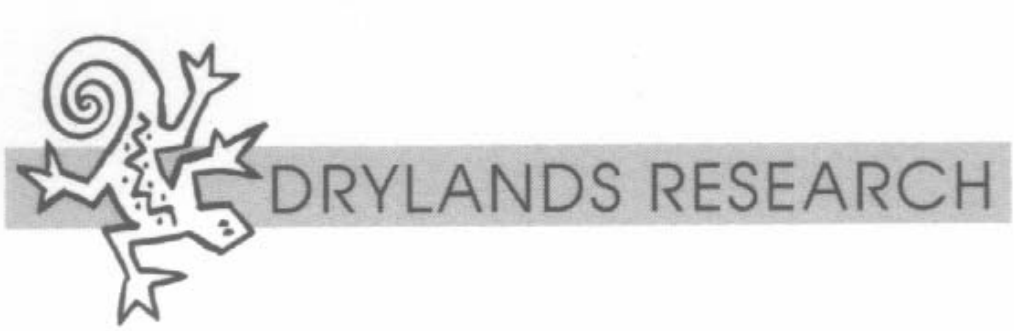

Drylands Research
Working Paper 11

MAKUENI DISTRICT PROFILE: SYNTHESIS

Francis Gichuki,
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Michael Mortimore

2000

Drylands Research
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Preface

Drylands Research Working Papers present, in preliminary form, research results of studies carried out in association with collaborating researchers and institutions.

This working paper is part of a study which aims to relate long-term environmental change, population growth and technological change, and to identify the policies and institutions which are conducive to sustainable development. The study builds upon an earlier project carried out by the Overseas Development Institute (ODI) in Machakos District, Kenya, whose preliminary results were published in a series of *ODI Working Papers* in 1990-91. This led to a book (Mary Tiffen, Michael Mortimore and Francis Gichuki, *More people, less erosion: environmental recovery in Kenya*, John Wiley, 1994), which was a synthesis and interpretation of the physical and social development path in Machakos. The book generated a set of hypotheses and policy recommendations which required testing in other African dryland environments. Using compatible methodologies, four linked studies are now being carried out in:

Kenya	Makueni District	
Senegal	Diourbel Region	
Niger	Maradi Department	*(in association with ODI)*
Nigeria	Kano Region	*(in association with ODI)*

For each of these study areas, there will be a series of working papers and a synthesis, which will be reviewed at country workshops. An overall synthesis will be discussed at an international workshop in London in 2000.

The Kenya series updates the previous study of Machakos District (which included the new Makueni District) and examines this more arid area in greater depth. The Research Leader for these studies is Michael Mortimore. The Leader of the Kenya Team is Francis Gichuki of the University of Nairobi. Michael Mortimore, Mary Tiffen or Francis Gichuki may be contacted at the following addresses.

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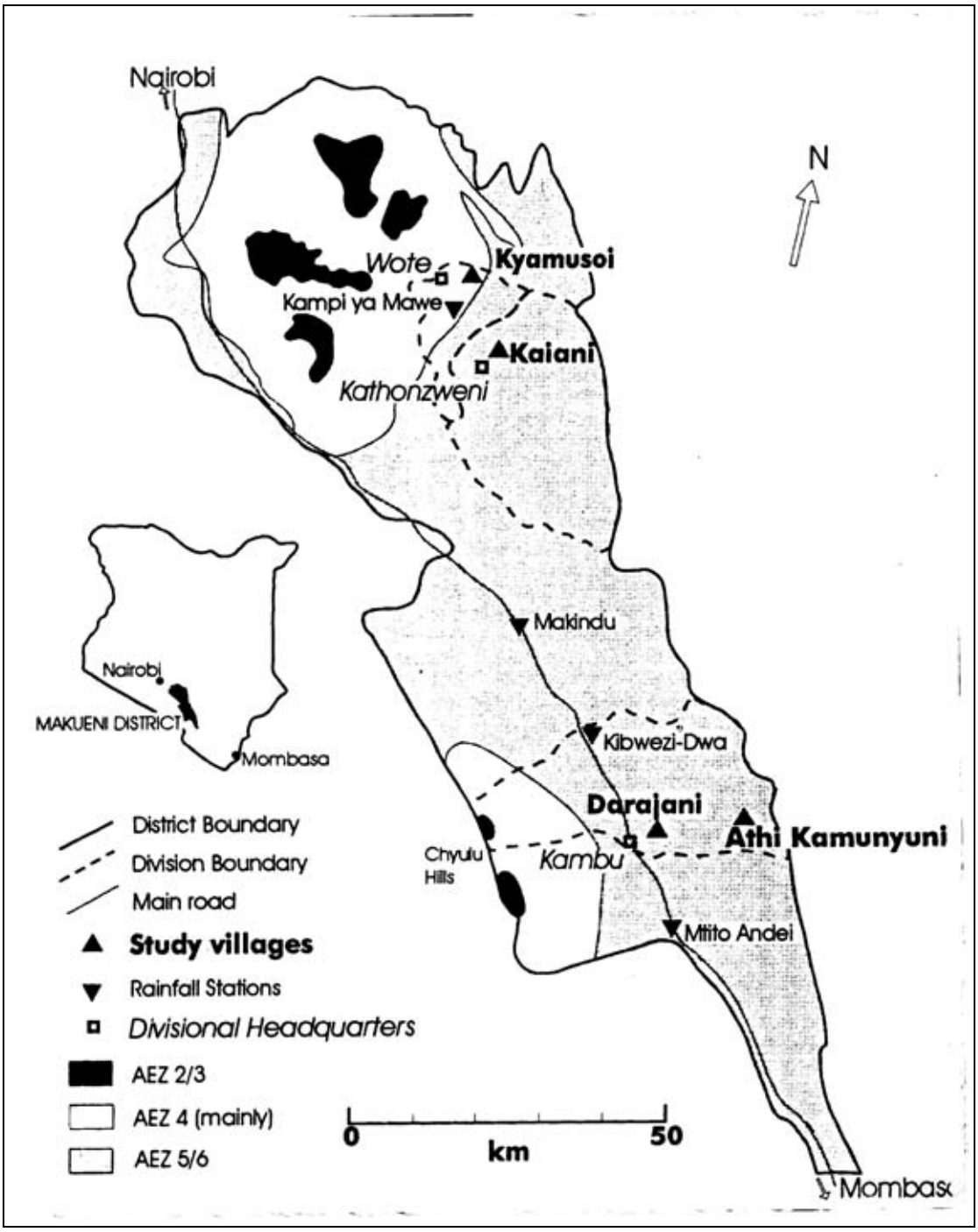
Preface map


Nairobi
N
Wote
Kyamusoi
Kampi ya Mawe
Kaiani
Kathonzweni
Makindu
Nairobi
MAKUENI DISTRICT
Mombasa
Kibwezi-Dwa
Darajani
Athi Kamunyuni
Chyulu Hills
Kambu
Mtito Andei
District Boundary
Division Boundary
Main road
Study villages
Rainfall Stations
Divisional Headquarters
AEZ 2/3
AEZ 4 (mainly)
AEZ 5/6
0
50
km
Mombasa

Abstract

Makueni District has been settled since 1948. Population density is still low, so transport and water conveyance costs are high. Despite the extremely variable rainfall, the settlers have developed their farms by clearing bush, installing terraces and hedges, improving housing and planting trees. Water and soil conservation on cropped land has been very efficient, but less so on grazed bush. Nutrient management on these inherently poor soils is problematic, particularly as livestock are frequently lost to disease, leading to manure shortage. The promotion of secure land titles and long-standing policies promoting soil conservation have assisted farm investments.

During the 1990s the Government cut services, introduced cost sharing, and abolished marketing boards. However, it also allowed inflation to peak at 46% in 1993, making financial planning difficult. The removal of the parastatal monopoly in milk supply to urban areas has led to substantial investment in dairy farming in suitable areas. The cotton reform was mishandled, so this crop is still unprofitable. The main crops, maize and pulses, are easily marketed. Reduced numbers and mobility of staff have led to poorer delivery and collection of information relating to crops, failure to control livestock disease and less back-up for groups running community assets.

A sequence of bad seasons makes farmers reliant on food aid. They regard a good non-farm income source for one member of the family as an essential livelihood strategy, and education for their children as an essential means to this. However, poverty and drought affect attendance in year eight of primary school. Livestock income pays school fees and buys food when crops fail; a good crop is used to replenish livestock, and non-farm income recycled through the family provides the money for farm development. Investment can only be carried out after good years, and failure to control livestock disease imperils livelihood and investment strategies.

A Kenyan debate on priorities is recommended so that the country is not subject to changing fashions amongst aid donors, but takes advantage of the strengths of its educated, entrepreneurial farmers. Issues include developing a national water plan, local government reform so local priorities can be financed, extension to help farmers improve their grazing management and tree offtake, reviewing the educational system, improving small town infrastructure, and developing ways to manage and finance the local amenities and services that people regard as most essential.

Résumé

Les premiers habitants à s'installer dans le district de Makueni sont arrivés en 1948. La population de ce district a rapidement augmenté et a atteint 670 000 habitants en 1989. La densité de population reste faible, et par conséquent le transport et l'approvisionnement en eau reviennent chers. Malgré les variations extrêmes de la pluviosité, les pluies étant souvent insuffisantes pour la culture du maïs, les habitants sont parvenus à exploiter les terres en défrichant les terrains, en adoptant des mesures de conservation de l'eau et des sols, en plantant des haies pour délimiter les champs, en améliorant les conditions de logement, en plantant des arbres, etc. En moyenne, moins de la moitié des terres exploitées sont cultivées, les reste servant de zones privées de pâturages. Alors que les méthodes de conservation utilisées dans les terres cultivées ont été très efficaces, la gestion des éléments nutritifs de ces sols qui sont par nature très

pauvres est problématique, en particulier parce que les troupeaux sont fréquemment décimés par des maladies, ce qui entraîne des pénuries de fumure animale. La promotion de la sécurité foncière et la mise en œuvre de politiques favorisant la conservation des sols ont encouragé les investissements dans le secteur agricole.

Pendant les années 1990, le gouvernement a réduit les cadres, introduit le partage des coûts, et aboli les offices étatiques de commercialisation. Il a cependant également laissé l'inflation atteindre le taux de 46% en 1993, ce qui a rendu difficile la planification financière pour les ménages et les gestionnaires des biens communautaires. La suppression du monopole parastatal en ce qui concerne l'approvisionnement en lait des zones urbaines a entraîné un investissement substantiel dans l'industrie laitière dans les zones appropriées. La agriculteurs ont abandonné la culture du coton vers la fin des années 1980 en raison de paiements tardifs par l'office responsable, mais ils déplorent de nos jours que la ginnerie soit restée fermée. Leurs principales productions, le maïs et les légumineuses, sont commercialisées sans effort étatique et ne nécessitent pas l'aide apportée par les coopératives ou les offices. La réduction du nombre de cadres employés et leur mobilité restreinte ont entraîné un appauvrissement de la diffusion et de la circulation des informations concernant les plantes cultivées, l'échec des mesures destinées à contrôler les maladies du bétail ainsi qu'une diminution du soutien apporté aux groupes chargés de gérer les biens communautaires.

Les agriculteurs ont été obligés de compter sur une aide alimentaire, après plusieurs saisons successives de récoltes mauvaises. Le crédit n'est pas une option viable. Ils considèrent comme une stratégie essentielle de survie le fait pour un membre de la famille de pouvoir bénéficier d'une source de revenu non agricole, et le fait d'éduquer leurs enfants comme le moyen essentiel pour parvenir à ce but. Mais la pauvreté et la sécheresse font qu'une minorité est incapable ou peu disposé à financer la huitième année d'école primaire, qui a été introduite en 1985. Les revenus générés grâce à l'élevage permettent de payer les frais de scolarité et d'acheter de la nourriture lorsque les cultures ne produisent pas assez; une bonne récolte permet d'agrandir les troupeaux, et les revenus générés grâce aux activités non agricoles qui sont recyclés dans les ménages permettent de réunir l'argent nécessaire au développement des exploitations agricoles ou à l'amélioration du bétail. Les investissements ne peuvent néanmoins être effectués qu'après les années de bonnes récoltes et le fait de ne pas pouvoir contrôler les maladies du bétail constitue une menace pour les stratégies de survie et d'investissement utilisées.

Dans le chapitre final est proposé un débat sur les priorités qui doivent être déterminées au Kenya de manière à ce que ce pays ne devienne pas la victime des changements qui s'opèrent chez les bailleurs de fonds, mais puisse profiter de la force que représente des agriculteurs bénéficiant d'une éducation et d'un esprit d'entreprise. Les principaux points abordés sont: la mise en place d'un plan national relatif à l'approvisionnement en eau, comment adapter les services fournis aux besoins caractérisant certains districts grâce à une réforme des administrations locales, orienter en partie les efforts de vulgarisation destinés à aider les agriculteurs sur le plan de la gestion des cultures de manière à ce qu'ils gèrent mieux leurs pâturages et l'exploitation des arbres, examiner le système éducatif, améliorer l'infrastructure dans les petites villes, et mettre au point différentes méthodes pour gérer et financer les administrations et les services locaux qui sont considérés comme les plus essentiels par les populations locales.

CONTENTS

About the authors

Francis N. Gichuki is a Senior Lecturer in Soil and Water Engineering at the University of Nairobi, Department of Agricultural Engineering. He is also the Kenya co-ordinator of NRM^3 project. He is co-author of the book *More people, less erosion: environmental recovery in Kenya* and is particularly responsible for its soil and water conservation component.

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Michael Mortimore is a geographer and partner in Drylands Research. His research and publications have focused on environmental management by smallholders in the drylands of Africa. He is Research Leader for these studies.

Acronyms and abbreviations

AEZ:	Agro-ecological zone
CBPP:	Contagious Bovine Pleuropneumonia
KARI:	Kenya Agricultural Research Institute
KCC:	Kenya Co-operative Creameries
Ksh:	Kenya shilling (1998: US$1 = Ksh 60.37; 1999 = Ksh 70.33)
MAP:	Makueni Agricultural Project
MIDP:	Machakos Integrated Development Programme
MSIP:	Makueni Smallholder Irrigation Project
NCPB:	National Cereals and Produce Board
PRA:	Participatory rural appraisal

1 INTRODUCTION

1.1 Background

A practical problem facing many African governments is how to maintain and increase food production and incomes for the rising populations living in semi-arid environments. Much literature paints a gloomy picture of inability to keep pace with demand and the potential for environmental degradation. A study of Machakos District 1930-90 demonstrated how the Akamba smallholder farmers living there adapted to changes in land availability, labour markets, technological options and institutional innovations to reverse the degradation trends (Tiffen *et al.*, 1994)[1]. It explained how in sixty years they transformed land resources "from an apparently misused and rapidly degrading latent 'desert' into a partially capitalised, still productive, and appreciating asset." (Tiffen *et al.*, 1994: 226). The conclusion was that over time farmers had improved their resource base and incomes by adopting new technologies within a policy environment that had been relatively benign in providing security for investments, and access to information and markets.

The study has been criticised as not applicable to all semi-arid areas, since Machakos District had some special features. The current study of Makueni District in Kenya is one of four country studies examining how policies have helped or hindered farmers' investments of capital and labour over time in the improvement of their land and incomes (see Preface). In each, districts have been selected that are within the challenging semi-arid areas and are experiencing population growth, leading to smaller farms. While one method of supporting a larger population is intensification of output per hectare through investment, another is the development of non-farm incomes. Therefore, the study also examines the relationship of the farm and non-farm sectors.

Makueni is a new Kenyan district, carved out of the southern part of Machakos District in 1992. Only 10% is high potential land, but the present study focuses on the drier parts of Makueni District (see Preface map). It examines farmers' investment strategies, particularly since 1990, when major structural adjustment reforms were implemented.

However, a major farmer investment has been the conversion of bush into farm land. Makueni was virtually uninhabited until the late 1940s. The Machakos study lacked detail on the process of new farm development, under a land tenure policy on private titles differing from that of most African countries. Since tenure is an important policy aspect, the process of farm development is examined over a period of 40 to 50 years.

1.2 The questions for this study

The implication of a high rate of population growth in rural areas, according to Boserup (1965), is that farming methods intensify as labour and capital are added to reduced landholdings in order to maintain or increase output. However, this is not the only option. Tiffen *et al.* (1994) presented three alternatives for a growing population:

1. Developing new land, which is usually of lower quality than the land first settled

[1] Referred to hereafter as the Machakos study.

2. Moving to a non-farm job, probably urban-based
3. Intensifying farming *in situ*

Economic incentive and market access are necessary for this third option.

The questions for this study are as follows:

- Is the intensification option viable when rainfall is low, variable and often inadequate for crop growth? Can farmers deriving an erratic and poor income from cropping make the savings needed for investing in improving their land? What are the necessary policy conditions for assisting them?
- If farming is to intensify in an agro-ecological zone (AEZ) most suited to livestock and millet (Jaetzold and Schmidt, 1983), what are the necessary policy conditions for the intensification of livestock keeping?
- If agriculture cannot support all the foreseeable population increases, what are the necessary policy conditions for developing the non-farm sector?

In present circumstances there is also a final question:

- If Government is short of revenues to finance services, what should be its priority services for people living in semi-arid districts, and if cost-sharing is necessary, what are the conditions for its efficacy?

1.3 Conclusions in brief

This research was commissioned within a natural resources framework because of donor concerns at the time. Examination of the linkages between agricultural intensification and employment was initially a secondary objective, but our results have caused us to give it great importance. Briefly we found that farmers have invested in improving their land, and that in consequence there are no major environmental problems (with a partial exception of soil fertility depletion). They have also intensified the livestock element (which provides necessary manure), but with the major constraint of livestock disease. The latter already begins to take us away from the focus on natural resource management. The farmers do see the means to improve farm production further to meet the livelihood needs of a still growing population, and they plan to do this as they accumulate the necessary investment resources. But they also see a non-farm income source for one or more members of their family as essential to their welfare in a chancy farm environment; and they further see education for their children as an absolute priority for their limited resources, because it helps them attain this objective. Farm and non-farm investments get the resources that remain after the educational necessity has been met.

