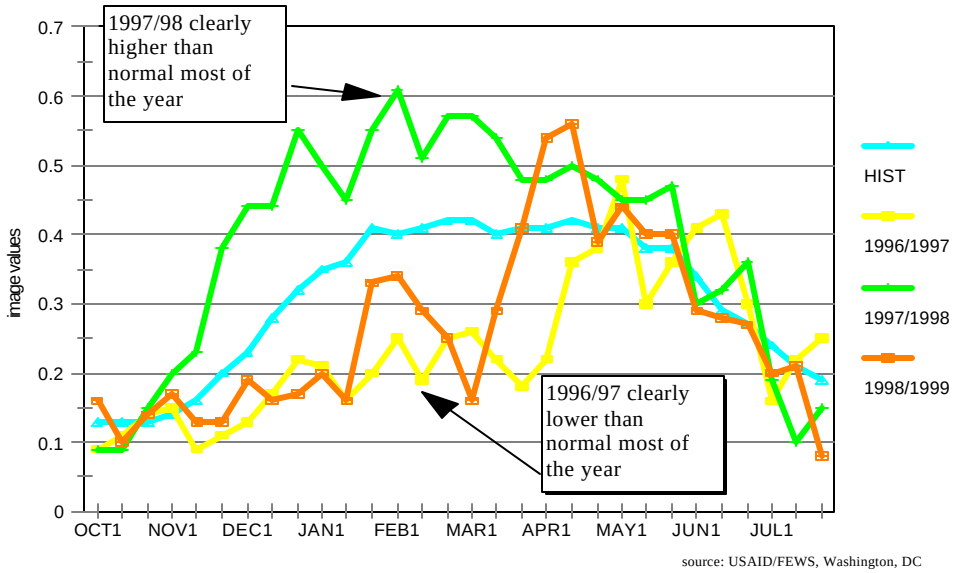
Where Y_1 is the proportion of the population required to be 'in surplus' in order to support the percentage of the population in deficit; and where X_1 (expressed as a % of minimum daily energy requirement, i.e. 1900kcal) represents the energy/food available for the proportion of the population with surplus food. and where X_2 (also expressed as a % of minimum daily energy requirement) represents the energy/food deficit for the population with a food deficit.

This Year

Although 1997 was considered a bad year in the southern pastoral zone, it has not left lasting effects. Recovery through increased crop production, aided by good growing conditions in 1998, has been swift, and few informants even mentioned it as having created significant losses in the first place. This resilience, or low vulnerability to external shocks, is related to the livelihood pattern described above: *crop production and mining income provide significant sources of income in normal years as well as a substantial buffer against loss in a bad year.*

Current year production
This year's production, according to official sources of data and our field informants, is

Fig. 12 NDVI - Kiteto (and Simanjiro)



likely to be significantly better than both 1996 and 1997.[24]

Because this area is experiencing a rapid phase of transition, with increased acreage under cultivation, and improved methods employed every year, one expects to see substantial increases in total crop production.

---

[23]Developed with assistance from Suleiman Mohamed, SCF-UK/WFP, Somalia.

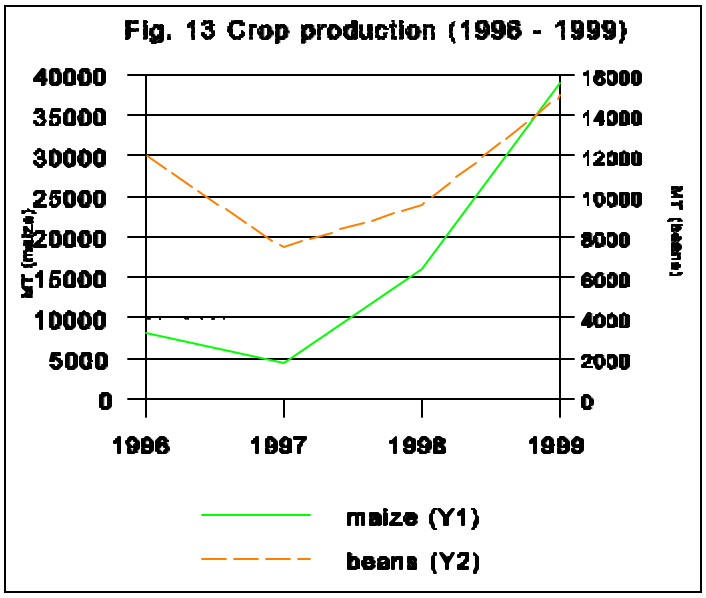
[24]Production figures from district HQ were questionable, with extreme variations in production (eg. bean prod. 1995: 65,000 MT; 1996: 309,600MT; 1997: 1097 MT; 1998: 12,000 MT). Therefore, a combination of FEWS figures and our field notes were used.

Table 1. Crop production - Simanjiro District[25]

crop	1995/1996		1996/1997		1997/1998		1998/1999	
	Ha	MT	Ha	MT	Ha	MT	Ha	MT
maize	8500	8000	3600	4320	8000	16000	13033	39094
beans	15000	12000	10500	7500	16000	9600	21977	14971

source: USAID/FEWS Dar es Salaam

According to the table above, the acreage under cultivation increased by around 50% from 1996 to 1999, and the yield per acre has at least doubled[26]. Therefore, the final 'problem' for maize production this year is 300% of normal (doubled yields x 150% increase in acreage under cultivation.) For beans, the current production is a function of an increase in the area cultivated (147% of 1996) times a slight reduction in yield (85% of normal) resulting in an estimated 25% increase in normal production.



Current year prices

District Headquarter prices were used to derive both the food price problem and the cattle price problem; there were no prices available for shoats, so the assumption was made that the same price problem applied to both cattle and shoats. The actual prices and this year's problem (expressed as a percentage of normal - or 1996 production and prices) are presented in the tables below.

CATTLE PRICE PROBLEM

February 1996	130000	1999 price is 35% of

[25]Kiteto figures were available, but it was feared that they were more a reflection of production in the southern, non-pastoral areas. In any case, the Kiteto figures suggest an even larger increase in production - well over 400% of normal and would only have served to make this year look even better than it does using the Simanjiro figures alone.

[26]FEWS figures reflect an increase in maize yields (per acre) from 376 kg per acre in 1996 to 1200 kg per acre in 1999. 1200 kg per acre is an unlikely figure as an average, given the fact that bomas inter-crop maize with beans and do not use improved inputs for the most parts. However, according to our field information, it is more than likely that yields could have doubled, and 752 kg/acre is a very reasonable estimate for this year.

February 1999	45000	1996 price 1999 price is 47% of 1996 prices	**Average price problem this year for livestock is 41% of normal.** *Source: Simanjiro District headquarters*
May 1996	80000		
May 1999	37500		

FOOD PRICE PROBLEM

MAIZE		
February 1997*	2000/tin	1999 price for maize is **200% of 1997 price.** * February 1997 prices are used, because this is the time when people would normally purchase (linked to 1996 harvest).
February 1999	4000/tin	
BEANS		
September* 1996	2500/tin	1999 price for beans is **200% of 1996 price**. *Source: Simanjiro District headquarters*
May* 1999	5000/tin	

* (Sept 1998/May 1999) were used to estimate the price problem for beans as September prices (when people normally sell their beans) were not yet available at the time of this assessment. May prices were the most recent ones available, and the assumption is that May prices will reflect (at least in part) the trend for the coming season. This price problem can be changed as the relevant information becomes available. The price problem for maize is also an approximation, since it is impossible to estimate what prices will be in January 2000, but February prices were used, because that tends to be the time of year when people purchase grain.

Current Year Analysis

The price information above indicates a serious loss in purchasing power for pastoralists in the Southern Pastoral Zone. Whereas the sale of one average bull at around 105,000 Tshillings (average price between February and May prices in 1996) would have raised enough cash in 1996 to buy 8.75 sacks of maize at the time of highest grain prices for that agricultural season (February of 1997), the same sale now would only cover the cost of 1.7 sacks of maize. This rapid decline in terms of trade would be particularly worrying if most pastoralists in the area still relied exclusively on grain purchase to cover annual maize requirements.

However, an analysis of the current year's production and prices in relation to normal year (1996) conditions reveals that even poorer pastoralists are likely to have more than sufficient access to food this year. Even though prices for livestock are very low in relation to grain prices, high food production and a wide margin of 'expandability' for rich household who do not cultivate has offset any deficit which may have occurred.

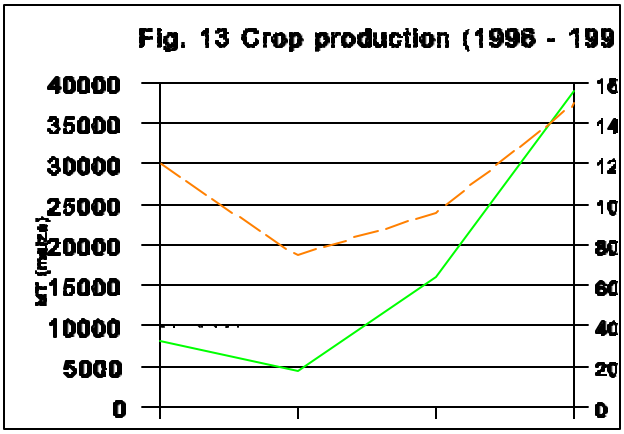
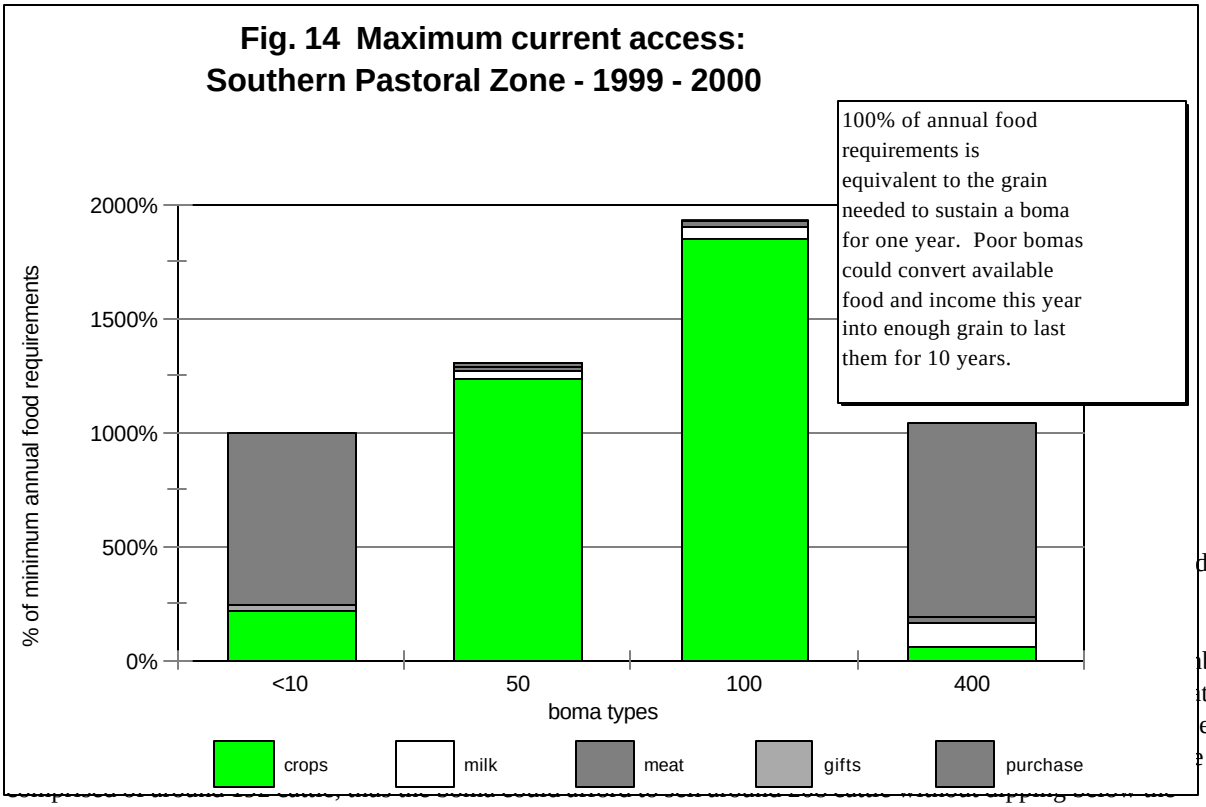


Figure 14 presents maximum access this year (or the total amount of food bomas in each category would be able to produce or purchase if they maximized all their resources).[27]



dard

ber
ttle
each

threshold established above.

Expandability of goat sales was more difficult to establish, as there is no specific reference point for the viability of goat herds. However, the assumptions we made were that since goat herds can double in two to three years - new kids are equivalent to around 50% of herd each year if they aren t managed at all, then it is possible to sell off significant numbers of goats without jeopardizing the long-term viability of the herd. With higher numbers of goats (say, above 50) we assumed you could sell at least 20 or 25 if necessary. With lower numbers - say, around 15 - you wouldn t want to sell more than 5.

Clearly this figure represents a hypothetical proposition (in that bomas will not be forced to maximize this access), however, the figure illustrates the point that pastoralists in the southern pastoral zone are more-than-sufficiently food secure this year[28].

Conclusion

Based on current harvest and grazing conditions, this year should not pose a food problem for pastoralists in the southern zone. On the whole, bomas are getting richer rather than poorer in this area. However, a number of important questions remain:

- How will the pastoralists' increasing reliance on agriculture affect the nature of current disputes surrounding access to productive land in Simajaro District? Because land is becoming increasingly valuable, not just for grazing, but also for agricultural production, it is likely that tensions will continue to increase. Working out equitable and sustainable solutions to these disputes clearly needs to be made a priority by policy makers.

- At what point will current grazing options be maximized? How much more room is there for increased herds, and what are the implications of this for future planning, particularly as it seems herds are increasing at the moment?

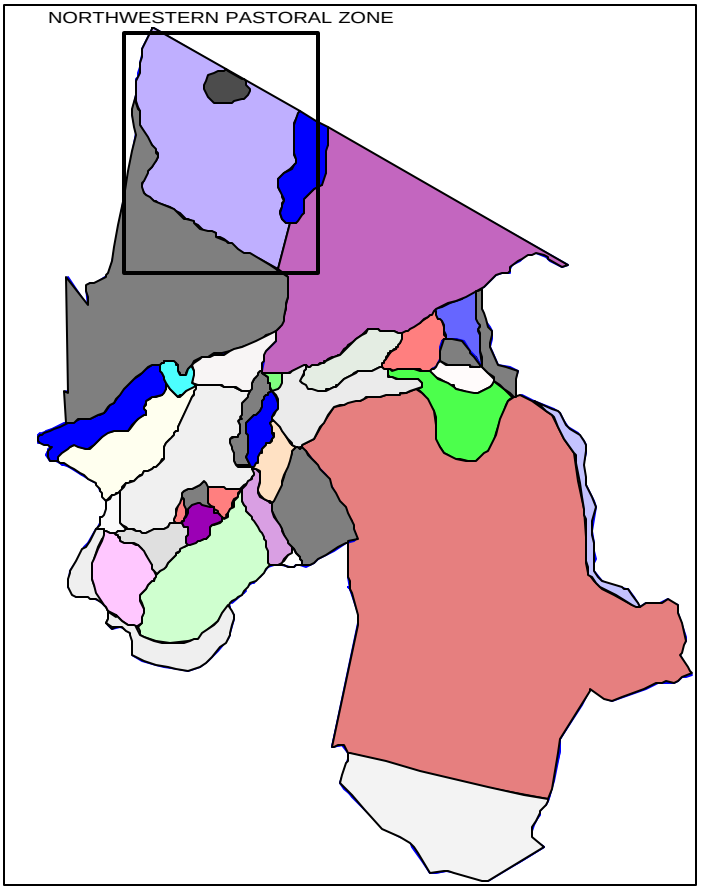
- How will the reliance on new sources of income affect traditional patterns of clan assistance? Will old patterns of rights and obligations associated with traditional means of acquiring cattle be undermined by new external sources of cash in the long run? Or does this new infusion of wealth just serve to make the whole community richer? If traditional means of support are undermined, what are the implications for future relief operations?

- Should agricultural extension services be more responsive to the fact that pastoralists have been cultivating (in some cases quite extensively) for years? What are the implications of this fact for other government planning and policy directives?

[28]No purchases are available for middle and upper middle bomas because their income from cash crops has been converted into food (shown in the own crops bar) and income from livestock sales is going to cover minimum non-staple expenditure, leaving nothing left over for purchase.

THE NORTHWEST PASTORAL ZONE

Location



The Northwest Pastoral Zone comprises most villages populated by Maasai in Ngorongoro District north of the Ngorongoro Conservation Area (NCA). The Songa, a small group of agriculturalists who live in an isolated circle of villages close to the central northern border,[29] are excluded from this zone. Also excluded are two Maasai villages close to Lake Natron: Ngaresero and Pinyiny (as their options are likely to be considerably different given the villages' proximity to lake resources and their distance from the Kenyan border markets)[30].

Although district officials reported significant differences between the production **potential** of villages located on the plateau close to Loliondo town (such as Engusero-Sambu, Sakala, and Olorien), and villages located in the lower plains (such as Oloipiri, Malambo, Losoito, and Sale), findings from the field suggest that these differences in potential have not necessarily led to significant differences in livelihood strategies. Bomas in all villages appear to practice a relatively similar pattern of reliance on crop production and livestock raising, and therefore the northwestern zone was not divided according to production potential, but left whole on the basis of actual practice.

It must be emphasized that the following analysis applies to villages outside the NCA only, since the Maasai living in villages within the conservation area are subject to a number of agricultural production constraints, and more importantly, they do not have access to the Kenyan market. Therefore, the food economy profile of Maasai living in the NCA is likely to be extremely different from the profile of those in the Northwest Pastoral Zone.

---

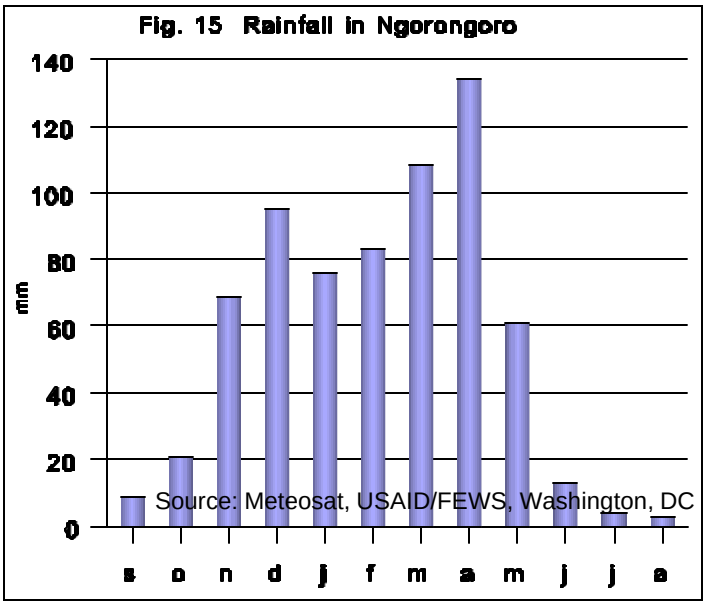
[29] According to district officials, the villages in the Songa zone are Samunge, Digodigo, Kisangiro and Oldanyo-Sambu.

[30] It is worth a visit to these villages to confirm whether these villages are in fact different enough to warrant exclusion.

Setting

The Northwest Pastoral Zone is situated in the central northern portion of Tanzania, sharing a border with Kenya to the north, Lake Natron and Monduli District to the east, the Ngorongoro Conservation Area to the south, and Mara Region (specifically Serengeti National Park) to the west.

The northern border areas, including the villages of Loliondo, Engusero-Sambu, Sakala, and Olorien, are located on higher ground, whereas the villages of Sale, Oloipiri, Losoito, Arash, Malambo and Piyaya are found in the plains extending northeastward from the Serengeti. Ololosokuwar, Soitsambu and Wasso lie in a transition zone between the higher plateau areas and the lowland areas.



Rainfall in the highland areas averages between 600 - 800 mm per year, whereas it can be markedly lower in the plains, averaging between 400-600 mm per year. The main rainy season is from November to May, followed by a dry season which lasts from June to October. In the lowland plains the vegetation tends to consist of open short grassland progressing to vast fields of rolling grassland interspersed with acacia woodlands in the higher areas.

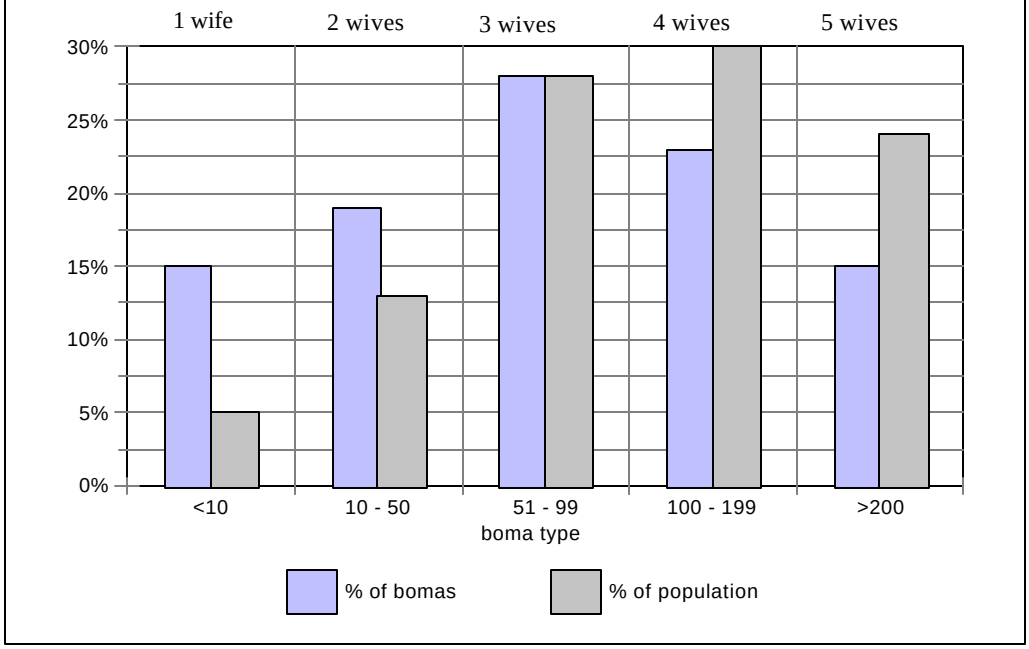
A permanent settlement in the highlands or lowlands does not restrict pastoralists' effective use of both areas. Herders seasonally move their cattle from highland to lowland grazing areas, exploiting the potential of each area at appropriate times of the year. Lowland areas tend to be rich in minerals, but grass cover is limited by the availability of rains; highland areas are lower in mineral content, but have greater moisture reserves, supporting grazing opportunities throughout much of the dry season.[31] Thus lowland pastures provide ideal wet season grazing lands, and highland areas offer sufficient forage in the dry season; movement between the two is an integral part of the annual cycle in the Northwest Pastoral Zone.

Wealth Breakdown

[31] Arhem, Pastoral Food System , pg. 8

Cattle ownership and boma (or family) size determines wealth and status in the Northwest Pastoral Zone, as in the Southern Pastoral Zone. However, whereas in the southern zone, the richest bomas had up to 10 wives, in the northwestern zone, the richest boma reportedly has no more than 5 - 6. But because the northwest zone has a slightly higher percentage of bomas in the >200 category, the percentage of population falling into each wealth category is quite similar between the two zones. In other words, both pastoral zones are relatively well off, with at least 70% of the population falling into bomas with 50 cattle or more.

Fig. 16 Wealth distribution: Northwest Pastoral - 1999



But unlike the Southern Pastoral Zone, wealth in the Northwest Zone is still generated almost exclusively by cattle ownership. Alternative sources of income, such as crop sales or mining, are not a significant means of establishing or increasing herds. Thus herds are built in the traditional way - through inheritance and careful management. What sets this food economy zone apart from others is its secure access to the Kenyan market. While pastoralists in the Southern Zone were selling their cattle for around 40,000 Tshillings in May of this year, pastoralists in the Northwest Zone are selling theirs for 250,000 Tshillings. Because the price differential is significant at all times between Kenya and Tanzania, the northwest pastoralist zone will always tend to benefit from its geographic location.

A distinction needs to be made between two categories encompassed within the lowest category (bomas with fewer than 20 cattle) represented in Figure 16. The first sub-group consists of very young men with one or two wives, just starting their herds; the second comprises older bomas that are ending their productive lives and tend to be supported by younger relatives. As a rule the second group is no longer economically active, and will not

be the focus of the current analysis. Further justification for their exclusion is as follows: if one includes all bomas with fewer than 50 cattle in this 'poor' category, it comprises around 24% of the total number of bomas, or 18% of the population (since these are smaller bomas). Given that the younger population is proportionally larger than the older population, we can assume that at least 75% of this category is comprised of younger bomas who are just starting their herds, which means that the older bomas in this category represent only 4.5% of the population. It is more appropriate to think of this poor category as an upwardly mobile transitory group rather than as static class of people.

Normal Year

For much of Tanzania, 1998 was the third in a purported series of drought years. The following excerpt from an Oxfam report on Ngorongoro District and parts of Shinyanga Region typifies the general consensus:

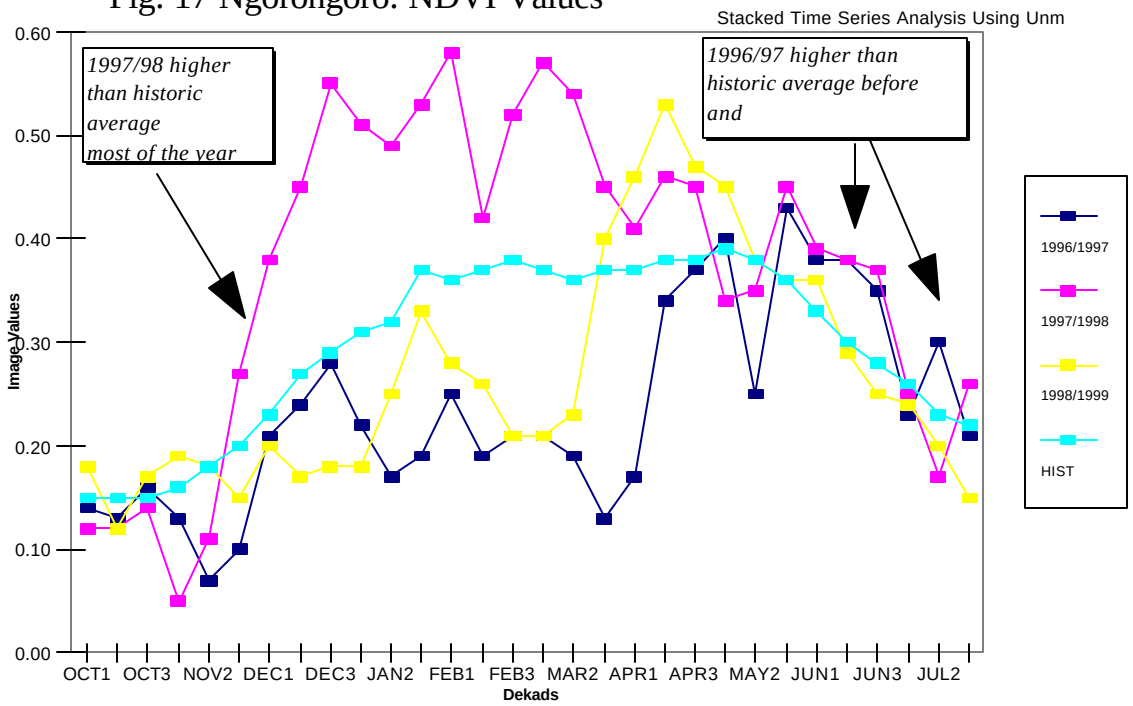
> *Tanzania is facing a food shortage for the third year in succession. In 1996, the short rains failed in most areas of the country. The following 'Masika' rains in 1997 came late and lasted for only a short time....In 1998 the El-Nino weather phenomenon caused unprecedented heavy rains and subsequent serious flooding*.[32]

Given the national trend, therefore, it may come as a surprise that pastoralists in the northwest pastoral zone claim that the 1998 harvest was the best they have experienced in the past 10 years. Consistent field reports in the Northwest Pastoral Zone suggest that 1997 was the last 'normal' year, with average yields of maize hovering around 8 -10 sacks per acre. In fact, for the purposes of the current analysis, it would have been mis-leading to characterize 1998 as 'normal' because it was too good a year, with average yields around 12 sacks per acre or even higher. NDVI images for the Northwest Pastoral area support the field claims, indicating far higher than average vegetation for June and July of 1998 - around the time of the harvest. See Figure 17.

Because 1998 was better than average and 1997 was reportedly a typical year, the following characterization of a 'normal' year refers to a year like 1997.

[32]Oxfam, Food Security Assessment: Ngorongoro District and Shinyanga Rural, Maswa, Bariadi & Meatu Districts, Shinyanga Region , March, 1999, pg. 6

Fig. 17 Ngorongoro: NDVI Values



source: USAID/FEWS,

The basic argument for the Northwestern Pastoral Zone is that crop production allows bomas to cover basic subsistence requirements, but it is not a means of generating significant wealth or income. Livestock sales generate the majority of income, and because the adjacent (and very strong) Kenyan market provides a consistent source of demand, this income is more than sufficient to cover minimum expenditure requirements. 'Surpluses' are re-invested in livestock, precipitating rapid herd growth. Crop production, therefore, plays an important role in offsetting expenditure requirements which frees up cash to devote to increasing herds.

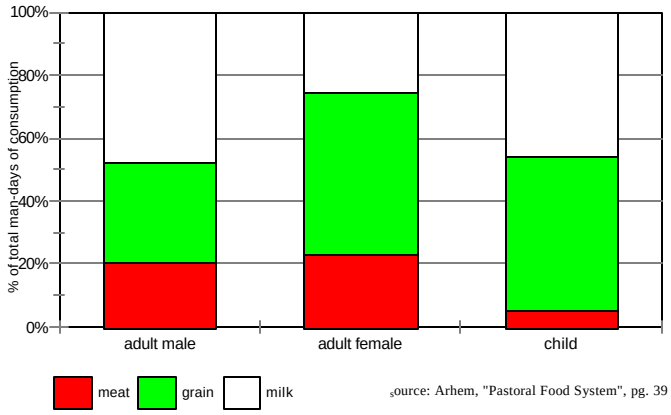
To illustrate these points, an analysis for the following three typical boma types is provided below: 1.) bomas with 20 cattle and two wives; 2.) bomas with 60 cattle and three wives; and 3.) bomas with 200 cattle and 5 wives. These bomas represent points along the wealth continuum (presented in the wealth breakdown above), and are meant to provide illustrative 'snapshots' of how pastoralists in the Northwest Zone obtain food and income most years. The 'rules' associated with the basic livelihood system described in reference to these typical bomas are relevant for the entire population in this zone.

Sources of Food

The typical traditional diet of a pastoralist in Ngorongoro consisted of maize, milk and meat. Figure 18 depicts food consumption profiles based on an intensive study of Ngorongoro Maasai undertaken in 1981.

