

# **Drylands Research Working Paper 1**

## **MAKUENI DISTRICT PROFILE: FARM DEVELOPMENT, 1946-1999**

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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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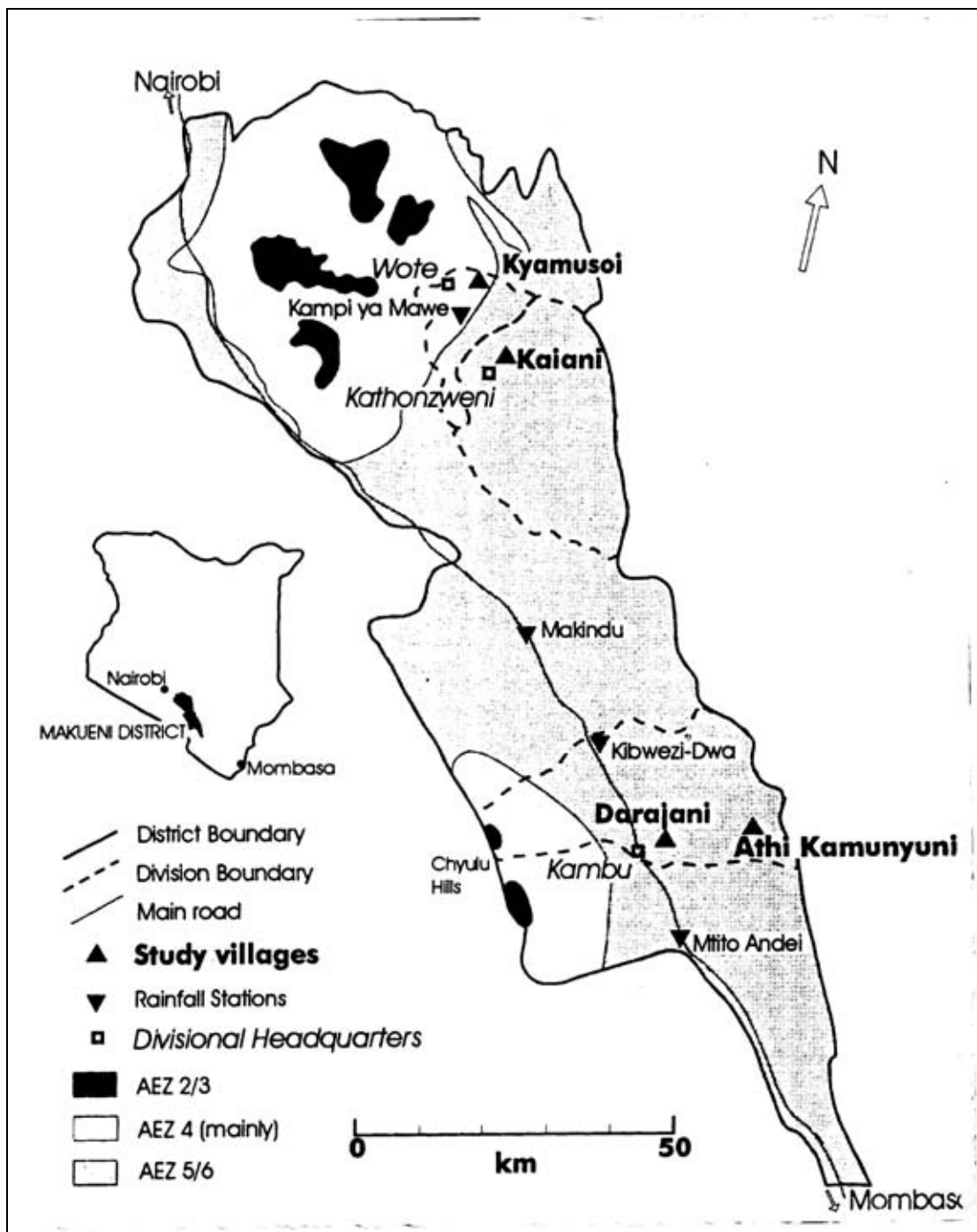
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# Preface Map



## **Abstract**

This paper reviews the settlement pattern and population growth of Makueni District since c. 1940 to the 1980s, and reviews the Government's involvement in the settlement process through five phases: government sponsored settlement in Makueni (1948-57); the Swynnerton Plan promoting titling (1954-59); government inaction as squatters took up land (1957-63); government loss of game reserves land to settlement (1963-1980); and restricted access to new settlement and a move towards urban plot development (1980 onwards). The paper also reviews how land tenure has evolved on the ground in the study villages, targeting how and when land was acquired by households, and shows that land tenure insecurity has not been an important factor impeding investment in mixed farms by households. Climatic, technical and institutional risks were key factors impacting upon the settlement process, and this paper shows how the settlement dynamic in Makueni District contradicts conventional assessments that semi-arid areas are unsuitable for smallholder farming. The continuous expansion of cultivated areas since settlement in the zone is illustrated, and village survey data shows that cultivation, rather than livestock raising, continues to be the preferred land use even in the drier areas, although there has been a continuous interplay between cultivated agriculture and livestock keeping. A review of investments in farms and houses is also undertaken and shows how households in Makueni District have been involved in a sustained programme of investment since settlement first began. Investments in housing, boundaries, tillage and agricultural equipment were found in the study villages and a history of their development was established. Smallholdings have accumulated many assets over time, but there is still a dependence on hired oxen or tractors for tillage operations. Housing investments by many are inhibited by poverty, but teachers and those with off-farm income sources have made substantial housing investments.

## **Résumé**

L'auteur étudie la dynamique de la colonisation rurale dans le district de Makueni du début des années 1940 jusqu'aux années 1980, en se penchant plus particulièrement sur quatre villages des divisions de Wote et Kibwezi. Il examine le rôle du gouvernement dans ce processus d'implantation humaine dans le sud du district et dans le nord, où le « Makueni Settlement Scheme » permit l'installation de soldats d'Akamba à la retraite et de paysans sans terre de zones à fort potentiel du district de Machakos. Le sud du district de Makueni fut marqué par une série d'expulsions et de cas de réinstallation, ainsi que des cas d'installation illicite qui perdurent à l'heure actuelle. La population de la zone couverte par le district de Makueni a augmenté de 190,631 en 1948 à 670,359 en 1989 (Figure 1). Les zones sèches du district ont subi la croissance la plus forte entre 1948 et 1989, mais récemment la croissance a diminué parce que les terroirs non-occupés sont devenus plus rares.