1.4 Study approach

The first stage in the study was to investigate the nature of the changes taking place, through profiles undertaken by authors of different disciplines (see list in inside cover), using district level data and farmer interviews in four villages chosen to represent a variety of marketing and ecological conditions within the Kenyan AEZ 4, 5 & 6 (see Table 1). A summary of the initial findings from the profile studies was presented for discussion and critique at a workshop in Wote (the headquarters of Makueni District)

with local officials and representative farmers, and at the workshop in Nairobi with central government officers and other policy makers (referred to below as the Wote and Nairobi workshops respectively). The recommendations made at the Wote workshop are presented in the Annex. Both sets of discussions were fed into this synthesis.

Table 1: Characteristics of study areas

AEZ*	Kyamusoi LM 4	Kaiani LM 5	Darajani LM 5	Athi Kamunyuni IL 6
Time of settlement	*1950s*	*1960s*	*1960s*	*1970s*
Mode of settlement	Government supported settlement	Spontaneous settlement	Spontaneous settlement under govt guidance	Spontaneous settlement
Predominant land use	Cultivation cattle	Cultivation cattle	Cultivation beef cattle	Cultivation goats
Access to market	Good	Good	Good	Poor
Administrative division	Wote	Kathonzweni	Kibwezi	Kibwezi

*Agro-ecological zones: Agricultural experts regard LM4 as a marginal cotton zone with an annual average rainfall 40-50 percent of potential evapotranspiration, with fair to poor conditions for cotton and maize, fair for pigeon peas and good for sisal. LM5 is a lower midland livestock-millet zone with an annual average rainfall 25-40 percent of potential evapotranspiration, regarded as fair to poor for millet, cowpeas and sisal. The natural pasture can support low density grazing. IL6 is an inner lowland ranching zone regarded as unsuitable for rainfed crops and with natural pasture that can support low to very low grazing density (Jaetzold and Schmidt, 1983).

1.5 Structure of this report

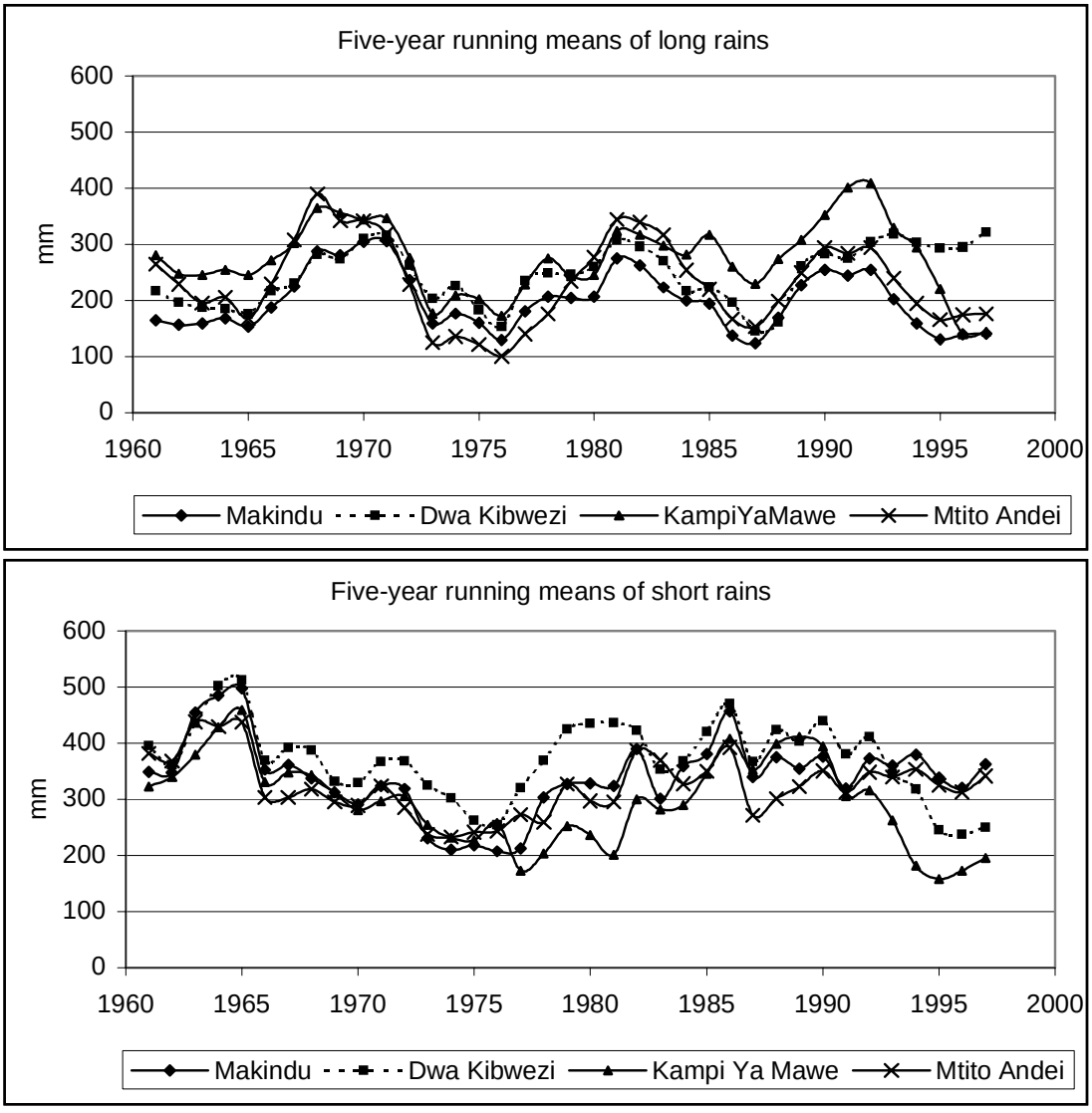
Chapter 1 has given the background to the study. Chapter 2 examines the factors which are outside the Government's control: the nature of the rainfall and the high rate of population growth in this area of new settlement. Chapter 3 examines the investments farmers made in developing their farms, 1948-98, and the policies which impacted on this. Chapter 4 outlines the major changes in the policy environment and the macro-economic background since 1990. Chapter 5 examines the managers: the farm family and the human resource investments it makes to execute its income generation strategy. Chapter 6 examines crop and livestock investments and the impact of recent structural adjustment policies. Chapter 7 presents our key conclusions and policy recommendations. The Annex gives the main recommendations at the Wote Workshop for farmers and district officials. Notes to each chapter refer to the working papers where further information can be found.

2 DROUGHT AND POPULATION GROWTH: THE CONDITIONING ENVIRONMENT

2.1 Rainfall[2]

The key characteristic of rainfall is high variability leading to frequent crop failure. There is no evidence of any change in trend since 1960, although there are cyclical patterns (Figure 1). There are two short cropping seasons. The long rains (March-May) and short rains (October-December) are separated by the July-September dry season, when less than 20mm normally falls. Then cropping is impossible and grazing is depleted.

Figure 1: Five year running mean of seasonal rainfall in mm per annum in southern Makueni from 1960



Source: Gichuki, 2000 (WP2), Figure 6.

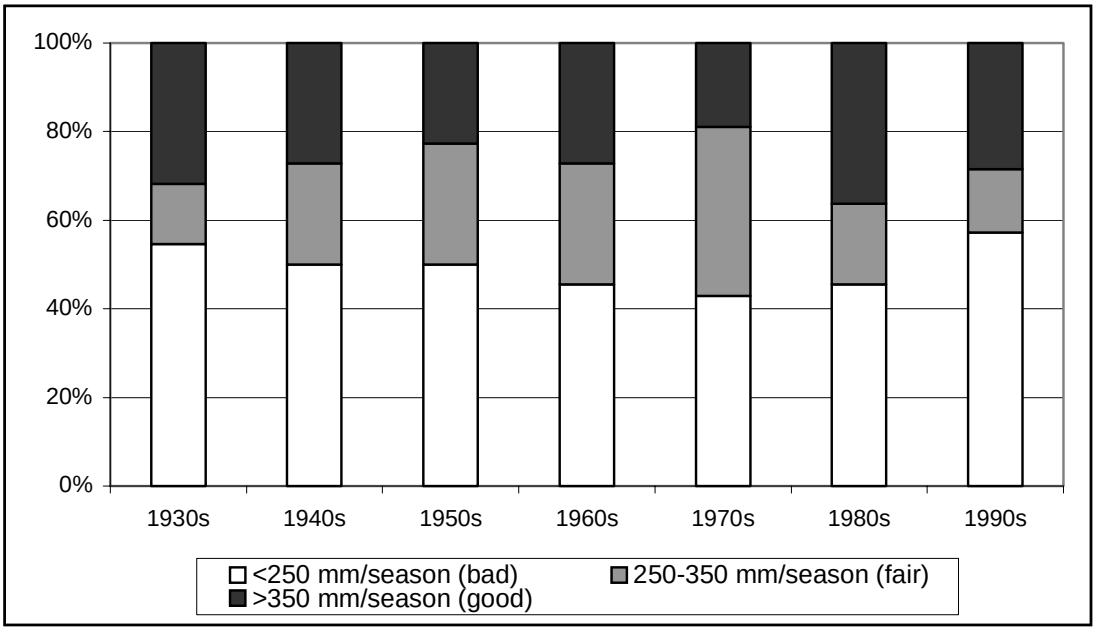
[2] Main data presented by F.N. Gichuki in WP1 (Gichuki, 2000a)

The January-February dry season receives on average 70 mm of rainfall, enabling pigeon peas to survive. The bulk of the rainfall arrives in a few heavy rainstorms, resulting in high runoff losses unless there is human intervention to hold and utilise the scarce water resource.

Seasonal rainfall was divided into three classes, namely: (1) bad seasons with rainfall less than 250 mm (the minimum considered necessary for growing a maize crop); (2) fair seasons with a range of 250-350 mm; and (3) good seasons with rainfall greater than 350 mm. Figure 2 shows that the 1980s had the highest percentage of good seasons, while the period 1990-97[3] had the highest percentage of bad seasons. Approximately 50% of the seasons experience drought conditions. These often occur in runs of 2-4 seasons, resulting in severe food shortage, loss of planting material and animals, high dependency on external assistance (famine relief and/or remittances from relatives) and impoverishment.

Farmers facing high risks and the certainty of recurrent loss of stocks and assets respond by two major strategies. One is to invest in on-farm water conservation and management, out of farm incomes limited by water scarcity. Chapter 3 details their successes in this respect. However, farmers know that major investments in irrigation and water storage are beyond their capacity and require government action (see their recommendations in the Annex). The second is to diversify their income sources and to see that some family members qualify for good non-farm jobs. Their investments in education are covered in Chapter 5.

Figure 2: Distribution of bad, fair, and poor seasons, by decade (1930-1997 only) at Kibwezi



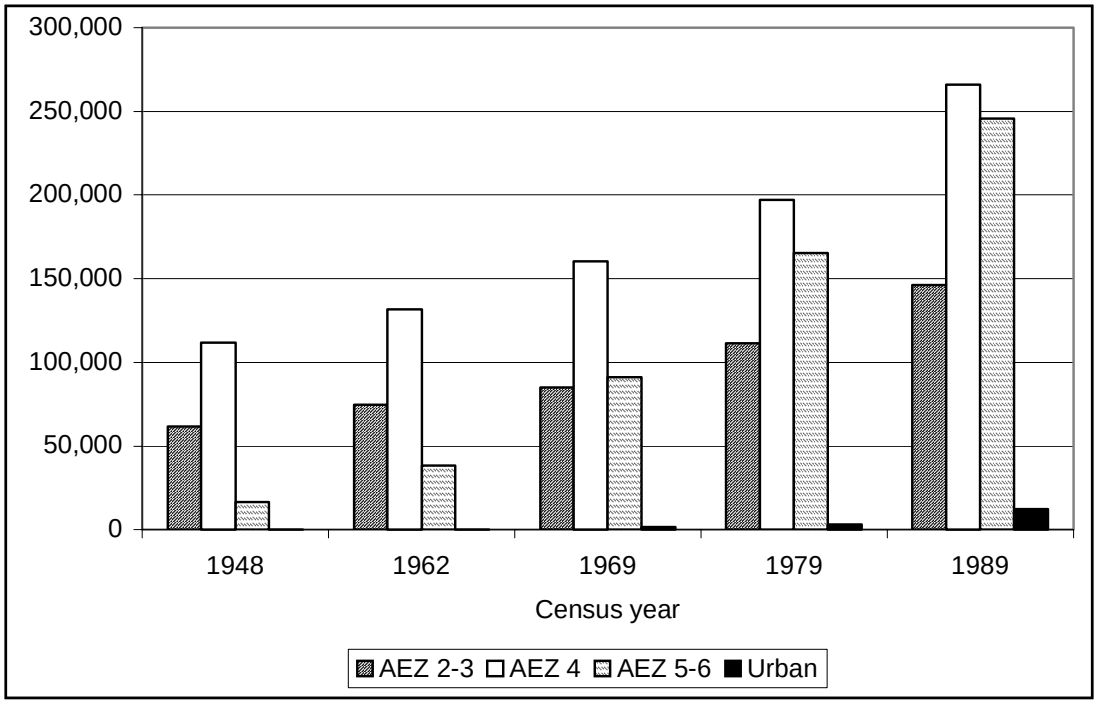
Source: Gichuki, 2000 (WP2), Figure 5.

[3] We had meteorological data only to 1997. In 1998 the *El Niño* long rains were exceptionally heavy, giving good harvests.

2.2 Population growth[4]

The population of the area currently covered by Makueni District increased from 190,631 in 1948 to 670,359 in 1989[5]. Figure 3 shows how the population first increased in the AEZ 4 area, then in AEZ 5 & 6. The population of the latter grew from 16,813 to 245,768 between 1948-1989, sometimes at rates of 10-15% per annum, as people flowed in seeking new land. Urban areas remain a very small percentage of total population. Wote town and Mtito Andei have municipal status; and there are also some other small semi-urban areas on the Nairobi-Mombasa road.

Figure 3: Population growth in Makueni District by agro-ecological zone



Source: Gichuki, 2000 (WP1), Figure 1.

By the 1989 census, the population of the few remaining areas with some available land was increasing at only 4% per annum. In the earlier settled areas, annual growth by 1989 was down to 2-3%. It may now be lower. Nzioka (2000, WP9) shows that most young families now want to limit the number of children they have, (because of the high cost of rearing children in present circumstances, rather than because of government family planning policies), but this will only gradually affect the rate of population growth.

The positive impacts of population growth in the area include increased labour availability, increased demand for goods and services and reduced transaction cost per capita. Negative impacts of population growth include reduced land per capita, which

[4] Further data on population are presented by F.N. Gichuki in WP1 (Gichuki, 2000a).

[5] 1999 population census data are currently not available.

has to be countered by productivity-enhancing investments, increased demand for government services, and in some cases depletion of water resources, encroachment on public, gazetted forests, and soil nutrient depletion where farmers were unable to replace nutrients.

The censuses for 1979 and 1989 show that 60% of the population is below the age of 20 years and 4% of the population is above 60 years. This limits availability of labour for on-farm improvements, and implies heavy family education costs (see chapter 5) and partly explains why some farm development investments are deferred. It also shows that further population growth is inevitable, even with smaller families in the future.

While population has massively increased, population densities are still low compared with the high potential areas of Kenya. In 1989 they averaged around 60/km^2 in the Wote area, and 30-40 km^2 in the south. This leads to high costs per user for roads and water distribution systems.

3 FARM DEVELOPMENT AND POLICIES ON LAND TENURE AND RESOURCE MANAGEMENT

3.1 Types of settlement, as illustrated by the survey villages[6]

Only one of the four village areas sampled came within a government-planned settlement. This was Kyamusoi, part of the Makueni Settlement Scheme, started in 1948. The guiding principle then was:

> ...land should be large enough to allow an improved standard of living and enable the farmer to utilise the services of craftsmen, industrial and farm workers, thereby creating a class that relied on off-farm income (Peberdy, 1958).

There were five main government activities: (1) tsetse fly control, (2) provision of roads and water, (3) land use planning, and farming rules and regulation, (4) selection of deserving settlers, and (5) provision of assistance in settlement. The early settlers were allocated 20-30 hectare land parcels depending on land quality.

The other settlements were uncontrolled. Settlement in Kaiani village started in the 1960s. Land was claimed by the traditional method of slashing tree trunks, the amount of land being limited only by family resources and the competition of neighbours. Disputes were resolved by elders (the first settlers), as there was no local administration. Settlement grew slowly, there being no government help on roads and water.

Settlement around the Nairobi-Mombasa road in an area below the Chyulu Hills, where Darajani village is located, was characterised by a series of evictions and resettlements, during the period 1927-1965. The colonial government tried to reserve these areas as Crown lands with the intention of making a game reserve and protecting the important water resources on the hills. At independence, the Government initially tried forcefully to retain these restrictions, but settlers nevertheless moved in. In 1965, the Government

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6 Further data presented by F.N. Gichuki in WP1 (Gichuki, 2000a).

designated the area for settlement and appointed a committee to allocate land in 20 ha lots, but as Table 2 shows, land was claimed by the same methods as in Kaiani. Charcoal made from the cleared bush helped meet initial living costs.

Settlement in Athi Kamunyuni village started in 1973. This area was a game reserve, where illegal settlement was later sanctioned by government officials. Charcoal production was limited by low quality of wood and high marketing costs, compared to areas near the Mombasa-Nairobi road, so that this resource for financing the new farm was not available.

3.2 Farm development[7]

Farm development started with bush clearing, and housing construction, and continued with the establishment of ownership rights, the development of crop areas, fencing, acquisition of tillage and other equipment, improvements to soil, soil and water conservation, development of water resources, improvements to grazing areas and tree planting. The investments necessary to acquire livestock and equipment will be considered in Chapter 6, except for the plough, which is used for many farm development tasks.