In general terms the same pattern of consumption holds today; however, whereas the grain component illustrated in Figure 18 was **purchased** in 1981, it is now almost invariably **grown**. The traditional seasonal variation, based largely on changes in milk yields from wet to dry season, still exists, but to a lesser degree. Before the advent of agricultural practices, grain was purchased in the dry season to make up for seasonal shortfalls in milk. In a normal year now, however, grain tends to be available throughout the year, and thus is consumed more regularly during both wet and dry seasons.

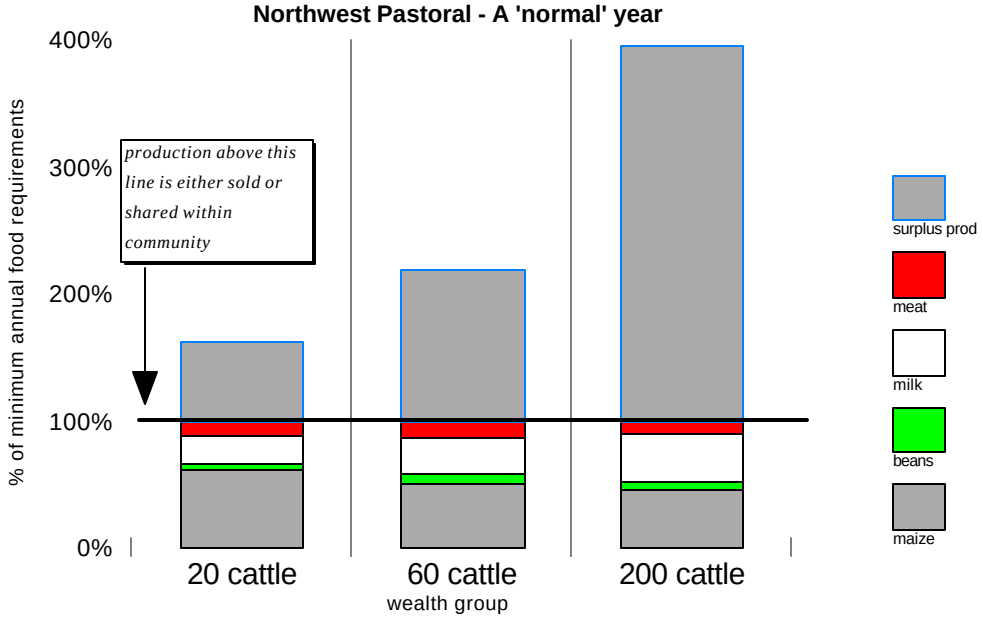
Fig. 18 Food Consumption Profiles: Ngorongoro Maasai - 1981



Source: Arhem, "Pastoral Food System", pg. 39

Figure 19 depicts current sources of food in the Northwest Pastoral Zone.

Fig. 19 Annual food sources now: Northwest Pastoral - A 'normal' year



The surplus in these graphs represents two things: 1. All groups produce a surplus above minimum food requirements consisting of not only crops (maize and beans) but also milk. Some of this surplus will be sold to supplement the income from livestock sales; and 2. Pastoralists in all areas interviewed appear to consume significantly more than the

minimum daily requirement in most years. A typical household[33] claims to be consuming 3 kg of maize a day, along with 6 - 12 litres of milk (depending on the season) and a variable amount of meat. Expressed as a percentage of minimum food requirements, this represents well over 150% of daily needs for a household of 5.

Sharing

What is not consumed within the household is shared with other households, both within and outside the boma. The practice of sharing is so much a part of Maasai life, that households appear to budget and plan on the assumption that they will be feeding not only themselves on a regular basis, but also numerous visitors, relatives and friends.

There are two types of sharing: reciprocal and non-reciprocal. The most common form appears to be reciprocal. In other words, any immediate surplus within the household tends to be shared out, but in the long run will be recovered when other households share their surpluses. Most commonly, sharing takes the form of joint meals, when visitors are invited to partake in meat, milk or grain. In the 1981 study by Arhem, the following rate of sharing was recorded for different foods: "Milk was shared out on 21 out of 29 recorded meal days, and grain was shared out in 12 out of 24 meal days...a level of sharing around 40% seems common in certain settlements."[34]

Thus it is fair to assume that at least some of the surplus recorded in the figure above is absorbed through sharing. However, not all of it can be explained in this way since, as Arhem claims, "If..equal attention is given to both sides of the sharing relationship it would seem that, over a long period of time, what is given away from a household is balanced out by what is received by its members from other households."[35]

It is possible to surmise that from an economic perspective sharing functioned traditionally (at least in part) as a form of long-term storage for perishable food items such as meat and milk. Rather than waste precious resources, surpluses were given away with the understanding that they could be retrieved when needed in the future.

Sharing also plays a role in building, nurturing and reinforcing social relations, which, in turn play an important economic role in bad years. Non-reciprocal sharing - or gifts - may be demanded at any time by clan leaders to provide assistance to bomas that temporarily fall below minimum subsistence or income levels. As described previously, this system of clan support reportedly functions throughout all Maasai areas, including the Northwest Pastoral Zone. These gifts arguably comprise at least part of the surplus presented in the figure

---

[33] A wife and her children within the boma - usually made up of around 5 people - or 6 on the occasions when the husband joins her.

[34] Arhem, Pastoralist Food System , p. 44

[35] Ibid, p. 44

above.

Crop Production
Crop production plays a different role in the Northwest Pastoral Zone than it does in the Southern Pastoral Zone. Whereas in the Southern Zone, Maasai pastoralists have recently begun to generate significant amounts of cash income through crop production, using it to help young bomas build herds, in the Northwest Zone, crop production primarily plays the role of covering basic food needs. Covering food needs and building herds are inextricably linked, however, since growing one's own food counters the need to purchase grain. Cash traditionally budgeted to buy grain is now used to purchase cattle.

In part, the lack of commercialization in relation to crops can be explained as a function of time. Crop production (as standard practice) in the Northwest Zone only began in earnest in the mid-1990s which means that the inputs required to produce significant surpluses are still minimal. Hired labour currently migrates from as far away as Singida and Dodoma, but these labourers are relatively few in number; improved seeds and inputs are expensive and difficult to buy locally; tractors are few and far between, and oxen are just now being trained to plough.[36]

More important, however, is that no obvious market exists for surplus crops. The major food markets in Tanzania lie far away in Karatu, Arusha, or Dar es Salaam over miles and miles of very poor roads. Traders are unlikely to come all the way to Loliondo to buy maize or beans. The influential Kenyan market is almost exclusively a livestock market. Surplus crops, therefore, would have to be sold locally, and for the moment local demand is too low to justify significant amounts of extra expenditure on labour and inputs.

Because crop production is used primarily for subsistence, the number of acres cultivated by a boma correlates roughly with the size of the boma: on average, 1 - 1.5 acres per wife. The main crops are maize, beans and occasionally pumpkins. Typical yields in a normal year are around 10 sacks of maize per acre and 1 - 2 sacks of beans. The boma, including all the wives and the husband, cultivate together, and the harvest is kept in a common store. The husband allocates around 10 sacks of maize and 1 or 2 sacks of beans to each wife to cover food needs for the year.

In addition, green maize and beans bridge an important pre-harvest gap when stocks from the previous harvest are beginning to run low, and the new harvest is still drying in the fields. The total contribution of own crops to food income for pastoralists in the Northwest Pastoral Zone ranges between 45 - 65%, with slightly more reliance amongst bomas with fewer cattle (and, therefore, less milk).

Milk and Meat Production
Access to milk depends on a number of factors including the number of cattle per person in

[36]Based on discussions with key informants in Olorien.

the boma, the percentage of milking cows in the herd, milk yields, and the boma's management practices (such as how many cattle are left in permanent settlement areas in the dry season or how much priority is given to suckling calves). Typically, however, for a boma with 50 cows and 2 wives, each wife would be allocated 5 - 6 milking cows for which she cares and milks according to her own household's consumption needs.

In the dry season, each cow produces around 1 litre per day[37] (including both morning and evening milkings), altogether providing 5 litres for the household, or approximately 33% of its daily minimum food needs[38]. Wet season yields are approximately twice as high, providing up to 10 litres a day or 66% of the household's daily calorie requirements. It is rare for a household to consume all of its own milk during the wet season, however and several litres may be sold or given away.

Meat consumption varies considerably, eaten at unpredictable occasions throughout the year. For the most part households eat meat when cattle or goats are slaughtered, or when livestock (excluding calves) die naturally. Livestock are slaughtered on rare occasions throughout the year: cattle are slaughtered for ceremonies (such as circumcisions) and medicinal purposes; goats are slaughtered more commonly, to celebrate and honor a visitor, to feed to women who have given birth, and in times of food shortage. It is estimated that at least one cow per year is slaughtered per boma (more for those with larger herds). Added to that, an average of 6% of the herd dies naturally and is consumed. For a boma with 50 cattle and two wives, this represents around 3 - 4 cattle, and up to 10 shoats. Converted into annual minimum requirements, this contribution makes up approximately 10 - 15% of the year's food[39].

Sources of Income

Livestock sales (including cattle, shoats and milk sales) make up 84%, 92%, and 100% of total income for 'poor', 'middle', and 'rich' bomas respectively. The significance of the Kenyan market is clear in these figures, particularly when compared to the Southern Pastoral Zone where the relative income from livestock sales for comparable wealth groups is 6%, 53%, and 75%[40] respectively.

---

[37] Based on pastoralist estimates as well as reference to the wider literature on milk yields among East African pastoralists.

[38] For a household of 5.

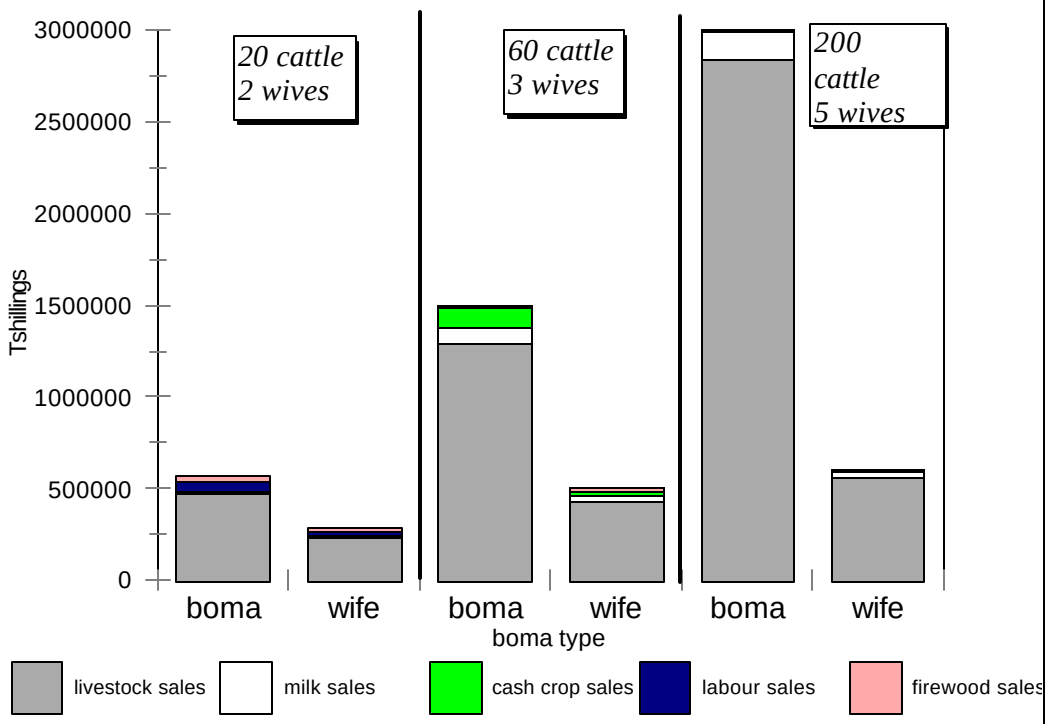
[39] Assuming that each cow s edible weight is 115 kg and each goat is 12 kg, the total meat available is 523 kg (taking 3.5 cows). 1900 kcal is equivalent to around 0.94 kg of lean beef. The calculation to derive % of annual food requirements is as follows: 523/.94 = 556 (person-days)/11(people in the boma) = 50 (boma days)/365 = 13.6%

[40] This figure was interpolated from the 100 and 400 cattle group, as we had no analysis for the 200 cattle bomas in the Southern Pastoral Zone.

Prices for an adult male bull at the moment range from 100,000-200,000 at the Wasso market. This market exports to Kenya, and ultimately Nairobi prices determine the price obtained locally. Higher prices can be obtained across the border in Kenya (150,000 - 250,000) and many make a monthly or quarterly journey northward to sell cattle, particularly when prices are highest at the peak of the wet season.

In normal years bomas with 200 cattle typically sell 1 - 2 steers per month and 3 shoats, grossing 2, 340,000 on cattle sales and 540,000 on shoat sales.[41] Bomas with fewer livestock naturally sell fewer cattle and shoats, although the number of cattle sold in relation to their total herds is actually higher. For instance, bomas with 20 cattle typically sell around 3 cattle annually, or 15% of the herd, whereas bomas with 200 cattle sell only around 9% of the herd. The explanation for this paradox is that bomas with 200 cattle can raise enough cash by selling only their unwanted steers (around 9% of their large herd) to cover all their minimum expenditure requirements, but those with fewer cattle have to sell relatively more (15% of their small herd) to cover the same minimum expenditure

Fig. 20 'Normal' Year Income: Northwest Pastoral Zone



requirements. Bomas with 50 - 60 cattle and 2 -3 wives reach a threshold at which they begin to sell only unwanted steers, or around 9% of their herd, and therefore build up relative cattle numbers more quickly than those below the threshold.

[41] Taking 18 steers for the year and a lower-end price of 130,000/steer and 36 goats at 15,000/goat.

Milk is an important source of cash for 'middle' and 'rich' bomas, and a particularly important means for women to obtain access to income. Men control all cash income from the sales of cattle and shoats, but women market and keep income from milk sales.[42] The market for milk is likely to be quite limited in this zone, as most households produce their own. However, there are some restaurants and guesthouses in Loliondo and Wasso that provide a steady source of demand, in addition to the few town residents who do not own cattle. Given the limited market it is unlikely for most surplus- producing bomas to sell more than 5% of their total milk production.

Bomas in the lower and middle categories may sell some of their crops to the local town market to raise additional cash income. A typical boma with 60 cattle, 3 wives and 6 acres may sell 4 sacks of maize and 1 or 2 sacks of beans, whereas those with 20 cattle, 2 wives and 3 2 acres may sell a sack of maize, or several debbes of beans.

Bomas with very small numbers of cattle engage in some activities outside the boma to earn extra income, including labour sales and petty trade. Men seek employment with richer bomas, building and repairing homestead structures or selling building poles; women sell firewood, transporting bundles on their backs to the town centre for 200 shillings a trip. This occasional cash makes up 10 - 15% of annual income for poorer bomas.

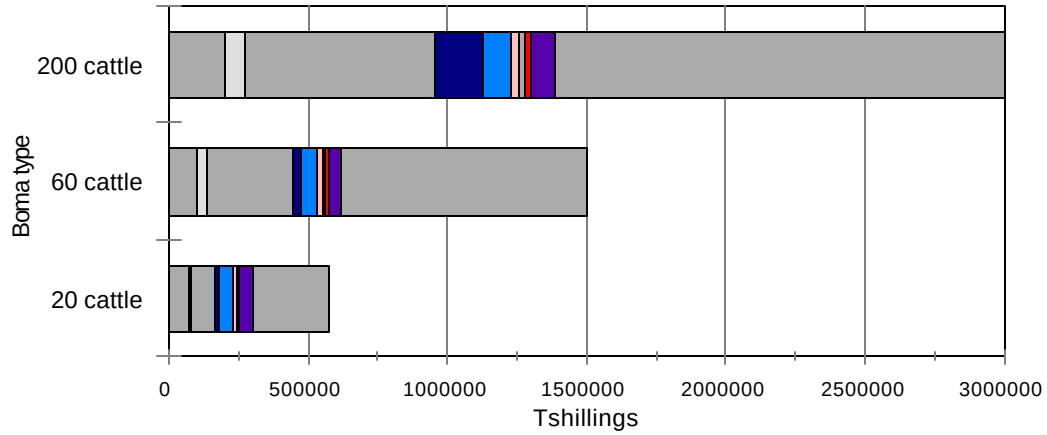
Expenditure

The cost of living in the Northwest Pastoral Zone is markedly high because of its considerable distance from other major markets in Tanzania and all bomas spend significant amounts of money each year to cover basic minimum requirements. Whereas a sack of maize in a normal year in other parts of Arusha typically costs 9,000 shillings, in Loliondo it costs 15,000 Tshillings. The price of other commodities, such as sugar, tea and salt is similarly inflated. In addition, new costs associated with agricultural production (such as labour hire and tools) draw down on cash funds along with veterinary costs (both preventative and curative treatments), which are extremely expensive.

[42]Since women are responsible for identifying and ultimately solving household expenditure requirements, this income is reportedly important for covering short-term seasonal food gaps in bad years.

It is important to keep in mind that unlike expenditure for households in monogamous areas, boma expenditure usually includes the costs associated with more than one household. The richer the boma, the more wives, the higher this cost. Figure 21 depicts expenditure patterns for three typical bomas. It should be noted that these patterns reflect normal year expenditure as described during field interviews, not absolute minimum expenditure.[43]

Fig. 21 Expenditure patterns:
Northwest Pastoral - 'normal' year



Source: field interviews

A Bad Year

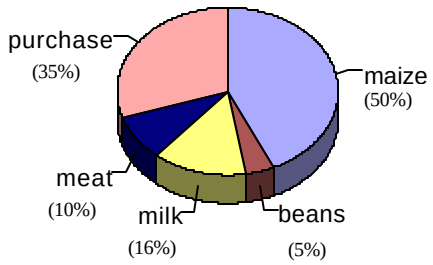
According to local informants, normal year maize yields of 10 sacks per acre drop to around 4 or 5 sacks per acre in a bad year. Milk production falls, as well, due to lowered yields associated with loss of pasture and because the number of cows in milk may also taper off with cattle deaths and a decreasing calving rate. To make up for the 50 - 60% loss, bomas are forced to purchase maize. But grain tends to be more expensive in bad years as well, so the same number of cattle equates to fewer sacks of grain. In other zones bad years trigger a fall in livestock prices as well; however, as the Kenya market is not necessarily linked to harvest conditions in northern Ngorongoro, cattle prices in the Northwest Pastoral Zone will not necessarily fluctuate to the same degree as in other parts of Tanzania.

A boma with 60 cattle, 3 acres and 3 wives typically purchases up to 10 sacks of maize in

[43] Absolute minimum expenditures are used as a basis for analysing the current problem in the spreadsheet, however, leaving out discretionary household expenditure, clothes, beads, other, and livestock purchase.

a bad year, making up around 35% of the boma's annual food requirements[44]. If crop production is 50% of normal, with the boma obtaining 5 sacks per acre instead of the standard 10, it will derive 50 - 55% of its annual food needs from maize, and an additional 5% from beans. The number of milking cows reportedly declines from 16 to 10, and yields tend to hover around 50% of normal. It is reasonable to estimate that milk's contribution to this boma's minimum food requirements in a bad year is around 16%.[45] Meat consumption is likely to remain roughly equivalent to a normal year, because although fewer cattle tend to be slaughtered, more die naturally (and are consumed). Thus, one could expect that meat would contribute an additional 10% to the boma's annual food income.

Fig. 22 Sources of food - a bad year: Typical boma, Northwest Pastoral Zone



It is clear that typical bomas in a bad year are not at risk of starving and are, in fact, likely to eat a diet which contains **more** than the absolute minimum calorie requirements. However, these bomas are forced to sell more cattle in order to purchase food (reportedly 10 cows instead of the normal 5) and must reduce their cattle purchases from 8 cows to 2. In addition, fewer calves are born in a bad year, and more cattle die.

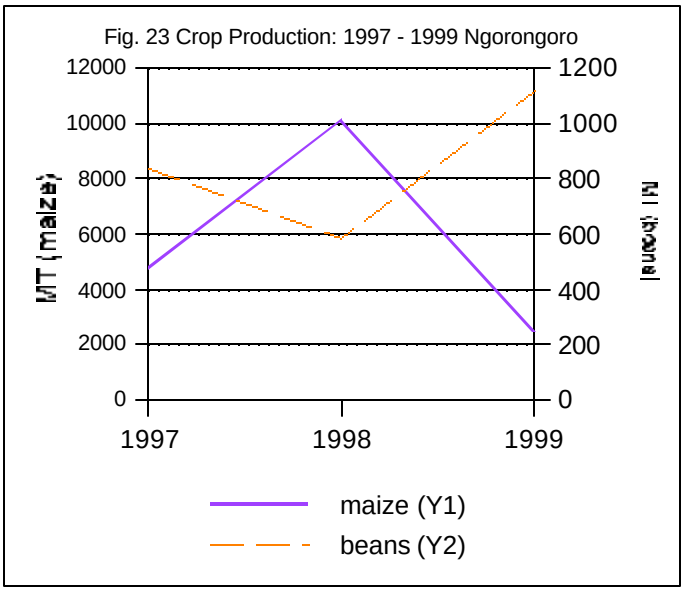
The most serious implication of a bad year, therefore, is a dangerous reduction in herd size. Whereas a boma with 60 cattle adds 10 new cows in a normal year (births and purchase balanced against sales, deaths and slaughter), it loses around 16 in a bad year. Two bad years in a row can be disastrous; a herd that starts out with 60 cattle can easily diminish to 30 by the end of the second bad year. At this point, access to food becomes a critical concern since the balance between milking cows and number of wives has dipped well below the minimum threshold of 6 per wife, averaging 2 - 3 instead; and the boma can ill-afford to sell more cattle to purchase the requisite grain.

This Year

[44]Similar descriptions are not provided for poorer and richer bomas to avoid too much repetition. It should be remembered that for those with a deficit, the same clan support systems described in the Southern Pastoral Zone are functioning in this area as well.

[45]10 litres/day during wet season (10/3=3.3; 3.3/16=.21 x .58 [% of year for wet season] = 12%) + 5 litres/day during dry season (5/3=1.6; 1.6/16=0.1 x .42 = 0.4) = 16%

This year[46] in the Northwest Pastoral Zone follows on one of the best years in the past ten, which in turn had followed on a 'normal' year. Thus, whatever the conditions this year, they are unlikely to cause a food security problem given the discussion above. Most bomas still have food stores from the last harvest, and grazing conditions are good at the moment. Cattle appear to be extremely healthy, and prices are 'normal'. In other words, even if next year turns out to be bad, bomas will be starting from a secure and strong position.



Current year production problem

Based on official data for maize and bean production, the current harvest promises to be mixed, with maize production lower than normal, and bean production higher than normal. Production figures from district HQ were used to derive the current problem for crop production.[47] The table below presents district headquarter production figures for 1997 and the estimated production in 1999 for both maize and beans.

Table 2. Crop Production - Ngorongoro District

crop	1996/1997		1997/1998		1998/1999	
	Ha	MT	Ha	MT	Ha	MT
maize	5982	4785	5322	10112	5980	2392
beans	2090	836	1436	585	1867	1120

It is worth keeping in mind several qualifications about the above figures:

First, the figures represent production for the entire district, whereas the Northwest Pastoral Zone is mainly concentrated in Loliondo and Sale Divisions, thus it is likely that

[46]Defined as the current harvest, including green consumption and the year that follows up to the next harvest (May/June 1999 - May/June 2000).

[47]Except for 1996 figures, the figures from district headquarters corresponded closely to FEWS figures. As we were not using 1996 as a base year, this didn t matter so much for our purposes, however, these discrepancies should be looked into and explained for future purposes. Division and ward figures were not available; district figures are too general to provide an accurate picture of actual production in the Northwest Pastoral Zone, however, it is assumed that they will reflect a common trend for the district.

variations within the district are not reflected.

Second, this year's figures derive from forecasts and not from field measurement of post harvest assessment, reflecting a *predicted* estimate, rather than a decisive judgement.

However, on the basis that these figures depict a general *trend*, then this year's maize harvest will be around 50% of normal, and this year's bean harvest will be around 134% of normal.

Current Year Price Problem

The trend in maize and bean prices, reflected in official district-level data, suggests a moderate rise since 1997. A comparison of averages (between the highest and lowest price for each year (1996/97 and 1998/99) indicates that current maize prices are 160% of 1997 prices, and current bean prices are 138% of 1997's prices.

Food Price Problem: Tshillings/tin

	1996/1997		1997/1998		1998/1999	
	range	average	range	average	range	average
maize	1200 - 3500	2350	1500 - 3500	2500	3500 - 4000	3750
beans	3000 - 10000	6500	4000 - 8000	6000	8000 - 10000	9000

Source: Ngorongoro District Headquarter Statistics, Loliondo

District-level data is not appropriate for analysing the main cattle market in the Northwest Pastoral Zone, because this data reflects prices from markets in Karatu and towns further south, which constitute the major source of demand for cattle in the southern half of Ngorongoro District. Nairobi cattle prices are a more relevant indicator for pastoralists in the northern half of the district than Karatu or Arusha prices. In any case, prices from district headquarters were only available for the years 1992 - 1997, and could not be used for the purposes of the current analysis.

Therefore prices obtained from field interviews were used to predict the current year price problem. Based on field interviews, there was no reason to assume a significant change in cattle prices since 1997; if anything they have risen. So cattle and shoat prices for the current year problem specification were assumed to be 100% of normal.

Current Year Analysis

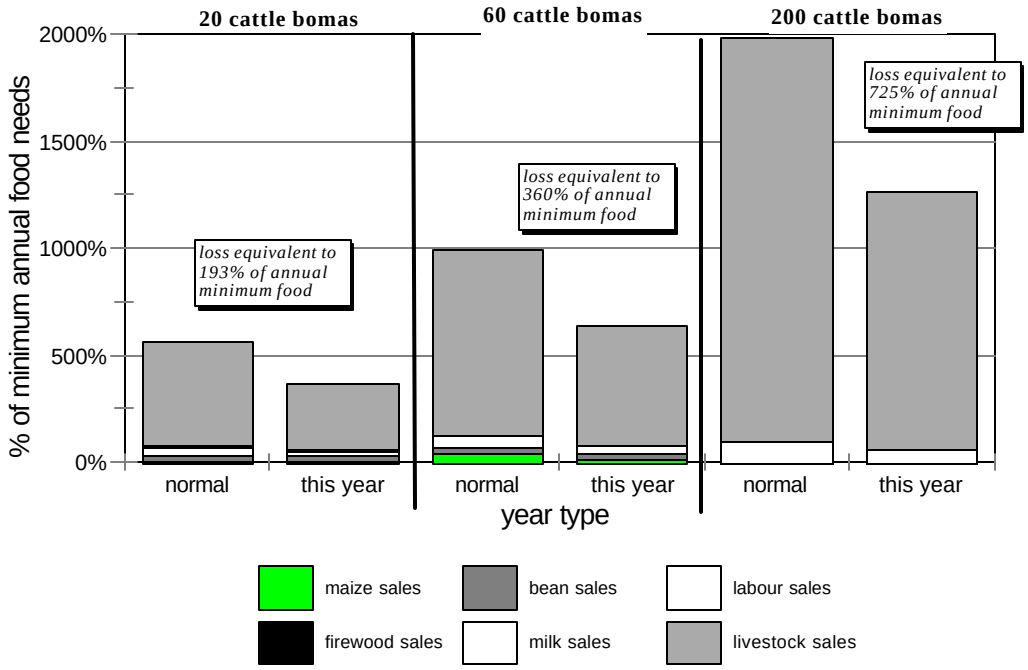
Notwithstanding the grim prediction for maize production and the rise in maize prices, bomas in the Northwest Pastoral Zone are unlikely to face a food deficit this year. Pastoralists in this zone are buffered against acute food deficits because cattle and shoat prices are still high, fueled by the steady Kenyan demand, and livestock numbers are plentiful. Most bomas will simply divert expenditure from non-essential items to purchase food.

Summary of current year problem specification for Northwest Pastoral Zone:

maize production: 50% of normal
bean production: 134% of normal
maize price: 160% of normal
bean price: 138% of normal
cattle/shoat price: 100% of normal

Although a food deficit will not result from the current production and price problem, it is likely that incomes will be adversely affected. Figure 24 depicts the changes in purchasing

Fig. 24 Loss in purchasing power: Northwest Pastoral Zone - 1999-2000



power for different boma types this year[48]. Even though prices for cattle and shoats are still high, maize prices have increased, which means that each cow is worth less in relation to maize.[49] This negative balance applies to all income sources except for bean sales,

[48]Based on the assumption that livestock prices have not gone up. Follow up investigation into market prices in Kenya would be a useful way to confirm this assumption.

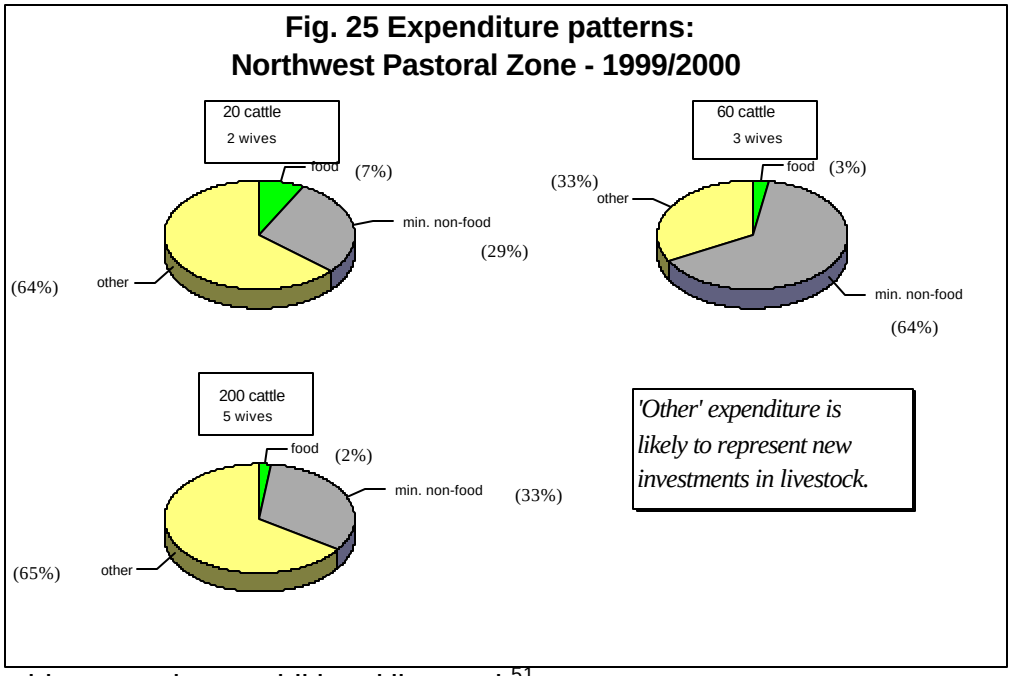
[51]Since maize prices are 160% of normal, a cattle sale now will purchase 63% of the maize it would have obtained at

because bean yields have gone up and the price of beans has risen as well.

The overall loss is presented as a percentage of annual food requirements. In other words, if each source of income were converted into food equivalents, 100% would be the amount required to purchase the minimum grain requirements for the boma for one year, 200% could cover two years and so on. In absolute terms, richer bomas will lose the most income, but in relative terms the loss is more or less the same for all boma types, approximately 36%.