Le gouvernement joua un rôle important dans l'adoption et l'application de règles de tenure foncière pendant la période étudiée, découpée en cinq phases : la colonisation rurale à l'initiative du gouvernement (1948-1957) ; le Plan de Swynnerton et la promotion de titres fonciers (1954-1959) ; l'inaction du gouvernement face à l'occupation de terres par des squatters ; la perte pour le gouvernement de terres servant de réserves à gibier, due à la colonisation rurale (1963-1980) ; la restriction de l'accès à

de nouvelles zones d'implantation et l'évolution vers une stratégie d'aménagement de parcelles urbaines (à partir de 1980).

L'auteur se penche également sur l'évolution du régime foncier dans les villages étudiés, avec un examen des dates et modes d'acquisition de la terre par les ménages (tableau 2). Dans le district de Makueni, l'insécurité de la tenure foncière n'a pas constitué un gros obstacle à l'investissement paysan, et une évolution vers la propriété privée a été notée. En règle générale, le régime foncier a facilité l'acquisition par les colons de droits privés sur les terres, soit pour cultivation, soit pour pâturage.

Les risques climatiques, techniques et institutionnels ont constitué des facteurs clés jouant sur le processus d'implantation. L'auteur présente de manière succincte certaines des stratégies utilisées par les ménages face à ces risques graves depuis le début de la colonisation et montre que la dynamique d'implantation rurale apporte un démenti à la thèse classique selon laquelle les zones semi-arides seraient inadaptées à l'agriculture en petites exploitations. Les données montrent que des interactions entre les cultures et le élevage dans une agriculture mixte ont pris place de manière continue, mais que la production est désormais dominée par l'agriculture et qu'il existe un marché en terres de pâturage. L'expansion continue des surfaces cultivées depuis le début de la colonisation est illustrée. Dans les divisions au climat semi-aride de Kibwezi et Wote, 29 pour cent des terres sont cultivées, 17 pour cent sont des pâturages, 18 pour cent des forêts et boisements et 35 pour cent font partie d'une réserve à gibier ou d'un parc national (figure 4). Les données des enquêtes villageoises montrent que l'agriculture représente également le mode d'utilisation des terres préféré même dans le village le plus sèche, Athi Kamunyuni. Dans les villages de Kyamusoi, Kaiani, Darajani et Athi-Kamunyuni, les terres cultivées ont représenté respectivement 40, 43, 50 et 20 pour cent des exploitations, la plupart de la reste sont leurs terres de pâturage. Les écarts d'un village à l'autre ont pu être attribués à l'un ou plusieurs des facteurs suivants : la durée de l'implantation, le climat et la taille de l'exploitation (tableau 6).

Un examen des investissements réalisés au niveau des exploitations et des habitations montre que les ménages du district de Makueni ont mis en œuvre un programme d'investissement durable depuis le début de la colonisation. Des investissements concernant des habitations, des bordures de parcelles ainsi que des instruments aratoires et d'autres équipements agricoles ont été inventoriés dans les villages étudiés et l'historique de leur développement a été établi (tableaux 9, 10 et 11). Les petits exploitants ont accumulé de nombreux biens au fil du temps, mais certains sont encore tributaires de la location de bœufs ou de tracteurs pour le travail du sol. La pauvreté constitue pour beaucoup un frein à l'investissement immobilier, mais des enseignants et des ménages bénéficiant de sources de revenu hors-exploitation ont pu réaliser d'importants investissements dans ce domaine.

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### **About the author**

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# **1 INTRODUCTION**

## **1.1 Background**

Policy plays an important role in ensuring that people make the investments required to use the available resources sustainably to improve their standards of living. This component of the Makueni study aims at improving our understanding of government policies which facilitate farm development in semi-arid areas. Improved understanding will contribute to ensuring that the policies formulated are appropriate to the different conditions and stages that are to be found in different parts of Sub-Saharan Africa.

## **1.2 Objectives**

The overall objective of this component of the study is to construct a profile of farm development for the semi-arid areas of Makueni District. This is achieved by documenting:

- Settlement history
- Population
- Land tenure and land use changes
- Investments in farm structures and equipment.

## **1.3 Methodology**

The study was carried out in four semi-arid areas of Makueni District, namely: Kyamusoi village in agro-ecological zone 4 (AEZ 4); Kaiani and Darajani villages in AEZ 5; and Athi Kamunyuni village in AEZ) (see Preface Map). The characteristics of these study sites are summarised in Table 1.

In each study area a group consisting of 6-12 farmers was selected to be interviewed on changes in settlement pattern, land tenure and use and community responses to these changes. Twelve respondents for each village were selected at random from a list of all the village households. Specific farm development issues were addressed using data from the following additional sources:

1. Secondary data on settlement history, land tenure and land use change;
2. Farm level observations, interviews and measurements of investments in housing and farm equipment;
3. District level interviews with subject matter specialists; and
4. Feedback from participants of the Makueni Workshop where the preliminary findings were presented.

**Table 1: Characteristics of study sites**

	Kyamusoi	Kaiani	Darajani	Athi
AEZ*	LM 4	LM 5	LM 5	IL 6
<i>Time of settlement</i>	<i>1950s</i>	<i>1960s</i>	<i>1960s</i>	<i>1970s</i>
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

\*Lower midland (LM) zones extend over an elevation of 800 to 1300 m in Eastern Kenya and have an annual mean temperature of 21-24°C, with a minimum temperature greater than 14°C. LM4 is a marginal cotton zone with an annual average rainfall 40-50 percent of potential evaporation. The climatic conditions are fair to poor 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 evaporation. The climatic conditions are fair to poor for millet, cowpeas and sisal. The natural pasture can support low density grazing. IL6 is an inner lowland ranching zone not suitable for rainfed crops and with natural pasture that can support low to very low grazing density (Jaetzold and Schmidt, 1982).