Housing investments

Housing improvements have been made over time. The oldest settlement has the best housing and the newest the worst. At Kyamusoi, 56 percent of the respondents had corrugated iron roofing with earth walling. Iron roofs make possible further investment in water collection. Least housing improvements were seen in Athi Kamunyuni, partly due to recent settlement, and partly due to poorer returns to their farm investments because of the high climatic risk and poor access to markets.

Establishing rights and boundary investments

Since the Swynnerton plan of 1954, individual land ownership has been promoted in Kenya, and under an on-going rolling programme, land boundaries are officially demarcated, registered, and titles given. It is a slow process due to the need to settle all disputes. Individual ownership established by clearing and first cultivation was a feature of traditional Akamba tenure. Originally, grazing land was only private so long as in use, with a cattle post and slashed trees as boundaries. The colonial government encouraged fencing, which led to permanent claims on grazing as well as cultivated land (Tiffen *et al.*, 1994). Current land demarcation recognises private grazing land as well as cultivated land. Land in the Kyamusoi and Kaiani areas is all titled. In Darajani and Athi Kamunyuni, land adjudication is in progress. The settlers have been putting pressure on the Government to finalise land registration because of the uncertain official status of their land which leaves them feeling vulnerable to policy change.

Whether registered or not, once settled, land can change hands by buying and selling, by inheritance on the death of a parent, or by allocation by the parent to a son (or more unusually, to an unmarried daughter) before death. Such allocations are now regarded as

[7] Further information is presented in WP 1, Gichuki (2000a).

reversible and dependent on good behaviour by the son, the father keeping the title deed (Nzioka, 2000, WP 9). In practice, many widows also retain physical control of the title deed. Sons (who form a large group of current holders – see Table 2) have to negotiate land improvement investments with their parents, and this limits some activities.

Table 2: Modes of land acquisition

	Kyamusoi	Kaiani	Darajani	Athi Kamunyuni	Total
Means of acquisition					
Cleared bush	0%	44%	50%	46%	35%
Allocated by government	50%	0%	0%	0%	13%
Inheritance	0%	11%	0%	0%	3%
Allocated by parent	25%	22%	8%	31%	22%
Purchased	25%	22%	42%	23%	28%

Source: Gichuki, 2000 (WP1).

Settlers initially expanded their farms by clearing more bush, (as is still happening in Athi Kamunyuni, Table 3). In older areas, most farms have reduced in size mainly as a result of inheritance and allocation, with a few sales. Later immigrants in all settlements (a quarter of our sample) have had to buy land. Competition for land was particularly high around Darajani. Its position near the main Nairobi-Mombasa highway makes it attractive. While some farmers there retain large farms, half our sample had very small farms, averaging 0.4-0.8 ha per household which may supplement a non-farm income.

Except for the smaller farmers in Darajani, all farmers have invested in hedges or fences. The most usual is a planted live fence of drought-tolerant *Euphorbia* or cut shrubs, and less often barbed wire and posts. In the more densely populated areas, they are regarded as important to mark property boundaries. In lightly-populated Athi Kamunyuni, the objective is to protect cropped fields from damage by animals. Farmers with important livestock interests regard fencing as an essential first step in improving their grazing land, allowing them to rest and reseed certain areas, and to prevent unwanted intrusion. Constraints are the expense of barbed wire, its theft, and the scarcity of the cheaper natural materials (species of thorn tree) in the more densely settled areas (Wote workshop discussions).

Land use

Cropped land still occupies less than half the farm area, but has been gradually expanded. Cropped and grazed land are not generally rotated, due to investments in soil conservation structures discussed later. Grazing land is converted to cropped land as farms are subdivided, as owners of small farms need the higher value of output per hectare obtainable from cropped land. Hence, Table 3 shows that the cropping percentage is higher on small farms. Farmers regard their cropped area as the most important part of their farm, even in Athi Kamunyuni, but its size is limited by labour constraints for bush clearance and shortage of draught power.

Table 3: Distribution of holding sizes

	Kyamusoi	Kaiani	Darajani	Athi Kamunyuni	Total
Area in hectares	*At time of settlement (percent of holdings)*				
	10.1	24.2	3.2	9.7	11.7
Changes in farm size since settlement (percent of holdings)					
Increased	25	11	8	15	15
Decreased	13	22	8	15	15
No change	62	66	84	70	70
Total	100	99	100	100	100
Current farm size(ha)					
Total area	7.6	11.7	3.2	11.3	8.4
Cropped area	3.6	5.2	1.6	2.4	3.2
Grazing, bush, homestead	4.0	6.5	1.6	8.9	5.2
Percentage cropped	47	44	50	21	-
Hectares per stock unit	1.8	2.0	1.8	3.4	-

Source: Gichuki, 2000 (WP1), Table 3 and Fall, 2000 (WP8), Table 16 (Gichuki 2000, WP1, Table 4 supplies distribution by holding size).

Farm equipment

The ox-plough is an important piece of farm equipment. It is a versatile tool used during seedbed preparation, planting and weeding. It also creates contour ridges and assists the first steps in terrace and pond construction. However, only 11-40% of farmers now have ox-ploughs. In Kyamusoi, the low percentage (11%) is due to the shift to dairying, the shortage of grazing land for oxen as farms become smaller, and the availability of tractor hire services. In Kaiani, with larger farms, 38% have ox-ploughs. Settlers started with hand hoes (*jembes*) and purchased ploughs between 1963 and 1993 as they expanded their cropped area. At Darajani, 90% use hand tools, partly due to small farms and partly due to loss of oxen. Some bigger farmers hire tractors. At Athi Kamunyuni, 60% are obliged to use hand tools, due to loss of oxen, and tractor hire is unavailable.

Soil and soil moisture management[8]

The soils of semi-arid areas of Makueni District are predominantly sandy to loamy sand. The main soil management challenges are erosion, moisture conservation and fertility constraints to crop production. These are linked: low soil fertility and low rainfall mean less vigorous vegetative growth and less ground cover. Consequently, soils have less organic matter, hence infiltration and water retention capacity are reduced. This vicious cycle can be broken by proper soil management.

Farmers know that preventing the run-off of precious rainfall and the retention of soil moisture is vital. In the four villages, all farmers used a variety of conservation

8 Further details in WP 4, Gichuki (2000d)

methods. *Fanya juu*[9] terraces and cut-off drains are the most popular technologies, even in sites where slopes are gentle (<5 degrees). Crop residues not required for feeding animals or fuel are piled into trash-lines on <50% of all farms. All farmers use contour ridging. Many settlers arrived with soil conservation knowledge derived from their previous home lands in the upper Machakos District. Work on conservation measures started one to ten years after first settlement. Cumulative investments in terraces and drains are in the ranges: 93-245 man-days/household; 31-58 man-days/ha; and 4,667-8,663 Ksh/ha. This high level of investment has been undertaken over a long period of time, and in most cases using family labour.

Soil fertility[10]

The key issues in soil fertility management are declining soil fertility, unaffordable inorganic fertiliser and insufficient livestock for manure needs. Soils in the area are low in supplies of organic matter as the hot and dry conditions decompose litter fall quickly and termites aggravate the shortage. nitrogen deficiency in cultivated soils was detected in 80-90 percent of the farms in the study areas, and phosphorus deficiency in 66-80 percent, but levels were also low in bush. There is no noticeable difference between cultivated land and uncultivated bush in terms of the plant nutrients analysed (Table 4). Uncultivated (bush) soils have significantly more organic carbon than cultivated soils, but no significant advantage in terms of nitrogen and phosphorus.

Farmers notice soil fertility decline some 5-20 years after first cultivation, depending on the inherent soil fertility, the rate of soil nutrient depletion or replenishment and their perception of the comparative impact of soil nutrient depletion and water shortage. At Athi Kamunyuni, the most recently settled area, farmers still attribute yield variability to rain, rather than depleted soil fertility. In Kyamusoi, settled around 1950, soil fertility decline was detected in 1960. People have replaced the former government's settlement rule of a grass/bush fallow by regular applications of manure. However, not all farmers have sufficient livestock to provide their requirements. Most of the farmers practise a grain-legume intercrop which contributes nitrogen to the soil.

Table 4: Soil chemical properties

Study site	C (%)		N (%)		P (ppm)	
	Cultivated	Uncultivated	Cultivated	Uncultivated	Cultivated	Uncultivated
Wote Kyamusoi	0.96	1.23	0.16	0.16	10.8	9.7
Kathonzweni	1.01	1.41	0.16	0.16	14.8	4.3
Darajani	1.05	1.29	0.11	0.17	17.3	39.1
Athi Kamunyuni	0.80	1.14	0.12	0.15	21.0	21.0
Average	0.96	1.27	0.14	0.16	16.0	18.5

Source: Mbuvi, 2000 (WP6).

9 Created by throwing the soil from a contour ditch upwards as the first stage in forming a bench. See Tiffen *et al.*, 1994 for its origins.

10 Further details are available in WP 6 (Mbuvi 2000).

Thus, when decline is noticed, the main soil fertility remedies adopted are: (1) use of farm yard manure; (2) grain-legume intercropping for nitrogen fixing; and (3) very limited use of inorganic fertiliser. Fertiliser application started in the 1980s but is not much practised, due to the high cost and the belief that crops grown on an area that is fertilised suffer greater damage from water stress. This belief appears to be justifiable on technical grounds. The current recommendation in the field manual for extension workers in Makueni is to apply 3 t/ha/yr of manure and 100-200 kg/ha of 20:20:0 fertiliser for maize production.

Soil fertility remains a problem, because many farmers have too few livestock for their manure needs, and fertiliser is expensive and risky. In view of the potential importance of manuring, correlations were computed between a number of landholding, fertility and livestock variables on 42 farms in the four villages. The only significant relationship found that directly linked livestock with improved fertility of cropped soils was between the level of phosphorus and the number and density of livestock. Thus there is little evidence yet that animals are being used to support intensification in the farming systems of semi-arid Makueni, but this has to be linked to the small numbers of livestock held, due to disease constraints (Chapter 6).

3.3 Water management for domestic use, livestock and irrigation [11]

Water development is difficult in this area due to the seasonality of many water courses, and the depth of the water table. Water distribution, by pipe or carrier, is expensive because of the scattered population[12]. Except at Kyamusoi, where the government initially provided boreholes (run by the County Council), the main sources of water supply for new settlements were rivers, often distant. Darajani had a supply which served the railway station. After independence politicians attacked the county council water rate, initially supposed to provide funds for maintenance. Various official pronouncements created the perception that it is the Government's responsibility to deliver water.

Many water systems have collapsed. Hence those who can afford it invest in private supplies, a move shown clearly in Figure 4. Eighty three percent of the respondents in Kaiani had invested in their own farm ponds. Although farmers reported that government support has been small, complaining of delays and lack of earth moving equipment, they acknowledged grants towards costs provided by the Machakos Integrated Development Programme (MIDP) and the more recent Makueni Smallholder Irrigation Project (MSIP).

Government policy changed with the introduction of the cost sharing strategy (see Chapter 4). Water users associations are now given more responsibilities in the management of communal water supply projects. They are not always competent to face the technical problems set by reservoir siltation and blockage of boreholes, pipeline leaks, etc., and there are also difficulties in financial management. Government is trying

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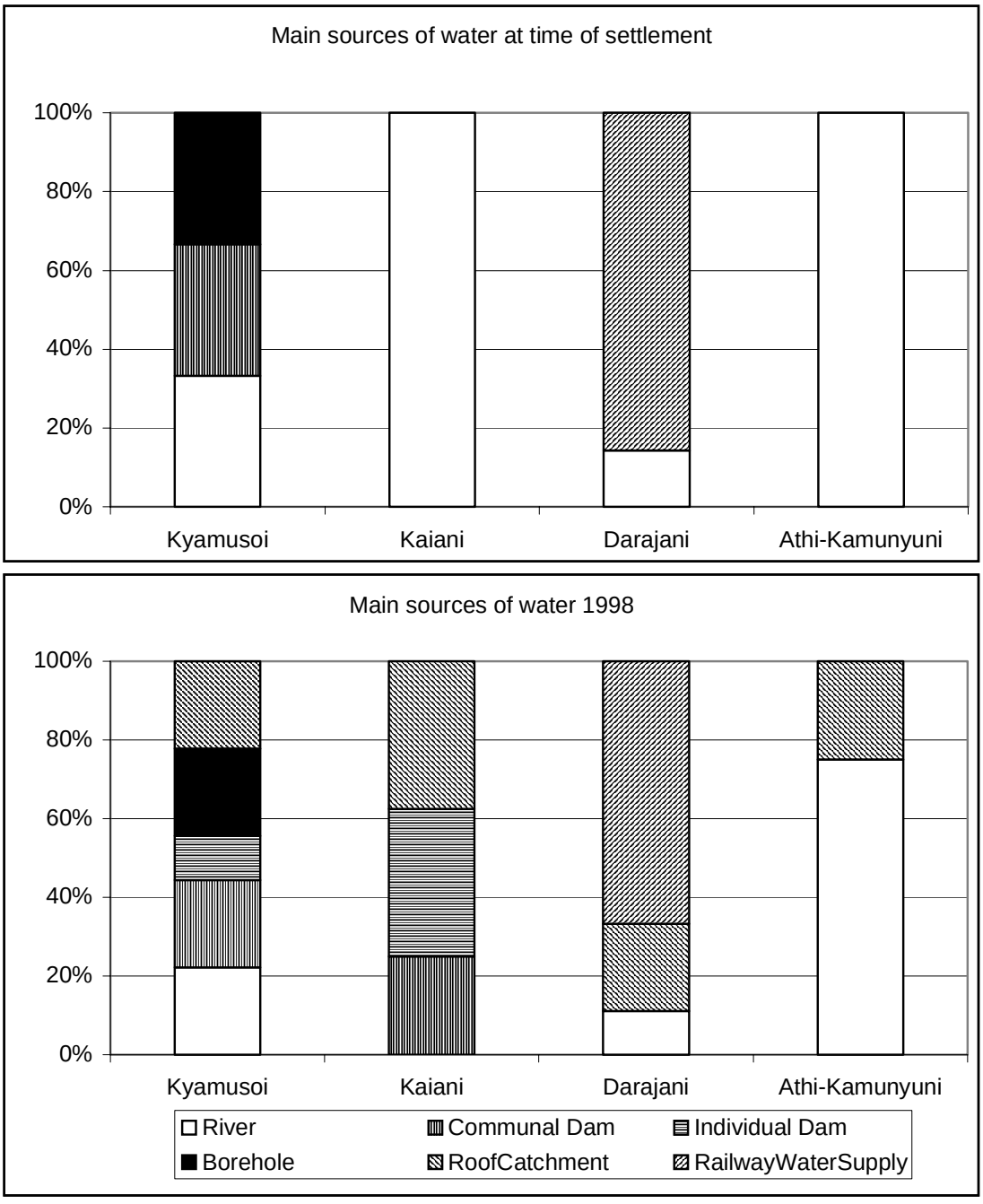
[11] Further details are presented in Working Paper 3, Gichuki, 2000.

[12] The water undertakers in Darajani and Athi Kamunyuni areas deliver by bicycles or donkey carts. Forty percent of the respondents of Athi Kamunyuni reported that they buy water at a cost of Ksh 10-15 per 20 litres container (US$8-12.5 per m^3).

to strengthen them by providing management advice, but national rural water tariff rates were set in the 1990s to address the problem of affordability for the poor rather than the cost recovery needed for maintenance. Rates set by recent community-based projects differ from place to place. Community management of boreholes and dams that were constructed 40 years ago and have reached the end of their design life cannot succeed without rehabilitation. In two cases we investigated this had been done, but it remains to be seen if water rates set are realistic (Gichuki, 2000, WP3: 9-10).

Figure 4: Water sources for households at settlement and in 1998



Source: Gichuki, 2000 (WP3), Figure 2.

The irrigation potential of Kenya's semi-arid areas has not been utilised due to high cost of irrigation infrastructure and low-profitability of smallholder irrigation schemes. Farmers see irrigation as desirable (see the Annex), but are unaware of the costs and difficulties of major schemes. The performance of existing smallholder irrigation schemes in Makueni has been limited by a variety of problems. In 1994, the grant-basis funding of smallholder irrigation projects growing horticulture crops was replaced with a cost recovery system, on donor insistence. This has led to the abandonment of most irrigation infrastructure rehabilitation plans.

Tree investment and management: clearing and replanting investments[13]

Trees provide useful products and environmental services. The flow of benefits appears only three or more years after establishment.

During settlement, the bush was cut and/or burnt: (i) to create room for homesteads, cultivation and grazing: (ii) to provide building materials: and (iii) to generate the cash needed while the farm is being developed (through sales of charcoal and firewood). Bush clearing is gradual, as new cropland or improved grazing is needed. It is also selective and partial. Trees remaining on grazing land are managed by selective cutting, leaving those with a high value, such as *Acacia* species (for browse), *Terminalia brownii* (for construction and tool-making), and trees with medicinal uses. The gradual clearing of trees in the bush is followed by planting of fruit trees, boundary trees and woodlots in degraded patches. Tree planting is sometimes used by sons as a strategy to help secure their inheritance rights.

The charcoal trade has declined following the ban on charcoal production (by presidential directive) and the use of alternative energy sources, particularly for urban consumers. There are no signs of a wood fuel crisis locally under current levels of wood product utilisation, either on farms or in available markets for wood products. The main sources of firewood are trimming, pollarding and lopping of trees in cropland and grazing land and collecting dead branches. In Darajani, approximately 30 percent of the respondents have very small farms with no trees for fuelwood (Gichuki, 2000, WP5). These farmers get their fuelwood from trimming, pollarding and lopping of trees growing on road and railway line reserve areas and from collecting dead branches from their neighbours who offer access rights to their woodlands.