Despite this overall reduction in purchasing power, sufficient surplus remains to enable all bomas[50] to cover both minimum staple and non-staple expenditure. As evidenced by the figure below presenting expected expenditure for this year, it is likely that most bomas will

Fig. 25 Expenditure patterns:
Northwest Pastoral Zone - 1999/2000



even be able to purchase additional livestock[51]

Conclusion

Bomas in the Northwest Pastoral Zone are unlikely to face food deficits this year. In normal years, agricultural production eliminates the need to purchase food, ensuring the maximum possible expenditure on livestock. In bad years relatively high livestock prices cushion the impact of periodic crop losses by guaranteeing that bomas have at least enough income to purchase minimum food and non-food requirements.

A number of issues are worth considering in relation to the future food and livelihood security of this zone:

- poor roads connecting the Northwest Pastoral Zone to the rest of Tanzania mean high

---

normal prices.

prices for basic commodities, including grain, salt, sugar, veterinary and agricultural inputs. Future plans for supporting local livelihoods will inevitably need to consider that one strategy for improving the standard of living would be to build better roads.

- since all bomas are involved in agricultural production to some extent, it may be worthwhile to provide more extensive agricultural support services to this zone.

- the border trade is critical for maintaining and building livelihoods in the Northwest Pastoral Zone. Future policies should be sensitive to this fact.

THE AGRICULTURAL ZONES

Background

Four agricultural zones were covered in the current assessment: 1.) Mid-altitude Hanang/Babati; 2.) Central/South Mbulu; 3.) Eastern Mbulu; and 4.) The Karatu Wheat Belt. They include parts of Babati, Hanang, Karatu and Mbulu Districts and can be characterized in two separate groupings: old settlement zones and new settlement zones. The old settlement zones include Eastern Mbulu and Central/South Mbulu (and part of Mid-Altitude Hanang/Babati); the new settlement zones include the Karatu Wheat Belt and part of Mid-Altitude Hanang/Babati.

The distinction between old and new settlements corresponds roughly to the overall wealth and, ultimately, food security of the zone. New settlements experience less land pressure, lower population densities, and higher fertility than old settlements. There is a sense of growth and expansion in the new settlement areas, and a palpable feeling of decline and contraction in older settlement areas.

The total population of Tanzania in relation to its land mass has always been relatively low. In 1982 the population density was around 20 people per square kilometre.[52] Currently it stands at approximately 34 people per square kilometre. Within Arusha Region, densities vary enormously, with the highest concentration of people in Arusha town (at 2,613 persons/sqare km), and the lowest in the pastoral districts of Kiteto, Monduli, Ngorongoro and Simnajiro (around 5 - 8 persons/square km). Population densities in the agricultural zones hover between 47 persons/square km in Karatu, and 59 persons/square km in Babati. Figure 26 provides population densities for districts in Arusha, indicating figures for both 1988 and 1999.

While densities are still relatively low, compared to a country like Kenya for instance,[53] rapid population growth will soon change this fact. In Hanang, the current density is 55% higher than that of 1988, whereas in both Babati and Mbulu it is 44% higher. And while Kenya's annual population growth rate is 1.71%, Tanzania's national rate is estimated at 2.41%.[54]

Because land is the crucial determinant of wealth in the agricultural zones, increasing population pressure will inevitably create new constraints on the current livelihood systems.

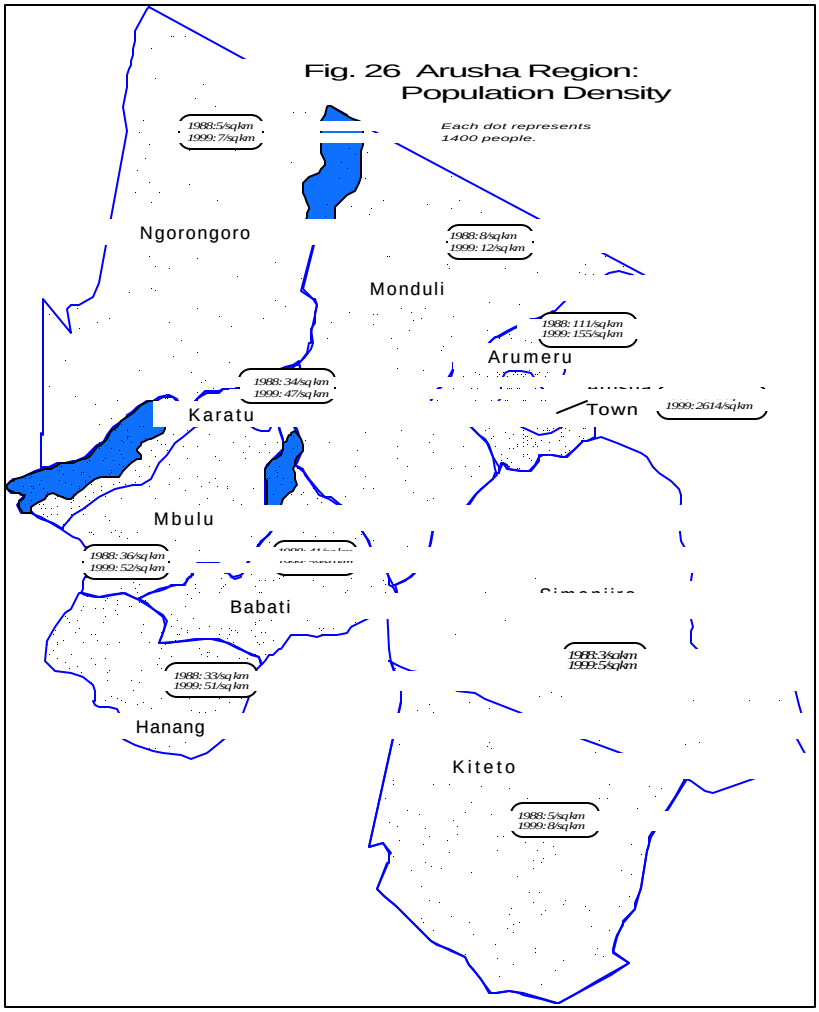
---

[52] Coulson, Andrew, Tanzania: A Political Economy, p. 10

[53] Where the average population density for the whole country is 50 persons/square kilometre

[54] ODCI Factbook.

Up until now, land pressure has been released, at least partially, through resettlement schemes and government land allocations in new areas. Karatu, for instance, became a new district in 1995/96, at which time many new settlers moved to the area and were given fresh land to cultivate; and when Hanang became a new district in the late 1960s, its expanse of open land attracted many land-constrained residents of residents of Babati and Mbulu who left their homes to make a new start on farms in the northeastern quadrant of the district. But with the new land laws recently enacted[55], which fix current land claims, this process of resettlement is likely to slow, which means that land pressure will build more rapidly.



It is important to view the following descriptions of livelihoods within this context of ever increasing land pressure; some areas already experience the effects of severe overcrowding (Eastern Mbulu) and others are likely to face similar circumstances in the not-so-distant future (Gorowa Division in the Mid-altitude Hanang/Babati Zone). Still others will probably not experience the problems associated with acute land pressure for a number of years (Karatu), but unless livelihood patterns or the rate of population growth changes, the distant future holds the same ultimate fate for them. The four zones are presented in order of newest settlement to oldest settlement; the reader will notice a corresponding decrease in wealth from zone to zone.

[55]New Land Ordinance, passed February 1999, states that current owners have a right to keep the land they are on, and it can not be re-distributed by the government.

THE SURPLUS AREAS

THE KARATU WHEAT BELT

Location

The Karatu Wheat Belt occupies the eastern highland areas at the northern tip of Karatu District, including over one-third of the villages in Karatu District. The villages of Gongali and Rhotia Kainam indicate the southwestern boundary of the zone, and the villages of Lositete and Upper Kitete mark the northeastern boundary along the edge of the Rift Valley escarpment. Kilima Moja, Chemchem, Endallah, Bassadwish, and Bashay fall inside the neighbouring food economy zone,[56] and form a boundary of sorts between The Karatu Wheat Zone and the other highland Karatu food economy zones. A narrow strip of land containing the local coffee estates along the northern forest boundary, adjacent to Ngorongoro Conservation Area, is also excluded from the Karatu Wheat Belt.

Setting

The Karatu Wheat Belt owes its climate, soils and vegetation to the Ngorongoro platform which forms its northern boundary. As part of the foothills of this mountainous land system, it receives relatively high seasonal rainfall, benefits from the run-off of fertile volcanic soils and enjoys moderate temperatures. The local landscape consists of moderately steep foot ridges and flat to gently sloping lava plains and footslopes. The soils are predominately clay and shallow but very fertile. The Karatu Wheat Belt is located 1200 - 1800 metres above sea level and receives between 700 - 900 mm of rainfall per year.

Fig. 27 Karatu Rainfall (916mm/year)

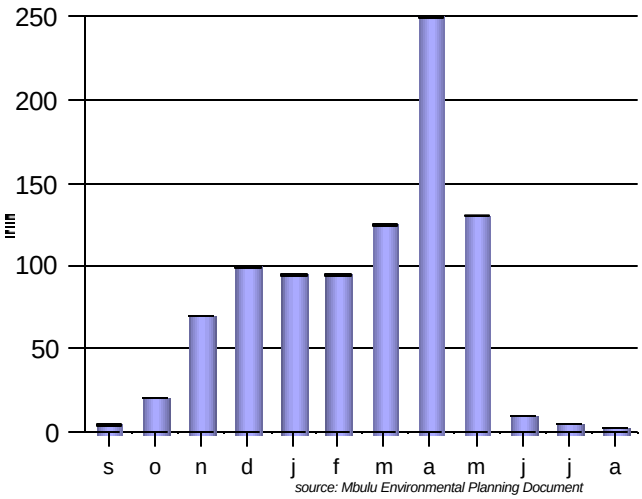


Figure 27 depicts rainfall distribution in a typical year. The main rains begin in November and continue until May, tapering off quickly in June. Most of the year's rain

[56] The food economy zone just to the south of the Karatu Wheat Belt, including the rest of highland Karatu areas and ending just before Endamaghang on the western side, is reportedly similar to the Mid-Altitude Hanang/Babati region, (in that they grow maize and beans as the main food crop and pigeon peas as the main cash crop). However, this hypothesis will have to be confirmed through further fieldwork, as there wasn't sufficient time during the current assessment to do a full investigation of this food economy zone.

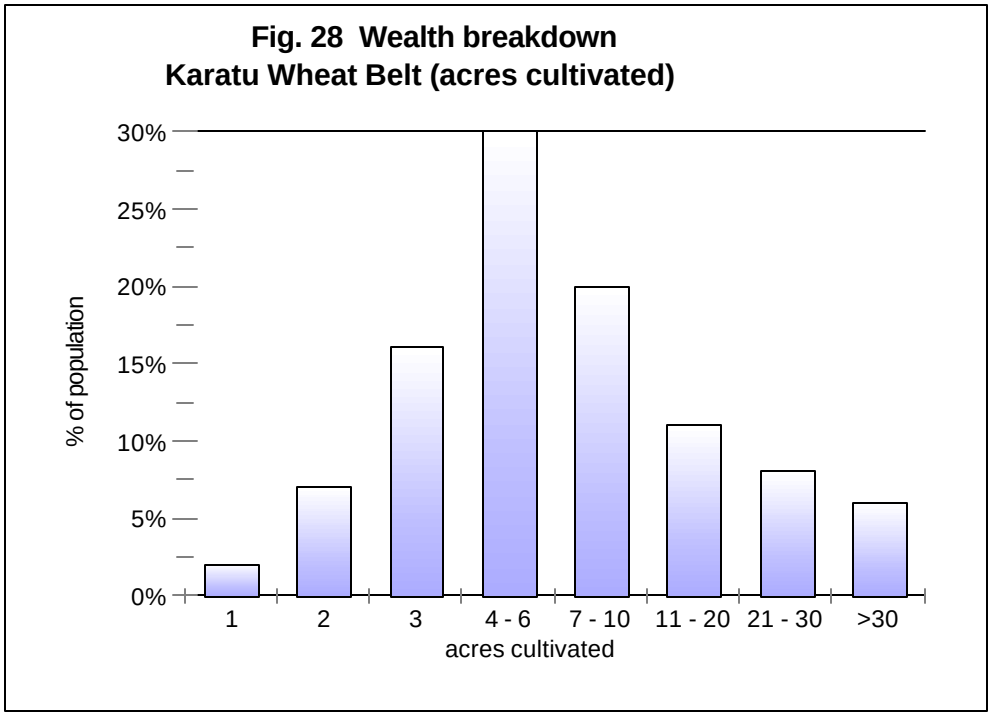
falls in the months of March, April and May. The growing season corresponds to this rainfall pattern, with crops sown in November or December and harvested in July and August.

Wealth Breakdown

Karatu District is the fastest growing area in Arusha Region at the moment, but this growth is just an extension of a process which began earlier in the century. Cultivation of the neighbouring coffee estates around Oldeani began in the 1930s and was quickly followed by the establishment of large wheat farms in the Mbulumbulu area. The current settlement pattern in this zone took shape mostly after 1965, when neighbouring Iraqw people began to move out from older settlement areas in the highlands east of Mbulu town. The recent establishment of Karatu as a new district has fueled in-migration as people from neighbouring districts come looking for new land and opportunities.

Land is the basic determinant of wealth in this agricultural zone, with livestock a variable contributor. At the higher end, livestock is fairly inconsequential, and richer households tend not to own more than a few milk cows. In the middle and lower groups, however, livestock function as an important source of labour (ox ploughs) and income. The main ethnic group in the zone, the Iraqw, have traditionally been cattle keepers and maintain a strong agro-pastoral tendency. However, with increasing mechanization and agricultural wealth, livestock rearing has diminished in importance; most households in the upper categories simply do not have the labour available to manage a big farm and a big herd at

Fig. 28 Wealth breakdown
Karatu Wheat Belt (acres cultivated)



the same time. Thus numbers of cattle increase in direct relation to land wealth only up to a

certain point (around 15 acres) at which point they decrease.

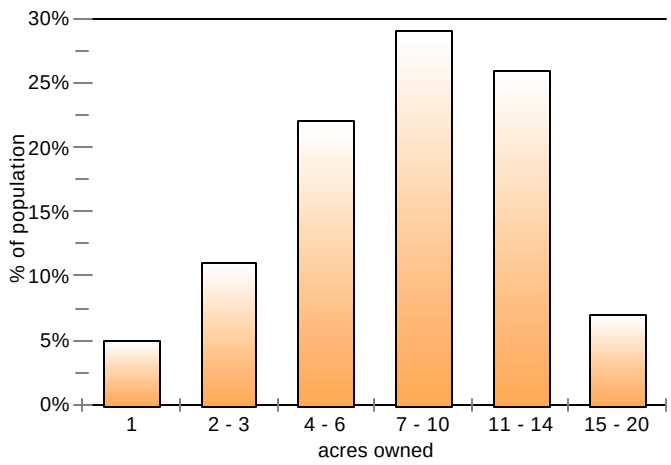
Along with differences in cattle ownership, *what* households are planting varies with wealth category as well. Those cultivating 1 - 2 acres plant only maize and beans - the main food crops. A household cultivating 3 acres may devote one acre to wheat, in addition to the maize and beans. In the 4 - 10 acre category, households plant maize, beans, finger millet, wheat and barley. Households cultivating over 10 acres plant just enough maize to cover household food needs and devote the remainder of their energies to beans, pigeon peas, barley, finger millet and wheat.

In addition, how households cultivate varies with wealth; households cultivating more than 10 acres tend to rent tractors and those cultivating more than 30 acres own their own tractors. Households cultivating 3 - 10 acres use their own oxen for ploughing, and those with fewer than 3 acres exchange labour for the use of ox ploughs.

There are notable variations in wealth within the zone. The largest areas cultivated are in the northeast, around Slahharno, with some households cultivating up to 100 acres. As one moves closer to Karatu town, the number of acres cultivated by any one household tends to decrease. The figure above represents the overall picture for the zone, taking account of both extremes.

The wealth breakdown presented in Figure 28 above depicts *acres cultivated*, as distinct from acres owned. The current analysis was conducted on the basis of acres cultivated, because this factor determines access to food, levels of income and annual expenditure. However, it is important to keep in mind that land ownership will determine longer-term security in the face of increasing land pressure.

Fig. 29 Wealth breakdown
Karatu Wheat Belt (acres owned)



At the time of land allocation in the 1970s, most households received 3 - 6 acres (6 for an elder, 3 for a youth). The current variations in land ownership are explained by the fact that some households who already had large tracts of land before re-allocation were able to keep them, and others have managed to purchase land to augment their original 3 - 6 acres. But no households *own* more than 20 acres. Those cultivating more than 20 acres rent land from households that own 6 - 12 acres (but cultivating only around 4 - 6).

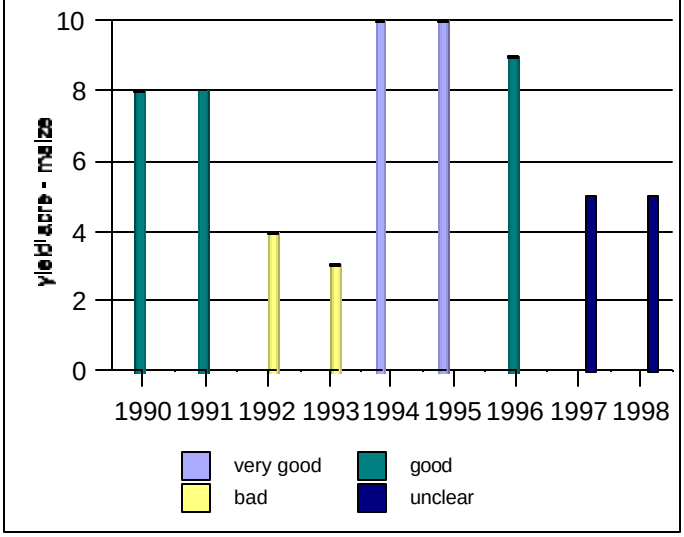
Thus the majority of households who **own** more than 7 acres **cultivate** less, either leaving some of it fallow or renting it out to richer households.

Normal Year

Local informants report that average yields of maize in normal years range between 7 - 10 sacks/acre, with richer households obtaining at least 10 sacks (since they use improved inputs and may not intercrop) and poorer households getting around 8 sacks per acre. Very good years are ones in which even poorer households obtain 10 sacks per acre. In bad years one might expect maize yields to drop as low as 3 - 5 sacks per acre.

A characterization of the past 9 years, based on field interviews, is presented in Figure 30. Reports about the last two years were inconsistent, with some claiming they were the worst in recent memory, and others insisting they were normal. It is difficult to confirm either view with official statistics since district data extends back only to 1996, when Karatu was established as a new district. Without 1990 - 1995 to compare to, it is impossible to know how these past three years measure up in relation to the past 10. However, it is possible to say that official data (see statistics later in 'This Year' section) confirms that the past two were indeed worse than 1996. As local informants unanimously agreed that 1996[57] was a normal year (regardless of disagreement about the last two), it was taken as the base year for the current analysis.

Fig. 30 The past 9 years - Karatu Wheat Belt



Field interviews were conducted with one acre, three acre, seven acre, ten acre and twenty acre households in the Karatu Wheat Belt. Three of these groups are described below: those cultivating one acre, three acres and twenty acres. These groups represent points along a consistent wealth continuum and thus provide implied descriptions for the groups that are not described explicitly. For instance, income and expenditure for those cultivating 14 acres will fall around half way between 7 and 20 acre groups. The food pies for all households above 2 acres are very similar, including no purchase and comprised

[57] 1996 refers to the year beginning with the harvest of 1996, starting with the green maize consumption in May or June and ending with the green maize consumption in May or June of 1997.

overwhelmingly of own crops. What varies for these groups is the amount of surplus food and income they produce each year, as well as their expenditure patterns.

Sources of Food

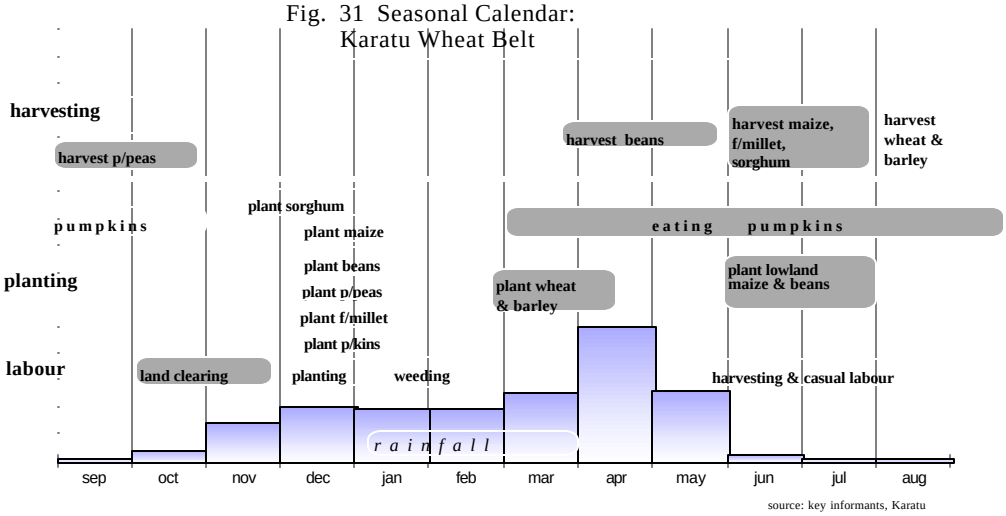
The Karatu Wheat Belt is a significant surplus-producing area in most years. The vast majority of households harvests well over their minimum annual food requirements and uses agricultural production as a means of obtaining both food and cash income.
The major sources of food in normal years for households in this zone are own crop production, milk and meat, and purchase. The only households that need to purchase food are those cultivating one acre. All others produce enough to cover minimum requirements and purchase only to add variety.

Crop production
Farmers in the Karatu Wheat Belt grow a large number of crops. Grain crops include maize, sorghum, wheat, barley, and finger millet. The main pulses are beans and pigeon peas, and pumpkins, sweet potatoes and greens are the most significant vegetable crops. Maize is the staple crop, supplemented with beans and vegetables. Households grow sorghum for brewing purposes and finger millet to make *uji* (a kind of porridge) for the young children; the other grains tend to be sold.

The relative importance of food crops (maize and beans) decreases in relation to the number of acres cultivated. So poorer households concentrate almost exclusively on maize, beans and pumpkins, whereas richer households devote large areas to wheat, barley and beans.

Most households that cultivate fewer than 10 acres use ox ploughs to prepare their land, making the first passes in October and November, at the first hint of rain. A second ploughing precedes sowing, which takes place at the end of November or beginning of December. Sorghum is planted first, at the end of November. Maize, beans, pigeon peas,

Fig. 31 Seasonal Calendar:
Karatu Wheat Belt

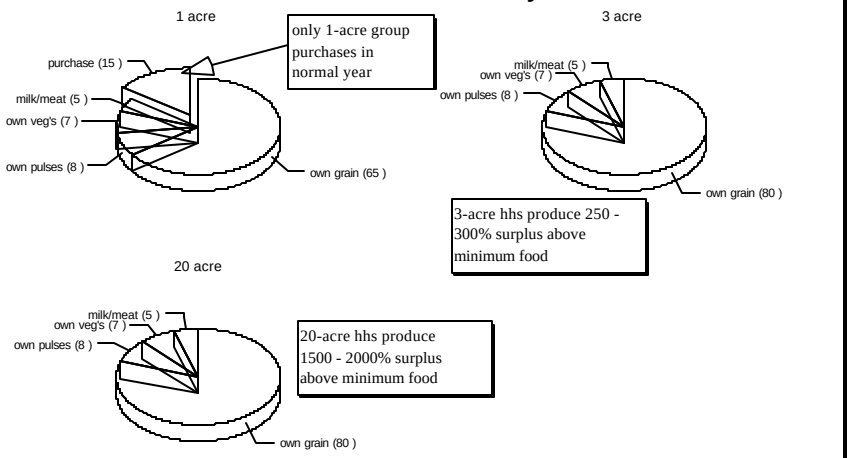


source: key informants, Karatu

finger millet and pumpkins are planted just afterwards and sweet potatoes are planted in February as the other crops are beginning to mature. Wheat and barley are sown at the end of February or the beginning of March, just before the heaviest rains fall. Both of these crops mature as the rains taper off, and flourish as the dry season approaches. (See Fig. 31, seasonal calendar.)

Beans are first to be harvested, eaten green in April, and collected for storage in May. Green maize provides an important source of food before the main harvest in July, eaten throughout the month of June along with pumpkins and beans. These foods cover a potential gap for poorer households in particular, when stores from the last harvest have run out and the new harvest has yet to be taken in. Pumpkins are eaten from March until October and although the energy value of pumpkin (without the seeds) is low,[58] its combined annual contribution adds up to around 5 - 10% since it is eaten regularly throughout these months. Along with green maize and beans, it contributes substantially to a household's pre-harvest food income. The main harvest of maize, finger millet, and sorghum takes place in July, followed shortly by wheat, barley and sweet potatoes, and finally pigeon peas.

Fig. 32 Sources of Food
Karatu Wheat Belt: normal year



Around 90% of the population harvest enough maize, beans and pumpkins in a normal year to cover household food requirements until the next harvest. Even with a less-than-normal harvest, three-acre households manage to take in around 18 - 20 sacks of maize, which is more than the 12 sacks they need for food alone. Figure 32, depicting how

[58] It takes over 5 kilos of pumpkin to make up 1900 kcal, or the minimum daily requirement. Informants claim they do not eat the seeds, but feed them instead to livestock.

households in the Karatu Wheat Belt obtain food most years, illustrates this overwhelming reliance on own crops. As evidenced by the surplus production figures, there is enough 'extra' food for most households to last more than three years. For the most part, this surplus is sold and makes up a significant part of annual cash income. Some of it is used as food stocks: a typical three acre household keeps three or four sacks of maize in reserve in case the coming harvest is poor, and twenty acre households keep as many as six or seven aside.

Milk and meat contribute a small but important source of food as well. Most households with three acres or more own at least two or three milk cows, the milk from which covers around 10% of household requirements in the wet season, and somewhat less in the dry season. Middle households cultivating around 10 acres may have quite large herds of cattle. The highlands can not sustain these large herds, so they are kept in the western lowland plains surrounding Lake Eyasi, around Mang'ola Chini. Most years a few are brought to the highlands to provide milk and meat for the household, but the rest remain in the lowlands.

Households cultivating ten acres or fewer also keep goats and sheep. Shoats are relatively more important for poorer households, who keep them for the same reasons as richer households keep cattle - as a buffer against bad years. Poorer households tend to have very few, if any, cattle, and therefore rely more heavily on shoats for obtaining emergency income.

Sources of Income

Crop production is by far the most important source of food for households in the Karatu Wheat Belt. It is also the most important source of income for all but the poorest 5 - 10% of the population. As detailed in the figure below, crop sales constitute over 95% of total income for twenty-acre households; for three-acre households they makes up almost 70%; and even for the one-acre group it covers a substantial 20%. Bean sales appear to be relatively more important for lower income groups, as they fetch a high price and are planted every year for food, which means that they are a low risk cash crop. The price of a sack of beans in January 1997 was 24,000 Tshillings, providing a substantial incentive for saving a sack or two for sale. If the harvest is normal, surpluses are sold off. In sub-standard years the beans are eaten instead of sold. Pigeon peas are the only pure cash crop (in the sense that they tend not to be eaten normally) grown by the poorest households. They are inter-cropped with the maize, beans and pumpkins, and one sack can earn a household up to 20,000 Tshillings.

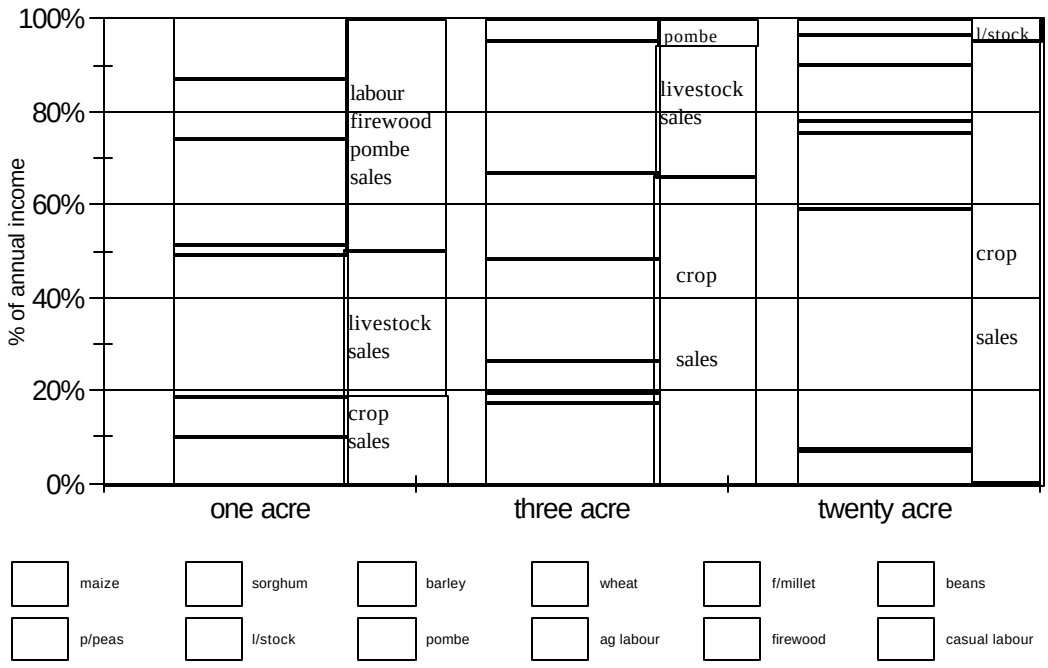
Richer households cultivating twenty acres may sell a cow or two a year along with one or two goats. But this income is insignificant in relation to their crop income. For three acre households, on the other hand, livestock sales contribute 25 - 30% of annual income; one big bull and two goats are sold by the typical household, along with some eggs and a few

chickens, adding up to around 120,000 Tshillings at 1996 prices. Poorer households usually sell a small bull, two or three goats, as well as chickens and eggs, raising perhaps 72,000 Tshillings, or around 31% of annual cash income.

Poor households are forced to seek additional sources of income, since crop sales and livestock sales make up only approximately 50% of their expenditure requirements. Agricultural labour sales constitute the most substantial source of supplementary income, at around 55,000 Tshillings. It is not difficult for one-acre households to find work on local farms, since households that cultivate more than two acres hire labour for clearing, planting, weeding and harvesting. In fact, much of the labour force comes from Mbulu District to the south, or from as far away as Dodoma and Singida Regions, as local demand is far greater than the supply.