## 2 SETTLEMENT HISTORY

### 2.1 The struggle begins

The history of settlement in the semi-arid areas of Makueni District dates as far back as the turn of the century, when Akamba traders took advantage of the development of the railway line and railway stations infrastructure. Settlement was constrained by harsh climatic conditions, tsetse fly and wildlife and government prohibition. As the Akamba population in the high potential areas grew, and land degradation set in, the Akamba intensified their struggle to increase access to land outside the Akamba Reserve. The Government could not, however, entertain such an idea for fear that it would only lead to demand for more land. The protests peaked around 1932 when Akamba marshalled 187 complainants to testify to their loss of land and cattle before the Kenya Land Commission in Machakos (Tiffen *et al.*, 1994). The degraded status of land in the 1930s partly convinced the Government of the need to do something, and the Land Commission recommended that the Crown land of Yatta Plateau, Makueni, Emali and Kikumbulyu should be converted to African Reserve land for use by the Akamba of Machakos District. In 1937 Maher estimated that 100,000 ha were available for settlement in Kikumbulyu Location (Maher, 1937: 258 quoted in Gichuki, 1991). The guiding principle in the search for and development of new lands for settlement 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 (Perberdy, 1958).

Thus, as early as 1943, the contribution of off-farm incomes in reducing environmental degradation had been recognised.

## 2.2 Government-sponsored Makueni Settlement Scheme: the Kyamusoi story

Kamunyolo village, Kyamusoi Sublocation of Wote Division was part of the Makueni settlement scheme. This was started in 1948, for the purpose of settling retired Akamba soldiers and landless people from the high potential areas of Machakos District. The settlement was well planned and implemented. The exercise started with initial planning, bush clearing for tsetse fly control and infrastructural development. The main infrastructural developments were (a) road infrastructure, consisting of roads linking the area with Machakos town and the Nairobi-Mombasa highway, and an access road to each settler's homestead and (b) water infrastructure consisting of dams and boreholes.

### Box 1: Settlement rules and regulations

1. Not more than one half of the total cultivated area may be planted to maize at any one time.
2. Every registered settler, before he brings his stock, must construct a 9m x 3m cattle *boma* that may subsequently be roofed.
3. Every farm owner shall construct a silage pit each season of at least 3m x 1.5m x 1.25m. The pit must be filled with green fodder and the resulting silage fed to the cattle.
4. Stock must be stall fed at periods laid down by the District Commissioner according to conditions (to prevent crop damage).
5. All arable land shall be terraced.
6. All terraces shall be properly maintained by the farm owner and be in a clean sound condition before the commencement of each rains.
7. No crop residue may be burnt, but must be used for feeding and bedding of cattle in *bomas*.
8. Cattle *bomas* must be cleared of all manure at least once a year before the advent of the short rains and the manure obtained applied to the arable land.
9. A farm owner, where bush has been cleared from his land, will be expected to take every reasonable measure to maintain the pasture in good order and prevent regeneration of bush. Should his effort fail, he must report such regeneration to the section headman.
10. Every settler must plant at least 0.1 ha of cassava.

Source: Peberdy, 1958.

Settlement priority was given to ex-soldiers and landless people from the highland areas. The Government screened the applicants, as those eligible had to be landless Akamba people. The settlers were allocated 12-20 hectare (30-50 acres) of land per family, depending on the land quality assessed in terms of soil texture and stoniness. Grazing land was to be adequate for 8 cows and 40 goats. New settlers were shown their

property boundaries and given six people to assist them in the initial bush clearance. The settlers were also assisted with initial cultivation of three ha (8 acres) by tractor, and the construction of appropriate soil conservation measures. The settlers were encouraged to work communally on the construction of houses and cattle *bomas* (cattle enclosures). Settlement rules and regulation formed an integral part of the settlement programme. The rules were mainly aimed at ensuring that the settlers utilised the land in a productive and sustainable manner (see Box 1).

Early rates of settlement were slow, due to the harsh environmental conditions partly induced by the drought of the early 1950s, dense vegetation, wildlife, tsetse fly and water scarcity (Rostom and Mortimore, 1991). By 1956, the Makueni Settlement Scheme had settled 1,476 families (ALDEV, 1960). Tiffen *et al.*, (1994) reported that by 1960, 2,187 registered households (12,000-16,000 people) had been settled at a cost equivalent to Ksh 101 million (1990 value). After 1960, the government lost control of the settlement process, stopped funding and the enforcement of the settlement rules lapsed. Migration to this area continued and 20,000 and 54,000 people had settled here by 1962 and 1969 respectively.

### **2.3 Eviction and resettlement in Ngwata: the Darajani story**

Settlement around Ngwata was characterised by a series of evictions and resettlements. Makin and Pratt (1984) reported that settlement in Kibwezi was encouraged from 1915 onwards by employment opportunities provided by Dwa sisal plantation and other estates. Mbithi and Barnes (1975) reported that in 1927, the colonial government evicted the Akamba people living around Ngulia, after declaring the area to be part of the Crown lands. These people moved to the Ngwata and Chyulu Hills areas. Ngwata means literally 'land that is acquired' (P.Muasya, personal communication, 1998). Those who went to Ngwata were moved again in 1933-36, as the area was declared Crown Land and made a Game Reserve. Part of the land was allocated to Kathekani lime factory. Eviction was enforced by strict rules and regulations. Any African caught in this area was accused of trespassing and severely punished. A few people remained behind and became poachers or obtained employment at the railway station or the Kathekani mining company.

At the dawn of independence, there were high expectations that the Government would provide land to all landless people. In 1961, the people displaced from Ngwata in the 1930s started trickling back. They were joined by adventurers from Kalama, Okia, Mukaa, Kangundo and Nzai areas of the old Machakos District and by squatters evicted from the Chyulu Hills (Chyulu hills is a gazetted water catchment area: Mbithi and Barnes, 1975). In 1965, the Government declared the area around Ngwata to be County Council land designated for squatter settlement. Each new settler was given 20 ha (approximately 50 acres). A committee of 10 members appointed by the District Commissioner was charged with the responsibility of land allocation.

A member of the Darajani informants' group reported that in 1965 many people from Nzai, Muituni, Kilango, Mukaa and other places moved to this area. The large number of new settlers and the lack of a government-led settlement programme created many land ownership and boundary disputes. Some of the settlers had to be sent back to their home areas to get written proof of their landlessness from a chief. A surveyor was sent in from Machakos to assist but could not resolve the disputes. Tiffen *et al.* (1994)

reported that Ngwata settlers continued to suffer intermittent harassment up to 1969. The frequent counter-claims, droughts and water shortages discouraged many claimants who finally returned to their ancestral homes.

#### **2.4 Spontaneous settlement in the early 1960s: the Kaiani story**

By 1960 the colonial Government was no longer able to prevent the Akamba from establishing settlements in unauthorised areas. There was a settlement surge into the Crown lands. The unofficial settlement was opposed by the colonial authorities and the newly independent Government, so that orderly sale of white settler farms to Africans could be undertaken and control of Crown land re-established (Tiffen *et al.*, 1994).