All the farmers have planted fruit trees, numbers ranging from three trees in the small farms in Darajani, to over 200 trees in Kaiani. Valued fruit trees are planted around homesteads for easy management and to guard against theft. Fruit tree establishment requires the digging of planting pits, manuring to improve water retention and fertility and supplementary irrigation or water harvesting until the tree is well established, and chemicals for pest and disease control. Most investments were made by the wealthier farmers, at a late stage of the farm's development. Farmers have learnt grafting techniques, but varieties are not always suited to the climate, and there are pests and diseases (especially for oranges), poor access to market and believed exploitation by middlemen. Nonetheless, farmers perceive fruit production as profitable. Farmers would often like to make more investments, particularly in oranges (20% of the sample) and

[13] Further details in WP 5, Gichuki 2000e.

mangoes (6%) but they are held up by shortage of capital and knowledge of the drought risk (Mbogoh, 2000 WP7, Table 21).

Favourable land and tree tenure combined with the ability and willingness of farmers to intensify tree planting has resulted in increases in tree density on farm over time despite conversion of bushland to cropland and improved grazing land. However, there is less willingness to invest in slow maturing trees which are in demand for hardwood and charcoal production. Many valued hardwood species preferred for furniture and implements and charcoal production have disappeared from the landscape. In some cases, rules restricting felling of trees on individual farms had a negative effect on tree planting. Prices of tree products, particularly fuelwood, medicine and construction poles and timber have remained too low to offer incentives for tree planting and management.

3.4 Natural resource management policies and their impacts on farm development, 1950-1998

Land tenure: The Government's long established recognition of private rights in both cultivated and grazing land has encouraged investment in both. As land tenure policy was in conformity with the direction in which traditional rights were evolving, traditional rights were sufficient to authenticate property rights and sales and to give investment security, in advance of the titling process. However, titling increases land values. Title deeds are regarded as particularly essential where there is any doubt over the status of land, for example, on former government forest or game reserve land, land owned but not used by an absentee parastatal or private owner, etc. Some farmers have delayed investment for fear that boundaries may shift when land demarcation is in progress.

Land tenure security is a necessary but not sufficient condition for farmer investment. For the benefits of security of tenure to be fully realised, there is a need for improvements in the factors that influence the productivity of the land and the profitability of various land use options.

Soil conservation: The Kenya Government has manifested equally strong support for soil conservation, both through its technical services and through high level support in the speeches of the President and cabinet ministers[14]. This will be considered in conjunction with its extension policies.

Tree management: Gazetted forests managed by the Forestry Department earn the district authorities income from timber and fuel. External interventions have focussed recently on agro-forestry and community forestry. The Government has responded by a shift in focus from industrial plantation in gazetted forests to on-farm forestry, and from government tree seedling production to facilitating community production. In this study, there is no evidence of direct impact of these policy changes on farmers' investments, which are driven by their own imperatives.

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[14] Government commitment in recent times are evidenced by: (i) the National Soil and Water Conservation (NSWC) programme (established since 1974), (ii) the Permanent Presidential Commission on Soil Conservation and Afforestation (established 1981), and (iii) the formulation and production of National Environmental Action Plan in 1994.

Water management: Water policies have suffered from inadequate attention to maintenance needs and costs, given the political attraction of promising free or cheap water. This has led to deterioration in public or community-funded sources, and investment in private sources by those that can. The cost-sharing policy will be considered in the next chapter.

4 NATIONAL ECONOMIC POLICIES AND THEIR INFLUENCE[15]

4.1 Policies and the economic background to 1990

The Machakos study found that the policy environment in Kenya from 1930 to 1990 had in general supported wise farm investments (Tiffen *et al.*, 1994, Part IV). Access to knowledge was provided through general schooling, with the Government following up the keenness displayed through *harambee*[16] fund-raising. Community inputs were assisted by training provided by a community development service. The agricultural extension service became better at securing knowledgeable farmer participation, particularly in soil and water conservation. In the 1980s, its size was greatly increased. Security for land investments was provided by the tenure laws, but we highlighted the dangers to farmers' savings in the form of livestock from inadequate livestock health services. Market incentives came from the growing towns, and although many export commodities were controlled by monopolistic marketing boards, prices were kept broadly in line with world prices, providing incentives. We noted that the restrictions on inter-district trade in grains and pulses added to costs and hampered specialisation. Most commodity boards carried out their functions relatively efficiently till the mid 1980s, when we noted that delays in payment were deterring farmers from cotton production. We noted problems in the lack of effective representative local government institutions, able to raise money to meet particular local priorities, and the lack of funds for the maintenance of publicly supplied infrastructure such as roads, water supplies, etc.

4.2 Economic growth and aid since 1990

In the 1990s the district, as the rest of Kenya, was affected by changes in the country's general economic policies and management, including control of inflation, and its public investment strategies. While some of these were at the dictate of donors, others were the result of Kenyan political choices.

World Bank figures show that growth in GDP per capita was rapid up to about 1980, slowed in the next decade, and has declined since 1990 (Figure 5). This translates into a general increase in poverty, reduced resources for private investment, and a decline in government revenues from taxation, tariffs, etc.

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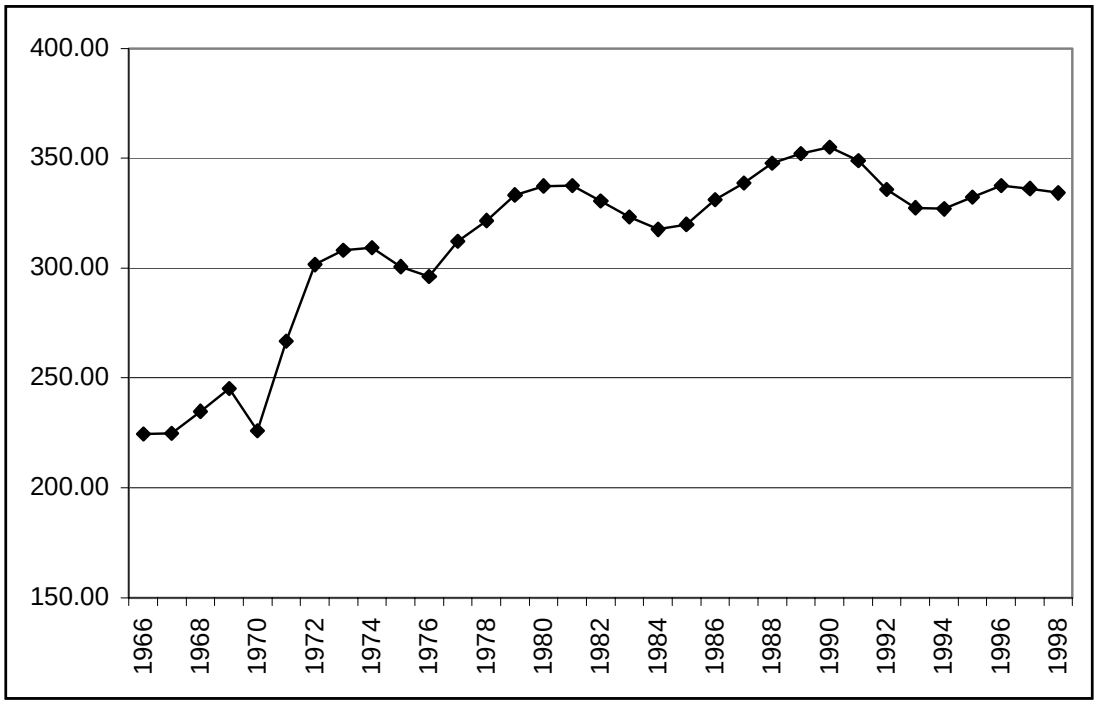
15 This section derives from WP 7, Mbogoh (2000), with some added material on the economic background.

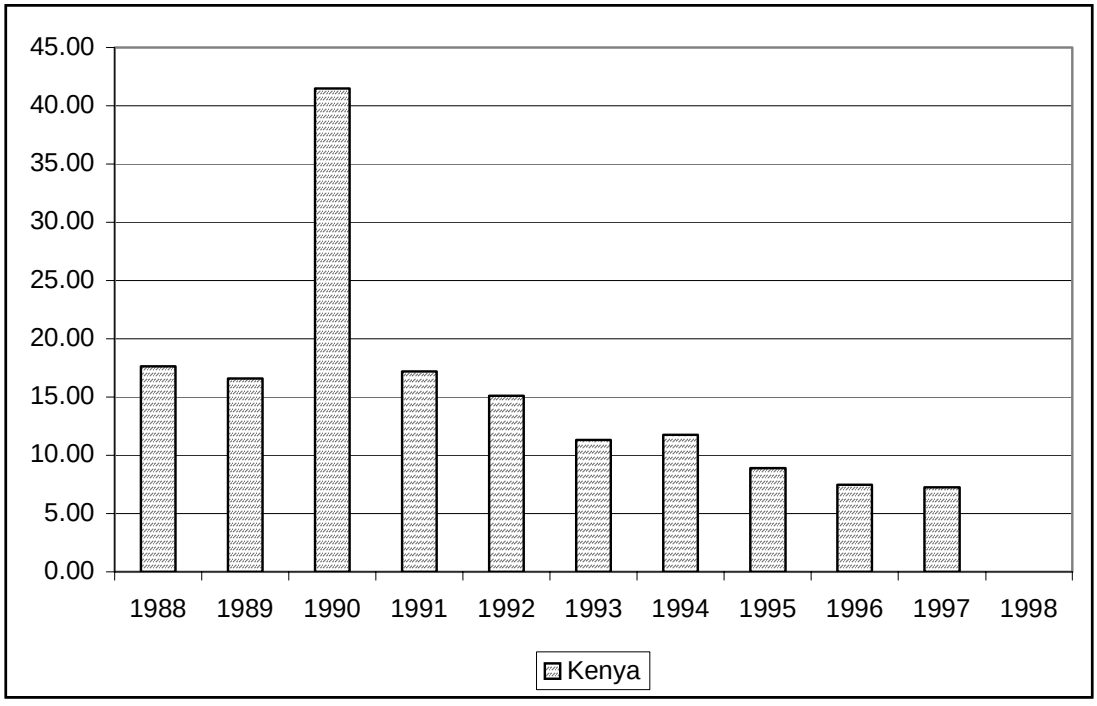
16 'Pull together in self-help'.

Figure 5: GDP per capita in Kenya (in constant US$, 1995)



Source: World Bank Africa Database 2000.

Figure 6: Official Development Aid, per capita, in Kenya (in constant US$, 1995)



Source: World Bank Africa Database 2000.

By the 1980s the Government was relying on aid funds for many operational costs (as opposed to salary costs), making it very vulnerable to the reduction in aid that took place in the 1990s, (Figure 6). Most structural adjustment measures - the abolition of most marketing monopolies, the reduction of the civil service, the removal of many subsidies, the introduction of cost-sharing for many services - were delayed to 1989-95. Some are still in at the implementation stage. Cost-sharing for services previously free or subsidised effectively means less money in the pockets of private individuals for other purposes. The question before us is how far these changes have reduced the ability of farmers in semi-arid districts to invest and to improve their own welfare.

4.3 Liberalisation of parastatal marketing

Like many other African governments, the Government of Kenya identified marketing through parastatals as a development alternative to an inexperienced and small private commercial sector. Some parastatals originated during the 1939-45 period as part of a war-time command economy. They continued partly because the predominant development theory of the time favoured government-directed investment according to planning priorities. Time has revealed inefficiencies and corruption in government parastatals, and there has been a general shift in development thinking towards more reliance on the private sector and market forces. In Kenya, the strong vested interests of politicians, big businessmen and graduates benefiting from employment delayed their collapse or abolition to the 1990s. In a semi-arid area like Makueni, the most important parastatals have been those relating to grains and pulses, cotton, and milk, and to a lesser extent, those concerned with the provision of seed and other inputs.

Grains and pulses: Trade in these was regulated by the National Cereals and Produce Board (NCPB) and its predecessors. From the 1939-45 war, the movement of more than two 90 kg sacks out of the district required a permit. The NCPB was also responsible for storing a strategic reserve. Though its costs were a heavy financial burden, vested interests fought for its survival, and the grain trade was only finally liberalised in 1993. However, there was always a large private sector trade.

Cotton: The MIDP (1978-1987) devoted much effort and resources to building up cotton production in the Makueni area, based on new co-operatives which would sell cotton and grains to the appropriate boards. A ginnery was built in Wote. Cotton output averaged 4500 tons p.a. 1981-5, but then dropped to less than 2000 tons p.a. 1986-8 when many farmers abandoned the crop due to the Cotton Lint and Seed Marketing Board's failure to pay them within a reasonable time-frame, (Mbogoh, 1991, Table A.7). The cotton industry was liberalised in 1993 in the face of a heavily indebted board and virtually inoperative Wote ginnery. The creation of Makueni District then led to a prolonged dispute between the Machakos District Co-operative Union and the local Makueni Co-operative Society (formerly part of the Union) over the ownership of the ginnery, and a further dispute over the inheritance of the Board's debts. There had been a failure to think through the consequences and effects of the privatisation policy, or how it should be co-ordinated with policies on district administration, and, via this, to the co-operative union structure. In 1999, the ginnery was still closed, and while some farmers were still producing cotton and selling to more distant ginneries, they suffered from high transport costs. Hence, most farmers did not regard cotton as profitable. As suitable substitute crops are not easy to find in their agro-ecological zone, the collapse of the cotton industry has hurt many farm households.

Milk: Until May 1992, only the Kenya Co-operative Creameries Ltd (KCC) was allowed to process and distribute milk and milk products in designated urban areas, and dairy co-operatives were only licensed to deliver milk to KCC factories and milk cooling facilities. When its monopoly was removed, the KCC had difficulties in competing with new entrants who shortened the route between producer and consumer, and it was soon in deep financial trouble, delaying payments to farmers still supplying it. For a period, the market was disrupted, but by 1996 over 1000 individual traders and over 200 co-operatives in Kenya were engaged in milk processing and marketing. Dairying became more attractive and some Makueni farmers have invested heavily in it.

Inputs: In 1990, price controls were removed from fertilisers and the trade was further freed by the liberalisation of foreign exchange in 1993. By 1996, competition had increased outlets. Fertiliser use has expanded in coffee and horticultural areas in Makueni, but it was never much used by cereal producers in AEZ 5, due to the high risk of inadequate rains. Following the liberalisation of the seed industry in 1996, the Kenya Seed Company has lost its monopoly and a variety of commercial seeds are now available in local stockists, adding to choice. However, most grain and pulse producers rely on their own stocks, unless they lose these during a sequence of droughts. They then often need official or NGO emergency relief to resume cropping. Hence, liberalisation of trade in inputs has had little impact in this area.

There is a problem of access to information on new varieties suited to this zone.[17] The divisional agricultural officer in Kibwezi did not think that new research-derived maize seed offered advantages over local varieties, but a new short-season pigeon pea was promising. A farmer at the Wote workshop agreed, but others had not yet been able to try it. Farmers are willing to test new varieties, and failures to reach the farmer or receive farmer feed-back is due more to breaks in the research-extension-farmer communication chain than to the abolition of the seed company's monopoly.[18]

4.4 Agricultural research and extension

Before 1980, research was regarded as the fount of knowledge for ignorant land users. A top-down approach for transfer-of-technology was therefore adopted, largely ignoring farmers' knowledge. Around 1980, the process of respecting and incorporating the farmers' knowledge began. However, the main extension tool became the Training and Visit system (T&V) which demanded heavy inputs of staff[19]. Staff levels were

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[17] Older research varieties, such as Katumani composite, have long formed part of the local gene pool.

[18] Multinationals are less attracted to open pollinated, composite maize varieties because of the inability to assure repeat purchases by farmers, although these have the advantage in the semi-arid areas. The Kenya Agricultural Research Institute (KARI) has given least resources to these areas, but probably needs to reallocate resources towards them (ed. Hassan, 1998, p. 78 and 202).

[19] The Bank relates this also to a Kenyan 1976 policy decision to employ all 'eligible' graduates, but agrees that the T&V system became too heavy for the Ministry's resources. It expresses, now, grave doubts on whether there should have been a favourable evaluation of the T&V system in 1993 under the given circumstances (World Bank, 1998: 26-7).

increased in the 1980s, assisted by aid finance (the World Bank supported National Extension Project (NEP) and the European Commission supported MIDP). However, since the late 1980s, the Government has recruited few new staff. With dwindling staff and government resources, the planned visits to farmers every two weeks under the T&V system extended to every eight weeks, which has seriously eroded its efficacy. In any case, most farmers dislike the T&V system of assembling for training at the farms of few 'select' farmers on topics not of their choosing. It is now proposed to introduce a 'demand driven' extension approach on request, with Makueni District as one of the pilot areas, but it is not clear how the reduced staff will get the needed mobility. The World Bank (1998) noted that two thirds of extension budgets still go to salaries, and the remaining one third is inadequate for field work, training costs, vehicle maintenance, etc. Farmers feel they lack access to relevant information (see Annex).

In this area, soil conservation support has been continuous since the Makueni settlement of the 1950s, though resources have varied. Within the Ministry of Agriculture and Rural Development, the Soil and Water Conservation Branch has been privileged by long-standing Swedish support. In 1992, the programme expanded nationally to take over the work in the semi-arid districts formerly supported by such special projects as MIDP (Tiffen *et al.*, 1996). The staff have operational funds and are very committed to working with and through farmers (Gichuki, 2000, WP4). Our results (Chapter 3) have shown that farmers in this area know the importance of soil and water conservation. They regard terracing as a strategic investment, (Chapter 6) and incorporate it and other conservation techniques into their cropped land as soon as they have the resources. This is to the credit of past programmes, but raises the question as to whether a change of orientation should now take place. Grazing lands are less well conserved, and their improvement is now the main area where farmers need technical support.

4.5 Government priority areas for investment

Kenya has veered at different times between concentrating its public investments on semi-arid areas, with a view to reducing poverty, and on its high potential areas, where large numbers live and a higher return to investment can be expected. Much public investment has been aid-financed and affected by the changing priorities of donors.