Fig. 33 Annual Sources of Income

A 'normal' year: The Karatu Wheat Belt



Firewood and charcoal sales comprise an important source of income for poor households as well. Karatu town generates a constant and growing demand for fuel resources; as a new district headquarter it has attracted many new guest houses and restaurants, and because it sits conveniently on the 'tourist trail' to Ngorongoro, there are always new ventures being started. Surrounding villagers derive important income from the trade in firewood, although at 200 shillings/bundle, firewood sales make a small daily contribution that only adds up in the long run. Ultimately firewood and charcoal sales diminish forest resources and create an even greater income crisis as erosion, lowered precipitation and

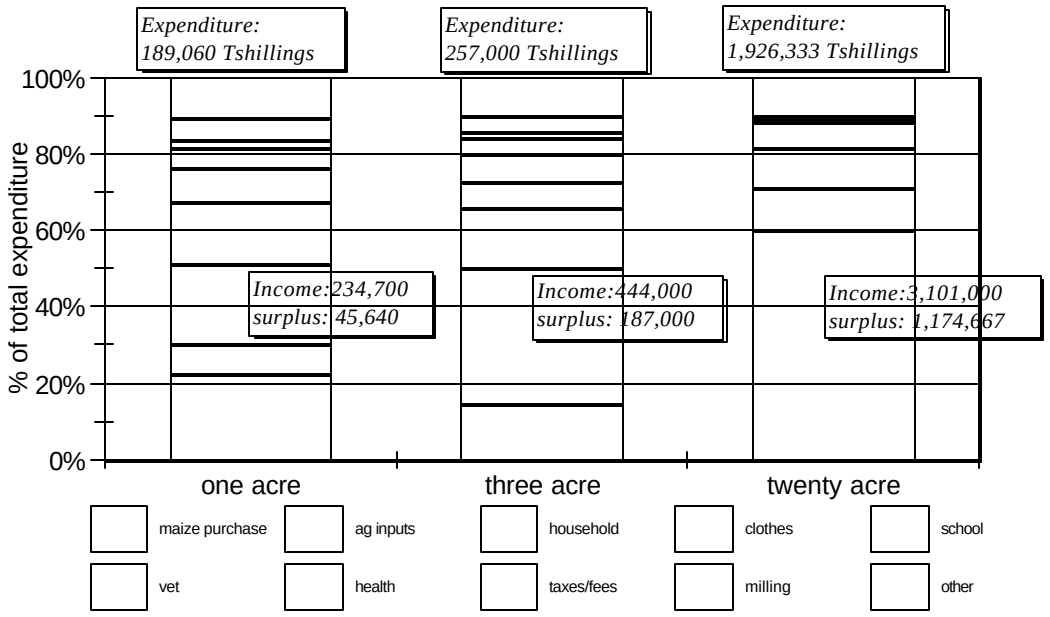
environmental degradation ensue. But for the moment, these sales will continue as long as the demand exists and firewood can be found.

The growth of Karatu town has spawned new opportunities in building and construction as well. Brick making, pole sales, and casual labour are common means of earning income for poorer households, particularly during the dry season when labour demand on the shamba is low. Earnings from these pursuits can be as high as 100,000 shillings, however, more commonly households obtain around 30,000 shillings annually.

Expenditure

Although one-acre households purchase food most years, they spend only 18% of their total income on it. By global standards, which suggest as a measure of poverty that households which regularly spend more than 50% on staple foods should be considered poor, the Karatu 'poor' can hardly be characterized as such. By local standards, however, having to spend money on food at all puts them in a poorer category.

Fig. 34 Annual Expenditure patterns
A 'normal' year: Karartu Wheat Belt



Even though most informants initially respond that school fees and associated costs take the biggest chunk of money from the household budget,[59] over time the biggest category of

[59]School appears to require the most money because it is usually paid all at once, and requires households to have a lot of cash on hand at one time. Usually they have to sell a goat or two to obtain the money, and this creates the impression that it takes the most money.

annual expenditure for one-acre households is actually household goods, like sugar, tea, salt, oil, kerosene, etc. Small amounts spent on these weekly (or monthly) necessities add up to over 60,000 shillings annually at normal year (1996) prices, or between 25- 30% of annual income. In comparison, school fees and school materials (uniforms, shoes, socks, workbooks, pens, etc.) for one primary school student amount to around 9,000 shillings, or 18,000 for a poor household if one considers that two might be in primary school at any one time.

Richer households spend the biggest portion of their annual income on production-associated costs. Twenty-acre households spend over 1,000,000 shillings annually on a wide range of agricultural inputs, including rental fees for land, tractors and combine harvesters; labour for planting, weeding, scaring birds, harvesting and shelling; seeds, fertilizers and pesticides; transport costs associated with moving and selling the harvest and sacks for storing the produce.

The next biggest categories of expenditure for richer households are household goods, clothes, and school respectively. Most richer households have at least one child attending secondary school, which is considerably more expensive than primary school, at around 120,000 per child (1996 prices), in addition to having two in primary school.

Additional categories of expenditure include health, vet fees, taxes/village fees, and milling. An 'other' category, equivalent to around 10% of total expenditure, includes things like pombe[60], occasional transportation costs, and any additional discretionary expenditure.

Even with this 'other' category, all except the one-acre group still generate significant surplus income above their stated annual expenditure, as illustrated in the figure depicting annual expenditure above. According to local informants this surplus income is invested into cattle herds (for the poorer households) and into agriculture for the richer groups in the form of land rentals or purchases and new equipment. Some richer household members even claimed that they put extra money into savings accounts at the national bank, which is not very common amongst rural households in most of Africa.

A Bad Year

In the short- to medium-term it is very unlikely that food aid will ever be required in the Karatu Wheat Belt, because even in bad years most households do no face an insurmountable food deficit.

Bad years in the Karatu Wheat Belt are characterized by inadequate, inconsistent, or excessive rainfall. Rainfall in 1996/1997 was reportedly inadequate; and that of 1997/1998

[60]Local beer

was said to have been excessive. These discrepancies lead to poor crop conditions, and farmers harvest 40 - 50% of what they normally might.

For most households this loss materializes into an income deficit rather than a food deficit, because 40% of 30 sacks of maize is still just enough (with other crops) to make it through the year. But if a household is eating all of its harvest, with nothing remaining for sale, and if crop sales for a household cultivating, say three acres, normally comprises around 70% of its annual income, there will be a dramatic reduction in available cash.

Based on information derived from field interviews, households conform to much the same pattern of response in bad years: 1.) they increase livestock sales to make up for the loss in crop income; and 2.) they reduce expenditure on non-essential items. 50% less is spent on household goods, like sugar, tea, and oil; and clothes are not purchased at all; extraneous expenditure falling into the 'other' category is consistently lower in bad years also.

Poorer households increase expenditure on food and seek additional labour income to pay for it. Field informants claim the labour market is robust, and employment can be found even in bad years when more people are looking for work. There is no evidence pointing to a time when the market was flooded.

This Year

Production and market figures for this year suggest very mixed conditions, with maize production lower than normal but production of beans and a number of cash crops significantly higher than normal.

The Production Problem

District headquarter data, presented in the table below, was used to devise the current year production problem specification.[61]

Table 3. Crop production in Karatu: 1996 - 1999

CROP	**1995/1996**		**1996/1997**		**1997/1998**		**1998/1999 (est.)**	
	Ha	*MT*	Ha	*MT*	Ha	*MT*	Ha	*MT*
maize	25,711	*45,059*	18,500	*20,300*	25,771	*19,328*	22,569	*28,224*

[61]District headquarter figures did not vary significantly from the corresponding FEWS figures for the two years being compared - 1999 and 1996. There is, however, a large discrepancy in the 1998 maize production figures; the FEWS figure is 32,215 MT, whereas the district HQ figure is 19,328 MT. This difference should be investigated and resolved.

beans	10,260	*4,498*	6,600	*1,665*	6,660	*333*	6,660	*6,660*
sorghum	580	*196*	580	*217*	500	*125*	300	*750*
wheat	6,000	*7,600*	6,300	*7,320*	5,500	*2,062*	5,197	*7,796*
barley	4,000	*7,000*	3,744	*6,552*	5,000	*2,500*	6,615	*9,922*
pigeon peas	300	*360*	315	*385*	300	*225*	456	*456*
finger millet	570	*506*	620	*1,480*	750	*71*	375	*468*
sunflower	128	*128*	280	*56*	450	*236*	450	*585*

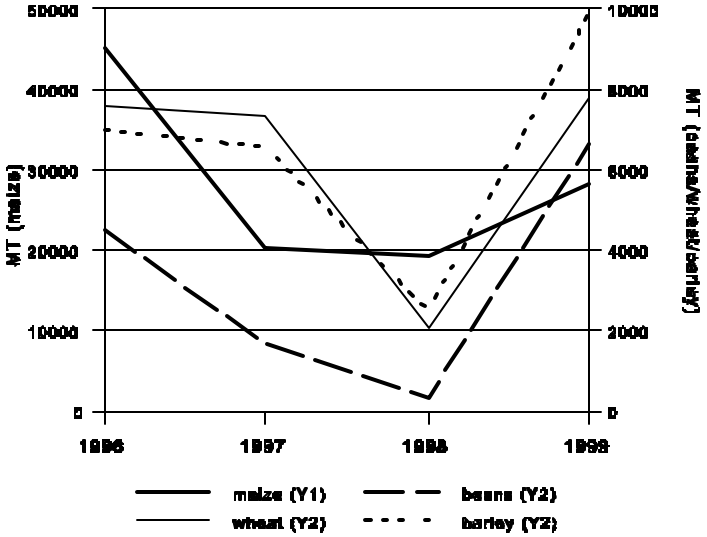
source: Karatu District Headquarters, June 1999

Again, as stated in the pastoral areas, these figures are based on pre-harvest estimates made at the district level and may not be as accurate as actual field measurements. In addition, because the figures reflect aggregate data for the district, they are likely to miss important variations in production from ward to ward, or even village to village.

If, however, we take these figures to be representative of a general trend, it is possible to estimate that in relation to 1996 the 1999 maize harvest will be around 63% of normal, whereas production for beans, wheat and barley is predicted to be 148%, 103% and 142% of normal, respectively.

The production problem for cash crops was weighted by wealth group, according to the relative importance of each particular crop and its performance this year (in relation to normal)[62]. The cash crop production problem for each group was as follows: one-acre, 152% of normal; three-acre, 124% of normal; twenty-acre, 123% of normal. The higher figure for the one-acre group reflects its almost-exclusive reliance on beans and pigeon peas and their respectively higher production this year.

Fig. 36 Crop production in Karatu: 1996 - 1999



Price Problem

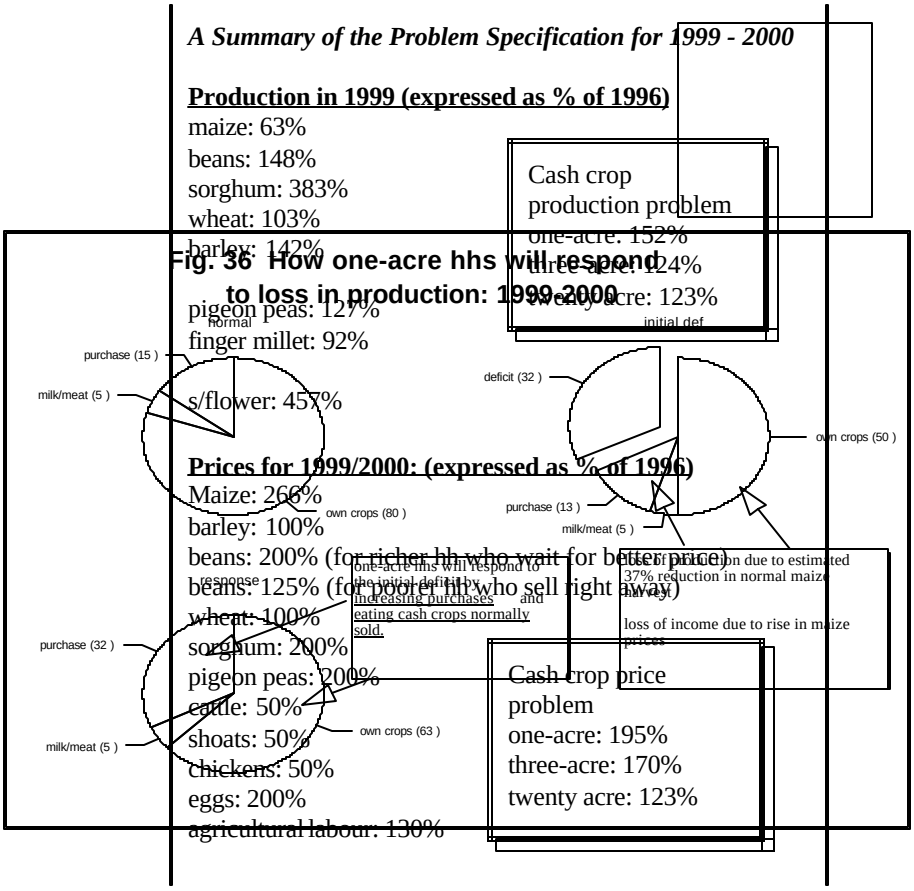
As with production, the relationship between 1996 and current price varied for each crop as well. Thus, in devising the problem specification for crop sales, each crop was weighted according to the percentage it made up in relation to total crop sales (by wealth group) and factored against its production or price this year (in relation to normal). Thus, the consolidated price problem for cash crops is different for each wealth group, reflecting the relative importance of that crop in relation to the group's income, as well as the performance of that crop in terms of production and price this year.[63] The cash crop price problem for the one-acre, three-acre, and twenty-acre groups is 195%, 170%, and 123% respectively.

[62]Details of these weightings are available on request.

[63]Details of these weightings are available on request.

Prices for maize and beans were obtained at district headquarters, but none of the other crop prices were available and therefore derived from field notes. For maize and beans, May prices were used (a comparison between May 1996 and May 1999), because no others were available.[64]

Similarly, prices for cattle and shoats were not available from district offices, and field notes were used to reconstruct 1996 and this year's livestock prices.



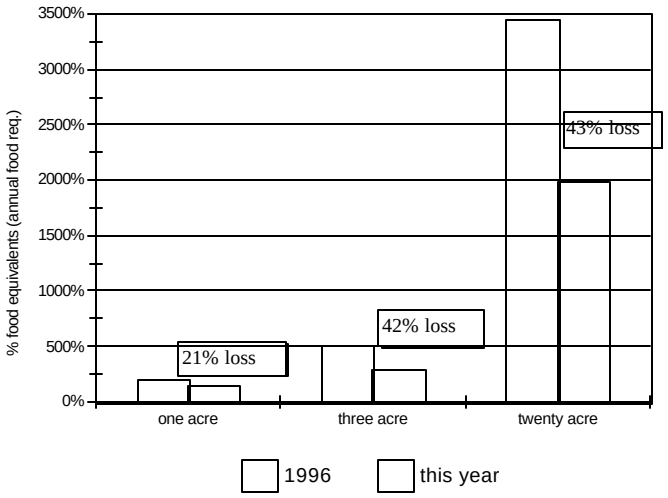
The Analysis

The effects of current year production and prices on rural households in Karatu will be felt most acutely on income. One-acre households may experience an initial loss of food because of lowered maize yields, equivalent to around 30% of annual food needs, but they will offset this deficit through purchase. They should earn more income from cash crop sales than in a normal year, since both bean production and prices are estimated to be higher than normal; this income will be equivalent to around 65% of annual food

[64] Therefore, prices for the other crops are based on recollections of villagers as well as their claims about this years prices.

requirements (despite the inflated maize price), and will more than cover their expected gap (which includes both normal year purchases and current year deficit) of 45%. Thus even though other income sources (such as livestock sales) may have lost value in relation to maize, cash crop income has gained value.[65] The process by which poor households are likely to make up their initial deficit is illustrated in Figure 36.

Fig. 37 Purchasing power
Karatu Wheat Belt: 1996 vs 1999/2000



Based on this analysis, it is predicted that none of the wealth groups will retain a food deficit in the coming year, at least not one that is caused by the estimated production and price problems detailed above.

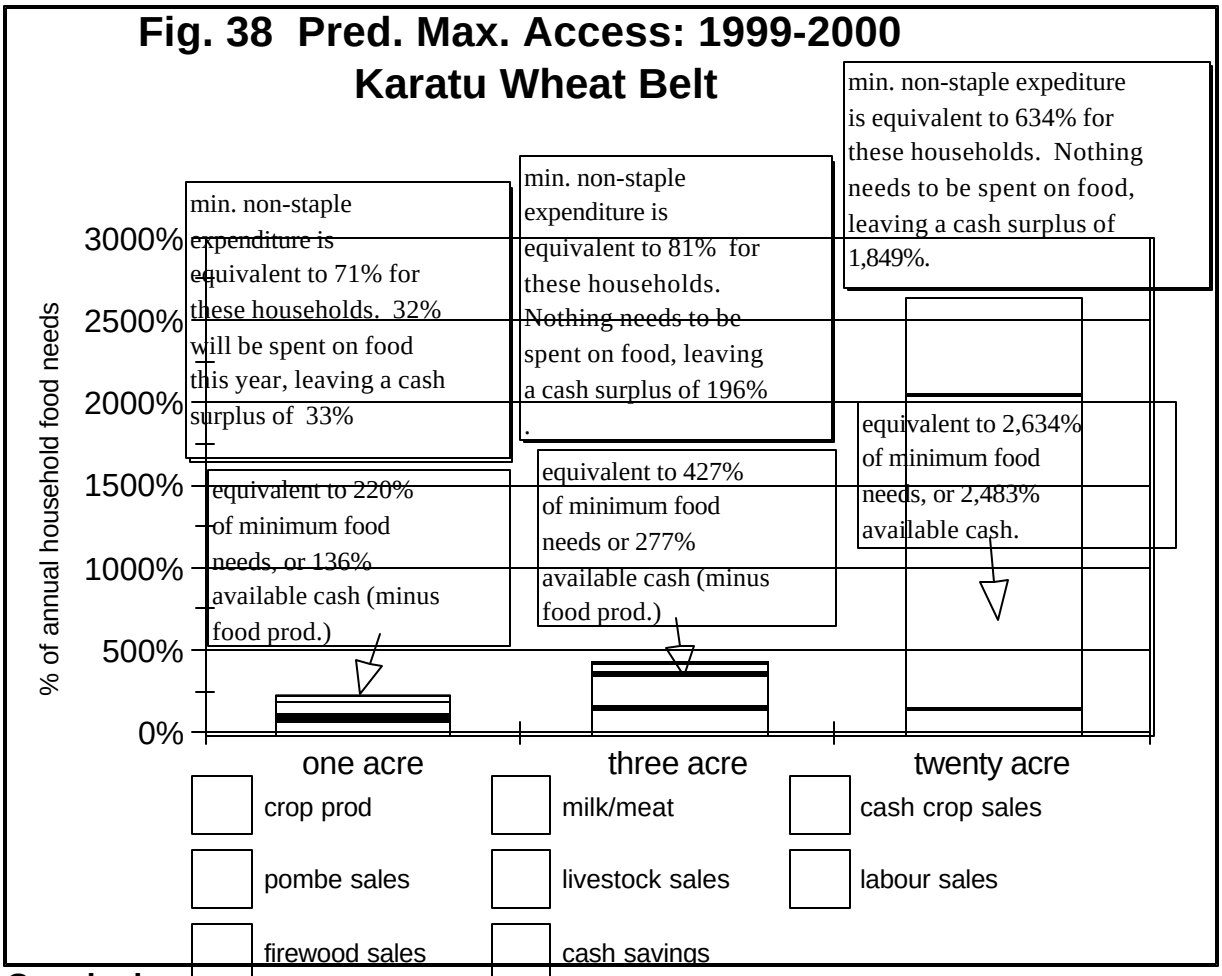
Loss in purchasing power

However, because maize prices are significantly higher than normal all regular income will be worth less in relation to food. This loss in purchasing power is actually more severe for richer households because their relative reliance on beans and pigeon peas is smaller, (both of which will benefit from both higher production and prices this year). Crops like barley and wheat will do well in terms of production, but their prices have not gone up significantly since 1996, which means that even at increased levels of production, they will be worth less in relation to maize.

Thus, while one-acre households will experience a 21% loss of purchasing power, the loss for both three-acre and twenty-acre households will be between 40 - 45%.

Despite this relative drop in income, all households will still be able to cover minimum expenditure requirements, with most retaining quite significant surpluses.

[65] Cash crop income for poor households is equivalent to 51% of annual food in normal years, and will be equivalent to 65% this year.



Conclusion

The Karatu Wheat Belt shows signs of impressive agricultural potential. Food security is not a problem currently, nor is it likely to be in the near future. Most households have access to considerable amounts of surplus food and income, enabling them to offset poor production through utilization of stocks and through converting potential cash crops to food use.

Although food security is not a priority in the Karatu Wheat Belt, a few other issues might be worth considering:

- The road leading to Karatu from Arusha is slow and jarring. Poor roads make it more difficult and more expensive to market surpluses effectively. A better road system would increase the development potential of the Karatu Wheat Belt.

- Most farmers do not have access to information about current world market prices for their crops. They cannot plan appropriately to maximize income through more

effective concentration on the year's highest value crops, and they do not have the bargaining power with big traders to get the best prices for their goods. Better access to information on global prices would increase their power to do both.

- Global climate predictions may also help farmers plan better. Access to advice and estimates provided by organizations like IRI[66] or the Regional Drought Monitoring group in Nairobi, or FEWS would strengthen the planning capacity of local farmers.

[66] A climate prediction institute run in association with Columbia University and San Diego University which provides climate information to farmers in Africa.

MID-ALTITUDE HANANG/BABATI

Location

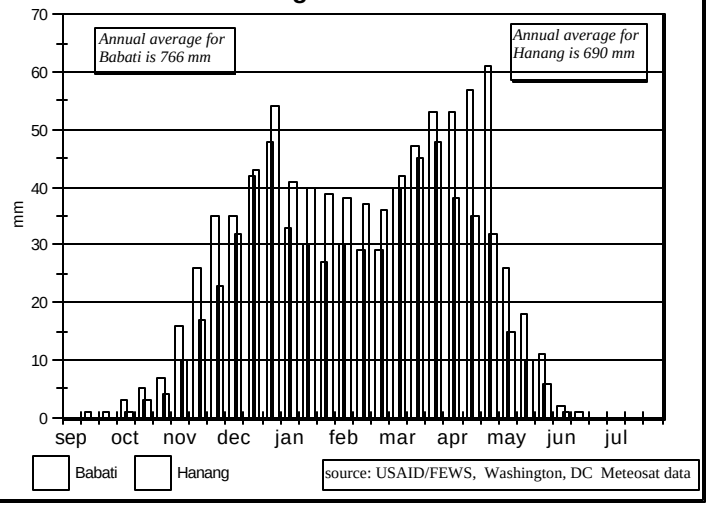
While the Karatu Wheat Belt represents a surplus area formed by the northern expansion of Iraqw outwards from older settlements in Mbulu, the Mid-altitude Hanang/Babati Zone resulted from a previous southern extension of the same expansion.

The zone includes an extensive swath of villages starting just to the east of the Wheat Complex in Hanang, and extending over the border through most of southern Babati, excluding four villages on the southern tip of Babati (Gidabaghar, Gjedaboahka, Gidas, and Boay) that share a closer resemblance to the northern part of neighbouring Dodoma Region. Within Hanang the southern boundary of the zone is marked by the villages of Simbay and Dirma (included in the zone); the western boundary extends as far as Mogitu and ends at the wheat complex. A clear separation exists between Dirma, where one finds agriculturalists similar to the rest of the Mid-altitude zone, and villages just to the west, such as Balangdalalu and Mureru, where one encounters a strong Barbaig presence. In Babati the zone includes most villages in Babati and Gorowa Divisions, with the exception of the sugar plantation villages (Kiru Six, Kiru Ndogo, Kiru Dick, Erri, Merri and Masware) and the four southern border villages mentioned previously. The villages on the plateau in Bashnet Division are excluded, but those in the hills below the plateau are included. The Mid-altitude Hanang/Babati Zone comprises 32% of the population in Babati and 59% of the population in Hanang, or 43% of the population in the two districts combined.

Setting

As suggested by the name, the Mid-altitude Hanang/Babati Zone occupies a transitional area between the lowland Rift Valley Plains and the highland Mbulu plateau. Most of the zone is found between 700 - 1000 metres, and comprises rolling crop lands, interspersed with occasional (and diminishing) wooded bush lands.

Fig. 39 Rainfall Distribution Hanang and Babati



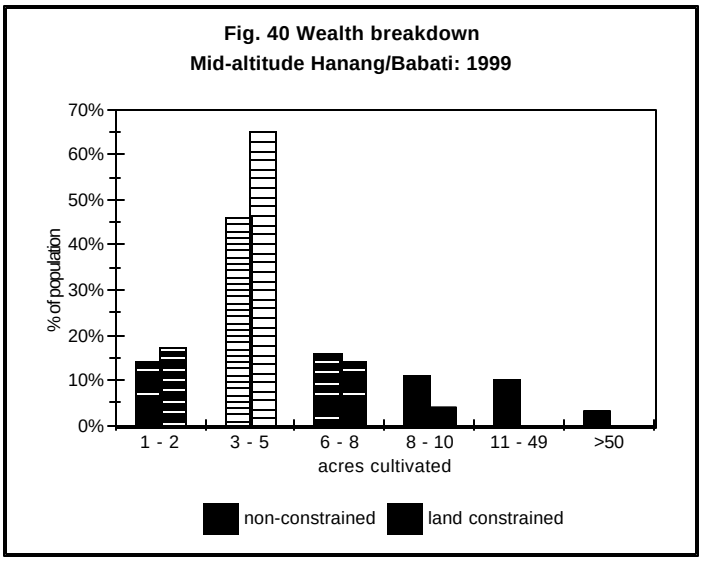
Average rainfall ranges between 680 - 800 mm per year, and the distribution tends to follow a bi-modal pattern (although there is only one harvest). Rains begin in November or December and continue until May or June, decreasing moderately in January and

February and then resuming throughout March and April.

The Iraqw occupy permanent dispersed settlements throughout the zone, and live in homesteads occupied most commonly by a man and his one wife and children. Polygamy is culturally acceptable and practiced, but not widespread.

Wealth Breakdown

As in Karatu, wealth in the Mid-altitude Hanang/Babati Zone is generated by agricultural production, and is linked, therefore, inextricably with land access. Again, as in Karatu, the number of acres cultivated by a household does not necessarily reflect the number of acres owned by that household, and while current wealth is a reflection of acres *cultivated*, longer term security will be determined by number of acres *owned*. The following graph depicts the current wealth distribution in this zone, based on acres cultivated.



Land pressure is more acute in this zone than in Karatu, particularly in older settlements like Gorowa Division in Babati District. In fact, although food, income and expenditure patterns are the same throughout the district, the wealth breakdown for Gorowa Division is different, and is presented separately in Figure 40 (as land-constrained). In the simplest terms, the implication of this variation is that Gorowa Division will become poorer sooner than the rest of the zone, because with increasing population growth, a rapid division of existing plots will take place. This fragmentation is likely to occur over the zone as a whole but he effects of it are likely to be visible within the next ten years for Gorowa Division, whereas other parts of the zone may only start to experience severe consequences in ten to twenty years.

Livestock are used for traction, for manure and for food. Livestock ownership tends to increase in direct proportion with wealth, although, again, the highest categories, particularly those owning tractors, are likely to have just enough cattle to provide milk and meat for the household, as more than that creates an unnecessary drain on labour resources. A typical household's livestock herd would comprise 10 goats and sheep and 8-10 cattle, including plough oxen.

The poorest households may not own any cattle, but tend to keep goats or sheep. Local

informants explained that most of these poor households, cultivating 1 - 2 acres, are younger families who are beginning to suffer the effects of increasing land pressure, or those headed by older men or women who no longer have the capacity to cultivate as much.[67] These poor households still represent a very low percentage of the population, but as the number of young men turning eighteen grows, and available land diminishes, the percentage is likely to increase rapidly.

Female-headed households are said to exist in every wealth category. Local informants claimed that they are not necessarily poorer than other households, because labour is hired from the outside which means that the household's cash flow determines its wealth, not its labour force. Widows may easily have inherited a secure cash flow based on agricultural production and livestock sales that they maintain after the husband's death, particularly if they have the help of older children. Women's access to land is clearly less secure than men's, as inheritance rights are exclusively the male's. Women do obtain land grants from the village government, however, and have strong usufruct rights to land.[68]

Normal Year

The last normal year in the Mid-altitude Hanang/Babati zone occurred in 1997, according to the overwhelming majority of field informants[69]. A normal year was described as one with average yields and average prices; in other words, neither the best of the past ten years nor the worst, but the type of year that occurs most frequently.

Informants estimate that maize yields in normal years are 8 sacks per acre; bean yields tend to hover between 1 - 2 sacks per acre on plots where they are inter cropped, although

[67]The inheritance system active in the Iraqw areas may exacerbate future land disputes, since the last born boy has rights to all the father-s property. The idea is that before the father dies, he will have distributed fairly most of his resources, so to protect the youngest born from being left out, he inherits what is left. But in practice, this system of unequal distribution may ultimately lead to a very bottom-heavy wealth distribution.

[68]Mbulu Planning Document, pg. 30

[69]1997 refers to the year beginning with the harvest of 1997, starting with the green maize consumption in May or June and ending with the green maize consumption in May or June of 1998.

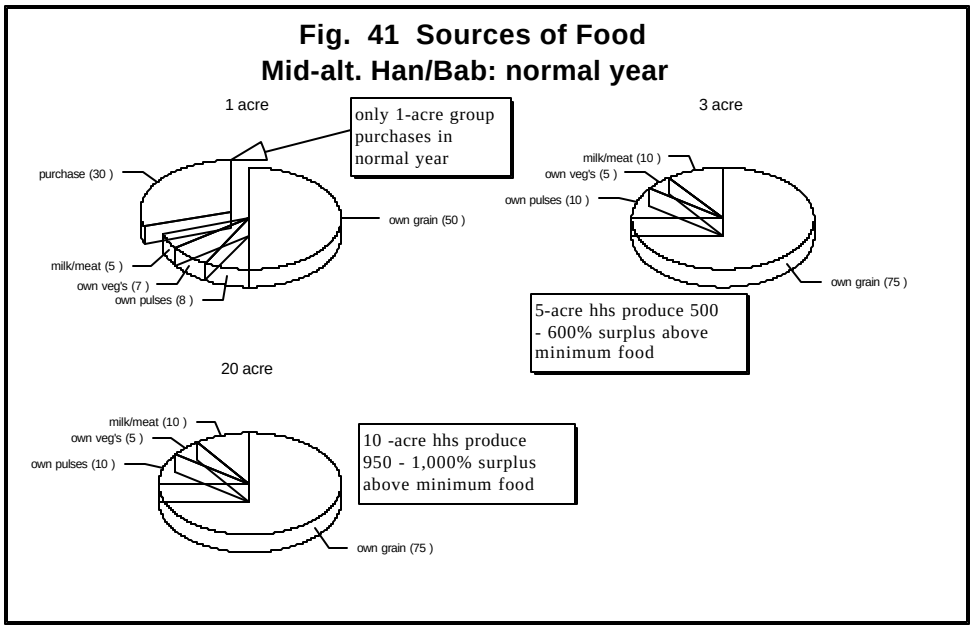
pure stand bean yields commonly reach 4 sacks per acre.