Settlement in Kaiani village started in the 1960s, as a result of increasing land pressure in the high potential areas and the success of Makueni settlement. Land was claimed by the traditional method of slashing tree trunks, and there was no limit to the amount of land one could claim. Some farmers claimed as much as 100 ha. Those who acquired large pieces of land later subdivided it and gave pieces to relatives or sold to new settlers who did not want to settle on the less accessible free land. Disputes arising were resolved by elders who had settled there earlier, as there was no local administration. Settlement continued in the 1960s at a slow rate, mainly due to poor access. Some of the settlers came from Kathonzweni market, originally a Mau Mau detention camp. Favourable climatic conditions in the 1960s encouraged more people to settle here (see Gichuki, 2000).

#### **2.5 Spontaneous settlement in the early 1970s: the Athi Kamunyuni story**

Settlement in Athi Kamunyuni started in 1973. Most of the settlers are reported to have come from Masaku, Makueni, Mbooni, Kisau and Nzau. This area was a game reserve, and settlement started as illegal squatter settlements that were later sanctioned by government officials. Early settlers "...came to 'Machinery' where a guide (approved by the Chief of Ngwata) was hired to go and show them the areas to settle. After slashing the trees to mark their acquired property boundaries they returned to the Chief who approved their claims".

No proof of landlessness was required for this settlement, which consisted of group and individual efforts. Group efforts were mainly in clearing and fencing a camp for group habitation during the individual homestead development stage, and in constructing small huts. Individual household efforts followed later with the construction of houses, cattle *bomas* and granaries, and clearing areas to be cultivated and planted. Bush clearing for improved grazing was undertaken in stages. First, the goats would be left to browse. This would be followed by the selective removal of trees for construction and charcoal production. Charcoal production in this area was however limited by a low quality of wood (size and species) and the high transportation cost, compared to areas along the Mombasa-Nairobi road.

The early years of settlement were very difficult, as evidenced by these statements made by the informants (1998, group interviews):

- The first satisfactory harvest was in 1978.

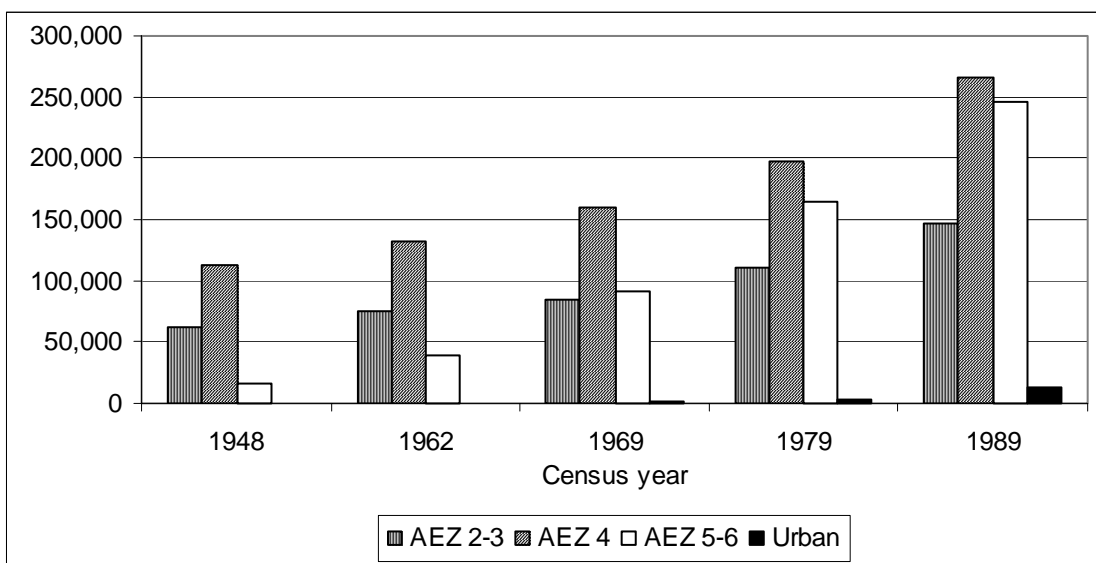
- Settlers sold their animals and many died from disease, which diminished herds to almost nothing.
- Settlers walked over 40 km to the Chyulu Hills to work for other farmers in exchange for maize, which they carried back, at up to a bag at a time.
- Some died from sickness (mosquitoes were as abundant as tsetse) and others abandoned Athi Kamunyuni and returned to their old areas.

Although the living conditions are very harsh some settlers argued that the problems they left behind were worse. Most argued that the difficulties are mainly during the initial settlement period and hoped that some day the situation would improve. One settler commented, “We were sure the rain that makes the baobab tree grow would some day return”.