In the 1950s much effort by the colonial government had gone into soil conservation in the semi-arid areas like Machakos in an effort to reduce costs of famine relief to government. The independent Government switched attention to its high potential areas where farmers were being resettled on land of departing white farmers, with a good deal of success. The early 1970s saw a focus amongst several donors and in Kenya on poverty, which was especially associated with the semi-arid areas into which more people were moving. This led to the EC-financed Machakos Integrated Development Programme (1978-88), as the first of several district-based projects designed to promote integrated rural development in the semi-arid areas.[20] We were disappointed to find how little impact MIDP seemed to have had when viewed from the year 1999, though some of its co-operative and other buildings are now government offices for the new Makueni District, some of its dams are still in use, and some farmers probably learnt their soil conservation skills under it. This lack of permanent impact on incomes was

[20] Other donors took up other semi-arid districts. A new ministry was set up in 1989 to co-ordinate the various programmes, but most donors failed to refund successor projects.

partly due to the cotton debacle, noted above. It was also because, once the project terminated, so did supervision and funding for maintenance, for which normal government budgets were inadequate.

Makueni obtained a pilot Small Scale Irrigation Programme (MSIP) funded by DANIDA in late 1993, which in 1997 became the Makueni Agricultural Project (MAP) with a wider remit. Mbogoh (2000, WP7) notes that this enables the district agricultural staff to obtain stationery and other supplies and to undertake some field work. MAP utilises the PRA (participatory rural appraisal) approach to identify priority projects and uses a cost-sharing strategy. In its project budget it has set aside some funds for those of the local people's priorities that contribute to the overall goal of the programme. These, as usual in a dry area, include water. It is focussing its resources on focal development areas, and we found evidence of its support of dams in the Kaiani area. Focal development means, of course, that people living outside these areas are unsupported. It rations scarce resources, but the rationing method was not selected by consultation with representatives of the district's population.

MAP is small compared with MIDP. The main donor interest has swung back to the high potential areas. An influential study in the late 1980s concluded, with special reference to Kenya, that "targeting policies and investments in the areas of high productive potential and high population densities offers the greatest scope for achieving growth in the short and medium run" (Lele and Stone, 1989: 38). This was followed by the World Bank Kenya Poverty Assessment (1995), financed by several major donors, which declared that "the bulk of the poor live in rural areas, two-thirds of them in the high and medium potential areas in the central and western parts of the country... in the semi-arid fringe...the incidence of poverty is high, but population density is lower" (p. iii).

Thus, despite lip service to community consultation, many aid projects are driven by the plans and allocations made during the project proposal stage, and the priorities are as perceived first by the donor and secondly by the central government, rather than by the district and the farmers. There are two levels of problem here. The conflict between donors and government was addressed by the World Bank's Evaluation Department in a review of the World Bank's aid to the Kenyan agricultural sector, with a distinguished advisory committee of "30 informed stake-holders in Kenya". This found a major problem of ownership, with most programmes being regarded as Bank projects implemented by Kenyan staff, rather than as Kenyan programmes implemented with the aid of World Bank funds. However, the district versus national level was not addressed by the stake-holders (who were presumably resident mainly in Nairobi), although it recognised that "genuine ownership by the local communities is ... the vital element in achieving .... sustainable institutional development" (World Bank, 1998:20).

4.6 Government policies towards identifying and meeting local priorities

The World Bank derived the lesson that special project implementation units outside the normal public service (such as the integrated development district programmes of the 1980s) cannot make up for weak local and administrative capacity (*ibid.*: 18). We would rather point to lack of district capacity to raise and control funds, or to tailor government provision to local priorities. There is a general consensus, based on experiences from the developed world, that power should be devolved to the lowest level. However, in

Kenya so far, this is mainly interpreted as deconcentration to lower levels of central government staff, rather than devolution to local elected authorities. The local authorities are weak, have very limited revenue-raising power, and this affects the county councils even more than the urban councils. Hence, there are almost no mechanisms for raising money within the district for district purposes, except at the level of small community-run projects. Community projects can use fees collected to meet staff and other costs for operation, repair and maintenance. However, some infrastructure requires a higher level of organisation than a local user group. Local authorities are weak everywhere, but particularly so in new districts. At its creation, Makueni District acquired its own county council and Wote town and Mtito Andei became Urban Councils, with responsibilities, amongst other things, for market facilities. As new bodies with no major revenue sources their efficacy in improving commercial infrastructure is limited[21].

The Government's District Focus for Rural Development Policy, announced in 1983, was deconcentration, not devolution. An elaborate set of planning committees was supposed to adjust national policies to local needs from the location upwards, and to solicit government and donor support for the implementation. The committees at district level are dominated by government officers, and elected bodies like the County and Municipal Councils are a small minority voice. Financial resources remain in the control of central ministries. District planning has therefore only been a reality when there is also external finance for district projects, as under MIDP, and the present MAP, but it is then subject to donor priorities and restrictions.

The Government took a different approach to bringing services closer to the people in the early 1990s with the sub-division of administrative areas. Makueni District was created from four divisions of Machakos District in February 1992. These have been split into 16 divisions, with additional locations and sub-locations. The improved access to administrative officers (sub-chief and chiefs) has contributed to more expeditious solution of local problems, but the main aim is political stability rather than economic development. However, since government investment tends to follow civil servants, the infrastructure associated with district and divisional headquarters is gradually being improved. Wote town, while still very small, has grown through the influx of new staff, and benefited from the multiplier effect of their salaries and construction needs. It was connected with the national power grid and telephone service in 1999. It has yet to get a tarmac road link, but its all weather road to Machakos Town is better maintained for easier official access and a tarmac road is under construction. The inadequacy of the roads infrastructure has always hampered market development in this area.

4.7 Fiscal and monetary policy

In the 1970s a growing balance of payments problem, attributed to increasing oil import prices, led to monetary and fiscal expansionary actions and the adoption of administrative controls that fuelled inflation. Inflation persisted, peaking at 46% per annum in 1993. Although the period 1990-1996 saw various financial sector reforms, a reduction in inflation was not immediately achieved because of conflicts in policy

[21] At the workshop in Wote we witnessed the Town Council setting up an unofficial road toll barrier.

actions, due partly to deliberate compromises in consideration of the 1993 election (Wagacha and Ngugi, 1998).

Inflation has two bad consequences for farmers. First, it confuses market signals on prices. Second, and more important, it devalues their savings if they keep them in cash or put them in a bank. As we will see, farmers tend to invest immediately they have a surplus after a good harvest. However, for some things, they need to accumulate savings. At Wote workshop, an example was given of a group that formed to make bricks, who needed to build a kiln. They felt they had been cheated by the man who advised them to put a first instalment in the bank. Because of drought, they were not able to add to the original capital the following year, and what they had was, in their words, "eaten by the bank". The same problem may lie behind the frequent references to the financial management troubles of groups managing a resource which periodically needs an expensive replacement or maintenance. It is not easy to calculate the sum needed to be put aside annually for an expense anticipated in five years time (e.g. desilting a dam) when inflation is high and variable.

Kenya liberalised the foreign exchange rate in October 1993. As this coincided with the inflationary peak, it was followed by the depreciation of the exchange rate in the first half of 1994. While this resulted in improved balance of payments from the inflow of capital, it increased the cost of inputs with an imported element, such as fertiliser and veterinary supplies, hitting these in advance of any increase in farm product prices. Thus input prices suffered the double effect of devaluation and the removal of subsidies. Kenya has now adopted a fiscal policy that emphasises prudent management. These policies should stimulate economic growth, but the question remains as to whether they will be consistently implemented.

4.8 Effects of macro-economic policies

We are trying to separate the impact of policy-induced changes on farmers' investments from those induced by rainfall variations.

Effects of rainfall variation are seen directly in terms of farmers' ability to make farm and other investments. Good harvests and better output of livestock mean farmers have more farm income to invest in their priority programmes. Poor outputs increase their reliance on off-farm income and transfer payments, including food relief. These impacts will be traced in the next chapter.

To survive repeated crop failure, the poor are forced to defer investments in natural resources conservation and livelihood improvements. The impact of low household food supplies are compounded by the market reaction of higher grain prices and low prices of livestock. The Government has been able to modify the former to some extent by its food import policies and famine relief. Nevertheless, a sequence of bad harvests leads to widespread hunger, elevated mortality and morbidity, and loss of wealth in livestock, which can be mitigated, but not altogether prevented, by appropriate policies and interventions.

The main impact of government policy and institutional changes in Makueni District over the last 10 years has been an overall reduction of government staff and services. This appears to have had negative effects on livestock disease control, the availability of

information on new crop varieties, and the managerial and technical advice available to groups wishing to undertake ambitious projects, as discussed further in Chapters 5 and 6. Inflation has hindered improved financial management. Increased cost-sharing for health and education services has reduced farmers' funds for investments they would like to undertake. However, liberalisation and marketing reforms have led to greater stability and availability of food and other consumer goods and production inputs, even though understandably at slightly higher but stable prices. According to the Makueni District Trade Office statistics, there has been an upsurge of private albeit micro-enterprises, with people investing in supermarkets, bakeries, etc., especially in the Wote Town and in Mtito Andei and the little towns within the district along the Nairobi-Mombasa highway, but the latter are still handicapped by lack of water, electricity, etc. Milk marketing has improved and grain marketing has not suffered from liberalisation. However, the cotton reform was botched.[22]

Experience with implementation of the marketing reforms in Kenya suggest that there is social goodwill to accept reforms that favour profitable private initiatives, the developments in the dairy sub-sector being a good example. At Wote workshop, farmers appeared to accept the necessity of cost-sharing, despite its personal costs to them, and they were realistic in supposing that they must themselves play a role in securing improvements, without relying on government. Nevertheless, they saw some necessary investments as beyond their capacity, and dependent on government resources, particularly in the areas of roads and water development.

Liberalisation of food and cash crop markets were aimed at freeing the market, resulting in larger agricultural incomes. It was also expected to benefit consumers of agricultural commodities as markets became more reliable and prices reduced due to expected improvement in market efficiency. Considerable progress in reform has been achieved but the process remains incomplete, partly due to resistance to change by vested interests. Inconsistent implementation of reform policies has resulted in uncertainties, which have made the private sector less forthcoming with its investments to participate in the market. Other constraints such as poor road infrastructure, high and unstable interest rates, lack of accurate and reliable market information, underdeveloped communication structure, unfavourable policy and regulatory environment have handicapped the private sector. The full potential benefits of reform, therefore, have not been realised. Nevertheless, there have been improvements. Maize prices have declined, to the benefit of both rural and urban consumers and milk is more available with price benefits to farmer and consumer.

4.9 Conclusion

Late implementation of policy reforms mean only limited impact as yet on incomes and investment. Except in the cotton industry, liberalisation has had positive effects. However, as we shall see in Chapter 7 staff shortages in key areas like livestock disease control, dissemination of crop information and advice in group management have hampered farmers' ability to help themselves.

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[22] World Bank (1998:11) conceded that the state divestiture was unsatisfactory in many respects and that some of the blame lay with the Bank.

5 THE MANAGERS AND HUMAN RESOURCE INVESTMENTS

The three main sources of income in Makueni District are crop production, livestock production, and non-farm income. Since decisions on income and investment strategies are made within a family context, we examine first the family managers and the nature of the family. We look also at how they invest to build up the knowledge base and the work options open to family members.

5.1 The resource managers[23]

The family and the rural household

Amongst the 45 households interviewed, there was an average of 5.8 residents, and a further two non-residents who were regarded as part of the close family. The 45 families had a total of 119 resident adults available for work, of whom 16 worked in the non-farm sector and four were job-seekers. There was an average of only 2.1 persons per farm mainly engaged in farm work, partly because 39% of residents were at school, with a further 13% below school age. Amongst the 91 counted as non-resident family members, 23% were on their own farms, (often on land allocated by the parents), 26% were private sector urban employees, 10% worked in the urban public sector, 3% had their own business, 18% were students and 14% were job-seekers (Nzioka, 2000, WP9, Table 6). There were more men in urban-based employment than women.

The farm managers

The mean age of the farm manager was 53.6 years. This person was in 63% of cases a resident husband, in 33% a wife with a non-resident husband, and in 4% a woman on her own. About 28% of the farm managers were over 60 years old. Some of the older people had retired from non-farm jobs, and had brought back to the farm not only a higher than average educational qualification, but also the skills and contacts which the job(s) had given them. Despite the tradition of ascribing decision-making to men (whatever the case in reality), a large amount of joint or female decision-making was reported even in the interview situation (Table 5). Farm management is thus a matter for both spouses, though men dominate in relation to cattle keeping, terracing, and selling of land. The spouses are well educated by rural African standards. Fifty four per cent of both men and women had had a primary education, and a further 16% of men and 5% of the women had had some secondary education.

[23] Further details are in Nzioka (2000), WP 9.

Table 5: Main decision maker by gender

Decision	Male		Female		Both		Totals	
Buy cattle	26	(57.8)	6	(13.3)	13	(28.9)	45	(100)
Sell cattle	25	(55.6)	7	(13.3)	14	(31.1)	45	(100)
Buy goats	21	(46.7)	8	(17.8)	16	(35.6)	45	(100)
Plant trees	18	(40.0)	7	(15.6)	20	(44.4)	45	(100)
Sell food	19	(42.2)	5	(11.1)	21	(46.7)	45	(100)
New crop	6	(35.6)	7	(15.6)	22	(48.9)	45	(100)
Terracing	25	(55.6)	6	(13.3)	14	(31.1)	45	(100)
Send child to secondary school	17	(37.8)	6	(13.3)	22	48.9)	45	(100)
Buy land	30	(66.7)	7	(15.6)	8	(17.8)	45	(100)
Average	22	(48.7)	6	(14.3)	17	(37.0)	45	(100)

Source: Nzioka, 2000 (WP9), Table 3.

5.2 Education, policies and cost-sharing[24]

Akamba parents appear to regard education as the main route to non-farm jobs, as well as providing the skills needed to use and communicate with important networks such as the churches and other NGOs. Although marriage and the obligations within the nuclear family are strong, compared with some other African societies they invest little in marriage costs, and bride price has largely been replaced by a social obligation to help the wife's parents if needed. Their social investments are mainly in schooling and local *harambee* activities.

Table 6: Number of educational facilities by type, 1989-95

Year	Pre-primary	Primary	Secondary	Youth polytechnic
1989	?	690	110	17
1992	880	743	124	?
1995	912	767	125	44

Source : Nzioka, 2000 (WP9) , Table 13.

Providing the facilities

Kenya has a long history of parental self-help, and many schools start outside the official system, and are later adopted into it, alongside government schools. (Tiffen *et al.*, 1994). Azam and Daubrée (1997: 68), in their economic analysis of growth in Kenya, note that the development of human capital was driven by demand and self-help, and is "clearly the driving force of long-term development in Kenya". In 1988, the Government shifted all costs for constructing and equipping schools to parents and local

[24] This section draws on Nzioka (2000), WP 9, together with further analysis of educational attendance figures provided by the District Education Officer, Wote.

communities. Although there have been no new government schools, investment in new facilities has continued (Table 6). These are small facilities well spread out over the district, so most children can walk to school.

Management and running costs

Schools are now run by PTAs (parent/teacher associations) and a board of governors selected from local prominent personalities and approved by the Ministry of Education. Government pays teachers' salaries only. Primary schooling is supposedly free but parents feel their primary school costs are higher compared with the former system when they paid tuition fees and the Government provided other inputs. Most parents pay fees for 1-2 years of nursery schooling, and a minority pay the heavy fees needed for secondary schooling. As educated children are regarded as a community asset (successful persons are expected to channel aid to their home areas), poor parents can often get help from relatives and neighbours through *harambee* fundraising efforts.

Suitability of curriculum to local needs and job requirements

In 1985, the educational system was changed from seven years primary, six years secondary (four years ordinary level and a further two years advanced level) and three years university, to eight years primary, four years secondary and four years university (8:4:4). The aim was to prepare primary school leavers for jobs by including practical skills like carpentry and metal work. This policy has not been wholly successful. The extra year increased the cost of primary schooling to parents. Many primary teachers are not trained for the new subjects, so the technical education was not always effective. Figure 7 shows that the drop-out rate is highest after primary VII, probably because many parents are unconvinced of the value of primary VIII. In a bad year like 1994 even primary VI suffers. However, the general quality of primary schools in Makueni is high. In the league tables for the Kenya Certificate of Primary Education Makueni has been either first or in the top five districts since it was formed.

About 30-40% of primary VIII go on to secondary school which involves parents in substantial fees, but qualifies children for higher-paying jobs and tertiary education. District Education Office statistics show that since 1995 slightly more girls than boys attended upper primary classes and in 1998 there were also slightly more girls than boys in secondary schools. Parents are increasingly worried about employment prospects and some think that boys are more able than girls to make their way without qualifications. Secondary attendance has hovered around 21,000 in the 1990s, and is possibly not keeping up with the growth in numbers of the age groups concerned.

An alternative to secondary school education is that provided by the youth polytechnics. These were originally established as self-help institutions to teach skills in demand in rural areas, such as tailoring, catering, carpentry, metal work, etc. They are much cheaper than secondary schools, since instructors are paid less and they are partly funded by the contracts they win for the students' output. Since the introduction of the 8:4:4 system, they have lacked official interest and have been passed from one ministry to another. Statistics on them were not available from the district education office. Village interviews showed that some parents still regarded them as a realistic and cheaper alternative to secondary schools, and Table 6 suggests that they have increased in number.