Field interviews were conducted with one-acre, three-acre, five-acre, seven-acre, and ten-acre households in the Mid-altitude Hanang/Babati zone. Three of these groups are described below: those cultivating one acre, five acres and ten acres. These groups represents points along a consistent wealth continuum and thus provide implied descriptions for the groups that are not described explicitly. For instance, income and expenditure for those cultivating 7 acres will fall around half way between 5- and 10-acre groups. The food pies for all households above 2 acres are very similar, including no purchase and comprised overwhelmingly of own crops. What varies for these groups is the amount of surplus food and income they produce each year, as well as their expenditure patterns.

Sources of Food

Own crops, milk/meat, purchase, and to a very small degree, gifts, comprise the only sources of food for households in this zone. All but the poorest category of households obtain annual food from their farms and livestock without having to purchase staple foods.

Fig. 41 Sources of Food
Mid-alt. Han/Bab: normal year



Only households in the one-acre category are forced to purchase food every year since they rarely produce enough to cover annual requirements. Most years these households obtain 55 - 70% of their annual requirements from their own crop production, around 5 - 10% from milk and meat (either from their own animals, or from animals borrowed from richer households), and the rest (25 - 35%) from purchase. One-acre households do not have food stocks on hand at the end of a normal year, and produce no more than 10% surplus. Although these households may *produce* just enough food to cover minimum requirements, they are forced to sell part of it at harvest to obtain cash for immediate use,

often to pay back debts which accrued during the agricultural season. Because they sell part of their production at harvest time (which also means they obtain the lowest price of the year), they face an annual deficit which is made up by purchasing food later in the year.

Five-acre and ten-acre households share the same relative reliance on food sources, with around 80 - 90% deriving from own crop production, and 10 - 20% from milk and meat from their own cattle and goats. These households do not purchase food out of necessity, but may purchase higher value foods, such as rice or fish, for variety's sake.

Crop production

Crop production is the most important source of food for all households. Iraqw farmers plant a wide variety of crops, including maize, sorghum, wheat, finger millet, beans, pigeon peas, pumpkins, and greens. Maize and beans are the most important food crop, and pigeon peas and beans are the most important cash crops.

Farmers use either tractors or oxen (or both) to plough and prepare land for planting. Access to oxen or cash to hire tractors is critical for all households. All households cultivating 6 acres and above own a complete set of oxen, except for the very richest which may own a tractor instead. Most cultivating between 3 -5 acres own a complete set of oxen, or at least half a set. In the poorest category only around 20% have a full set of their own oxen; 60% have at least one ox, but the remaining 20% have none.

There are three methods for obtaining access to plough oxen: 1.) one can pay cash in exchange for a full set; 2.) one can provide labour in exchange for a full set; or 3.) one joins with a neighbour or friend to make a full set. Most households with no oxen at all opt for the second alternative. The implications of this exchange are that poorer households usually end up ploughing later than other households, often missing the prime time for planting.

The Karatu Wheat Belt and the Mid-altitude Hanang/Babati Zone share the same seasonal calendar. Most crops are planted in December and harvested in June and July. Before the June/July harvest, both maize and beans are eaten green for at least a month, filling an important gap for poor households in particular, who take the opportunity to reduce their expenditure on grain purchase in anticipation of the coming harvest. These green crops make up around 5 - 10% of annual food income every year for all households. (See Figure 31.)

Milk/Meat

Most households have access to milk, either from their own cattle or from borrowed cattle. It is quite common for poorer households without cattle of their own to borrow cattle from richer households in order to obtain regular supplies of milk and manure. The poor household may not sell or slaughter the borrowed cow so meat or livestock cash income must come from its own livestock (usually goats). But by borrowing one milk cow, a household obtains at least 5% of its annual food requirements from milk, providing a

particularly important contribution to the children.[70]

This arrangement benefits the richer household as well, since farming out one's livestock lessens one's labour burden. In addition, grazing is often in short supply, and by distributing cattle to poorer households, a richer household ensures that its cattle will have access to sufficient fodder.

Figure 41 (above) depicts the relative importance of own crops, milk/meat, and purchase for different wealth categories. Surplus production is defined as the food (including crops, milk and meat) above and beyond minimum consumption needs generated by a household in one year. Most of this surplus is sold or given away; in bad years, this extra production buffers households against acute food deficits.

Sources of Income

The major sources of income for the majority of households in the Mid-altitude Hanang/Babati Zone are crop sales and livestock sales. Other sources of income, particularly for poor households, include labour sales and firewood/charcoal sales. Brewing is a source of income for households in many different wealth categories, although poorer households tend not to brew as they have difficulty raising the cash required for the initial inputs. Richer households also earn some income from renting out oxen.

Crop sales comprise almost 80% of total income for ten-acre households and five-acre households, but only around 20% of income for one-acre households. Five- and ten-acre households both sell maize, sorghum, beans, and pigeon peas. In addition, ten-acre households sell finger millet and wheat, with crop sales totaling around 1,245,000 Tshillings. One-acre households may sell up to a sack of maize and 5 tins of beans, making significantly more on the beans (at 6,000/tin) than the maize (at 6,000/sack).

Livestock sales are relatively more important for poor households than crop sales, making up around 34% of annual income; for richer households this relationship is reversed, and livestock sales (17 - 19% of income) are of considerably less importance in proportion to overall income.

Poor households commonly sell a small bull (at 50,000 Tshillings in 1997), one one goat (at 10,000 Tshillings) and some chickens in a normal year; five-acre households sell a big bull (at 85,000 shillings), two goats, milk, chicken and eggs; and ten-acre households sell two

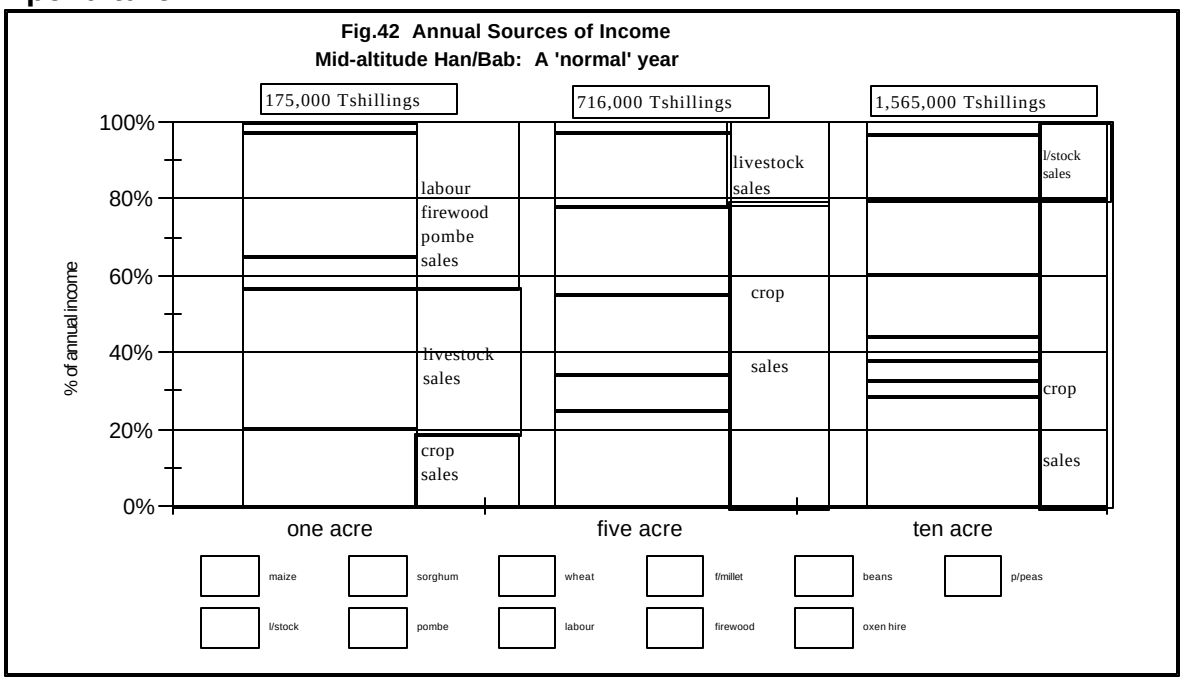
[70]Calculated as follows: average annual milk yields of 1.5 litres/day x 240 days (8 months of the year, corresponding to the lactation period) = 360/3 (3 litres is equivalent to 1900 kcal) = 120/6 = 20/365 = .05 x 100 = 5%

big bulls, seven goats, and substantial amounts of milk. Thus although absolute income from livestock sales is significantly higher for richer households, in relative terms these sales are more important for poor households.

Other sources of income for poor households, such as firewood/charcoal sales and labour sales, make up around 45% of annual income. The district headquarters of Babati town and Katesh, along with Dareda town (the site of a large missionary hospital), provide a steady source of demand for firewood and charcoal and for building supplies such as bricks and poles. Men find employment or petty trade opportunities in the dry season when labour demands on the farms are lowest. Women collect, transport and sell firewood to businesses or households in the towns or outlying villages. One-acre households can earn up to 150,000 Tshillings making and selling bricks alone, and according to field informants, these alternative income sources are readily expanded to cover quite serious food or cash requirements. Thus the role of these income sources will naturally vary from household to household depending on the specific requirements of that household. The importance given to them in the figure depicted below is based on an estimate of their average contribution to one-acre households, recognizing that this figure falls within a large range.

Expenditure

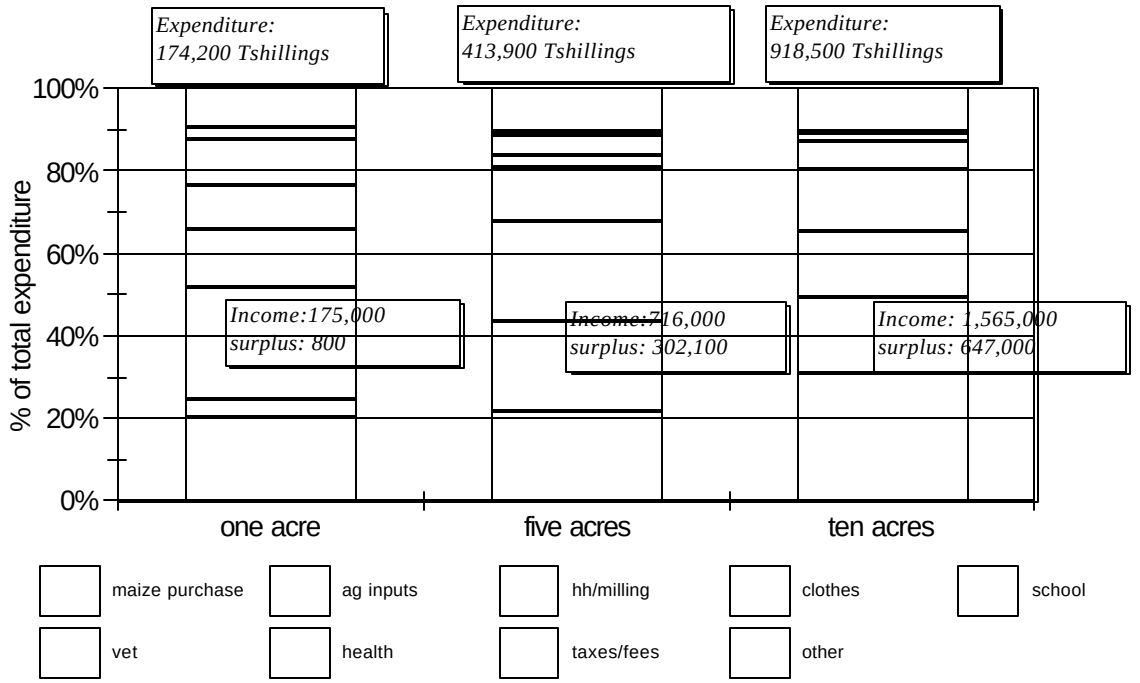
Fig.42 Annual Sources of Income
Mid-altitude Han/Bab: A 'normal' year



Households spend money on a number of different essential items and services during the year, including clothes, household items, medicines, vet fees, school, taxes, and agricultural inputs. Richer households spend by far the most money on agricultural inputs (eating up 30% of annual income), and poor households spend the most money on household items (such as salt, sugar, soap, cooking oil, etc.). Compared to the Karatu

Wheat Belt, where poor household expenditure on food comprises only 18% of annual income, poor household expenditure on food in this zone is only slightly higher at 20%. But typical poor household income for this zone, at 175,000 shillings per annum, is notably less than that of poor households in the Karatu Wheat Belt, which is approximately 235,000 shillings a year. Most of this difference can be explained by the higher productivity in the Karatu Wheat Belt which gets translated into higher cash crop income for poor households.

Fig. 43 Annual Expenditure patterns
Mid-altitude Hanang/Babati: normal yr



Agricultural inputs for a typical five-acre household cost around 92,000 shillings in 1997. Most farmers hire a tractor to make one pass on three of the acres (used for planting the cash crops) at the beginning of the season, spending 10,000 shillings per acre. In addition, they hire labourers during both the mid-January and the February weeding sessions at 4,000 shillings/acre and again at harvest they pay 3,000/acre to bring in the crops. In addition, they pay for transporting the crops (1,500/trip) from the fields to storage areas. Five-acre households may or may not buy improved seed and fertilizer; often they use their own seeds and manure instead.

Five-acre and ten-acre households still manage to secure sizeable surpluses in most years, which get re-invested in livestock (as a savings account) or new productive potential, such as land rental or equipment purchase. None of the informants in this area claimed to invest their surplus cash in banks, as in Karatu.

A Bad Year

While average maize yields in a normal year hover around 8 sacks per acre, in a bad year they fall to between 3 - 5 sacks per acre, or 40 - 60% of normal. Last year was reportedly the worst of the past five years in this zone, with both 1995 and 1996 production higher than normal.

Informants claim that households respond to bad years by reducing expenditure on non-essential items and selling additional livestock. For households in the richer categories, cultivating at least three acres, there is no need to purchase extra food, since 50% of 24 sacks still provides them with 12 sacks, which is just over annual minimum food requirements. Thus normal surplus production for households with more than three acres gets converted into household food in a bad year. As in Karatu these households typically reduce expenditure on household items, such as sugar, tea, and soap. Additional clothes purchases are put off, along with other types of discretionary expenditure (such as travel and home improvements). Most richer household informants claim that they still purchased the same number of livestock in bad years as in normal, but spend less money on them since livestock prices are lower.

One-acre households purchase more food, increasing from 2 ½ sacks to around 6 ½ sacks. These households are limited in their capacity to raise extra income through livestock sales, in part because they have fewer animals, and in part because livestock prices are significantly lower in a bad year. At the same time grain prices tend to be higher, which means that for each animal sold they can afford less grain. One-acre households, therefore, most commonly increase off-farm employment efforts, seeking work from richer households or in towns. If a poor household is in particular need of food or assistance, it borrows a bull from a richer relative or neighbour, sells it, and uses the money to purchase food and/or pay for school fees. In comparison to the pastoral areas, community support networks in this zone are not as reliable and not as direct; however, relatives do help if a family is really in need and it is rare for a poor household to fall through the cracks entirely.

This Year in Babati

Although all villages in the two districts making up the Mid-altitude Hanang/Babati zone share the same baseline picture, variations in **current** year production require that the analysis for this year be conducted separately by district. The following description applies to the part of the zone which falls in Babati District.

The Production Problem

The production problem for this year resulted from comparing 1999 estimates to1997 figures.[71] FEWS production figures were used rather than our district headquarter figures[72]

[71] It is worth noting that the 93 - 98 average was very close to the ›normal‹ year (1997) figure, confirming for us that 1997 was indeed a ›normal‹ year. 1997 figure for maize: 72,982 MT and 1993 - 1998 average for maize: 72,380

for two reasons: first, at the time of our visit to Babati District the current year estimate was not available, but the FEWS figures contain this figure; second, district headquarter data contained a number of gaps, lacking figures for finger millet, wheat and sorghum. For the sake of consistency and completeness, therefore, the FEWS figures were used. The following table provides four years of production data for Babati District.

Table 4. Crop production in Babati: 1996 - 1999

CROP	1995/1996		1996/1997		1997/1998		1998/1999 (est.)	
	Ha	*MT*	Ha	*MT*	Ha	*MT*	Ha	*MT*
maize	38,774	*96,935*	42,899	*72,982*	37,103	*45,004*	34,753	*57,966*
beans	11,522	*11,469*	18,704	*13,762*	12,600	*11,300*	10,948	*16,458*
pigeon peas	19,644	*17,364*	12,910	*12,499*	11,500	*10,200*	14,122	*9,569*
finger millet	3,041	*3,983*	3,296	*2,880*	3,600	*2,800*	2,000	*1,200*
wheat	1,850	*32,200*	1,700	*1,890*	1,800	*1,900*	1,500	*1,250*
sorghum	9,785	*11,541*	7,695	*7,607*	9,300	*8,900*	6,125	*4,288*

Source: USAID/FEWS, Dar es Salaam

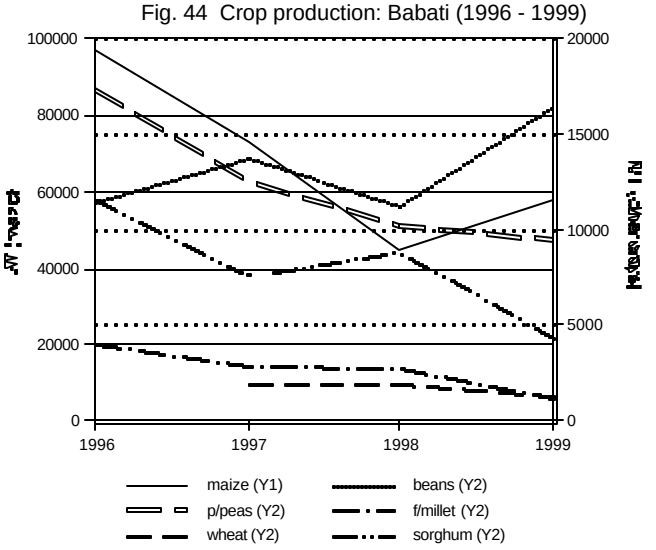
Again, as stated above, there is reason to view these figures cautiously, and current year estimates should, in particular, be seen as initial predictions rather than final statements. However, if these figures provide a general indication of the real trend, it is clear that, in relation to 1997 production, the only crop that will perform better than normal this year is beans, at 120% of normal. The maize harvest is likely to be around 79% of normal, whereas production of pigeon peas, finger millet, wheat and sorghum are predicted to be 77%, 41%, 66% and 56% of normal, respectively.

MT.

[72]FEWS reportedly obtains its figures from district headquarters, so in theory both sets (theirs and ours) should be the same, however, discrepancies (some slight, some quite dramatic) between the FEWS data and the figures we obtained at district level can be found in every set of production data.

The cash crop production problem results from weighting each crop in relation to its relative importance for each wealth group and factoring this by its production (in relation to normal) this year. The result of these weightings is as follows: one-acre households, 120%; five-acre households , 90%; ten-acre households, 83%. The reason for this inverse relationship between cash crop prospects and wealth group is that one-acre households sell only beans (which reportedly have higher than normal yields this year), whereas richer households sell an additional number of crops that have performed worse than normal this year.

Fig. 44 Crop production: Babati (1996 - 1999)



The Price Problem

Although FEWS figures were used to devise the production problem, it was not possible to use the same source to construct the price problem because the regional figures in its database are not detailed enough for the purposes of this analysis.

However, there were problems using the district headquarter price data as well, as these figures reflected a **rise** in livestock prices between 1997 and 1999 (of between 4 - 6%), contradicting all the evidence at field level, which suggested a significant **decline** in livestock prices. Based on field notes cattle prices this year are only around 80% of what they were in 1997 and goats/sheep prices are only 33% of 1997 prices.[73] Because of an overwhelming consistency in the field claims, field notes (rather than official data) were used to build the current year scenario for livestock prices.

Official data, however, was used to come up with the price problem for crops. A comparison between the February 1998 price (which reflects the price at which people buy grain after the 1997 harvest) and the February 1999 price indicates no rise in maize prices and a 100% rise in bean prices (using the May price, closer to when people sell). Because one can not know what maize prices will be in February of 2000, an additional 12% was added to the current price problem for maize to account for possible inflation. This measure was taken for Babati district (and not for others) because all other district figures demonstrated significant price rises already, well beyond inflation, but Babati figures

[73]For the current analysis livestock prices were set at 60% of normal, because cattle make up around 90% of total livestock income.

showed no change; adding the additional 12% for inflation in Babati provides a slightly safer guess/estimate of the coming year's conditions.

The cash crop price problem results from weighting each crop in relation to its relative importance for each wealth group and factoring this by its production (in relation to normal) this year and its price (in relation to normal) this year. The result of these weightings is as follows: one-acre households, 200%; five-acre households, 138%; ten-acre households, 131%.

Firewood and charcoal prices have decreased this year, reportedly because more people are selling them now (since last year's poor harvest). The current decline ranges between 66 - 75% of 1997 prices; the average, 70%, was used for the current analysis. In addition; wages for agricultural labour have increased by around 25% since 1997.

A Summary of the problem specification: 1999 - 2000

Production in 1999 (expressed as a % of 1997)
maize: 79%
beans: 120%
sorghum: .56%
finger millet: 41%
pigeon peas: 77%
wheat: 66%

Cash crop production problem
one-acre: 120%
five-acre: 90%
ten-acre: 83%

Prices for 1999/2000: (expressed as a % of 1997)
Maize: 112%
beans: 250%
finger millet: 100*%
sorghum: 100*%
wheat: 100*%
cattle: 79%
shoats: 33%
chickens: 50%
eggs: 200%
agricultural labour: 130%
*no price information - assumed no change

The Analysis
The consolidated problem detailed above will have the following effects on households in the Babati District area of the Mid-altitude Hanang/Babati Zone:

On the basis of the problem specified above, it is not predicted that any household will face an insurmountable food deficit in the coming year.

One-acre households will face an initial deficit of around 18% which they will offset by increasing food purchases and by converting cash crops into food.

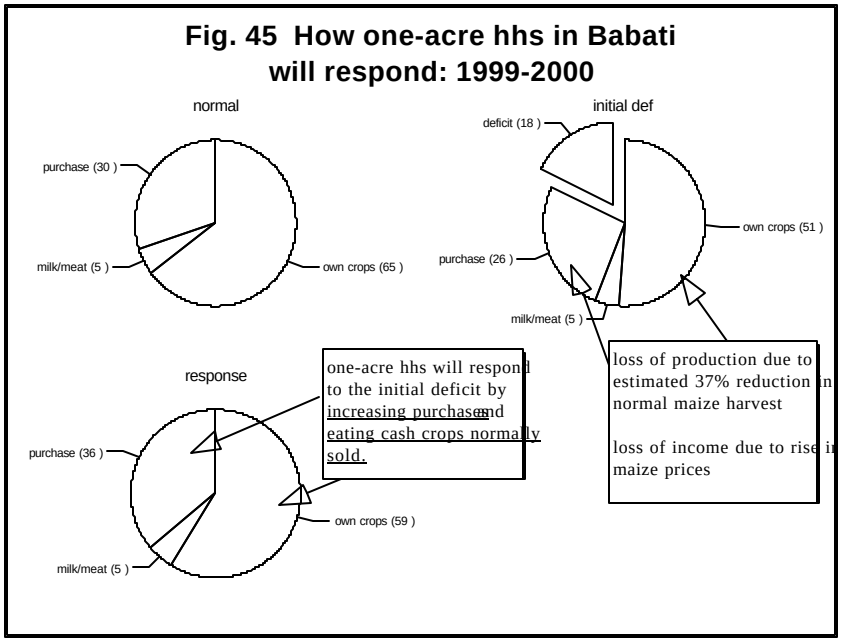


Fig. 45 How one-acre hhs in Babati will respond: 1999-2000

They will be able to obtain enough money to purchase extra food by increasing employment on neighbouring farms, intensifying firewood/charcoal sales and moderately increasing livestock sales. Because maize prices have not increased substantially, according to official district data, but labour rates have increased, and bean prices have risen, one-acre households will actually managed to *increase* their purchasing power this year by around 13%. This extra boost allows them to cover both minimum food and non-staple expenditure requirements, retaining a very slight surplus (14% in food equivalents) to spend on other goods.

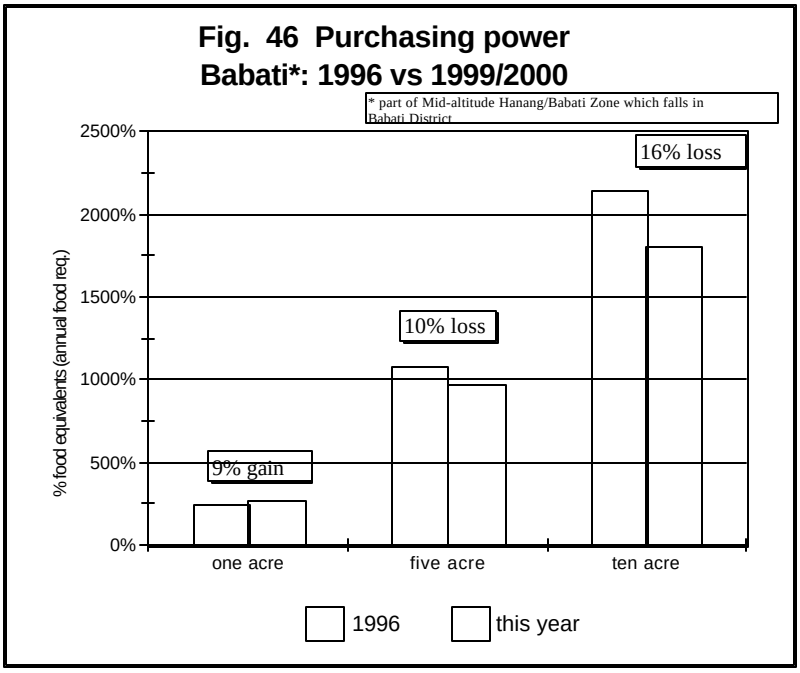


Fig. 46 Purchasing power Babati*: 1996 vs 1999/2000

Paradoxically, although poor households will experience a slight increase in purchasing power this year, richer households are likely to suffer a moderate decrease in purchasing power. This unexpected outcome is explained by the specific price and production changes associated

with the particular pattern of income sources pursued by richer households. Livestock prices are lower than normal, and the particular mix of cash crops grown by richer households did not perform well this year. The logical conclusion, therefore, is that since these two sources of income comprise almost all of normal income for richer households, they will have less access to cash this year.

This Year in Hanang

The Production Problem

Production figures used to devise the problem specification were obtained from district files, rather than FEWS, since the district figures were complete and included an estimate of this year.[74] As in the above Babati analysis, the current estimate for 1999 production was compared to 1997 production to derive the problem for production. The results of this comparison are quite mixed, with relatively better production estimated for beans, wheat, and sorghum, but significantly worse production forecasted for maize, pigeon peas and finger millet. The following table provides production figures for Hanang District for the past four years.

Table 5. Crop production in Hanang District: 1996 - 1999

CROP	1995/1996		1996/1997		1997/1998		1998/1999 (est.)	
	Ha	*MT*	Ha	*MT*	Ha	*MT*	Ha	*MT*
maize	29,683	*59,367*	32,286	*58,114*	24,347	*46,347*	23,724	*37,958*
beans	13,599	*8,159*	7,928	*6,342*	12,087	*7,426*	11,800	*14,160*
pigeon peas	3,415	*3,415*	6,028	*5,425*	4,453	*2,989*	3,580	*1,790*
finger millet	1,775	*1,953*	1,504	*2,105*	1,861	*3,062*	1,783	*1,605*
wheat	6,214	*9,320*	9,204	*16,567*	4,781	*9,634*	8,654	*17,308*
sorghum	9,754	*12,680*	4,809	*5,770*	3,651	*3,947*	6,800	*6,800*

USAID/FEWS, Dar es Salaam

As with the Babati analysis, the cash crop production problem varies for each wealth group, based on each group's relative reliance on different crops and the current year production of those crops.[75] The problems for each wealth group are as follows: one-acre, 223%; five-acre, 121%; ten-acre, 111%.

[74]Historical data did not differ significantly between FEWS and the district figures.

[75]Details of these weightings are available upon request.

The Price Problem

Field interviews were used to derive the livestock price problem, as district figures were unreliable for the same reasons stated above in the Babati section. Field notes indicate that cattle prices are now around 79% of prices in 1997 and shoat prices are 33% of 1997 prices, therefore the livestock price problem used in the current analysis was 60% based on a weighting towards cattle.

Data for staple crops (maize and beans), obtained from district files, indicate a 40% rise in maize prices (based on a comparison between February 1998 and February 1999) and a 67% rise in bean prices (based on a comparison between August 1997 and June 1999).[76] The cash crop price problem results from weighting each crop in relation to its relative importance for each wealth group and factoring this by its current production (in relation to normal) and price (in relation to normal). The result of this weighting for Hanang District is as follows: one-acre households - 167%; five-acre households - 125%; ten-acre households - 121%.

The same change in charcoal and firewood prices and agricultural labour rates apply in Hanang as in Babati.

Summary of problem specification: 1999 - 2000

Production in 1999 (expressed as a % of 1997)

maize: 65%
beans: 223%
sorghum: .118%
finger millet: 76%
pigeon peas: 33%
wheat: 104%
sunflower: 146%

Cash crop production problem:
one-acre: 223%
five-acre: 121%
ten-acre: 111%

Prices for 1999/2000: (expressed as a % of 1997)

Maize: 140%
beans: 167%
finger millet: 100*%
sorghum: 100*%
wheat: 100*%
cattle: 79%
shoats: 33%
agricultural labour: 130%
*no price information - assumed no change

Cash crop price problem:
one-acre: 167%
five-acre: 125%
ten-acre: 121%

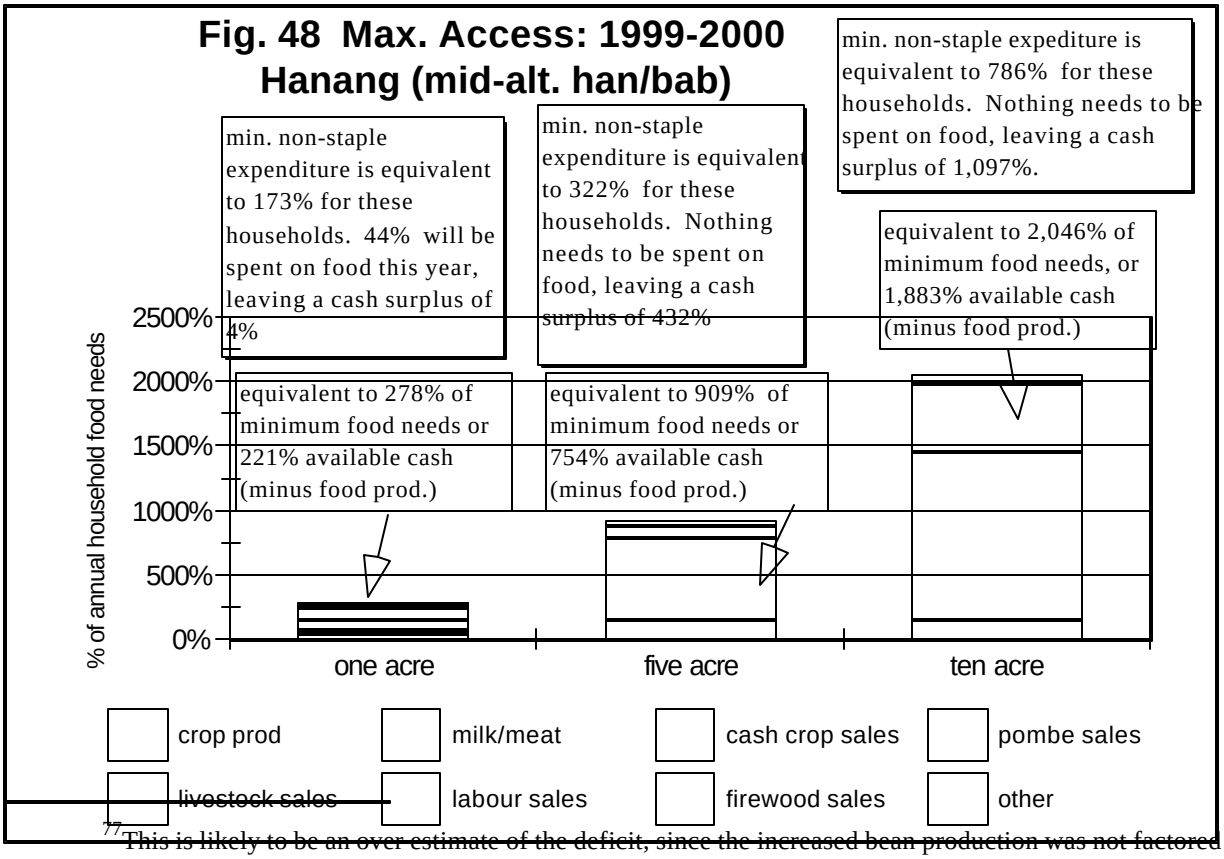
[76] An additional 12% was not added to the maize price since it already exceeds the three-year increase one would expect to see from inflation alone.