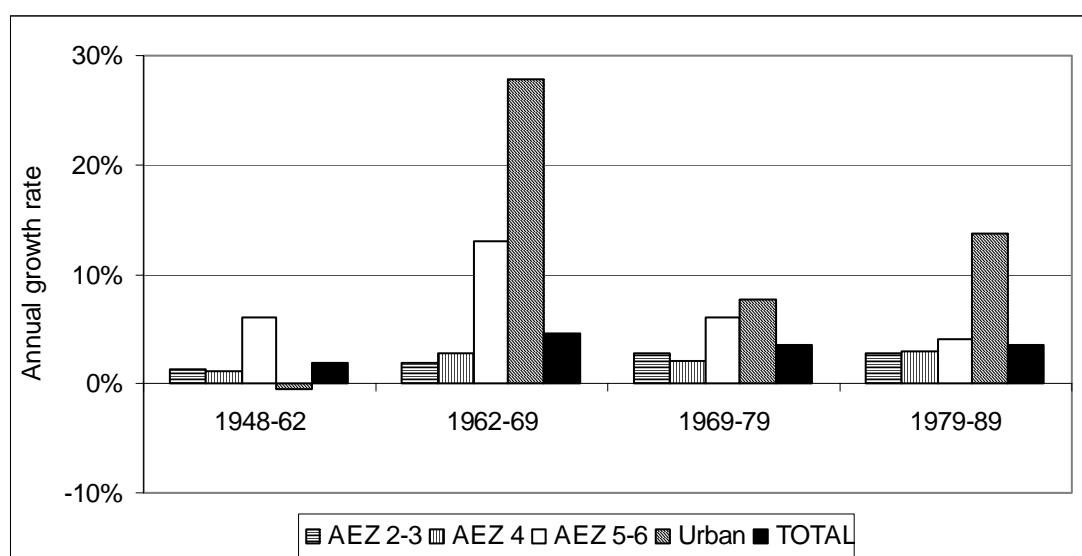
### 3 POPULATION

The population of the area currently covered by Makueni District increased from 190,631 in 1948 to 670,359 in 1989 (1999 population census data are currently not available). The population increased 2.4, 2.4, 14.6 and 39.2 fold between 1948 and 1989 in AEZ 2/ 3, 4, 5/ 6, and urban areas respectively (Figure 1). AEZ 5 and 6 experienced the highest rates of growth for the period 1948-1989, from 16,813 to 245,768 people. Figure 2 shows that the largest population growth rate between 1962 and 1969 occurred in townships. This is attributed to temporary settlement of new settlers in townships before acquiring land and to increasing trading opportunities along the Nairobi-Mombasa highway. High population increases in townships is also reported for the period 1979-89. The population growth rate in AEZ 5 and 6 peaked in the period 1962-69, and has been decreasing since then. This is attributed to opportunities for spontaneous settlement, which have diminished.

**Figure 1: Population changes in Makueni District**



**Figure 2: Population growth rates in Makueni District**



**Table 2: 1948-89 Population growth, density and percent women in selected locations and townships**

Census		Locations			Townships	
Year	Attribute	Kikumbulyu *	Makueni	Ngwata/ Kibwezi	Kibwezi	Mtito Andei
1948	Total population	10,372	2,103	4,338	112	202
	Growth (1932/48)	3.3	17.5	-5.4	7.0	
	Density (person/km <sup>2</sup> )	51.3	1.6	1.5		
	Women	52.1	21.8	34.6	44.6	16.8
1962	Total population	16,362	20,191	2,006	290	
	Growth (1948/62)	1.6	9.6	0.5	2.6	
	Density (person/km <sup>2</sup> )	17.6	15.5	0.7		
	Women	53.6	51.1	42.4	45.5	
1969	Total population	22,210	54,595	14,255	721	889
	Growth(1962/69)	1.4	2.7	7.1	2.5	
	Density (person/km <sup>2</sup> )	23.8	42.0	4.8		
	Women	49.6	50.5	47.2	41.2	31.5
1979	Total population	38,612	69,727	56,977	1,324	2,067
	Growth (1969/79)	1.7	1.3	4.0	1.8	2.3
	Density (person/km <sup>2</sup> )	23.0	52.8	33.2		
	Women	50.4	52.4	49.9	41.6	37.9
1989	Total population	58,546	81,124	80,613	4,549	7,771
	Growth(1979/89)	4.3	1.5	3.5	13.1	14.2
	Density (person/km <sup>2</sup> )	34.8	61.5	46.9		
	Women	50.7	51.8	50.1	49.8	50.0

Source: Tiffen, 1991.

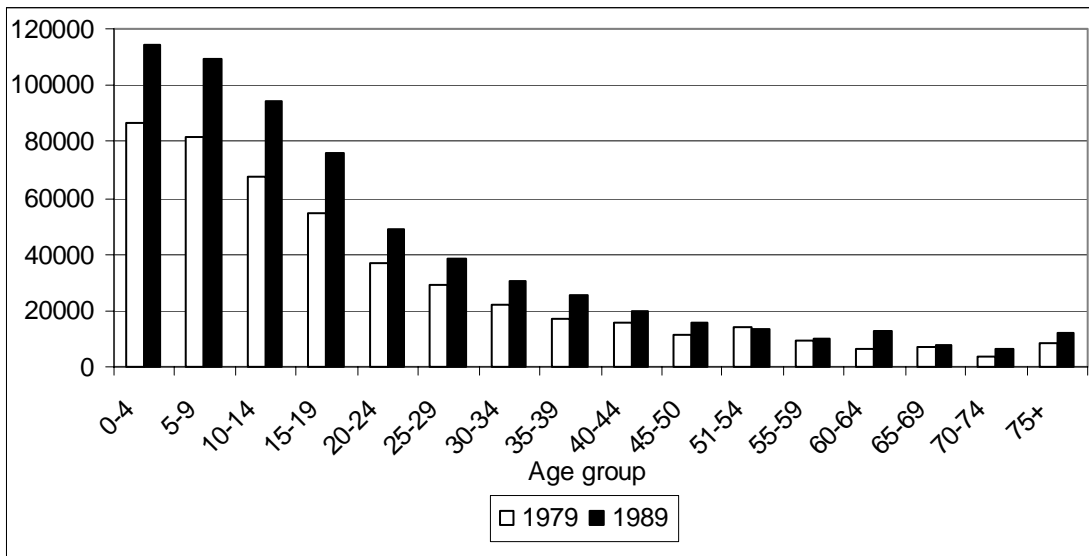
\*Note that the area of Kikumbulyu Location increased from 202 km<sup>2</sup> in 1948 to 932 km<sup>2</sup> in 1969

The population growth, density and percentage of women for selected locations and townships are presented in Table 2. This data shows the following:

1. There was a negative growth in Ngwata/Kibwezi area between 1932 and 1948. This is attributed to government evictions.
2. The percentage of women was lower during the early years of settlement. This was attributed to the fact that it is men who mainly undertake initial bush clearing work.
3. The percentage of women in townships has been increasing over the years. This is attributed to their involvement in trading activities.

The population data for 1979 and 1989 shows that 60 percent of the population is below the age of 19 years and 4 percent is over 60 years old (Figure 3). This has implications for the availability of labour for farm investment and on investments in education (Nzioka, 2000) and partly explains why some farm development investments are deferred.

**Figure 3: Age structure of the population, Makueni District**



Source: Census data, cited in Kenya, MPND, 1993,1996.

#### 4 LAND TENURE

The objectives of this section are to document:

- The evolution of land tenure (type and time of land acquisitions) in the four study areas; and
- Land tenure in semi-arid areas of Makueni and the continuing struggle to acquire crown land.

A series of questions was used to assess the right of ownership and right to use the land, and changes in ownership that have taken place since settlement.



#### **4.1 Land ownership and use rights in semi-arid Makueni**

Land in the semi-arid areas of Makueni can be subdivided into the following categories:

- *Government land*, which includes gazetted forests, national parks and game reserves; land allocated to parastatals (Kenya Agricultural Research Institute, University of Nairobi, Tana and Athi River Development Authority, Kenya Railways); and free land reserved for development of public facilities;
- *Trust land*, consisting of land currently undergoing adjudication and registration (mainly the Greater Kibwezi squatter settlement area and early settled area where land disputes have not been resolved);
- *Private land*, owned by individuals, co-operatives or companies.