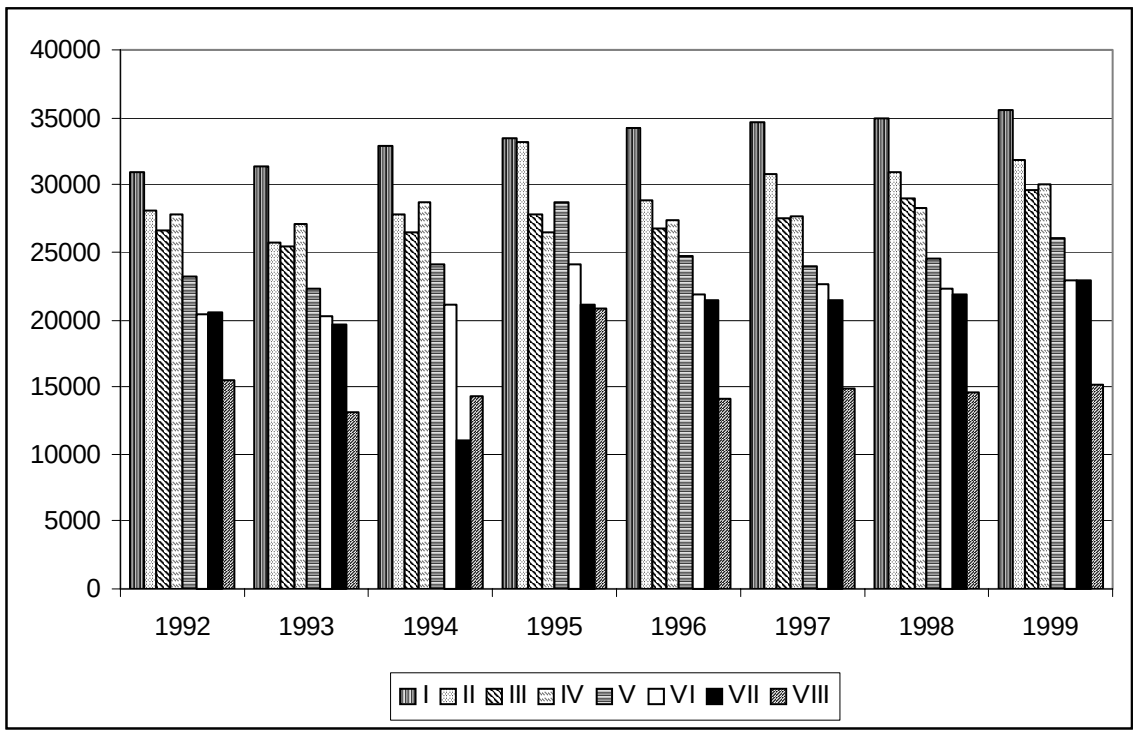
Amounts of labour foregone

Data from the Wote office show that the average age for 33% of nursery school children is five years, and six years for another 33%, so that primary education often does not begin till age seven nor finish till age 15. Late completion of schooling delays entry into work, and increases the labour shortage on the farm. The 1989 census showed that in the old Machakos District, 77% of the age group 15-19 years were students (Tiffen, 1995). An estimated 33% of the population are in school in most years.

Commitment to education

While those interviewed insisted that they had been able to maintain their children at school despite droughts (Mbogoh, 2000, WP7), Figure 7 shows that school drop-outs increase in bad years, such as 1994. The continued good attendance in primary VII in the poor income years that followed 1995 shows the strong parental commitment to educational investment, despite hardship. This commitment is also shown in the investment in additional schools and youth polytechnics, completely a parental responsibility since the cost-sharing policy was introduced. However, parents obviously have worries on the relevance and effectiveness of primary VIII in the 8:4:4 system, and on whether the costs of secondary are justified in the present employment situation. The present system is not catering very well for those children who need to find work as artisans, and in the small-scale service sector.

Figure 7: Primary school attendance, by number, class and year



Source: Figures provided by the Ministry of Education, Wote office.

5.2 Self-help groups as investment and management institutions

Self-help groups, locally known as *mwethya,* are part of the *harambee* concept ('pull together in self-help'), which has been a governmental theme for rural development since independence. In the 1950s and 1960s groups built community amenities, such as schools and dips, and also, by rotation, private on-farm terraces (Mbithi, 1972; Tiffen *et al.*, 1994). This tradition is now being called upon to buttress new policies of handing over some former government services and assets to community management. However, self-help ability may have diminished, partly for social reasons, and partly because of a reduced government input into training.

While 70% of the interviewed households are or had been involved in on-farm self-help groups, for such things as bush-clearing, cultivation and terracing, their sons and daughters seldom participate, being in school or working away from home, so that traditions of management are not being passed on to a new generation. Just over 80% of the families also had a participant in an off-farm *mwethya*. About a quarter were using off-farm *mwethya* to make an investment. Men were engaged in acquiring a water facility, or a business, and the women usually in smaller investments, such as buying goats and tools, though some were buying plots (probably for constructing a building for rent or for a business activity). However, some 40% were women in rotational savings groups which finance consumption needs like clothing and domestic utensils.

We were given incidental evidence of failures in group management of community assets like water, or in group business activities like brick making or marketing. These activities inevitably give rise to differences of opinion and conflicts of interest between members. At the Wote workshop, villagers emphasised the need for training in organisation and management, as well as the necessary technical information. A policy of handing over to community management does require resources for back-up training.

6 INCOME DEVELOPMENT: STRATEGIES AND INVESTMENTS

Each of the three sources of income in Makueni requires investment. Family managers pursue an integrated livelihoods strategy: livestock finance education, as well as being a savings bank drawn on if crops fail. A good harvest is used to restore livestock capital and to make investments in crop development, but much capital for both crop and livestock development comes from non-farm income.

6.1 Crop production, marketing and food needs[25]

Difficulties in the analysis of official statistics

The recorded district production and price data are available in Tables 4 and 6 of Mbogoh (2000, WP7). Official crop production statistics are based on averages of estimates from field staff at the location level and yields on demonstration plots. Their accuracy and reliability becomes increasingly dubious due to staff cuts at the location level. The amalgamation of two seasons' results into one annual production figure

[25] Further details are in Mbogoh (2000), WP 7.

makes trends and relationships to rainfall and the quarterly price data difficult to analyse (see Figure 8). Recording the seasons separately would enable agricultural officers to make better use of the results. The figures do, however, reflect the huge variability from year to year. Recorded maize production has varied from 20,000 to 80,000 tons per year, and farmers are sometimes substantial buyers and sometimes sellers.

Yields

Grain and pulse yields vary considerably, with an average grain yield (1992-8) of 0.5 tons per ha. Compared with Machakos district records for the 1980s, average yields were slightly down, understandable as the Makueni data reflect an area with a higher proportion of AEZ 5 & 6. Nevertheless, the yield trend should be watched.

Choice of crops - maize versus sorghum and millet

While the district has some coffee and horticultural areas, these are not being considered in this report. In AEZ 4, 5 & 6, maize and pulses have always been the principal crops, providing both food and income. From the statistics, farmers appear to get higher yields in both good and bad years from maize than from millet or sorghum, which are the recommended crops for the dry areas. Maize is the preferred food staple and as maize prices are generally higher than those of the coarse grains, it also gives a higher income per ha. It would seem that official recommendations on appropriate food crops for these areas need to be reconsidered, but only after more research and analysis on local and introduced grain varieties than we have been able to undertake.

Food sufficiency and drought relief policies

Food sufficiency can be considered at two levels: the ability of the district to provide for its own needs by production and internal trade, and the ability of individual households to produce or buy the food they need. At household level, half to two thirds of farming households aim to feed their families from their own crops in reasonable rainfall years (Table 7), but during the last five years many have had to purchase much more food than planned. A minority plan on regularly buying some food.

Table 7: In years of reasonable rainfall, the length of time households aim to supply family food from own farm (percentage of respondents in each village)

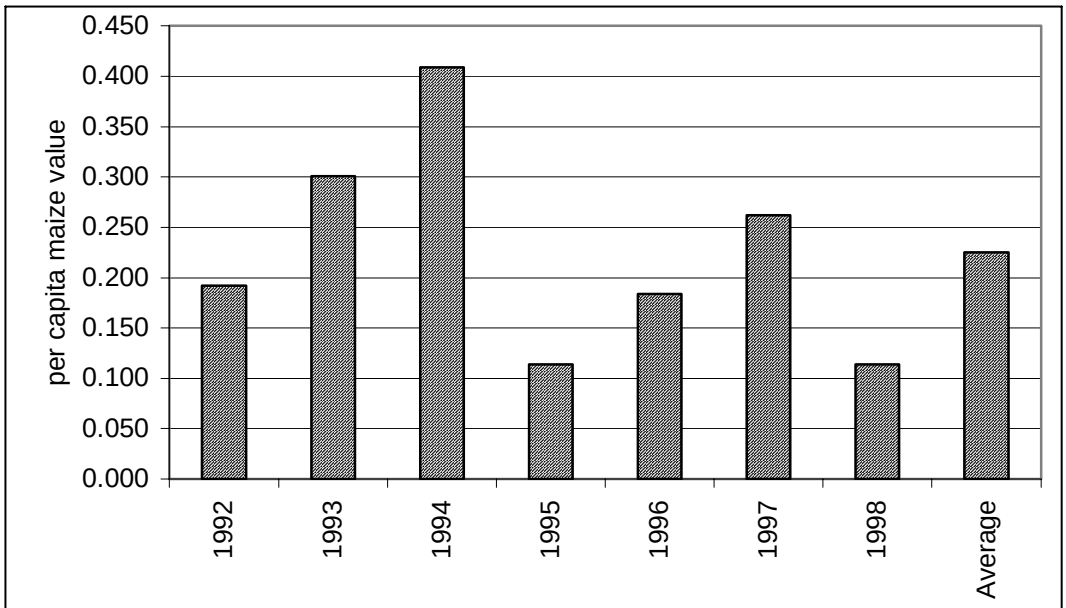
Villages	Less than 6 months	6-7 months	8-11 months	Year
Kyamusoi	16.7	26.0	8.3	50.00
Kaiani	8.3	16.7	8.3	66.7
Darajani	16.6	0	33.4	50.0
Athi Kamunyuni	-	9.1	-	90.9

Source: Field interviews, 1998.

Respondents said they financed the additional food needs of drought years from their non-farm income (54%), help from absent family members with non-farm jobs (19%) and livestock sales (23%). In 1998, all the surveyed households reported that they had

not yet been able to replace all the livestock sold to cope with the 1996 and 1997 droughts. In addition to cutting consumption, 15% said that they also cut expenses related to improving or maintaining their farm, or house non-farm business (10%), and 16% reduced educational expenditures.

Figure 8: Maize value of grain and pulse production per capita, in tons, Makueni District



Rainfall in mm: Long rains (LR) short rains (SR)

Kampi*LR	172	53	118	200	200	191	n.a.	257
SR	289	206	107	135	135	405		274
Dwa*LR	274	277	472	199	199	408	n.a.	200
SR	333	178	303	169	169	397		384

*Kampi Ya Mawe and Dwa Plantation stations: Average is for the years 1972-97 (Data from Kenya Meteorological Service. Note that production relates to the two rains of each year: the harvest of January 1997 reflects the rains of 1996.

The Government supplies food aid during severe droughts and inputs to help recovery in the next rains. These are administered through the Office of the President and a series of Committees at each administrative level. They appear to work, as 80% of the farmers we interviewed said that they had received food aid during the last drought, mainly from the Government. There was also a school meals programme.[26] Relief and recovery programmes were in place in 1997 till November. The position improved with the harvest of January 1998. We were unable to obtain full food aid figures. Given the erratic climate, emergency relief is probably a cheaper option than any form of insurance, which would be unaffordable. Credit is risky since it cannot be repaid if one

[26] Information from Ministry of Education officials at the Nairobi workshop. This was through the World Food Programme. (Further investigations would be needed to see if this school feeding programme was related to the lower drop-out rate in 1997 than in 1994, (Figure 7).

season of bad rains is succeeded by another. The present system seems to have built-in measures to avoid dependency.

At the district level, an analysis was made to see if the district produces the 200 kg of grains and pulses per head needed to meet average food requirements. All crops and pulses were converted into what they would buy in maize at current price levels. Total district production has been divided by total estimated population. Figure 8 probably reflects the situation of the low potential areas fairly accurately, since the small area of high potential hand is not a big grain producer.

The rainfall figures in Figure 8 show the difficulty of relating rainfall to total annual production. A good annual production was probably often the result of one good rain and one failure. The figures also illustrate how rain can vary within the district. 1994 was a very good year for some parts of the district, when Dwa Kibwezi recorded two good rains, while others, including the area round Kampi Ya Mawe, had two seasons with insufficient rain for crop production. The district produced its food needs in four years, and less than needed in three. Given the rainfall, it was an achievement to maintain an average just over the 200 kg taken as requirements, although this average figure disguises great differences between years, between village areas and between households. This variability emphasises the importance to the households of non-crop income, so that they can buy food when needed.

6.2 Crop incomes

Average crop incomes on a district basis have been calculated using the Machakos study methodology. Current prices were calculated by averaging the median price for each quarter for the production year concerned, as given in Mbogoh, 2000, Table 6 (WP7). All production was then expressed in terms of the amount of maize that could be purchased, in order to avoid the difficulties caused by the high inflation rate. Figure 9 also compares the results with the previous Machakos study data for 1987.

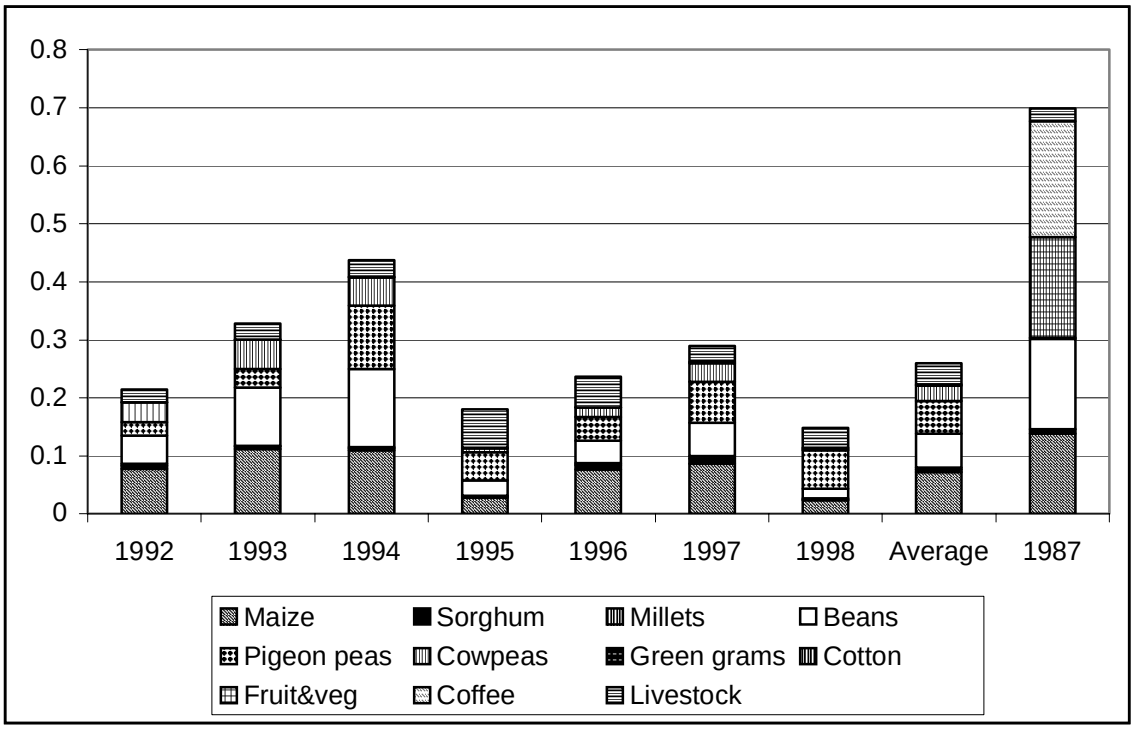
Figure 9 shows:

- the importance of maize compared to sorghum and millet;
- the importance of the three main pulse crops in income and their great variability from year to year. The successful pulse crop in parts of the district in 1994 seems to have been directly reflected in investments in education in 1995 (more children kept in primary VII and VIII, as shown in Figure 7, and more livestock obtained, especially goats and beef cattle[27], giving higher offtake possibilities in 1995 and 1996 (livestock calculations will be explained in the Livestock Section.);
- Average crop incomes in the old Machakos District were higher than in the part that is now Makueni District, largely because of the significant production of coffee and fruits and vegetables in the other parts of the old Machakos District. There is some production of coffee in the higher areas of the Makueni District, but we have not recorded the figures. There are also minor amounts of fruit and vegetables.

[27] See Fall, 2000, WP8, Table 1.

Farmers would like to invest in new products, or to expand production of old staples. The most frequently mentioned products were oranges (20%), cabbages (11%), and cotton (10%). They recognise the importance of higher value crops, but in Makueni conditions this requires the concentration of water on the areas of production (annually for vegetables and during establishment for trees). A third of the farmers said that the rainfall risk was the main reason why they had not undertaken the desired investment, but 37% were held up by their shortage of capital.

Figure 9: Crop and livestock incomes per head in maize purchasing power (tons of maize) in Makueni 1992-1998, and Machakos, 1987



Source: Authors' calculations. 1987 data relates to old Machakos District. Coffee, cotton and horticultural data were not collected for this study.

Marketing of crops

Our thesis is that access to markets is one of the necessary conditions for intensification. Marketing is naturally hampered in districts with low population density and poor roads, and governments have frequently felt that they should intervene, to control the activities of traders who might take advantage of shortages, particularly in basic foodstuffs. However, our results show that the grain and pulse markets have been operating fairly smoothly. Farmers' complaints at the Wote workshop alleged that imports of foreign grain depressed prices when they had a surplus, although they acknowledged they needed imports in shortage years.

The maize marketing reforms discussed above took effect in 1993, so we asked about points of sale in 1988-90 and in 1996. Only 14% of those in Kyamusoi, adjacent to Wote, sold direct to the NCPB in 1988-90, but none used its grand new depot in 1998.