The Analysis

The consolidated problem for 1999 -2000 will affect households in Hanang in much the same way as it affected households in Babati. Those cultivating three acres and above will divert surplus food to household consumption to avoid facing a food deficit.

One-acre households will experience an initial crop deficit of around 42% due to the loss in maize production,[77] and an initial income deficit of around 4% because of increased maize prices.

They should, however, be able to offset this deficit in three ways. First, an increase in bean production and prices will result in significantly higher cash crop income for poor households, providing them with the means to purchase up to 40% of annual food needs with bean income alone. Second, increasing agricultural employment (at the higher wage rates) will provide them with additional income (equivalent to around 87% of annual food requirements) which could be used to purchase either food or non-staple minimum requirements. Third, poor households can expand their reliance on firewood and charcoal sales to provide them with an additional 15% of annual food needs if necessary.



[77] This is likely to be an over estimate of the deficit, since the increased bean production was not factored into this loss.

Although one-acre households will not experience an increase in purchasing power like their neighbours in Babati, their loss in real income, commensurate with around 3% of annual food, is not significant. Richer households, however, will experience a more substantial loss in purchasing power, equivalent to approximately 162% of annual food for five-acre households and 430% for ten-acre households. Notwithstanding this loss, both groups will still retain significant surpluses after expenditure on minimum non-staple requirements.

Conclusion

The Mid-altitude Hanang/Babati zone is appropriately termed by some the 'bread basket' of northern Tanzania. Most households sell considerable amounts of surplus food each year, filling market stalls in Arusha town as well as in neighbouring Singida Region. In part this area benefits from its advantageous position between the extreme highlands and the extreme lowlands; and in part, its surplus results from the fact that much of the zone (particularly the portions in Hanang) has only been settled recently, leaving room for large plots and considerable expansion. One must question how long these surpluses will remain with diminishing plot sizes and a continued contraction of new lands associated with Tanzania's rapid population growth.

In the meantime, the suggestions posited for Karatu apply to this zone as well and are repeated below.

- Poor roads make it more difficult and more expensive to market surpluses effectively. Although the road from Arusha to Babati is not bad, it quickly deteriorates when traveling towards Hanang. A better road system would increase the development potential of this zone.

- Most farmers do not have access to information about current world market prices for their crops. They cannot plan appropriately to maximize income through more effective concentration on the year's highest value crops, and they do not have the bargaining power with big traders to get the best prices for their goods. Better access to information on global prices would increase their power to do both.

- Global climate predictions may also help farmers plan better. Access to advice and estimates provided by organizations like IRI[78] or the Regional Drought Monitoring group in Nairobi, or FEWS would strengthen the planning capacity of local farmers.

[78]A climate prediction institute run in association with Columbia University and San Diego University which provides climate information to farmers in Africa.

MBULU SOUTH/CENTRAL ZONE

Location

The Mbulu South/Central Zone comprises a large portion of villages on the Mbulu plateau, including the wards of Maghang, Bashay, Dongobesh, Sanu, Bargish, Daudi, Gehandu, Buger and parts of Tlawi, Tumati, Masieda, and Kansay. Maretadu ward on the southern boundary is excluded, as it is more like the wheat complex area to the south in bordering Hanang District. Haydom ward is also excluded, on the basis that its production system is reportedly quite different from the rest of the district's. Half of Tumati and Tlawi wards fall into the neigbouring Eastern Zone, along with Murray and Kainam wards. The western half of Masieda and Kansay wards, which are excluded from the Southern/Central Zone, fall instead into the lower plains of the Western Zone. The Southern/Central Zone makes up approximately 53% of the district's population[79], and covers around 233,700 ha, or around 45% of its land mass.[80]

Setting

The Mbulu plateau lies in the southern part of the Western Rift Blick zone, comprised of uplifted land to the western side of the East African Rift Wall. Bordered by Manyara and Balangida faults to the east and the Eyasi basin and Yaeda valley to the west, the plateau sits at an elevation of between 1100 - 2400 metres above sea level. Most of the Southern/Central Zone lies between 1500 - 2100 metres.

The landscape in this zone consists of moderately steep ridges and uprising hills with long straight and gently sloping foot slopes in the north, and flat to gently undulating plains in the south. Soils are shallow with poor fertility.[81] Much of the zone is covered with a mixture of crop lands and natural vegetation, interspersed with wooded grassland and bushland. On first glance, one is struck by shades of light green and brown, as compared to the deep, rich greens of Karatu and Hanang/Babati.

Average rainfall readings from two weather stations in this zone are presented in the figure below. Dongobesh mission is found in the southern part of the zone, and Mbulu town is located in the central east. Average annual rainfall at Dongobesh approaches 750 mm

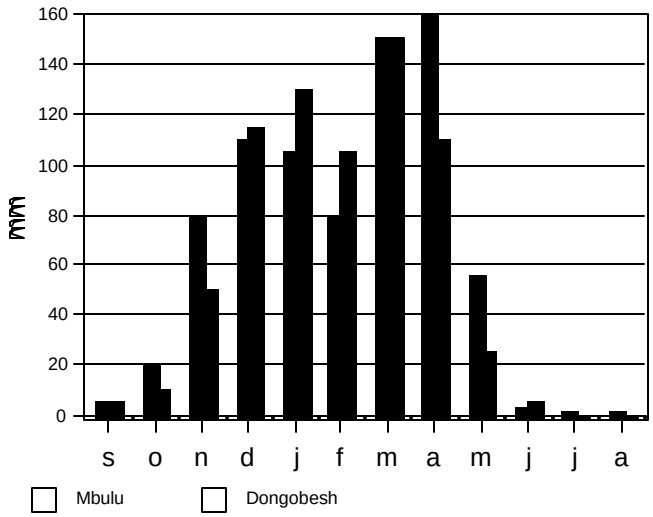
[79]Based on district HQ population figures.

[80]Based on Mbulu Planning Document estimate of Maghang-Harsha/ Waama-Endallah land systems, pg. 9

[81]Mbulu Planning Document, pg. 9

and is slightly higher in Mbulu, at 827 mm. Seasonal variation within the zone is roughly the same, with rains starting in October/November, peaking at the beginning of the year before falling off slightly in February and then peaking again in March/April prior to dwindling away completely in June and July. Despite a bimodal tendency in rainfall, there is only one harvest in the Southern/Central Zone.

Fig. 49 Rainfall in the Southern/Central Zone

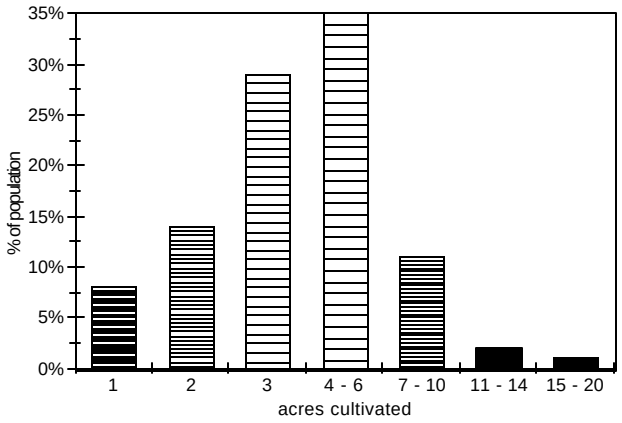


Wealth Breakdown

Smallholder agriculture became entrenched in the Mbulu plateau as the primary means of subsistence in the 1960s. Before that much of the land was uninhabited due to the presence of tsetse fly. In the 1940s and 1950s, large areas of the district were cleared to counter the tsetse fly infestation, leading the way to a significant expansion into areas to the north and south of Mbulu town.[82]

The current wealth breakdown, therefore, is a reflection of at least thirty years of settlement; it is clear that the best lands have already been claimed, cultivated and sub-divided. In the recently established Karatu Wheat Belt, households may be farming up to 100 acres; in Mbulu Southern/Central Zone, on the other hand, no household cultivates more than 20 acres, and the vast majority cultivate between 3 - 6.

Fig. 50 Wealth breakdown
Mbulu Southern/Central Zone



As a rule, very few households use tractors, and the overwhelming majority rely on ox-ploughs to prepare their land. Cattle are a source of labour, manure, food and cash, and because of their importance, livestock ownership varies in direct relationship to wealth. In other words, one cannot become richer without cattle, and at the same time, one stores capital in the form of cattle, so the richer the household,

[82] Mbulu planning document, pg. 19 and discussions with key informants.

the larger the herd. Households cultivating 1 - 2 acres reportedly own very few (if any) cattle, although they may have access to milk and manure through the loan of one or two cows. They typically own 5 - 10 shoats, which play the role of a bank account and are drawn down upon when cash is required. Those with 3 - 6 acres own 5 - 10 cows and 10 - 20 shoats; and households with 11 - 20 acres own between 30 - 60 cows and 30 - 60 shoats.

A correlation between wealth and what types of crops are grown also exists. Maize and beans, the basic food crops, are grown by all households, but 1 - 2 acre households concentrate exclusively on these two crops, whereas richer households also grow sorghum, finger millet, and sunflower.

Informants claimed that one-acre households tend to be very young couples who have yet to establish themselves. The assumption is that they will acquire more land as the household expands, following the same pattern that households have for many years, working their way up the wealth continuum by labouring for others early on, acquiring livestock, and claiming new land as their income and labour force grows. There is cause to question this assumption in the coming years, because although local informants claim that land is still available, the wealth breakdown above suggests otherwise. It is more likely that if young couples remain in the area, they will find themselves stuck in the initial phase of working for others and be unable to expand into new productive lands. Their current temporary income opportunities, which include local agricultural employment, or migrant work in areas like Mang'ola Chini on the onion plantations or the Bashuto Wheat Complex, may soon become permanently entrenched as the only options available.

Normal Year

Accounts of crop performance in recent years varied from village to village, reflecting (at least in part) localized variations in weather patterns. The most consistent claims, however, were that 1997 was a very bad year, followed by 1998, which was only slightly better. The last 'normal' year was said to have been 1996, which had followed on two good years. Average maize yields in 'normal' years in this zone range between 6 - 10 sacks per acre, with richer households obtaining higher yields than poor households since they have access to manure and hired labour. Sorghum yields average 5 sacks per acre, and bean yields tend to be around 2 sacks per acre. Sunflower, an important cash crop, produces between 6 - 7 sacks per acre in a normal year.[83]

The following sections provide descriptions of household access to food and income for one-acre, three-acre and seven-acre households in normal years, (a year like 1996). Other wealth groups fall along an implied wealth continuum, the basic outline of which is

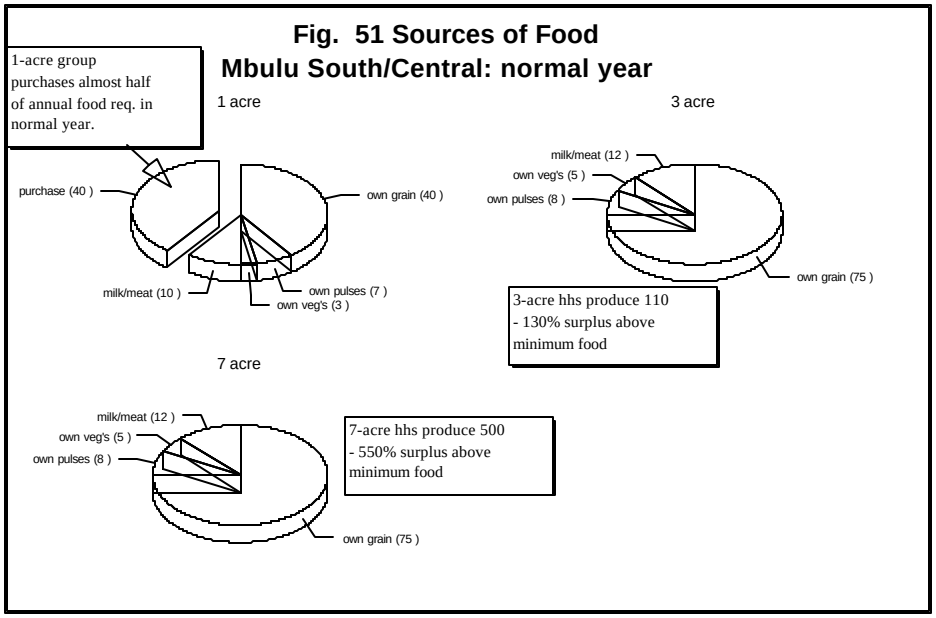
[83]Based on reports by village key informants.

suggested by the three groups described in detail.

Sources of Food

Households in the Southern/Central zone obtain food in much the same way as described in the Karatu Wheat Belt and the Mid-altitude Hanang/Babati Zone. What is different about this zone is that the absolute quantity of surplus production is far less than in the two bordering surplus zones, and therefore, livestock sales take on more prominence than crop sales.

The figure below illustrates the relative importance of different sources of food for one-acre, three-acre, and seven-acre households.



One-acre households obtain around 55% of their annual food requirements from their own crop production, making up 50% from maize production, and an additional 5% from beans and vegetables (including pumpkins and greens). Even though they harvest 6 sacks of maize in a normal year, poor households sell at least 1 sack at harvest time to cover immediate cash needs, leaving them with only 5 for the household's consumption. Similarly, they harvest 1 sack of beans, but sell half of it, remaining with 3 or 4 tins. Later in the year, as food stocks run out, the same household purchases maize tin by tin at a steadily higher price, making up for what it sold and what it needs in addition. This typical cash flow problem, requiring poor households to sell at the worst prices and ultimately re-purchase at higher prices, creates a taxing cycle of debt and poverty.

Richer households manage to avoid this trap by producing enough to cover both the food and cash requirement, and by maintaining enough cash on hand to avoid selling food at

harvest time, waiting instead until prices go up early the next year and thereby profiting from their own flexibility.

Milk and meat comprise between 5 - 20% of food requirements. Poor households obtain milk from borrowed cows whereas richer households depend on their own milk cows. The same system of borrowing exists here as was described in the Hanang/Babati zone.

Sources of Income

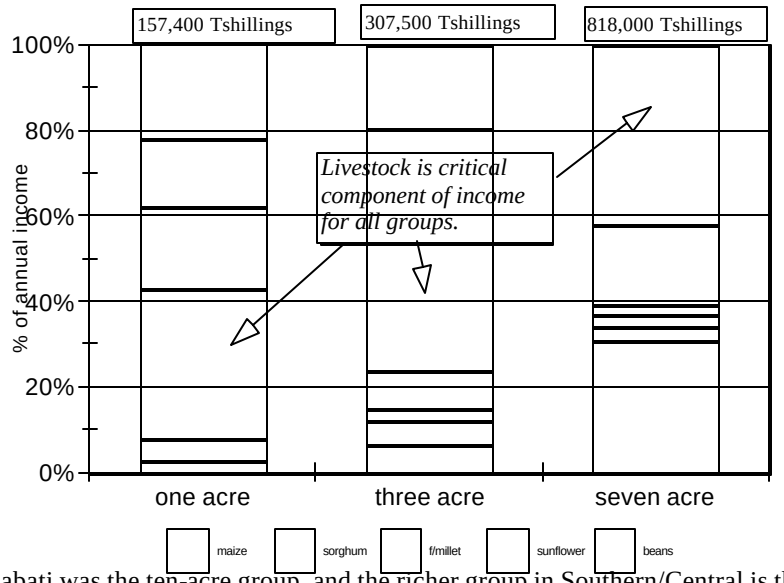
Livestock play a much more important role in the Southern/Central Zone than they do in the two agricultural zones described previously. This is not to say that households necessarily own **more** cattle or goats in this zone, but rather that their function is more critical: in essence, livestock ownership provides households with income to cover minimum expenditure in good years protects households from going hungry in bad.

The basic tendency is to sell cows in bad years and goats in good years. This rule does not preclude cattle sales in normal or good years, but simply suggests that only unproductive bulls are sold in normal years, whereas sales may extend to the productive part of the herd as well in bad years. Goats are the equivalent of small change, and are commonly sold to cover school fees, agricultural inputs, or food purchases. In addition to cattle and shoats, households sell chickens, eggs, and pigs to raise additional cash.

Whereas livestock sales made up around 18% of annual income for richer households in Hanang/Babati, they comprise 41% for the same group in the Southern Central Zone, making clear the contention that livestock play a more important role in this zone than in the previous two.[84]

A typical seven-acre household sells 6 goats, 3 cows, a number of pigs and chickens annually, along with several eggs a day, obtaining an annual income

Fig. 52 Annual Sources of Income
Mbulu South/Central : A 'normal' year



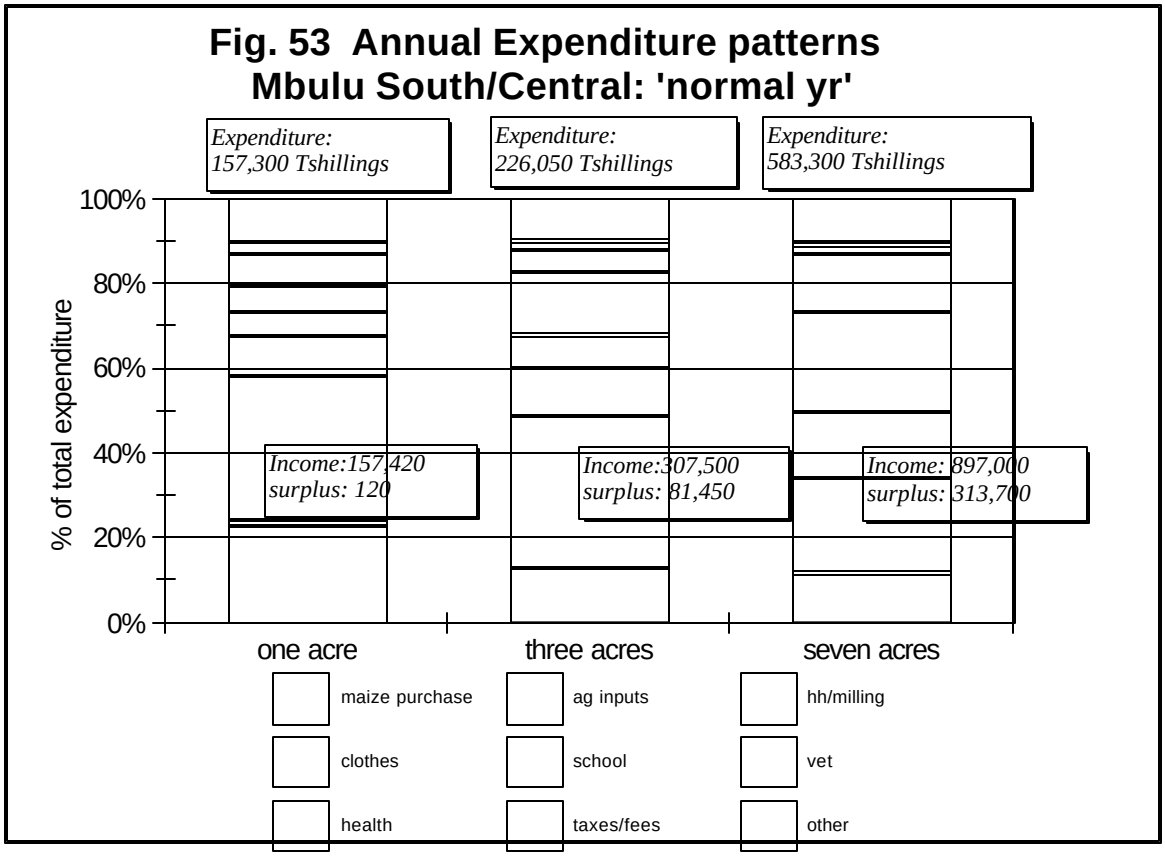
[84]The richer group in Hanang/Babati was the ten-acre group, and the richer group in Southern/Central is the seven-acre group, but in relation to each zone=s wealth breakdown, they represent the same relative >richness=, falling within the 7th decile of the population (in Risk Map terms).

of around 362,000 Tshillings from livestock sales alone. Three-acre households derive 57% of their cash from livestock sales, selling 1 big and 1 small bull a year, 4 shoats, and a number of chickens and pigs. One-acre households manage to earn only 55,000 Tshillings selling livestock, far more limited in the number and type of animals they can afford to sell.

Instead, one-acre households make up the largest part of their income selling firewood and pombe, and by seeking work locally and on neighbouring commercial farms in the Basuto Wheat Complex and in Mang'ola Chini (on the onion plantations). These three options comprise between 50 - 60% of their annual income.

Expenditure

The following graph depicts normal year expenditure for households in Mbulu Southern/Central Zone.



One-acre expenditure on food comprises a significant portion of its annual expenditure, eating up around 30% of annual income. The relative impact of this necessary purchase is far more acute than for comparable households in either the Karatu Wheat Belt or the Hanang/Babati zone, suggesting that these households are fundamentally poorer than neighbouring-zone one-acre households. An additional indication is that their minimum

expenditure on household goods, at around 40,000 per year, is spare and pared down to the basics, whereas 'poor' households in Karatu and Hanang/Babati spend up to 66,000. Three-acre and seven-acre households do not purchase staple foods most years, spending the majority of their money on household goods, vet fees, and agricultural inputs. School fees and associated costs constitute the single highest outlay of money for households with students in secondary school, which tend to be those in the higher wealth groups. For seven-acre households with two children in primary school and one in secondary, annual expenditure on school adds up to at least 138,000 Tshillings, or 24% of total expenditure. The high cost of secondary school presents an impossible barrier to most households cultivating fewer than four acres, and an overwhelming expenditure burden for those above the four-acre threshold who make the commitment to send one child. Sending two children proves almost impossible for any household cultivating less than seven acres, and is rare even amongst these richer households. Even if the money is available in normal years to afford to send more than one child, bad years are common enough to warrant a second thought before making such high expenditure commitments.

This Year[85]

The upcoming year in Mbulu Southern/Central zone promises to be a poor one, based on official production estimates. The performance of all crops, including both food and cash crops, will be considerably worse than normal; farmers will have the most luck with beans, but even this production is estimated to be 42% lower than normal. The implications of this estimated production are that poor households will face a substantial food deficit, and although middle and rich households will be able to meet their food needs, they will lose well over half their real income.

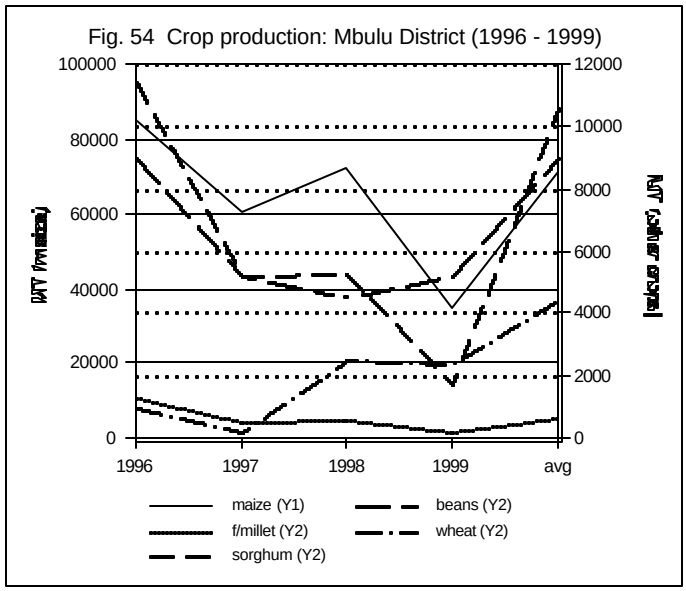
The Production Problem

The production figures used to devise the problem specification were FEWS figures instead of those we obtained at the district headquarters, because the district headquarter data still included Karatu production up until 1996, whereas FEWS had modified its figures to reflect only Mbulu production (without Karatu).[86] An additional point to be noted is that the problem for crop production resulted from a comparison between the 1999 estimate and the *average* for 1993 - 1998 (rather than just 1996). The decision to use the average was taken because 1996 appears in the figures to be (by far) the best of the past 6 years, and therefore not entirely representative of 'normal' in terms of production.

[85]This year is sufficiently bad that writing a ›bad year‹ section would have constituted a repetition, so it was decided not to present the ›bad year‹ section in this zone.

[86]The district figures vary significantly from FEWS figures for the two years being compared, 1999 and 1996, although the figures for the years since 1996 appear to be fairly similar. This difference is likely to be the result of Karatu's inclusion in district figures.

The same weighting process applies to cash crops in this zone as in the previous zones. Each crop was weighted according to the percentage it made up in relation to total crop sales (by wealth group) and the result was factored against its production this year (in relation to normal). The subsequent cash crop problem for each wealth group is as follows: one-acre, 58%; three-acre, 50%; seven-acre, 53%.[87]



The following table provides production figures for the last four years in Mbulu District (counting this year), and includes the 1993 - 1998 average for each crop. It is of particular importance in this zone to view the district-level figures with caution, because significant variations in this year's production were apparent from one village to the next during the recent assessment and the district-level figure will obscure these differences.

Table 6. Production Figures in Mbulu District, 1996 - 1999

CROP	1995/1996		1996/1997		1997/1998		1998/1999 (est.)		93 - 98 avg	
	Ha	*MT*	Ha	*MT*	Ha	*MT*	Ha	*MT*	HA	*MT*
maize	26,009	*84,941*	34,375	*60,726*	29,028	*72,546*	34,375	*34,364*	39,364	*71,238*
beans	13,100	*9,005*	5,565	*5,428*	2,504	*4,507*	4,726	*5,252*	10,912	*9,002*
finger millet	1,446	*1,244*	440	*525*	551	*551*	551	*440*	792	*647*
wheat	1,200	*950*	796	*208*	796	*2,507*	2,370	*2,370*	2,378	*4,415*
sorghum	4,800	*11,454*	2,497	*5,221*	2,944	*5,300*	2,479	*1,699*	6,579	*10,615*

Source: USAID/FEWS, Dar es Salaam

The Price Problem

[87] Details of these weightings are available on request.

Reliable district level prices for livestock and staple crops were not available. Thus prices used to derive the problem specification came from field notes obtained during the recent assessment.

In addition to devising a wealth-specific cash crop price problem, in this zone each wealth group also requires its own livestock price problem, since the change in livestock price is different for each category of sale. For instance, although cattle and shoat prices have decreased, egg prices have gone up, so a household's relative reliance on each category determines its specific price problem. The cash crop price problem for each wealth group suggests an increase in cash crop income, and is as follows: one-acre, 200%; three-acre, 258%; seven-acre - 222%. The livestock price problem, however, indicates the opposite trend: one-acre, 61%; three-acre, 60%; seven-acre, 55%.

Production in 1999 (expressed as a % of avg)

maize: 48%
beans: 58%
sorghum: 15%
finger millet: 31%
*sunflower: 100%
*(estimate - no information from official data)

Cash crop production problem
one-acre: 58%
three-acre: 50%
seven-acre:53%

Prices for 1999/2000: (expressed as a % of 1996)

Maize: 233%
beans: 200%
finger millet: 200%
sorghum: 350%
sunflower: 250%

Cash crop price problem
one-acre: 200%
three-acre: 258%
seven-acre:222%

cattle: 50%
shoats: 50%
chickens: 50%
eggs: 200%
agricultural labour: 130%

Livestock price problem
one-acre: 61%
three-acre: 60%
seven-acre:55%

The Analysis

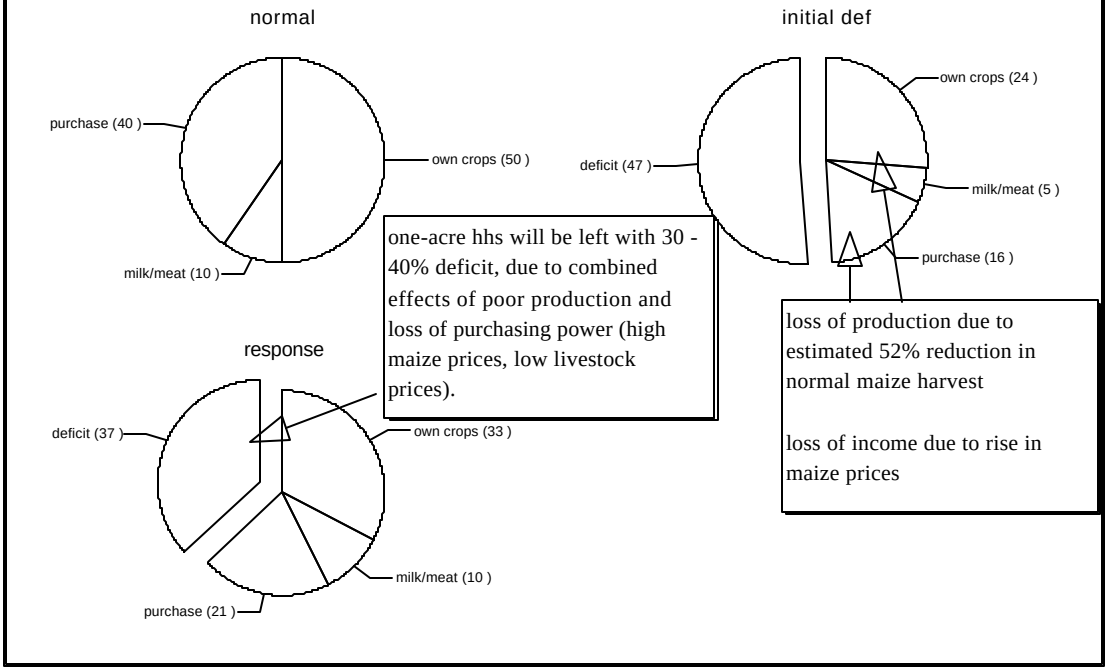
One-acre households will suffer a 30 - 40% food deficit this year if the above production and price information is accurate. Their initial problem will be caused by the loss of food crops, and instead of harvesting the usual 6 sacks of maize and 1 sack of beans, they will harvest 2 sacks and 5 tins of maize, and around half a sack of beans. This will provide them with the equivalent of 30 - 35% of the coming year's food needs. But in addition to

having lost half of their normal food, they have also lost cash crops as a source of income; and although admittedly it is a small amount (approximately 12,500 Tshillings, representing 10% of normal cash income), poor households count on every bit of cash they can raise. To put it another way, 12,500 shillings represents 70% of a child's annual primary school costs. They will have to find a way to make up this loss in some other way.