Government, trust and private land are defined as follows:

Government land is land owned by the Government for its own purpose and includes unutilised or unalienated Government land reserved for future use by the Government itself or may be available to the general public for various uses. Land allocated to parastatals is classified as reservation and is not available for use or occupation by another person/body without surrender of the land by the original allottee (i.e. the parastatal).

Trust land is land held under trusteeship by various county councils under the constitution of Kenya for the benefit of the people who are ordinarily resident of that land. The residents occupy the land under their customary laws and rights but have no registered interest in it.

Private land is land owned privately in freehold or leasehold (maximum lease period is 99 years for urban plots and 999 years for agricultural land) tenure after registration and issue of titles following government or trust land allocation to individuals or companies (Kenya, MoLH, 1991).

#### **4.2 Land ownership and land use rights for the study sites**

##### *Land acquisition*

Land acquisition (for the respondents) started in the 1950s in Kyamusoi and continues to this day, as a result of buying and selling and allocation by parents (see Table 3). Approximately 57 percent of the respondents in Kyamusoi area acquired the land between 1970 and 1998, by allocation through parents or by purchase. In Kaiani and Darajani areas, settlement started in the 1960s, driven partly by the colonial Government's reduced restriction of settlement in Crown Land. The settlement at Athi Kamunyuni began in the 1970s. This was brought about by increasing population pressure in Ngwata settlement area, development of an access road to the Athi River<sup>1</sup>,

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<sup>1</sup> The road to the Athi River was mainly to serve ranchers and irrigators there. Variation in the time of settlement indicates that settlement was gradual, as was experienced in Makueni Settlement Area in the 1950s and partly because this was a squatter settlement area, with the risk of eviction.

and reduced wildlife numbers in Ngai Ndeithya Game Reserve. So far the Government has not de-gazetted the area for allocation to squatters.

**Table 3: Period and mode of land acquisition (percent of holdings)**

	Kyamusoi	Kaiani	Darajani	Athi	Total
<i>Period of acquisition</i>					
1950s	43	0	0	0	8
1960s	0	44	37	0	22
1970s	43	22	18	20	24
1980s	0	22	36	40	27
1990s	14	11	9	40	19
Total	100	100	99	100	100
<i>Means of acquisition</i>					
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	23	8	31	21
Purchased	25	22	42	23	28
Total	100	100	100	100	100

Source: Field interviews, 1998.

Land was acquired by government allocation, clearing the bush (squatter settlement), inheritance, allocation by parents or by purchase (see Table 3). The land in Kaiani, Darajani and Athi-Kamunyuni was mainly acquired through squatter settlement and claiming land by bush clearing, whereas in Kyamusoi it was by government sponsored settlement. After the initial settlement land ownership or user rights changed through inheritance, allocation by parent or by the buying or selling of land. Allocation of land by parents is a common disposal of user rights, particularly when the original settlers' older children request land to settle their families. Darajani has the highest percentage of purchased land. This is attributed to its close proximity to a trading centre (Darajani Market and Railway Station). Similar modes of acquisition occur in areas surrounding other trading centres.

#### *Holding size*

Table 4 shows the distribution of holding sizes for the four study sites. The holding size at the time of settlement varied depending on the mode and year of acquisition. Early settlers got larger farms. The small farms of less than 10 acres belong to those who bought or were allocated land by their parents. The average holding size was largest in Kaiani because the original settlers were few, and they were free to acquire as much land as they wanted. The respondents recalled that Mr. Metho, one of the oldest settlers in this area, started off with over 100 acres, which he gradually subdivided and sold to subsequent settlers who did not want to go and acquire free land in less accessible locations. In Darajani, approximately 33 percent of the respondents bought small plots

of less than two acres near the trading centre. These respondents were mainly landless people settled on small but accessible farms, or traders in the local market.

**Table 4: Distribution of holding sizes**

	Kyamusoi	Kaiani	Darajani	Athi	Total
<i>Area in hectares</i>					
<i>At time of settlement (percent of holdings)</i>					
<0.8	0	0	33	0	10
0.8-4.0	22	0	42	50	31
4.0-8.0	11	13	17	0	11
8.0-12.0	34	12	8	10	15
12.0-16.0	33	37	0	30	23
16.0-20.0	0	13	0	10	5
>20.0	0	25	0	0	5
Total	100	100	100	100	100
<i>Average area in hectares</i>					
	10.1	24.2	3.2	9.7	11.7
<i>Changes in farm size since settlement (percent of holdings)</i>					
Increased	25	11	8	15	15
Decreased	13	22	8	15	15
No change	62	66	84	70	70
Total	100	100	100	100	100
<i>Reasons for buying more land (percent of holdings)</i>					
Cope with increasing household needs	25	0	0	8	8
For children's inheritance	0	0	17	0	4
Speculation	0	11	0	0	3
Owner leaving the area	0	0	0	8	2
Total	25	11	17	16	17
<i>Reasons for reduction in farm size (percent of holdings)</i>					
Raise school fees	0	0	0	8	2
Raise medical bills	13	0	0	0	3
Raise off-farm investment	0	11	8	0	5
Gave land to relative	0	11	0	0	3
Total	13	22	8	8	13

Source: Field interviews, 1998.

Holding sizes have changed as a result of buying or selling land, and by sections of land being given to relatives. Respondents of Kyamusoi reported that they increased their farm sizes mainly to cater for increasing household needs (see Nzioka, 2000). In Darajani, the main reason for buying more land was for children's inheritance, as the current sizes of holdings are too small (an average of eight acres, with 33 percent

owning less than two acres). Eleven percent of the respondents in Kaiani reported that they had bought land for speculative purposes. The main reason for selling land was to raise funds for investment in children's education and off-farm investment.

### *Land registration*

Land in Kyamusoi and Kaiani areas is all titled and the titles are held by the owner, or by the parent where the son or daughter is using the land owned by the parent. In Darajani and Athi-Kamunyuni areas land adjudication is in progress. In Darajani area, a land survey carried out in 1992 'disqualified' that of 1965, and a current survey is in turn 'disqualifying' that of 1992. To date no one has title deeds (District Informant, 1998). Most of Athi Kamunyuni's area falls under the Ngai Ndeithya Game Reserve, and although the government approved settlement, the land has not been de-gazetted to pave the way for demarcation and allocation. The process has started with the land surveyors' first visit in 1997 (District Informant, 1998). The settlers have been putting pressure on the government to finalise land registration for fear that since the land they currently occupy is still classified as game reserve, they may be evicted if government policies on squatter settlement change.