Most farmers have always marketed principally through private traders in the nearest active market. Three of the four villages had access to markets with more than 100 licensed traders. Athi Kamunyuni was the exception, being 22 km from an active market, with no licensed traders and no public transport. About half of the Athi Kamunyuni households had carried their saleable food crops to the NCPB depot on the Nairobi-Mombasa road in 1988-90, but used private traders in 1998 (Mbogoh, 2000, WP7, Table 12). No farmer recalled using the co-operatives set up under MIDP, even in 1988-90.

District price data show that grain and pulse prices vary considerably according to the nature of the last harvest. They also respond to general inflation. However, prices also fluctuated in rural areas before the liberalisation of the grain trade, for government prices seem only to have been operational for sales to and from the NCPB depots. There is no evidence that the abolition of marketing controls made a difference.

The implication is that, even in Makueni District with its bad roads, private traders compete to offer farmers reasonable services in the marketing of crops, though they find it uneconomic to travel to isolated villages like Athi Kamunyuni. The exception may be where the crop requires some processing near to the point of production, as in a cotton ginnery, where local traders may lack the necessary capital. However, if this is to be remedied by a parastatal, it must perform efficiently, or it will discourage its suppliers.

Crop production inputs

The impact of liberalisation on the availability of purchased seed and fertiliser has already been considered. In the drier parts of Makueni District, the main use of pesticides is in the form of grain storage dusts, where there has always been a liberalised market. The main problem is that imports of technical grade pesticides for local formulation attract much higher duties than the imports of already formulated compounds, such as fungicides and insecticides (Kenya, MoALDM, 1996).

6.3 Livestock management[28]

Livestock play an important role in Makueni incomes and farming systems. The abolition of the KCC monopoly opened up a much wider market for milk, and some farmers have made impressive investments in dairying in consequence. However, the depletion of veterinary service staff and recent poor performance in disease control have led to heavy losses, over and above those caused by sales to finance food purchases in drought years.

Livestock incomes are difficult to calculate, since some sales represent the drawing down of stock rather than income from a sustainable offtake. In Figure 9, income, as in the Machakos study, was calculated by using a standard offtake rate for cattle and small stock[29]. Poultry income, and income from milk and eggs, have not been estimated. Almost all livestock owners use and value manure.

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[28] Future details will be found in Fall (2000), WP 8.

[29] The cattle offtake rate used in the Machakos study was assumed at a varying rate of from 17-20%, partly based on recorded sales and hides figures as a proportion of recorded cattle

During bad years, farmers are obliged to draw down on their livestock holdings. The National Welfare Monitoring Survey II collected its data in July 1994 and estimated that the mean monthly household income from the sale of crops, livestock and livestock products in Makueni District was Ksh 1,388 (Kenya, CBS, 1996). The bulk of this, Ksh 1,090, came from livestock sales, in a period which followed a bad harvest (Nelson, 2000, WP10). Most farmers also stressed the importance of livestock for meeting school fees. Unlike crops, livestock can be sold at any time of year to meet urgent needs.

Livestock herds are rebuilt by foregoing sales to increase the breeding animals, or by buying in new stock. New animals are usually acquired from purchases with money gained from a family member's salary. Other farmers sell farm produce or small stock to meet the heavy costs of establishing a cattle herd.

Cattle ownership, benefits and risks: Cattle ownership varies by location, as shown in Table 8. Cattle ownership was widespread in northern Makueni where undulating topography allows for the construction of small dams and ponds for watering livestock. Around 30% of cattle owners in Kyamusoi and Kaiani had cross-bred dairy cows, to take advantage of the improved market for milk. This is a new development. In the 1980s, pure and cross-bred dairy cattle were mostly confined to AEZ 2 & 3 because they require more water and a higher standard of feeding and management than the local zebu cattle. Cross-bred cattle are mainly acquired by using the services of a neighbouring bull. The cost is between 100 and 300 Ksh per service (depending on the bull quality), a price not all farmers can afford. The Government formerly promoted dairy cattle through its artificial insemination (AI) service at a charge of Ksh 40. Under the cost-sharing scheme, the charge is now Ksh 400 per service plus the cost of transport. This subsidised cost is now above private charges for bull services. (The full cost of AI is estimated at Ksh 2,000 per service in Makueni, and private operators have no interest in taking it over).

However, 67% of our study respondents in the southern Makueni villages of Darajani and Athi Kamunyuni had no cattle in 1998. The major risk to livestock, and particularly to cattle, comes from disease, and 84 percent of farmers interviewed identified health problems as their major constraint. Surprisingly, only 10% of farmers ranked drought as their main problem. Losses are high. For instance, 40% had once lost all their livestock, while 64% have once lost 80% of their animals. Heavy cattle losses were reported between 1992 and 1995, and in 1997. While most owners battle to restock following losses, and are prompted to invest more in vaccination, spraying, and buying of drugs, 27% of our sample were former cattle keepers who either gave up all livestock or switched to keeping small stock only.

The Makueni District Veterinary officer said that Foot and Mouth Disease is endemic while Contagious Bovine Pleuropneumonia (CBPP) and Rinderpest are epidemic in the district (there were outbreaks of CBPP in 1992 and 1994, and Rinderpest in 1997). Tick-borne diseases (such as anaplasmosis), trypanosomiasis and helminthiasis are also common. While vaccination against Rinderpest, Blackquarter, Anthrax and Rabies is undertaken, this does not cater for the other diseases. A charge of Ksh 30 per cow was

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population. This is a high rate, but we thought the cattle population was probably under-recorded. In this study, we have used an offtake rate of 17%.

implemented in 1992. With the reduction of veterinary and extension staff, control of diseases deteriorated after 1992, particularly in drier southern areas with more scattered populations. There is no private veterinarian in Makueni. Although the number of shops selling veterinary medicines has increased, particularly in the dairy areas, the cost of modern drugs is out of the reach of many farmers.

The main tick control measure prior to the 1990s was dipping. Around 1990, the dips were handed over to community management. Communal dips work best in the high potential areas with a dense cattle population. In AEZ 4-6, farmers with valuable animals prefer to invest in their own sprays rather than subject their animals to possible infections at dips, while farmers in drier, lower risk areas, only dip when they are conscious of a tick build-up. If dips are not regularly used by large numbers of cattle owners, their economics under any type of management becomes strained.

In addition to their livestock and water investments, dairy farmers have cleared bush, planted grass, added fencing, etc., to improve grazing, often with the help of hired labour. Natural pastures in this area form the primary livestock feed, followed by crop residues, and in third place, fodder planted in the strips and terrace lips, developed for soil and water conservation. According to season and a farmer's particular resources, cattle may be tethered, kept in a cattle enclosure (*boma*) or herded on the grazing area. Grass planting is highest in the Kaiani area where the largest grade cattle population is found. A market has developed in grazing land, which can be rented for cash, or farmers without cattle may provide it in exchange for ploughing services. Molasses and other supplementary feeds have become more available with liberalisation. But while molasses have become cheaper, prices for other inputs have increased.

Other livestock: Goat ownership is widespread (Table 8). A few farmers also keep sheep. It is easier to rebuild livestock herds, even of goats, in AEZ 4 than in AEZ 5. Donkeys are growing in number and were owned by about 20% of households in Kyamusoi, Kaiani and Athi Kamunyuni, but not in Darajani. Donkeys are used to haul water and to plough lands in Athi Kamunyuni, where the number of bulls and oxen is limited. The majority of households keep 15-20 chickens of local broiler type. Newcastle disease is a major problem. Poultry income can be a useful contribution (see examples below). More than 50% of farmers in Kyamusoi, Kaiani and Athi Kamunyuni have some beehives. There have been various official efforts to modernise the honey industry without much success.

Table 8: Main livestock holdings in 1998

Village	Percentage households owning cattle			Percentage households owning goats		
	Zero cattle	1-5 head of cattle	6+ head of cattle	Zero goats	1-5 goats	6+ goats
Kyamusoi	27	55	18	18	36	45
Kaiani	8	50	42	25	42	33
Darajani	67	33	0	25	25	50
Athi Kamunyuni	67	25	0	18	27	55

Source: Field surveys, 1998.

Livestock: land ratios and intensification: Since both uncropped and cropped land support livestock production, total farm area was used to assess the stocking rates using the traditional Stock Unit (SU) of 1 cow = 5 shoats. Table 3 has shown livestock density is highest on small farms with high cropped land percentages. Hectares per stock unit are now down to 1.7-2.0 in three villages, and 3.4 in Athi Kamunyuni, compared with 20.0 ha 1940s and 6.0 to 15.0 ha in the 1970s in AEZ 5 & 6 (Ackello-Ogutu, 1991).

6.4 Total incomes and non-farm income[30]

Reports since the late 1970s and early 1980s indicate that between 20 and 50% of total household incomes in AEZ 4 could be attributed to off-farm earnings. The 1994 welfare study (Kenya, CBS, 1996) reported that non-farm income was 59% of total monthly household income in the district. In our sample 63% reported the farm was the single largest source of income for the household, with 58% estimating that it provided more than half of their income in food and money. Our sample may have been biased in that we were deliberately interviewing farmers, and in Darajani this involved replacing some of those picked up on the sampling frame because their main occupation was not farming. We were also concentrating on the farm manager, even where the household head had another occupation. In 1998 many farm families had secondary sources of income, or a partially non-resident member working in town who contributed income (Table 9 below and see also Nzioka, 2000, WP9, Table 6).

Table 9: Involvement in income diversification (percentage response)

	Full sample	Kibwezi Division	Wote Division	Close to Market	Athi Kamunyuni
Local non-farm income (salaries, business, crafts)	42.2	54.5	30.4	28.5	90.0
Local casual labour sale	54.7	9.2	60.0	56.2	50.0
Migration	48.8	42.8	54.5	51.5	40.0

Source: Field interviews, November, 1998.

While there are few permanent local salaried occupations apart from teaching, there are various part-time off-farm occupations. More than half the households had one or more members who worked occasionally for other local households for house-building, farming etc. (casual labour sale in Table 9). Wages reflected skills and the degree of labour demand. Other non-farm income is derived from crafts, charcoal, trading, and honey. Some secondary activities like rope and basket making were under-reported, partly because they are often undertaken by women in connection with their rotational savings groups. These casual, part-time activities reflect the lack of small urban centres where people can develop a viable non-farm business. The income derived from a non-resident member is important (See the Migration line in Table 9 above).

As to be expected, higher farm incomes were reported from the northern AEZ 4 & 5 area (Wote Division) and lower from the southern AEZ 5 & 6 areas (Kibwezi Division).

30 Further detail in Nelson (2000), WP 10.

The worst farm incomes were reported from Athi Kamunyuni, which is in AEZ 6 and also furthest from an active market.

Farmers have somehow to match their cash incomes and their cash needs, and the Central Bureau of Statistics (CBS) regards expenditure as a better guide to incomes than income reported for a particular month and year. In Makueni in 1994, the CBS survey found an average total monthly income from all sources of Ksh 5,520, mainly, as we have seen, from livestock sales, matching an average monthly expenditure of Ksh 5,065. The national rural monthly income and expenditure averages were respectively Ksh 8,508 and Ksh 6,365, showing Makueni to be clearly amongst the poorer districts in income terms. Our investigations showed that farmers normally regard the crop element as more important than livestock in their farm incomes. The variation in income sources from year to year can be illustrated by the case of one woman farmer, who in 1997 agricultural year harvested 31 bags of maize and beans, bought no food, sold grains for Ksh 4,320 and earned Ksh 6,000 from the sale of labour and Ksh 1,500 from chickens. The following year, both harvests failed and she had to buy 20 bags of maize and beans, selling off five goats. She did more casual labour to earn Ksh 9,600 to make ends meet.

The implication from the above is that while most farmers regard farming as their basic source of income, they rely on other sources to complement this. The urban-based off-farm income that some members of the family can earn if they have the necessary educational qualifications bring in greater returns than local work. Hence, education for their children is a major part of their investment strategy.

Table 10: Annual income category from crop and livestock sales (percentages)

Income categories (Ksh/year)	Full sample	Kibwezi Division	Wote Division	Market-close	Athi Kamunyuni
>50,000	4.4	0	8.6	5.7	0
25,000-50,000	11.1	9	13	14.2	0
5,000-25,000	57.7	50	65	60	50
1,000-5,000	22.2	31.8	13	17.1	40
0-1,000	4.4	9	0	2.8	10

Source: Nelson, 2000 (WP10).

6.5 Investments strategies

Owing to the importance of investment for our study, questions on investments and means of financing were included in three profiles: those on livestock (Fall, 2000, WP8); crops and marketing (Mbogoh, 2000, WP7); and on incomes (Nelson, 2000, WP10). We have already shown that livestock are often acquired from a family member's salary. Non-farm incomes are also important in financing other types of investment.

Households were asked to list the three investments made in the past 10 years which they considered had greatest impact on their overall welfare. In Table 11, the maximum score for an investment mentioned by all respondents is 33.3%, since they could list

three. Terracing for crops, the planting of trees and clearing bush ranked highly everywhere. There are interesting variations in that education was seen as being more important in the *drier* areas than in Wote Division, while building dams, naturally, was confined to areas with the topography suitable for this. Beyond these major categories, there was a great variety of responses, showing how farmers mix and match to fit their particular resources, skills and circumstances (Nelson, 2000, WP10).

Table 11: Top three household investments (percentage response) (n=122)[31]

	Full Sample	Kibwezi Division	Wote Division	Close to Market	Athi Kamunyuni
Terracing	23.7	20.6	26.5	23.9	23.0
Plant trees	19.6	18.9	20.3	19.7	19.2
Clear bush	13.1	10.3	15.6	11.4	19.2
Build house	12.2	12.0	12.5	12.5	11.5
Education	10.6	18.9	3.1	9.3	15.3
Purchase livestock	7.3	8.6	6.2	8.3	3.8
Build dam	4.9	0.0	9.3	6.2	0.0
Fencing	1.6	1.7	1.5	2.0	0.0
Shop	1.6	3.4	0	1.0	3.8
Poultry production	1.6	1.7	1.5	2.0	0.0
Grain store	0.8	1.7	0.0	0.0	3.8
Vegetable production	0.8	0.0	1.5	1.0	0.0
Cart	0.8	0.0	1.5	1.0	0.0

Source: Field interviews, November, 1998.

Mbogoh (2000, WP7) enquired about whether investments had been made specifically to increase crop production. Of the 45 farmers, 44 percent had made investments since 1989 to begin selling a new product or to increase sales of an existing crop. While a few had made numerous investments, most farmers had made two or three, totalling an average of Ksh 9,000. Most investments were to expand production of grains and pulses, but eight were for oranges, two for cabbages and one for green grams. Investments were concentrated in years with good harvests, e.g. 1997/8. Sixty percent of investments were for improving production on existing land and can therefore be considered as intensification investments. Terracing scored highly as a key investment, followed by tree planting. Only 10% were for opening up new cropping areas. Another 15% were for improving storage facilities, and a similar number were for transportation. Purchases took the form of new hand tools, ox-ploughs, wheel-barrows or materials for new grain stores. Some 17% purchased fertilisers, pesticides or other agro-chemicals. Sixty percent of these investments were said to be financed with non-farm income, 25% from crop sales, and 8% from livestock sales. The wetter villages were more able to use crop income, while the drier ones relied more on off-farm income. Darajani, on the Nairobi-Mombasa highway, had the poorest farm investment record, probably because

[31] Maximum number of responses was three investments per household x 45 households, or 135. Some households listed less than three top investments.

people there have relatively small farm holdings and were more interested in their non-farm businesses than in their farms. Enquiries were not made into non-farm investments. Only 20% of the sample households had obtained loans from banks or NGOs.

About 65% thought that school fees and books had diverted funds from farm investments, but most households said they expected that investments in their children's education would pay off in future (Mbogoh, 2000, WP7).

In summary, for many farmers, crop income finances livestock investments, which finance educational investments (and emergency expenditures). The educational investment gives one or more of the family members a better competitive position to seek urban-based salaried employment, which is a source of funding for major family farm investments and emergency needs.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 The need for a public debate on priorities and the deployment of public resources

It is now time to sum up the findings of this review of past experience in the district to set out our suggested agenda for a public debate on future priorities and policies in Kenya, and to make some specific future policy recommendations at national level and at the level of Makueni District. We hope the latter will also help other semi-arid districts.

Based on the existing government policy statements and statements by other politicians there is a general awareness of the importance of education, transport and water development. However, there are no actions plans developed, nor the necessary budgetary allocation, to translate the policy statements into action. Over the last 10 years, the clamour for political pluralism has diverted attention from development activities to resolving political problems of succession and multi-party politics. Consequently, politicians give empty promises and avoid hard choices. If Kenya is to recover, we need a public debate on the real priorities and the allocation of public resources.

Donors at the beginning of the decade were pressing for action on environmental problems which did not always exist. If Kenyans do not wish to be at the mercy of changing fashions amongst donors, they themselves need to engage in a hard debate on where they need to direct their scarce resources and how to cater for diversity between districts. Reforms need to have acceptance and comprehension, at the highest political authority, amongst technical experts, and by village opinion leaders, or they will be evaded. We put forward some principles for this debate in the next section.

Donors should recognise that it is important that projects and programmes should be clearly sustainable within Kenya's own human and financial resources, which was not the case with the T&V extension system. Aid is still required for economically useful capital items. However, both Kenya and donors should work to a target of seeing that in

the medium term, operating costs of priority services can be met from Kenyan sources, and met at a level that ensures staff have the means to work. We would not wish to see the district agricultural staff without stationery when the DANIDA programme ends.

The current mismatch of aid provision and local need is dramatically illustrated in Wote. The largest building is a huge grain store with a large empty yard and imposing office block, aid-financed, and scarcely used, as it was completed after the NCPB reforms. On the hill overlooking the main Wote town, a grand several-storey building, intended as the new district headquarters, has remained empty since we first saw it in 1991, awaiting funds for completion. Most government officers are crammed into a collection of dilapidated and poorly maintained buildings.

What can be done to generate a debate within Kenya on policy priorities so that the Government has the support of its people in its discussions with donors? We put forward the following suggestions.