The most likely way one-acre households will compensate for the loss in crop production and cash crop income is through additional employment, increasing sales of firewood/charcoal, and selling more livestock. The most they can hope to obtain through these means is the equivalent of 117% of annual food needs at current prices.

The real problem for these households is not just the loss of crop production, but the combination of three significant factors: 1. Crop production will be far less than normal; 2. Food prices will be over 200% of normal; and 3. Livestock prices will be around half of normal. If food prices were normal, and both the other conditions remained poor, as stated above, one-acre households would face only a 10% food deficit, as opposed the estimated 30 - 40% deficit. Similarly, if livestock prices were to revert to 'normal', which would place them approximately twice as high as they are now, (with the other two factors remaining poor, as they are currently) the one-acre food deficit would be only 14%. However, since these households will face reduced production in conjunction with high food prices, any

Fig. 55 One-acre hhs in South/Central this year: 1999-2000



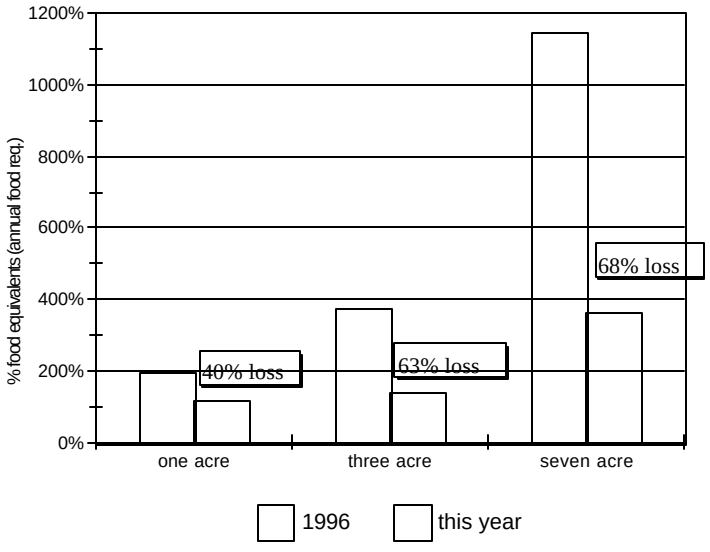
income earning option they pursue will be worth only half as much as it would in a normal year.

Although one-acre households will increase off-farm work and increase the number of firewood bundles sold, each extra day worked is equivalent to only half a day at normal wages (or more accurately, 57% of a day) when compared to how much food can be purchased at the end of that day. Furthermore, with food prices 233% higher and livestock prices 50% lower, livestock sales will be worth only about a quarter of their normal value in relation to food. Normal year income for one-acre households, without the expansion of work and sales, is equivalent to 196% of food requirements. Even if they expand their income opportunities to the furthest degree possible, one-acre households will still only be able to earn the equivalent of 117% of annual food income in 1999/2000. If they spend the minimum amount of money required to cover non-staple expenditure (such as school, health, agricultural inputs and basic households goods), they are left with only enough cash to cover 21% of food needs, leaving a 35 - 40% food deficit.

Three-acre households (and above) should not face a food deficit, since they will convert surplus food production, normally sold, into food stores for the household. More specifically, in a 'normal' year, three-acre households produce enough food to cover 190 - 195% of their food requirements, so even in a year like this one, where they are likely to produce only 48% of the normal harvest, they will still be able to cover around 90% of food needs with their own crops. The additional 10% will derive from milk and meat consumption.

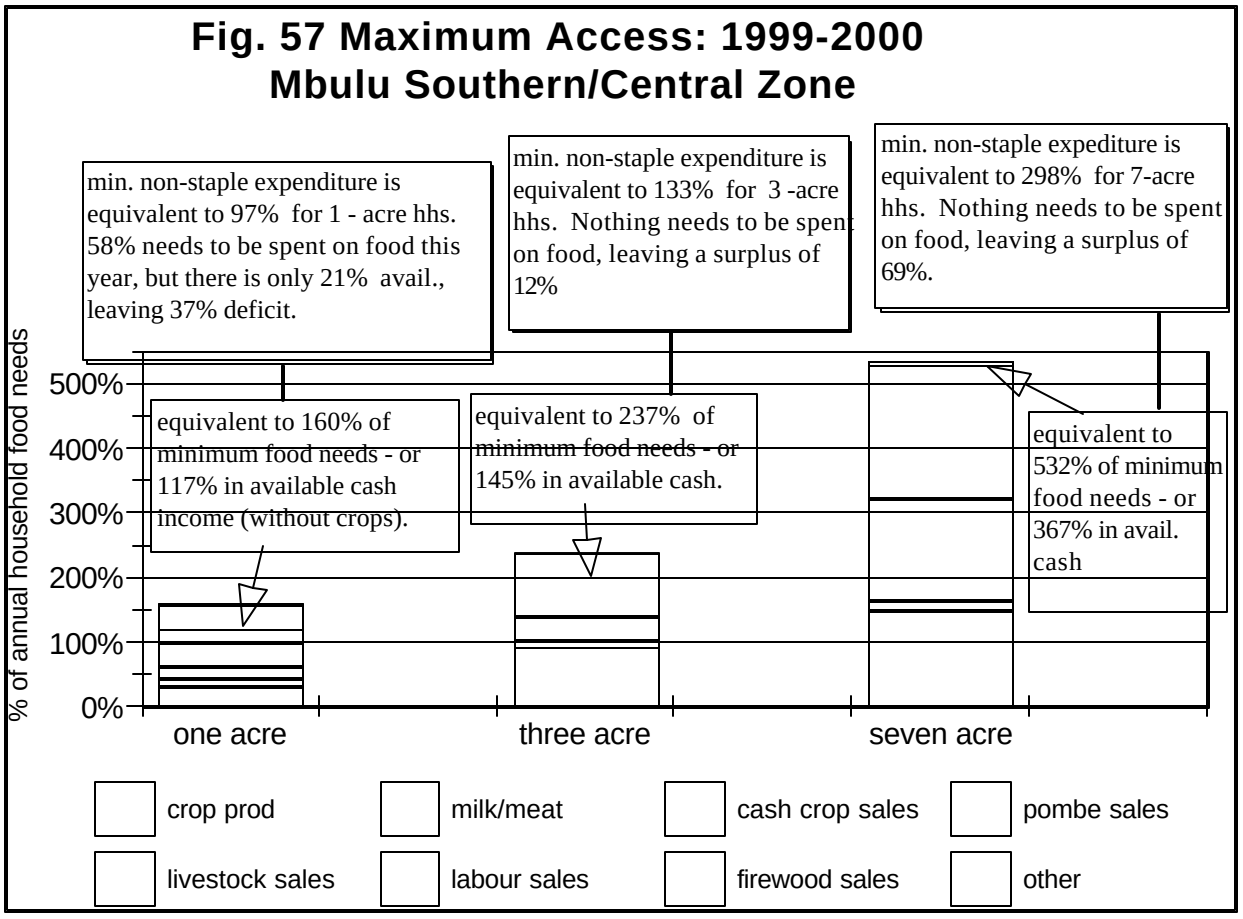
But even though food will not be a problem, loss of income will create a substantial strain on the household, which will have to budget very carefully to cover its minimum expenditure requirements. Three-acre households will lose around 63% of normal-year purchasing power, in large part because livestock sales are worth only 26% of their usual value and make up around 58% of normal-year income, consequently bringing down the overall prospects for obtaining cash this year. In addition to suffering poor terms of trade for livestock, cash crop income will be effectively eliminated, diverted to feeding the household instead, resulting in an overall loss equivalent to 97% of annual food income (at normal year prices).

Fig. 56 Purchasing power
Mbulu S/Central: 1996 vs 1999/2000



Sales of pombe will be an important means of acquiring income for these households, however, there is some question as to whether an available market exists for pombe in a bad year. If pombe sales are not possible, these households are likely to seek work off their farms, from richer households or in neighbouring surplus areas. If pombe sales are half of their normal level this year, then three-acre households would have to find enough work to purchase the equivalent of half their annual food needs, or around 5 2 sacks at normal year prices (or 39,000 Tshillings) to make up the income difference and cover minimum non-staple requirements.

Seven-acre households will have more room to play with, and despite a significant loss in purchasing power, will still retain a slight surplus (in food equivalent terms) above minimum expenditure requirements.



Conclusion

In the short term, the coming year will be difficult in the Mbulu Southern/Central Zone[88]: poor households will face an almost-certain food deficit, and will find it challenging to acquire the cash to cover both the required increase in food purchases and the household's minimum non-staple expenditure. Households with three acres or more under cultivation should not face a food deficit, but will almost certainly struggle to find enough money to cover all their spending requirements. Emergency food aid is a very real solution to the current year's dilemma. Stabilizing maize prices and/or supporting livestock prices presents other alternatives. As suggested above, **the combined effect of normalizing both maize and livestock prices would eliminate the food deficit for poor households and ease the income stress for richer households.**

Options for the future are more difficult to propose. In the mid- to long-term, Mbulu Southern/Central Zone faces the likely scenario of increasing impoverishment because a growing percentage of the rural population will find it increasingly difficult to secure enough land to both feed itself and raise enough cash income to cover minimum expenditure requirements. It would not be unexpected within the next ten years to see a large rural population transforming itself from subsistence farmers into a labour force for surrounding surplus areas. How to keep this from happening should be a primary topic of conversation for development experts and government officials responsible for Mbulu's future.

[88]This prediction is contingent on the quality of district production data, since it is from the official production figures that the current problem specification was derived.

MBULU EASTERN ZONE[89]

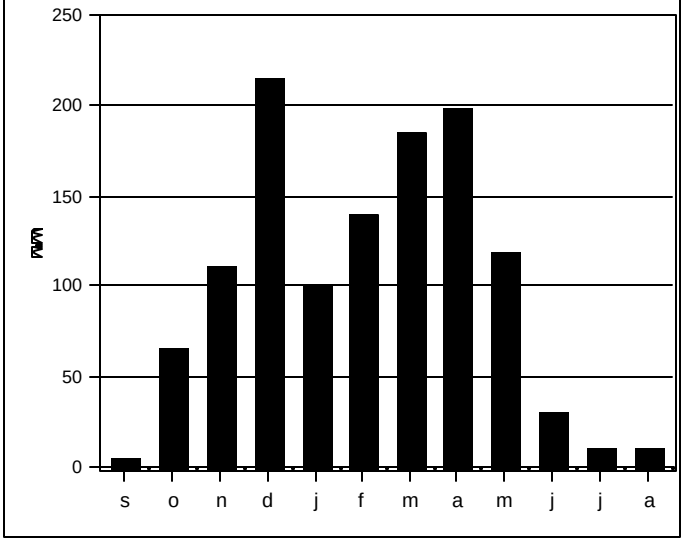
Location

The Mbulu Eastern Zone comprises a relatively small area (covering 51,200 ha) about 20 km to the southeast of Mbulu town. It includes both Kainam and Murray wards, along with half of Tumati ward and the southeastern corner of Tlawi ward. The Nou and Hassama forest reserves take up significant portions of the zone's central-west and northeast. The main villages included in the Eastern Zone, starting from the south, are Endoji, Arri, half of Tumati, Murray, Kwermusi, Kuta, Hayloto, Kainam and Nahhasey and the population is estimated at around 23,488 people, or about 13% of the district's overall population.

Setting

Within a 20 mile radius of Mbulu town, perched high on the summit above the surrounding forest reserve and overlooking the escarpment which drops down to the Manyara basin, lies an isolated area inhabited by Iraqw. The Iraqw have lived in this area, also known as Mama Isara, since the late 18th century, and it is commonly referred to as the Iraqw homeland. The Eastern Zone is an isolated area, bordered by the Rift Valley escarpment to the east, the Nou Forest Reserve to the south, the Hassama Forest Reserve to the northeast, and several large hills to the western side. In the past, these natural barriers provided a useful defense against raiding Maasai, Arab slave traders and European invaders; but nowadays the relative isolation proves more hindrance than help, constraining agricultural production and access to central markets.

Fig. 58 Rainfall in the Eastern Zone



Situated at 2100 - 2400 metres above sea level, the Eastern Zone consists of alternating summits, steep ridges and plunging valleys. Roads and homesteads are built on the summits; a seasonal rotation of crops is cultivated on both high and low lands. The soils vary with the landscape: shallow soils with low

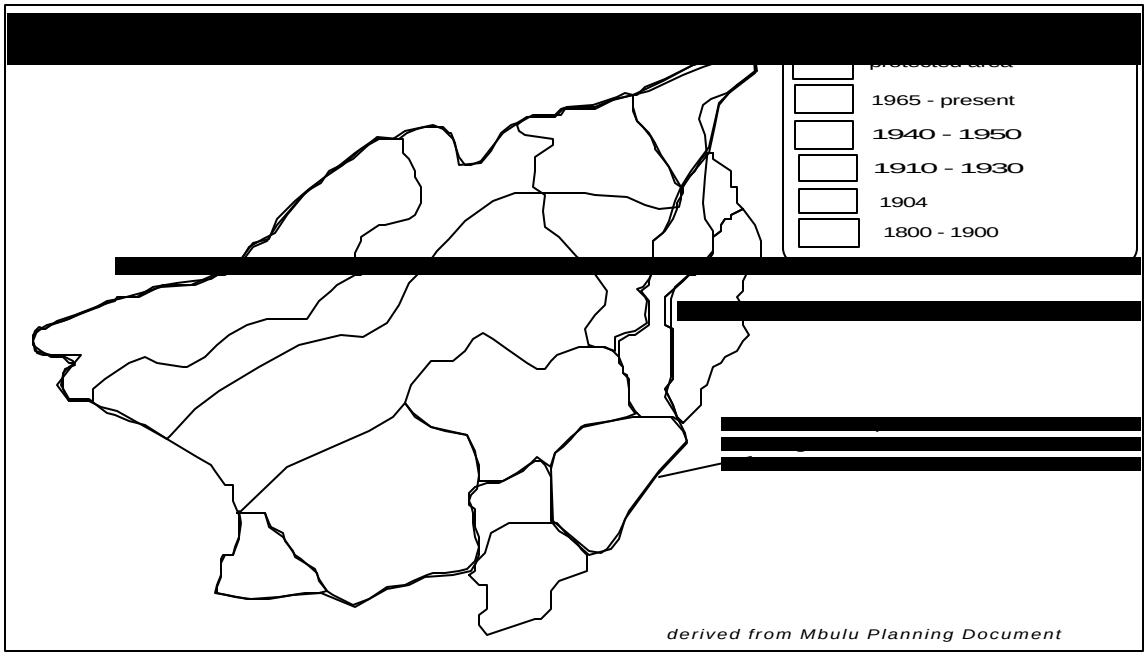
[89]The assessment team had limited time in the Eastern Zone; the following notes are provided as a set of initial hypotheses rather than as a compilation of final conclusions.

fertility on the summits and moderately fertile clay soils in the valleys.

The rainfall regime in the Eastern Zone is quite different from that of the lower plateau areas in the Southern/Central zone. Whereas annual rainfall averages between 750 - 850 mm in the lower plateau areas with only one planting season, annual rainfall in the Eastern Zone averages around 1221 mm, and two distinct rainy seasons allow for a double harvest, one in January/February and one in April/May.

Wealth Breakdown

In line with the previous contention that a settlement's age can be linked to its relative wealth, the Eastern Zone is the oldest settlement in Mbulu District, and by far the poorest (by any standard). As depicted in the map below, Iraqw expansion into the Mbulu plateau and surrounding Districts stemmed from the highlands to the south east of Mbulu, settled around 1770.



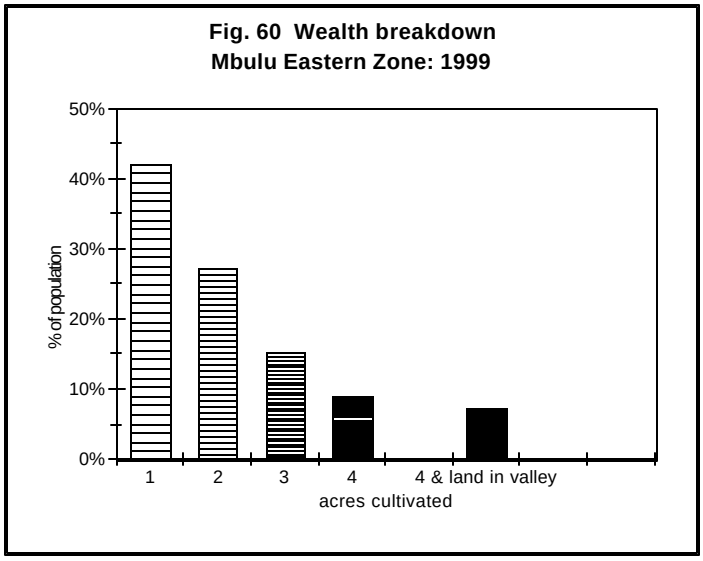
Combined with the inevitable loss in land fertility implied by this two-century-old tenure is a rapid rate of population growth. Mbulu District has one of the fastest growing populations in the Region. "Between 1948 and 1995 the population in Mbulu district increased almost five-fold....(and) between 1982 and 1995 the population almost doubled."[90] The Eastern Zone typifies this trend; people were being encouraged to move out of the Eastern Zone area as early as the1940s because even then it was considered over-populated.[91]

[90] Mbulu Planning Document, pg 27

[91] Loiske, Vesa-Matti, AMama Isara: A sustainable agricultural system in Mbulu District, Tanzania@, *Arusha Region Assessment Report*

The subsequent land pressure has resulted in a 'bottom heavy' wealth breakdown, with the vast majority of households cultivating fewer than two acres and none reportedly cultivating more than four. (See Figure 60 below.)

The richest households own 3 - 4 acres in the Eastern Zone and cultivate land in the lower Southern/Central Zone as well. These households tend to have a large pool of available labour and are likely to have strong links to relatives in the areas of Mbulu where they obtain the additional land. Other households cultivate land in the Eastern Zone only, and have between 1 - 4 acres.



According to local informants, a positive correlation exists between land cultivation and livestock ownership, however, even the richest households generally own no more than 5 cattle. Cattle are an important source of manure and milk, and income in bad years. Grazing opportunities are limited in the Eastern Zone, and although some households keep cattle in the lower Mbulu plateau areas, these are few in number (according to local informants). The poorer households own no cattle, although they may 'borrow' one or two milk cows and have some shoats. Livestock ownership plays a much more subdued role in the Eastern Zone than in the Southern/Central Zone, not by the choice of its inhabitants, but as a result of the limited extent of its grazing areas.

Normal Year

According to local informants, 1996 was the last normal year. Normal year maize yields average around 5 - 6 sacks per acre. In the past two years, however, production has been quite poor, with households obtaining 2 - 3 sacks per acre in 1997 and less than a sack per acre last year. The past ten years have reportedly been drier than the previous decades, and yields have been steadily diminishing. It is difficult to judge the veracity of this local recollection, as it may well be tinged with nostalgia for a re-invented past; however, it is certainly possible that yields may be decreasing even with stable weather patterns, since land fertility is likely to be declining with time.

Interviews in the Eastern Zone were conducted with one-acre, two-acre, and four-acre households; because the spread in wealth is so narrow, the three points described below encompass a large part of the population. In essence, one-acre households do not cover their minimum food requirements in any year, and regularly depend on gifts to make up a deficit of around 25%. Two-acre groups cover annual food needs, but do so by purchasing up to 35% of the year's requirements and have very little cash left over to spend on other items. Four-acre households cover minimum food and income requirements, retaining a small margin of surplus in normal years.

Sources of Food

Crop production

Crop production in the Eastern Zone is a complicated affair. Most farmers have more than one plot, with the majority of four-acre households owning seven and one-acre households owning two to three. Plot sizes range between a quarter of an acre to one acre.

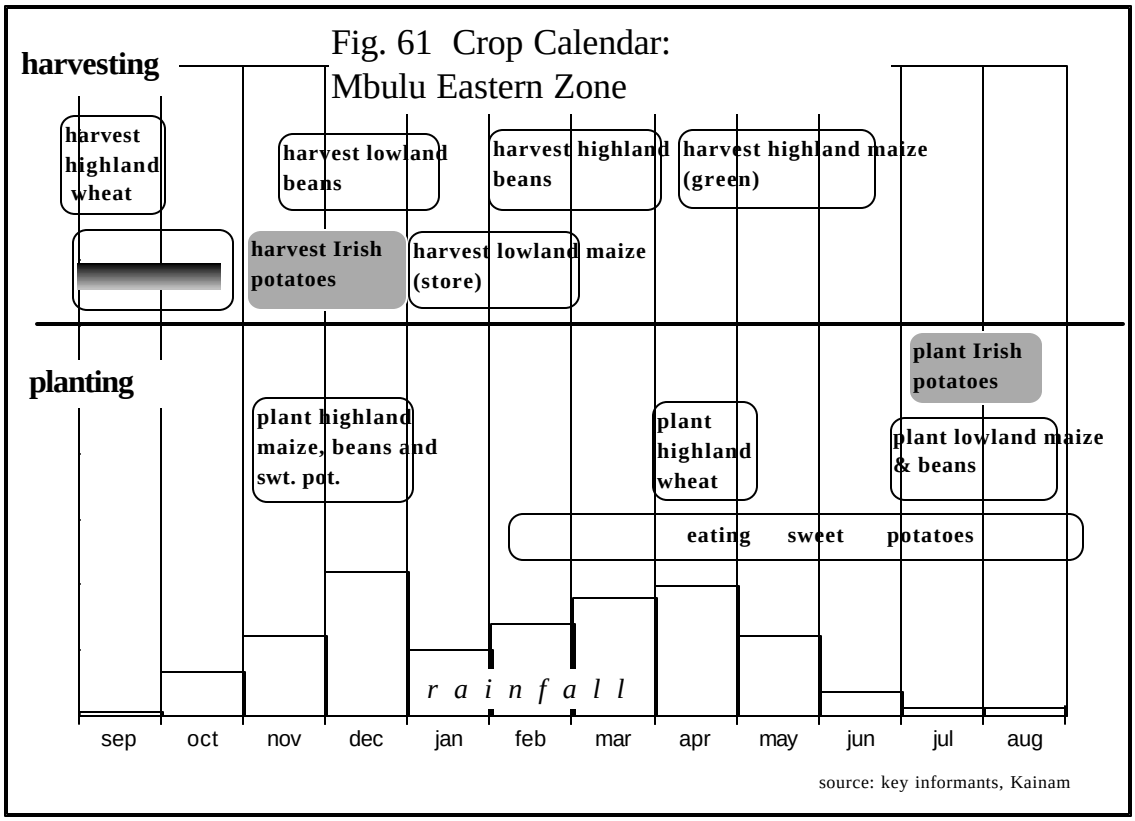


Fig. 61 Crop Calendar: Mbulu Eastern Zone

The aim is to have a healthy mix of highland summit plots and lowland valley plots. Highland plots are planted during the first rains in November and include maize, beans, sweet potato and Irish potato. Wheat is also planted on the highland plot, but not until April.

Lowland valley plots, planted in July and August utilizing residual moisture from the recent rains, include maize and beans (inter-cropped).

Highland maize is planted in order to eat green, starting in April. What remains after green consumption is never more than 2 - 3 tins. This maize is planted as a filler crop to take households through a month or so, extending the value of the lowland crop, which is harvested and stored in January and February. The crop calendar above suggests a pattern of staggered consumption, filling in with one crop as another runs out, or planting more of one crop if another does poorly.

Clearly this low risk strategy has been effective for the past 200 years, but currently, most households obtain less than a year's supply from the combined production of their incremental harvests. Two-acre households may harvest 5 sacks of maize from the lowland harvest, eat around a sack of maize green from the highland harvest and harvest an additional 3 tins of dried maize; in addition to maize, they obtain approximately 1 sack of beans, and 7 sacks of sweet potatoes. In total, this production is equivalent to 70 - 80% of annual food requirements for a household of 6. But because these households are perpetually short on cash, they sell some of the sweet potatoes and some of the beans, leaving them with a gap of around 35% to be filled with purchased maize later in the year.

Milk and meat are available in steady supply only to the richer households who own cattle. Poorer households may borrow milk cows, thereby obtaining access to milk indirectly, however, this practice appeared to be less common in the Eastern Zone than in the other Iraqw areas visited.[92] In any case, milk makes up around 5 - 10% of richer household food income, but can not be included as a certain source of food for poorer households.

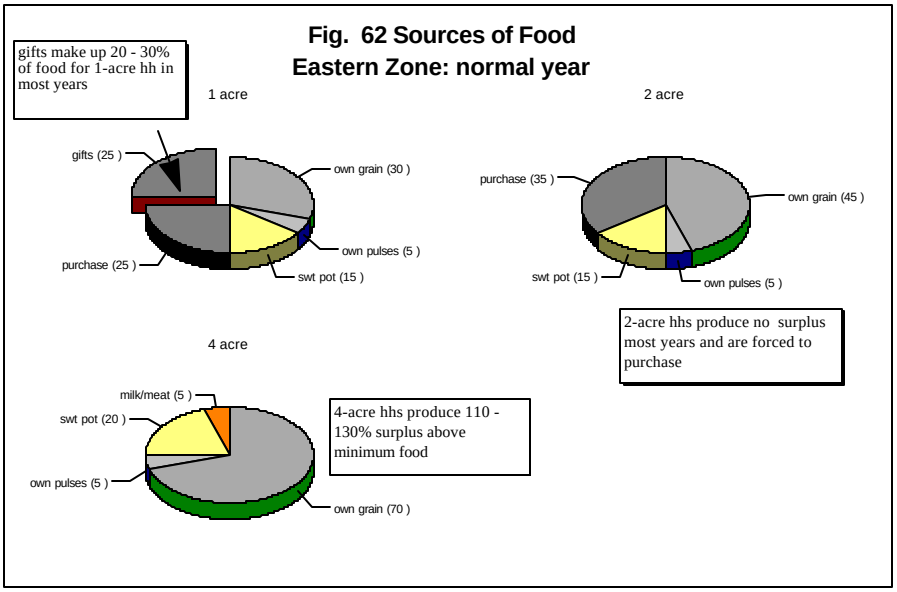
The role of gifts

Both reciprocal and one-way gift exchanges are common between the plateau area of Mbulu and the Eastern Zone. Richer households commonly exchange food with lowland areas to balance out seasonal surpluses and deficits. Because the Eastern Zone harvests maize twice, obtaining its main production in January and February when lowland households are facing their biggest gap, patterns of exchange have been established over the years to ensure that maize is shared out in January/February and received back in June/July, when lowland areas harvest.

[92] This issue requires further investigation, as there are contradictory claims in the literature, suggesting that most households have access to 5 cows, but only around 20% of the population owns cattle, the rest being borrowed. (Loiske, pg. 8)

Straight-up gifts of food play a crucial role in the food supply of one-acre households. According to local informants, the only way for one-acre households to fill their annual gap is through seeking assistance from friends or relatives in neighbouring surplus areas, like Karatu, or Hanang. It appears as if these households rely on gifts to the extent that they actually plan them into the yearly budget, living with the expectation that they will not be able to produce or purchase enough food on their own.[93] Figure 62, illustrating the relative importance of different sources of food for the three wealth groups, highlights the importance of gifts for one-acre households.

Sources of Income



The major sources of income in the Eastern Zone are livestock sales, labour sales, non-food products sales, and petty trade. Cash crop sales are not a significant means of acquiring income for most households, in part because people simply do not have enough land to grow both food and cash crops,[94] and in part because of the zone's relative isolation from major markets. Despite the proximity of Mbulu town centre, poor roads and very little access to transport make it much farther away in practical terms.

---

[93] In total, gifts are equivalent to 4,110 sacks of maize (if 42% of the households require 25% of their food income to be covered). It is more than possible for Karatu households alone to cover this requirement, as there are approximately 26,433 households in Karatu and the top 91% of the population have surplus food equivalent to at least 20 extra sacks of grain and most have far more. If only 2,100 households provided 2 sacks each, the Eastern Zone surplus would be covered. As it is, Eastern Zone households do not rely on Karatu alone, but seek assistance from relatives in other parts of Mbulu as well as Hanang and Babati.

[94] This point is made by Loiske as follows: AAn egalitarian distribution of land prevails, preventing individuals to move into major cash crop undertakings....because of the need to grow subsistence crops on what little land is available for cultivation.@ Loiske, pg. 4

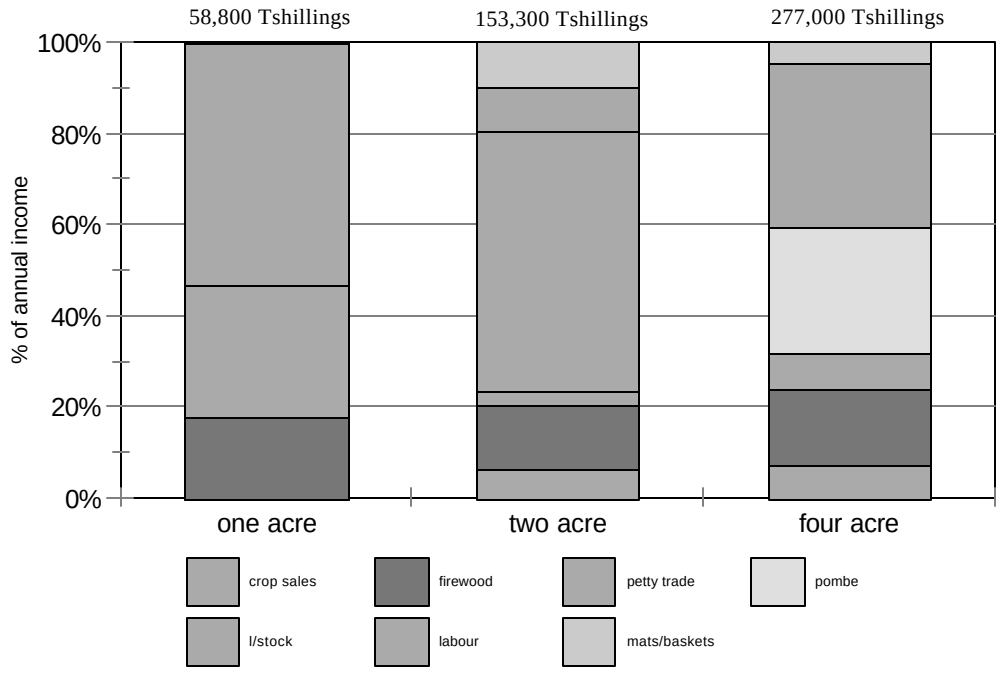
Irrigation farming, mining and brick making in Mang'ola and Bashay provide income opportunities for migrant labourers from the Eastern Zone, as well as agricultural labour on farms in Karatu and in the Basuto wheat growing areas. Labour income makes up around 50% of one-acre household cash income, and 10 - 20% of two-acre household cash income.