A district informant made the following observations on the role of title deed:

1. Title deeds are not necessary for investment, particularly in areas where traditional rights are respected. In Makueni, the perceived rights of squatters to progress to legal allocation in the foreseeable future are good enough.
2. Title deed as an instrument for improving access to credit has not worked successfully, due to the high risk of loan defaulting. Loans for agricultural purposes are considered too risky due to the high incidence of crop failure, and loans for off-farm investment are not supported by all family members for fear that profits may not necessarily be ploughed back to benefit the entire family, while the risk of losing the land is shared by all family members.
3. Impacts of delays in land demarcation and titling include: low land values, as people willing to pay more require land that is titled; boundary location conflicts; and delays in finalising farm plans (particularly farm buildings) for fear that boundaries may shift at demarcation, as happened in other parts of Makueni.

### *Land use rights*

Land allocation to family members is a common practice, particularly in Kyamusoi where most of the original allottees have sons and daughters with families of their own. Currently four to six households (allottee and three to five sons) occupy the land initially allocated. The sons/daughters are only given use rights. This has an implication for the level of investments that they can undertake. Table 5 shows the distribution of land allocated by parents. In most cases the land was allocated to only one family member. In Kyamusoi, 13 percent reported that three family members had been allocated land. This could be related to the duration of settlement.

In the absence of communal grazing land, farmers with large livestock numbers normally turn to neighbours with under-utilised bush and grazing land. The grazing land is leased per livestock per day or per season (see Fall, 2000).

**Table 5: Land allocation by parents (percent of holdings)**

Area in hectares	Kyamusoi	Kaiani	Darajani	Athi
<i>Area allocated to family members</i>				
4.0	0	11	0	0
3.2	13	0	0	0
2.0	13	0	0	0
1.6	25	11	0	8
1.2	0	0	8	0
Total	53	22	8	8
<i>Number of family members allocated land</i>				
One	38	22	8	0
Two	0	0	0	0
Three	13	0	0	0
Total	51	22	8	0

Source: Field interviews, 1998.

### 4.3 Changes in settlement and land policy

Land tenure in the study area has changed from Crown Land in the 1940s to mainly individual ownership of smallholdings (0.8-40 hectares). The Swynnerton Plan is credited with the improvement of land tenure (Tiffen *et al.*, 1994). The Plan was aimed at improving agricultural production in African farming areas (mainly in high potential areas) but it also had spin-off benefits for semi-arid areas with mixed farming. The strategy of systematic consolidation and registration of land in smallholder sector in the African Reserves led to the current land tenure system, which promotes individual ownership of land. The land policy of Kenya recognises the importance of individual land tenure, particularly in high potential areas where there is a high incidence of litigation over land rights and boundaries. In Makueni, the registration of individual titles has been a slow process, with priority being given to the high potential areas. Four phases can be used to distinguish government efforts in land tenure improvements:

1. Government sponsored settlement – Makueni settlement (1948-1957).
2. Swynnerton plan (1954-59) promotes consolidation and individual titles for small-scale farms.
3. Government looks on as illegal squatters take up land (1957-1963).
4. Government loses some game reserve land to human settlement (1963-1980).
5. Restricted access for new settlement – move towards urbanisation (plots in the towns) (1980 onwards).

## 5 LAND USE

The objectives of this section are to document predominant land uses in the semi-arid areas, and how they have been influenced by settlement dynamics and land use changes in the study areas.

### 5.1 Land uses in semi-arid areas of Makueni District

Approximately nine percent of the area of Makueni District is of high potential, while the semi-arid areas account for 64.4 percent of the District (see Table 6). The low-lying divisions (Wote, Kalawa, Kathonzweni, Kibwezi, Makindu and Mtito Andei) have no high potential land.

**Table 6: Distribution of agro-ecological zones (AEZ) in Makueni District (ha)**

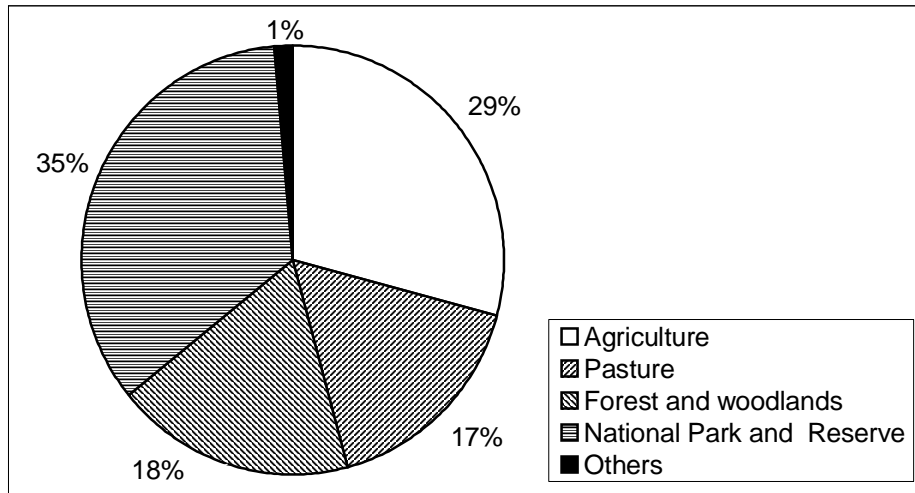
Division	High potential (AEZ 1&2)	Medium potential (AEZ 3&4)	Low potential (AEZ 5&6)	Total
Wote		10,160	15,240	25,400
Kalawa		3,780	34,020	37,800
Kathonzweni		17,180	68,720	85,900
Kibwezi		28,704	192,096	220,800
Makindu		6,010	114,190	120,200
Mtito Andei	7,030	115,70	87,400	106,000
Kilome	18,095	31,020	2,585	51,700
Mulala	8,680	13,020		21,700
Matiliku	1,475	26,550	1,475	29,500
Kaiti	7,228	17,236	3,336	27,800
Nguu		3,240	29,160	32,400
Kasikeu	5,120	17,920	2,560	25,600
Kilungu	7,680	1,920		9,600
Mbooni	12,325	1,450	725	14,500
Kisau	7,125	8,550	12,825	28,500
Tulimani	630	10,080	1,890	12,600
Total	75,388	189,790	478,822	744,000
Percent	10.1	25.5	64.4	100.0

Source: Makueni District Forest Department Annual Report, 1998.