The initiative of the World Bank of involving as many stakeholders as possible in "Poverty Reduction Strategy Framework" was a good first step in getting policy and planning discussions. At the local level, the present district and divisional development committees are too dominated by government officers with their own vested interests. Stakeholder meetings at various levels (local, division, district and national) on specific issues (e.g. water) may be a way of getting like-minded people to start facing the realities in terms of what is physically, financially and managerially possible. The Makueni Agricultural Project's Focal Area Development approach is a step in this direction, as stakeholders are involved in project formulation, but priorities need public discussion at higher levels also.

7.2 The questions under study and the answers from past experience

Let us consider again the questions with which we started:

(i) Is the intensification option viable when rainfall is low, variable and often inadequate for crop growth? Can farmers deriving an erratic and poor income from cropping make the savings needed for investing in improving their land? What are the necessary policy conditions for assisting them?

Farmers have maintained food production per capita despite smaller farms and an enormous increase in population. The number of livestock they can support from their cropping and grazing land has increased. In suitable areas they have upgraded their cattle. They have made substantial investments to develop their farms by terracing, fencing, water conservation, tree planting, etc., but this has taken place over a long period of time. Policies giving security of tenure and promoting soil conservation have assisted them, and the Government's emergency food relief and recovery programmes have provided a safety net.

However, intensification has met limitations:

- A move to higher value crops has been limited by lack of water and the costs of irrigation.

- Cotton failed because of an efficient local processing and marketing method was not found.
- Education takes priority over farm investments because a non-farm income for a family member is seen as an essential insurance strategy.
- Credit is not used because farmers risk being unable to repay through no fault of their own, and they will not risk their title deeds. Instead the savings needed for investments have derived from a combination of non-farm income, and livestock and crop surpluses in good years. There are important financial transfers between family members, and to a much lesser extent between neighbours engaged in group activities.

(ii) If farming is to intensify in an agro-ecological zone deemed most suited to livestock and millet, what are the necessary policy conditions for the intensification of livestock keeping?

Livestock disease is a real and great risk, with many farmers having suffered severe losses, damaging incomes, food security and soil fertility, by creating a shortage of manure. Policies that prevent the spread of disease, or facilitate its treatment, and facilitate improvements of the grazing and water resources that animals need to increase their disease resistance, are a necessity. These policies should be complemented with marketing policies and infrastructure that improve profitability of milk and meat production. Farmers in Wote are well aware that prices in Wote are lower than in Machakos town because of poor roads.

(iii) If agriculture cannot be expected to support the whole foreseeable population increase in semi arid areas, what are the necessary policy conditions for developing the non-farm sector?

The necessary policy conditions relate to an education system that prepares people not only for salaried employment but also for self-employment in the non-farm system, and the promotion of the necessary infrastructure of water, electricity, roads, postal services, etc., in market centres so that more small businesses and workshops can develop. At the national level there is need to have policies that create the conditions favourable for economic growth and equitable and fair distribution of wealth.

(iv) If government is short of revenues to finance services, what should be its priorities for people living in semi-arid districts, and if cost-sharing is necessary, what are the conditions for its efficacy?

This is a key question, and the answer in a country like Kenya with many very diverse environments will differ from district to district, according to its combination of resources. Hence, it involves methods of governance, planning and priority setting and revenue raising at the local level. It means deciding what revenues and payments should be retained and re-circulated at which level – community, district, central. At the national level efficacious cost-sharing depends on the control of inflation, which impedes financial planning.

The cost-sharing policy and the reduction of government staff in veterinary, extension services and community management (although necessary, given lack of government revenues) have had an impact on investments in water, education, livestock and crop

production, on the potential income streams from these, and on the benefits flowing from assets turned over to communities. Staff reductions have not been carried out in a way that prioritises the needs of individual districts. Yet a cost-sharing policy should imply that the services that people want and are ready to pay towards are expanded, and those that are not useful wither away. The implications for civil service deployment need debate.

7.3 The way forward

The principles for the way forward should be :

- identification of priorities and needs;
- building on strengths;
- ensuring financial resources at a level that enables priority services to operate effectively.

Strengths are:

- the strong entrepreneurial and trading tradition in Kenya. We found prices operating according to supply, demand and quality considerations, in relation to casual wage rates, land sales and pasture rentals, bull services, etc. Farmers within reach of active, competitive markets have not even been conscious of the abolition of many government controls or the collapse of marketing boards, co-operatives, etc. Most marketing reforms have stimulated private investments (e.g. in dairy development, veterinary and seed supply shops, on-farm storage);
- a farming community with good knowledge of soil and water conservation for cropped land;
- a strong commitment to education, and a pool of well educated people within the rural environment who can give leadership and spread new technologies;
- a tradition of mutual support within the family that transfers resources between urban and rural members according to need and to perceived investment benefits.

Weaknesses are:

- acute water shortages, limiting investment opportunities, and causing stress to people, animals, trees and crops, thus increasing their vulnerability to disease;
- proneness to drought, which causes families to lose or sell assets, and which makes them dependent on food relief at some periods. Poverty levels are higher than the average in rural Kenya and people can only invest sporadically, after good years;
- the variability of rainfall, which increases the risks associated with the use of fertiliser and makes farming too risky for reliance on credit;
- bad roads almost everywhere, which increase market and transport costs and handicap isolated communities;
- The market does not always operate smoothly. Cotton needs ginning close to the place of production if attractive farm-gate prices are to be offered, and the investment needed for economies of scale mean a substantial commercial operator is required, who will effectively have a local monopoly, whether public or private. Such cases may require government intervention, after careful consideration of costs and benefits.

7.4 Priority areas that require action at the national level

1. Water scarcity is a national problem and compromises are needed so that the benefits are distributed in a socially sound and economically effective way. Water does not respect administrative boundaries, and what is used in the upper catchments is mostly not available to the lower areas like Makueni (though some re-circulates). Hence a national plan is needed, and a charging system that discourages wastage and ensures maintenance. Once a national plan is established, districts like Makueni could promote irrigation projects and boreholes and dams for domestic water with the water resources allocated to them, and seek funding for those that seem financially viable but beyond community means to finance.
2. Human resources are the most precious resource in development. However, as educational costs divert money and labour from other investments and activities, it is important that it is as cost-effective and relevant as possible. The management system for community-funded schools seems effective. Government should speed up its present reconsideration of the educational system. A rather large number of parents seem unable or unwilling to finance eight years of primary education. While it is a worthy aim to include more practical subjects in the primary course, an alternative is to revert to the seven year curriculum (which is all some parents can afford), and encourage youth polytechnics for those who either cannot afford secondary education, or who might not want that type of education.
3. Good governance is a fundamental building block for development and an economically prosperous society and, therefore, is an essential component of an action programme to encourage farmers' investments. In 1999, the Kenyan Government, under intense pressure from the donors, started addressing governance issues by focusing on: (i) enhancing accountability and transparency; (ii) strengthening oversight bodies; (iii) strengthening budget planning and execution; and (iv) changing the incentive mechanisms faced by potential participants in corruption. These matters are all important, but given the great diversity between districts, there is need also for a national debate on how to devolve more real power, and revenue collection authority, to the districts, so that they can deliver the services that are locally important, and cut back on those that are less relevant. The present district planning system is not only without resources to implement local priorities, but is also not accountable to local people. Local authorities have been inefficient in the delivery of their services as evidenced by the collapse of the water supply systems and poor state of roads under their control, but this is partly due to their lack of revenue. As shown by the schools, people pay more readily for services from which they receive direct benefits. Cost-sharing measures (e.g. road tolls, water rates, vaccination charges and cesses) could be worked out and would be acceptable if the money collected was used for local needs. There may be a need to reduce central government taxes and introduce local government taxes. The central government taxes would be used to implement national priorities while local government taxes are used to implement local priority projects. The local authorities could also be empowered to set their level of taxation on the development needs and the ability of the local economy to pay the taxes.
4. More thought and debate is needed on the management options for services handed over to the community or privatised. Even at the local level, group management by the users is not necessarily the right answer in all circumstances. Groups cannot always manage internal conflicts and often lack necessary technical knowledge.

School governing bodies and parent-teacher associations work partly because the teachers are the experts, partly because there are no difficult technical problems (building a new classroom is well within local capabilities), benefits are shared equitably and group investment is complemented by individual investments (fees), and partly because of the strong level of community support. They would not work as a user group, i.e. managed by the school children. Thought should be given to alternatives, particularly if the Government cannot afford to restore its old community development advisory service. There are various management models, such as: (1) Privatisation: the service is delivered by a technically qualified entrepreneur who receives fees. The sanction is that his business will fail if he does not satisfy customers. (However, as yet, a private vet has not been attracted to Makueni. Possibly he/she would be, if the job included a contract for vaccination delivery from the Government as well as curative services for individual farmers). (2) Local councils, charging rates to householders and paying staff. These could operate at location level for locational facilities as well as at County and municipal level; and (3) An elected or representative body drawn from users/members of a particular facility, supervising a staff paid from subscriptions or fees. Combinations of these and group management or *harambee* should be well within the imaginative capability of Kenyans: an area that desperately wanted a vet could subsidise him/her by building a house by group *harambee*, then pay by fees.

5. Government should facilitate good management at the local and district level by controlling inflation. High inflation makes it very difficult to set fees and charges at a level that will continuously meet operation and maintenance costs.
6. Tariffs and maize prices: Maize prices have fluctuated around Ksh 10 per kg while the price of pigeon peas and beans has increased from Ksh 15-50 per kg. Maize prices have remained relatively stable due to the Government's policy of importing maize to maintain low prices following seasons of poor maize harvest. Although this has benefited the consumer, it hurts the producer as he/she is unable to take advantage of the laws of supply and demand. Farmers in Makueni recognise that they need to buy maize when harvests are bad, but think the duty on imports should be raised in years of good harvest. Government should also look at its tariff policy on agricultural inputs, given the large number of Kenyans who earn their livelihoods in this sector.

7.5 Priority areas for Makueni

The priority in this risk-prone environment is the reduction of risk. This means, in farming, conserving and concentrating water, having livestock as a financial buffer and to supply fertility (purchasing fertiliser increases risks), using crops that resist or escape rain shortages, and developing off-farm income.

In the crop and livestock sector

- Grazing land: farmers have improved their cropped area. The priority now is the half or more of their farm that is under bush grazing. The improvement of the grazing area will enable more livestock to be kept and improved feed resources will increase their resistance to disease. This also requires water conservation and concentration for livestock needs. The soil and water section should be giving priority to grazing land improvement and advising farmers on small dams, water harvesting, etc. They need to identify farmers who have already found good methods so that these can be spread to others. This service has already built up good participatory approaches for

working with farmers (Tiffen *et al.*, 1996). The MAP should consider whether it could not help more farmers by requiring a higher level of personal contribution for each farm dam than at present.

- Grazing land also carries trees, which can either compete with or complement grass, and which provide income. The forestry department should consider reducing its input into gazetted forests and nurseries (the private sector is well able to provide young stock of types of plants in local demand) and increasing its input into advising farmers on the following aspects: (i) best management for grazing land, to encourage species valuable for browse or honey production, to control invasive species that damage productive pasture; (ii) pruning and coppicing measures to increase output of fuel and building timber; (iii) methods of combating fruit tree pests and diseases. A blanket ban on charcoal production is not necessarily needed, since there is no evidence that farmers destroy trees without consideration of the consequences. Trees can be sustainably harvested off-farms as well as off-gazetted forests to provide materials for non-farm enterprises.
- Better livestock disease control is urgent, and research needs to identify the most dangerous diseases and the most cost-effective measures to tackle the current disease problem, rather than historic problems. Public/private sector collaboration needs to be thought out, to attract private vets and to make full use of the growing number of shops supplying drugs and supplementary foods.
- In respect of field crops, agricultural officers should not just collect or manufacture statistics, but use them in order to identify trends where they may need to bring in more information or seek research help. The data has to be collected by season and by division, but at present it is not archived at this level. It could be used, for example, to investigate the preference for maize over the recommended sorghum and millet, to monitor yields, to note an apparent increasing trend to pigeon pea, and to consider how to help farmers increase production of this if, in the circumstances of a more liberal and fluid market for grains, some degree of specialisation on this should be encouraged. The figures should also be used to highlight divisional differences, and to deploy staff according to their different needs. We recommend, therefore, that there should be a workshop to discuss how to exploit better information already collected, and how to improve data collection given staff constraints, so that farmers needs are known more accurately. This should be at national level, since the problem is not unique to Makueni.
- At the moment, agricultural officers feel that they have little to offer the farmers in the way of maize varieties that are better adapted to the region than the farmers' own varieties. This is a matter for KARI. At district level, there is the problem that farmers may be compelled to eat the selected seed they had reserved for planting during a drought. They then have to resume planting with whatever is available in the markets or is provided in a rehabilitation programme, and the local adapted varieties get diluted. There may be a case for holding a seed reserve of the best local varieties at divisional level. At village level, conflicts of interest and the desperate need for food can prevent a seed bank from operating well. The same applies to the other dryland grains and pulses.
- Farmers feel the need for more information than they get at present. In this district, this applies to fruit and other tree varieties, and livestock disease prevention, as well as to field crops. Having identified their information needs, the extension services need to identify the most cost-effective ways of getting suggestions to the farmers, given the limited resources for transport and touring. As most farmers can read, and as the Government has increased the number of location chiefs, more information

can be distributed via chiefs' notice boards, posters in markets, etc. As most primary school teachers also farm, information on new crops and varieties can be channelled to them for trial and discussion in their communities (for trial on their own farms, not school plots that suffer divided management). If Kenya cannot afford agricultural staff at the locational level, it must try new ways of getting information out.

- Remedies for the cotton industry need to be subjected to cost-benefit analysis and pursued in a more urgent manner than heretofore.
- AI is not a priority, since farmers have developed other means of access to improved stock.

Community amenities, group activities and subsidised assets

Before handing over any community asset to local management, district officials should ensure that the type of training given covers: a) the technical consequences of neglecting maintenance; b) costing of operation and maintenance; c) areas where conflicts are likely to arise and means of resolving these; d) who are the new legal owners, and how these can be made accountable to users; e) whether future technical advice will be available if needed, and on what terms. The appropriate form of management structure needs to be decided with the community, together with the type of charges, and the rates needed to cover costs. These issues need to be addressed where new assets are created by group activities, with or without NGO inputs.

The non-farm sector:

This was not the subject of our study, nor of the Wote Workshop whose conclusions are given below. Nevertheless, it is apparent that it forms a vital and necessary part of income strategies in areas where farming is risky, and that it is also crucial in providing funds for farm investments. The district needs to identify the market centres that could be built up to provide more informal sector jobs, in workshops and service facilities, and lobby for the necessary infrastructure, particularly water and electricity. Some of these could add value to district output of such products as timber, hides and skins, processed food derived from pulses, etc. Others would provide the input and consumer needs of farmers (tools, clothing, furniture, etc.).

Improved roads: These are needed to reduce marketing costs for the farm sector and to give access to a larger clientele for those in the informal manufacturing centres mentioned above. Cost-sharing measures discussed above could be introduced to provide for the necessary maintenance. The district soil and water conservation officer could collaborate with the roads engineer and local communities on this, since cut-off drains improve roads and can concentrate water in useful places.

7.6 The debate and the people of Makueni

Some of the above issues require a re-orientation of thinking, which will take time. While we offer them for debate, we hope some of the practical measures suggested can be put into action relatively quickly, for the benefit of the courageous and hard-working people with whom we were working. These measures should reduce poverty, which is the current aim of both the Kenyan people and the donor community. If poverty can be reduced, people will be able to save and invest more to improve their assets and income

streams still further. The final recommendations of the Wote workshop, given below, give some idea of the quality of the human resource available in a poor Kenyan district, and offer hope for Africa in the 21st century.

ANNEX: RECOMMENDATIONS OF THE WOTE WORKSHOP OF DISTRICT STAFF AND REPRESENTATIVE FARMERS FROM FOUR VILLAGES, ON ACTIONS TO BE TAKEN AT DIFFERENT LEVELS, NOVEMBER, 1999

Kyamusoi farmers and officials

District level:

- Improve collection and ensure proper utilisation of agricultural and forest products cess (a local levy by the County Council)
- Empower local authorities to collect revenue and use it to provide the services required by communities

Farmers level:

- Communities to take up the challenge of good farming and livestock keeping methods
- Farmers to be encouraged and given incentives to take advantage of the untapped potential in grazing land (bush clearance and reseeding with indigenous grasses), and runoff harvesting, storage and utilisation

Central government level:

- Programme to construct dams for irrigation development
- Policies that promote agricultural production or lower production costs by reducing tax on inputs and guarantee a fair price for producers by variable duties required
- Extension services to be area-specific and demand-driven, i.e. based on farmer needs.

Kaiani group and officials

Central government and district level:

- Government to explore ways of providing water for irrigation and domestic use
- District Agricultural Office to provide seeds for planting in time
- Extension staff to mobilise farmers to practise better soil management
- Develop farmer-driven research and extension (PRA approach) - Farmers to be approached first before officers undertake any development plan or project
- Reduce or cut duty on imported agricultural inputs and machinery

Farmers level:

- Communities to take up the challenge of good farming and livestock keeping methods
- Farmers should demonstrate what they have been taught in order to set a good example to others.

Darajani group and officials

Farmers level:

- Form marketing groups
- Get training on group management

Central and district government level:

- Intensify extension and training
- Review liberalisation of cotton industry
- Subsidise inputs or reduce duties
- Greater support to irrigation
- Increase duty on imported agricultural produce.

Athi Kamunyuni group and officials

Farmers level:

- Farmers should form organisations to identify and tackle problems facing them.

Central and district government level:

- Government should intensify extension services
- Government should provide market information, open up market channels and improve infrastructure
- Government should come up with farmer-driven research and farmer-friendly policies.

NGO level:

- NGOs should provide technical, material, and financial support to community-based organisations.

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