What is particularly noteworthy about relative income sources in the Eastern Zone is that richer households rely quite heavily on options that are typically the domain of the poor (eg. firewood & charcoal sales), a further indication of the area's extreme poverty. (See Figure 63.)

Sales of local beer feature strongly in the income of richer households as well. Richer

Fig. 63 Annual Sources of Income

A 'normal' year: Mbulu Eastern Zone



households appear to be the only ones in the community capable of raising the necessary capital to undertake brewing. Women make and sell the beer, particularly during the dry season, between August and March. Men control sales of livestock, and reportedly spend a large portion of their proceeds on beer. One woman claimed that selling beer was the only mechanism by which women could obtain livestock income originally meant for the household: men sell the cattle and spend the cash on beer sold by the women, who then use the cash for household goods and food. Although indirect, the method apparently works. Pombe sales generate at least 20 - 25% of four-acre household income (perhaps even more, if livestock income is not included in household income). An outsider may

wonder about the market for this beer, but drinking has become part of the daily fabric of life in the Eastern Zone (and much of Mbulu, for that matter). A planning document for Mbulu District stresses the same point: "The traditional custom of beer drinking, which goes with important social events, has evolved into a situation where beer is available at any time and for old and young, men and women. In a survey carried out by the Catholic Diocese, the problem of excessive drinking features strongly."[95] The demand is there, but beer can be expensive to make, particularly in a bad year, when prices of necessary inputs are high. Thus constraints on production are more likely to limit sales than lack of demand.

Expenditure

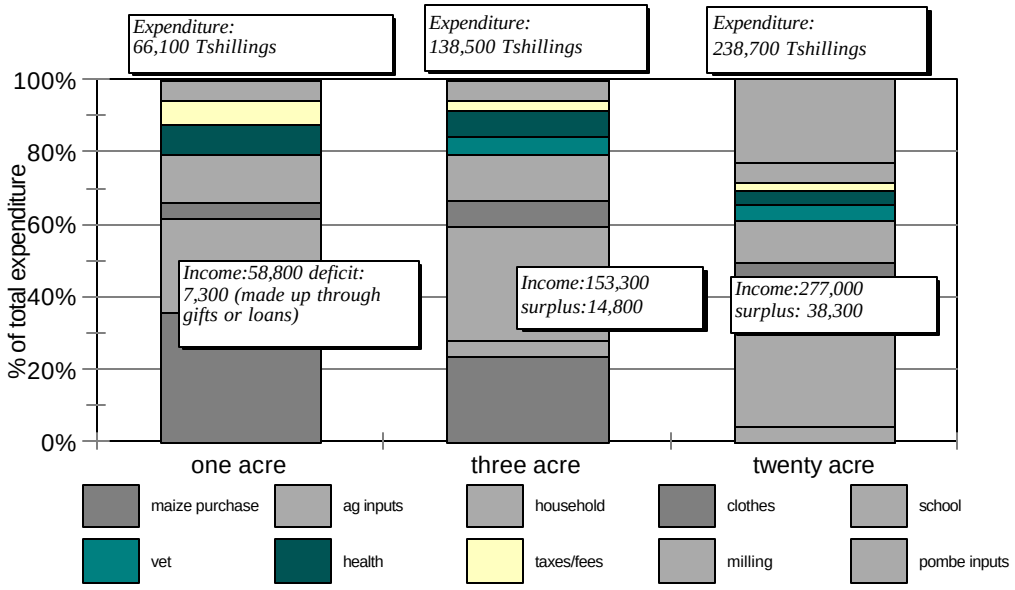
By necessity, annual expenditure in the Eastern Zone is far lower than in the other agricultural areas already discussed. For instance, one-acre expenditure in the Eastern Zone is no higher than 66,100 Tshillings per annum, equivalent to around a third of one-acre household expenditure in Karatu (where it is closer to 189,000 per year). Low incomes in the Eastern Zone limit spending, and the consequences of this constraint extend far beyond access to food: fewer children are likely to attend school, medical attention may not be sought when necessary, and productive inputs are likely to remain un-purchased.

One-acre households spend more money on food than any other category, but still require outside assistance from relatives to cover minimum food requirements. Food purchase comprises 38% of their normal annual income, but if they were to meet all their food requirements (for instance, if they lost access to normal year gifts), they would be forced to spend 76% of their normal year income, which is clearly impossible given other household requirements. Household expenditure to cover just the very basics in a normal year comprises around 27% of annual income. These two categories alone (food and household) would consume all available cash if these households did not receive gifts of food; children would not go to school, or receive medical assistance, or be clothed. There is no question that these annual gifts play a critical role in sustaining a large percentage of households in the Eastern Zone.

Four-acre households invest around 26% of their annual income in productive inputs (pombe, agriculture and vet); the rest of their money is spent on household goods, schooling, medical treatments, clothing and village fees. Based on estimates of normal year income, it is beyond the reach of most four-acre households to send their children to secondary school, and it is unlikely for most to make it beyond primary levels without the assistance of outside relatives.

[95] Mbulu Planning Document, pg 31

Fig. 64 Annual Expenditure patterns
A 'normal' year: Mbulu Eastern Zone



This Year[96]

Production figures for Mbulu are available only at the district level. Kainam and Murray wards (the main wards in the Eastern Zone) are part of their own micro-clime, however, and the aggregate district-level figures will not reflect Zone-specific historical trends, or the likely production for this year. This is particularly so because the current estimates are for the Mbulu plateau's main harvest (of June/July) but farmers in the Eastern Zone do not even plant lowland crops until June/July and highland maize, which is eaten green, (and might be reflected in current year estimates) represents only a small portion of the household's total production.

Because no other figures were available, district-level figures were used to derive the current year problem specification. **However, it cannot be stressed enough that these figures are likely to have little meaning in the Eastern Zone, and should be replaced with division- or ward-specific figures as soon as possible**.[97]

[96] This year is sufficiently bad that writing a 'bad year' section would have constituted a repetition, so it was decided not to present the 'bad year' section in this zone.

[97] In an ideal world, a separate monitoring system devised around the specific cropping and income patterns of the Eastern Zone would be established. The area is poor enough to warrant special attention.

As stated above in the Mbulu Southern/Central Zone section, the performance of all crops, including both food and cash crops, will be far lower than normal this year in Mbulu District. The implications of this estimated production for households in the Eastern Zone are grave: both one- and two-acre households will face a significant food deficit, even with substantial extra help from relatives. Four-acre households will cover their food needs, but only if they receive gifts from relatives. In other words, all households will face a food deficit if they do not receive assistance from relatives, and some will retain a significant deficit even if they **do** receive assistance.

Since district-level figures were the only ones available, Mbulu Southern/Central Zone production figures are the same as the Eastern Zone figures (both the historical data as well as the estimate for this year). The text explaining the source of information and any necessary caveats will not be repeated here. [See Mbulu Southern/Central This Year section for details.]

However, as a reminder, a summary of the problem specification is provided, along with the Eastern Zone-specific weightings for cash crop production/prices and livestock prices.

Production in 1999 (expressed as a % of avg)

maize: 48%
beans: 58%
sorghum: 15%
finger millet: 31%
*sunflower: 100%
*(estimate - no information from official data)

Cash crop production problem both two- and four-acre: 55%

Prices for 1999/2000: (expressed as a % of 1996)

Maize: 233%
beans: 200%
finger millet: 200%
sorghum: 350%
sunflower: 250%

Cash crop price problem both two-and four-acre: 150%

cattle: 50%
shoats: 50%
chickens: 50%
eggs: 200%
agricultural labour: 130%

Livestock price problem
one-acre: 148%
three-acre: 79%
seven-acre:50%

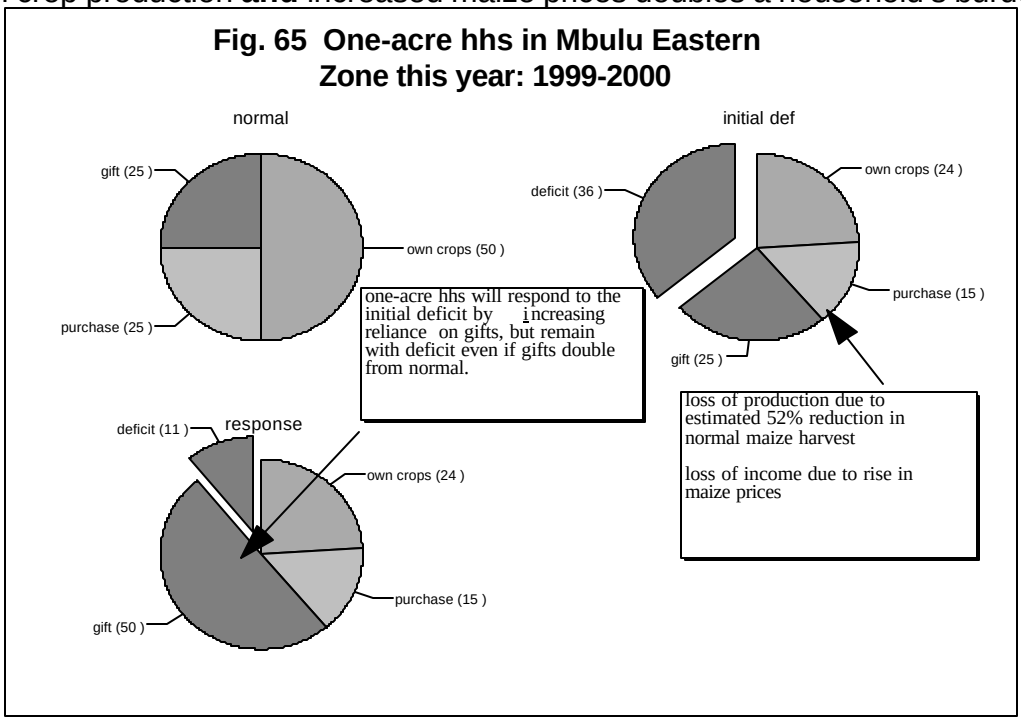
The Analysis

If the district production figures adequately reflect production in the Eastern Zone,[98] and the baseline information is accurate, it is difficult to see how one-acre and two-acre households will cover their minimum food requirements this year.

The consolidated problem for 1999/2000 production and prices is likely to lead to an 11% deficit for one-acre households, a 7% deficit for two-acre households, and a 4% deficit for four-acre households. This level of deficit is based on the assumption that gifts will expand to cover an additional 25% of food needs (above the normal 25% it covers most years) for one-acre households, that two-acre households will derive 40% of their annual food from gifts, and that four-acre households will obtain 20% from gifts. Without **any** contribution from gifts, one-acre and two-acre households will face a 61% and a 46% food deficit respectively and four-acre households will face a food deficit of around 24%.

The main reason for this grave situation is that households in the Eastern Zone live close to the edge every year, and a loss in production is difficult for any household to recover from. A loss in crop production **and** increased maize prices doubles a household's burden.

Fig. 65 One-acre hhs in Mbulu Eastern Zone this year: 1999-2000

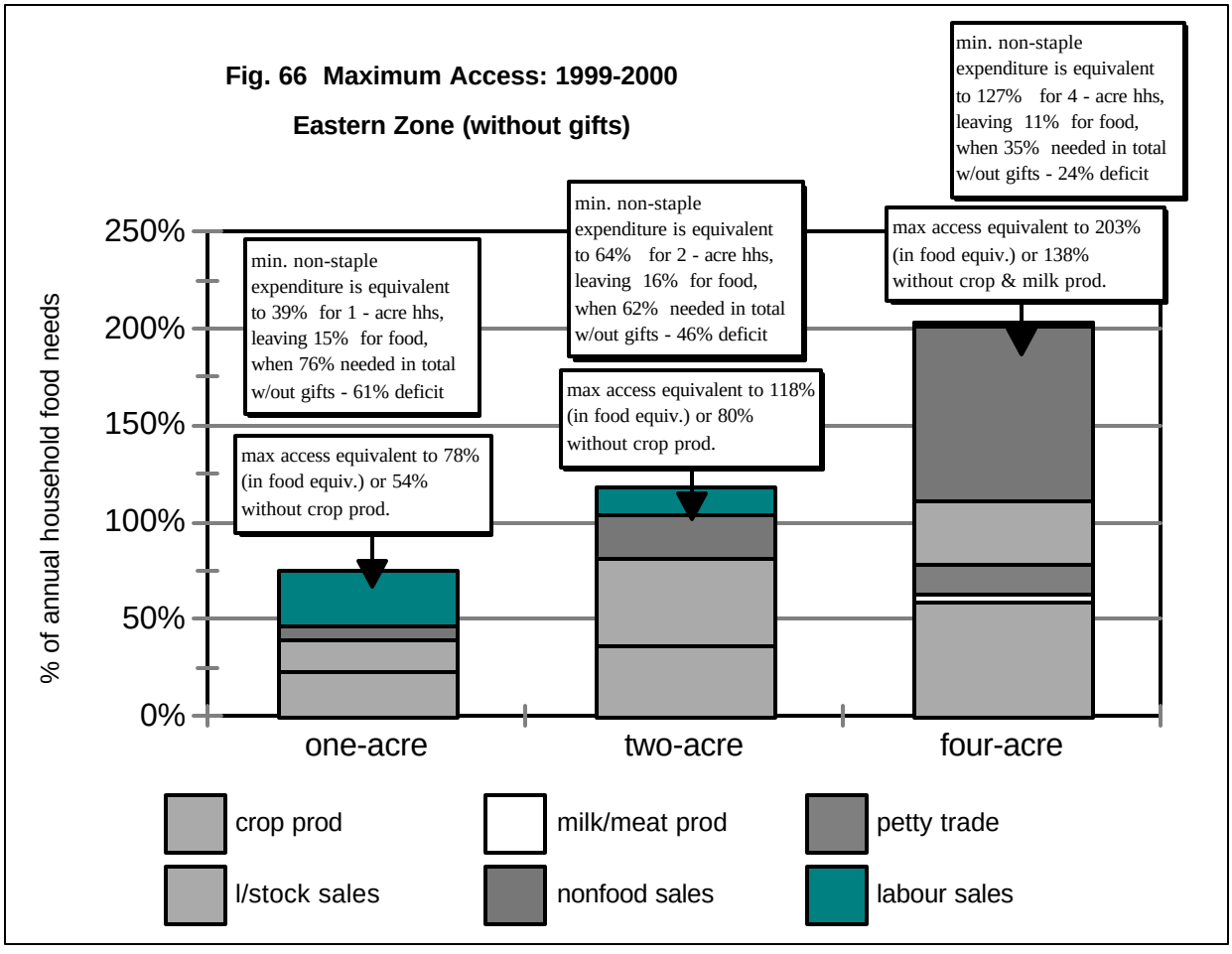


[98] The production figures alone are unlikely to represent the Eastern Zone accurately, and the baseline, while a good beginning outline, needs some verification, particularly with respect to one-acre income, as it is possible that they have higher non-food production income.

Figure 65 depicts how one-acre households will attempt (unsuccessfully) to compensate for this year's loss in production, highlighting the loss of purchasing power as well as the importance of expanding gifts.

The process is similar for two-acre households, who lose 68% of their purchasing power and cannot manage to cover both minimum staple and non-staple expenditure requirements. It is possible that these households could defer school payments and agricultural/vet inputs to pay for food instead; but surely emergency assistance is intended to help households avoid such extreme measures.

Figure 66, which presents predicted maximum access for all three household types in the coming year, makes the following point clear: **without gifts from relatives, no household in the Eastern Zone will be able to cover both minimum food and non-food expenditure requirements this year**.



'Maximum access' represents the value of each food and income source at its uppermost

limit (in other words, at peak expandability) expressed as a percentage of annual household food needs, or in the case of income source, as the percentage of annual food needs that can bought with the corresponding amount of cash at its present value. When compared to the predicted maximum access charts of households in other food economy zones, such as Karatu, or the pastoral areas, the Eastern Zone's acute poverty and relative vulnerability to production and price shocks is overwhelmingly apparent.

The combined effect of production and price problems will take its toll on Eastern Zone households. It should be noted, however, that the price problem, while perhaps more hidden than the production problem, is felt just as acutely. Consider the following table, in which three scenarios are proposed. The current production problem is held constant in all three, but in the first, maize and livestock prices are as stated in the problem specification. In the second, maize prices are changed to normal and livestock prices are as stated in the problem specification. In the third, both maize and livestock prices are changed to normal.

THREE PRICE SCENARIOS	Maize and livestock prices as stated in current problem spec.	**Maize price normal** with livestock price as stated in current problem spec.	Both **maize and livestock prices normal**
THE FOOD DEFICIT (WITHOUT GIFTS)[99]			
one-acre	64%	42%	42%*
two-acre	46%	23%	0% (+ 6% surplus)
four-acre	24%	8%	0% (+88% surplus)

* one-acre households do not see any change at normal livestock prices because they do not sell cattle (but sell eggs and chickens instead, and the price of both have gone up).

Normalizing maize prices reduces the deficit of all three groups by 34%, 50% and 66% (from poor to rich); adding the effect of normal livestock prices leaves only the one-acre group with a food deficit, one it is likely to cope with through increased gifts.

Conclusion

The price scenarios above imply a number of suggestions for decision-makers:

- First, there is an imperative to carefully monitor prices over the coming months in the Eastern Zone to determine whether or not the predicted price problem will develop;

[99]The food deficits were calculated with the help of the Food Economy Group spreadsheet, designed to help decision-makers consider the effects of different price and production shocks on food access for rural households.

- Second, if food prices appear to be rising significantly and livestock prices appear to be falling, temporary price controls might be in order, keeping in mind that the consequences for not controlling prices will be increased food aid requirements;

- Third, food aid estimates should be re-visited in light of ward-level production figures and a careful estimate of how much gifts can expand to cover apparent deficits.

The structural deficit apparent in the Eastern Zone alludes to a level of severe poverty of the sort found in areas like the famine-stricken northern Ethiopian highlands. Because poor households seem to have secure access to gifts from relatives and friends in neighbouring surplus areas, this poverty has yet to transform itself into a real food crisis. But one might assume that it soon will.

It is worth asking how best to approach this structural problem before rushing in with food aid. A short-term input of food aid will not solve the underlying contextual problems which have led to this year-on-year deficit. Overpopulation, growing land pressure, isolation from markets, and a lack of sustainable income sources are just some of the long-term problems facing households in the Eastern Zone, and if food aid is delivered, it must be done so with this context in mind and a clear set of short-term objectives on the table.

Poorly thought-out deliveries of food aid may in fact exacerbate the underlying conditions leading up to this current food crisis, by encouraging in-migration, or at the very least, not encouraging out-migration; by disrupting access to gifts, or access to alternative income sources (if distributed through food-for-work schemes).

In addition, if food aid is chosen as an option for addressing the predicted deficit, decision-makers should consider how long they are willing to continue delivering food aid to this area, because the current crisis (if that is indeed what it is) is not the result of a temporary shock, over and done with in one year; it is the result of a gradual on-going process of population growth and overcrowding which will only get worse with time, assuming no changes in population growth or the basic livelihood pattern.

Devising longer term options for addressing the structural deficit in the Eastern Zone now, and incorporating them as part of a strategy to counter current short term deficits, will save time, precious resources, and maybe even lives in the end.

ADDENDUM: Notes on the Northeast Pastoral Zone

The assessment team visited two villages in northern Monduli District, in part of what has been termed the Northeastern Pastoral Zone.100 On the basis of interviews in these villages, the team formed an initial hypothesis about the zone. However, it could not establish a set of confident conclusions for a number of reasons, including lack of time, contradictory information, lack of cooperation from local leaders, and the relative inexperience of a number of team members who had just been trained.101

The team's hypothesis

A. <u>The baseline picture:</u>

- The initial hypothesis is that pastoralists in the Northeastern Zone lack access to alternative income sources, leaving them more vulnerable to external shocks than their neighbours in the Southern or Northwestern Pastoral Zones.

- Crop production is minimal, existing only in and around the forest reserves located in Gelai and Kitumbene Wards, and few people seem to labour outside the area in the southern mining industries.

- The majority of pastoralists, therefore, rely almost exclusively on traditional means of obtaining food and income: consuming milk, blood, meat and purchased grain for food; and selling cattle for income.

- In addition, as pastoralists in Monduli are tied to the unfavourable Tanzanian cattle market, their fates rise and fall with fluctuating cattle and grain prices. Because terms of trade have suffered in recent years since 1997, opportunities for rebuilding herds have contracted.

- The consequences of such heavy reliance on cattle are obvious: when cattle die people go hungry. Thus external shocks, such as drought or flooding, can devastate pastoralists in this zone, whereas they may only cause a brief disturbance to those in the Southern or the Northwestern Pastoral Zones.

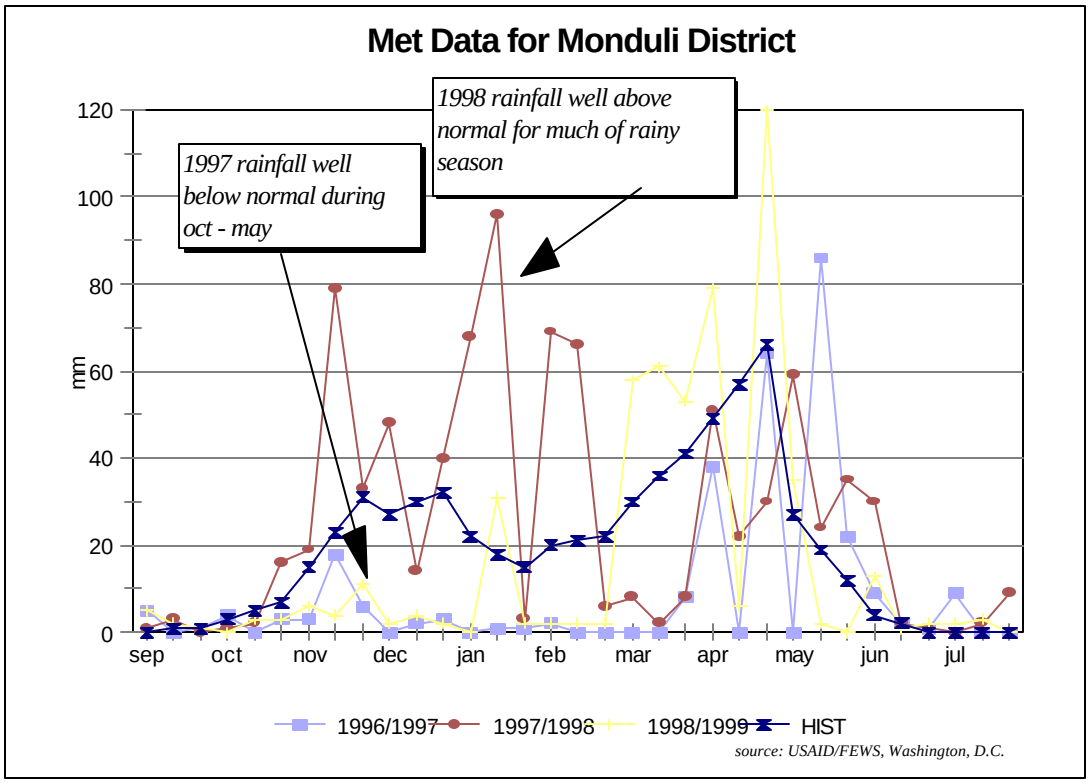
<u>B. The nature of the 'shock':</u>

---

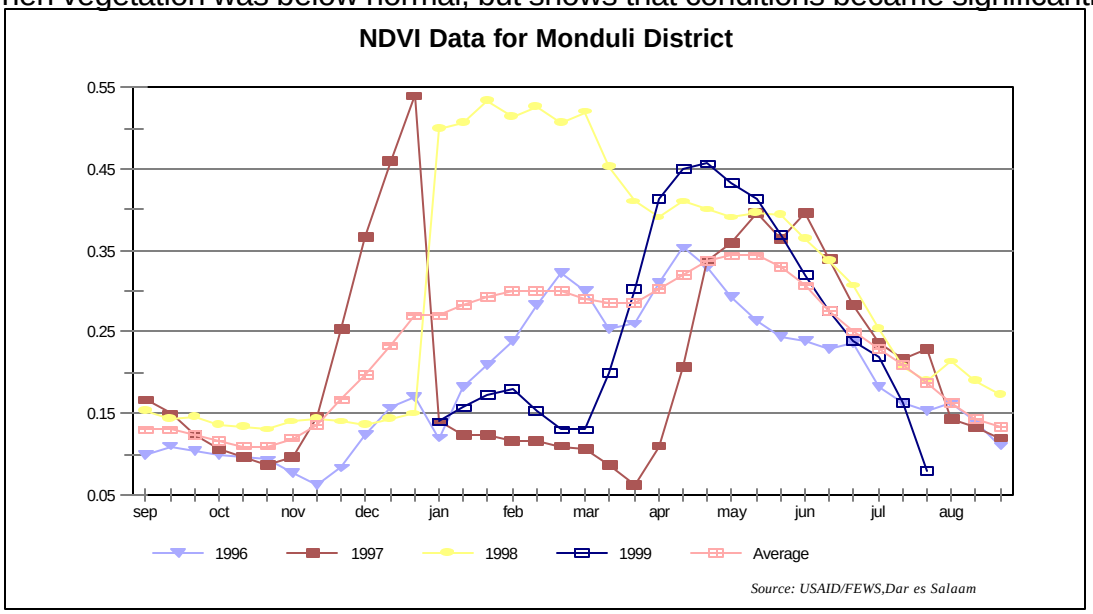
100 This zone covers most of Monduli District, including areas north of Monduli Juu and excluding the far northeastern tip which is more like Kenya. It also excludes areas south of the main road west from Arusha and bordering road villages. (See FEZ map.)

101 This was the first zone visited on the assessment, and most of the team members were still relatively inexperienced, which meant that a large number of the interviews were not up to standard and had to be disregarded.

Satellite imagery is somewhat inconclusive about the actual conditions in Monduli District during 1997. While it is clear from the met data below that rainfall was well below normal

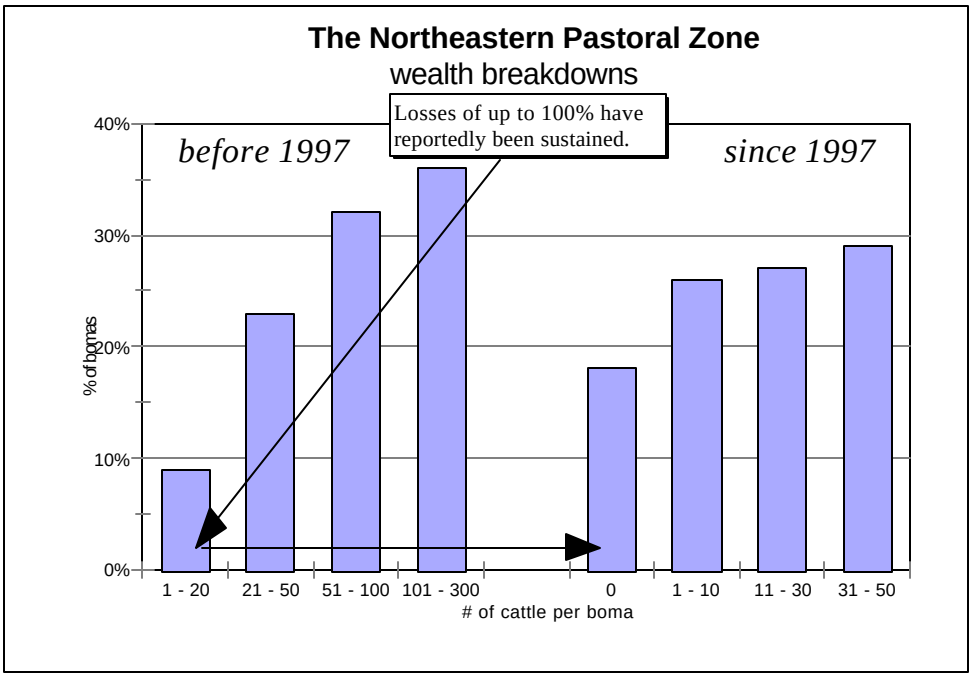


for most of the 1996/1997 rainy season, NDVI data indicates a period from January to May when vegetation was below normal, but shows that conditions became significantly better



from June to August.

What this data means in terms of actual grazing quality is unclear, although it is safe to guess that the dry period which lasted from October 1996 through at least April 1997 could not have led to healthy livestock conditions.
Evidence of this devastation exists in the comparative wealth breakdowns provided by local informants, describing the situation before and after 1997.



But it was difficult to take some of the testimonies in the field at face value, as informants were clearly biased by the knowledge that our visit to them was related in some way to the possibility of relief deliveries.

C. What needs to be determined

A number of issues require further investigation:

1. While it is clear that some pastoralists are cultivating in Kitumbeine and Gelai wards, (and reportedly have been cultivating since the mid-1950s), it is not clear how to categorize these cultivators. The cultivators may comprise a wealth group within the larger Northeast Pastoral Zone, or they may constitute another FEZ altogether. To further complicate matters, the basis of this economy has almost certainly changed since 1997, so that poor pastoralists practicing agriculture before 1997 may now be moving up the wealth scale, overtaking formerly rich pastoralists who concentrated exclusively on cattle-raising. So that if a team determines that this is a wealth group within the larger FEZ, (rather than a separate FEZ) it will be necessary to do a 'before'

and 'after' analysis to determine the current situation as well as the likely trend for the future.

2. If agriculture is as uncommon as reported, why? Is the constraint one based on physical properties (such as soil quality and rainfall) or lack of knowledge? If it's based on lack of knowledge, why is this zone different from the other two zones in terms of access to knowledge? One would have expected this zone to be more 'knowledgeable' given its proximity to Arusha town, and it's location along the road towards Kenya.

3. The wealth breakdown (before 1997 and now) has to be re-visited and nailed down before pursuing a focused enquiry into current sources of food[102] and income.

4. It is unclear whether pastoralists in this zone sell across the northern border to Kenya or not. It is critical to determine what markets are most commonly used before analysing the effects of recent price trends.

102 Many informants insisted they still use blood extensively during the dry season (in place of milk). If this is the case, it is critical to obtain nutritional information on blood in order to cross check against local claims.

REFERENCES

Arhem, K., A Pastoral Food System: The Ngorongoro Maasai of Tanzania, BRALUP, University of Dar es Salaam.

Boudreau, T., "The Pastoral and Central Food Economy Areas of Tanzania: Some notes on vulnerability in two arid zones", September 1996.

Conyers, D., Agro-economic Zones of Tanzania, Research Paper No. 25, BRALUP, University of Dar es Salaam, 1973.

Coulson, A., Tanzania: A Political Economy, (Oxford University Press: 1982)

Kessler, J. and Meindertsma, J. D., Towards a Better Use of Environmental Resources: Mbulu Planning Document, Mbulu District Council: 1997

Loiske, Vesa-Matti, "Mama Isara: A sustainable agricultural system in Mbulu District, Tanzania", Stockholm University, School of Geography Working Paper No. 21.

Van Campen, et al, "A Short Description of the Main Agro-Ecological Zones and Farming Systems in Mbulu District" (draft).

Katakweba, M., et al, "Oxfam Food Security Assessment: Ngorongoro District and Shinyanga Rural, Maswa, Bariadi and Meatu Districts", March 1999.