The predominant land uses in the semi-arid area areas of Makueni (Wote and Kibwezi Divisions by the 1994 boundaries) are shown in Figure 4. Agriculture is practised in 29 percent of the area. Intercropping of maize and pulses is common in all areas. Makin and Pratt (1984) reported that in Kibwezi area, 98 percent of pigeon peas and 66 percent of beans were intercropped with maize. Maize/legume intercrops are attempted in both seasons, although the November rains are more reliable than the April rains. Intercrops may be planted in alternate rows with the maize, or two rows of intercrop alternate with a single row of maize. No particular crop rotation is followed, as maize/pigeon pea intercrop is followed by maize/pigeon pea. Although drought resistant crops are more

appropriate for these areas, there are only small hectares of crops such as sorghum, cowpeas, cassava, millet and green grams. This is because maize is still the preferred crop, giving higher yields when the rains are adequate, but failing when rainfall is inadequate. Reliability can be increased by timely operations (tillage, planting, thinning and weeding), growing quick maturing maize and low planting densities (Stewart, 1991). Owing to the high risk of crop failure, low management input is not irrational, but rather the farmers' interpretation of risk management.

**Figure 4: Land use in Kibwezi and Wote Divisions (1994)**



Source: Makueni District Forest Department Annual Report, 1998.

## 5.2 Land use changes in the study areas

Land use changes in the study area have been influenced by climate, soil, population density, duration of settlement, access to markets and land users' capabilities to cultivate more land. Agriculture continues to be the preferred land use even in the drier areas of Athi Kamunyuni. The importance of livestock is decreasing, partly due to reduced grazing areas, children who used to graze animals now attending school, and better returns from crop production. Although drought-tolerant crops are more suited to drier areas farmers still prefer to grow maize. When rainfall is low, millet does better than maize, but when there is more, vice-versa. Farmers plant more maize because they believe that 'you cannot eat millet all the year round: it is not good for people'. They say they are more familiar with maize, that it can be cooked with beans, made into flour, *ugali*, *muthokoi*, and is an easy food to prepare.

### *Land allocation for cultivation and grazing*

Land allocation for cultivation, homestead, improved grazing and bush is presented in Table 7. The cultivated areas varied from 0.1 to 12 ha per household, and over 40 percent of the respondents cultivated from two to four ha. The cultivated land was 40, 43, 50 and 20 percent of the total land area for the respondents of Kyamusoi, Kaiiani, Darajani and Athi respectively. These differences are attributed to: long duration of settlement (30-50 years) and favourable crop production conditions in Kyamusoi and

Kaiani; small farm sizes in Darajani; short duration of settlement (less than 30 years), large farm sizes and less favourable crop production conditions in Athi.

**Table 7: Percentage of land under different land uses**

	Kyamusoi	Kaiani	Darajani	Athi	Total
<i>Cropped area (percentage of holdings)</i>					
<i>Hectares</i>					
>8	0	22	0	0	6
4-8	50	0	0	10	15
2-4	38	45	50	30	40
0.4-2	12	22	17	60	28
<0.4	0	11	33	0	11
Total	100	100	100	100	100
Average(% of a holding)	46	43	50	20	37
Average (in hectares)	3.6	5.2	1.6	2.4	3.2
<i>Homestead, grazing and bush area (percent of holdings)</i>					
<i>Hectares</i>					
>8	44	63	8	50	38
4-8	33	24	0	20	18
2-4	0	13	17	10	10
0.4-2	12	0	17	20	13
<0.4	11	0	58	0	21
Total	100	100	100	100	100
Average(% of a holding)	54	57	50	80	63
Average (in hectares)	4	6.5	1.6	8.9	5.2

Source: Field interviews, 1998.

#### *Changes in cultivated areas*

Cultivated land dynamics are presented in Table 8. Cultivation started at the time of settlement with relatively small plots. Most respondents from Kyamusoi started crop production in the 1950s. Cotton was produced in the area between 1963 and 1985. In Kaiani and Darajani crop production started in the 1960s, while in Athi Kamunyuni cultivation started in 1970.

The initial cultivated areas were less than 1.2 ha because the farmers could not cope with the labour demands and fears of devastating crop failure. Expansions of at least 60 percent in cropped area were reported to have taken place between 1965 and 1985 in Kyamusoi and between 1970 and 1985 in Kaiani. In Darajani most of the expansion took place in the 1990s, as new immigrants came and opened up more land for cultivation. In Athi, only 23 percent reported having made major expansions in their cultivated areas. This is attributed to the late settlement and a long series of dry years experienced in the 1980s and 1990s.



**Table 8: Dynamics of cultivated land in the study areas (percent of holdings)**

	Kyamusoi	Kaiani	Darajani	Athi
<i>Period when crop production started</i>				
1950s	63	0	0	0
1960s	0	44	33	0
1970s	25	11	17	23
1980s	0	11	25	31
1990s	0	0	0	23
Total responses	88	66	75	77
<i>Initial cropped area</i>				
<1 acre	13	11	58	8
2 acres	50	44	17	38
3 acres	13	11	0	8
>3 acres	0	0	0	8
Total responses	76	66	75	62
<i>Period of major expansion in cropped area</i>				
Before 1965	13	0	0	0
1965-1970	13	0	0	0
1970-1975	13	44	0	0
1975-1980	0	0	25	0
1980-1985	25	22	8	0
1985-1990	0	0	0	23
1990-1995	0	22	50	0
1995-1997	0	11	0	0
Total responses	94	99	83	23

Source: Field interviews, 1998.

## 6 INVESTMENTS IN FARM STRUCTURES AND EQUIPMENTS

The objective of this section is to document investments in farm houses, cattle *bomas*, boundary fences and farm equipment.

The investment was assessed in terms of the type of house, farm boundary, farming equipment and other investments. The time when the investment was made was also obtained. Literature review is used to assess the role of oxen and tractor ploughing hire services.

### 6.1 Housing investments

Housing investments were assessed on the basis of the type of roof and walls of the main house. The initial houses were constructed at the time of settlement and additional improvements have been made based on the availability of resources (Table 9). At Kyamusoi, 22 percent of the respondents have grass thatched and earth walls building, while 56 percent of the respondents have corrugated iron sheet roofing with earth

walling. Eleven percent of the respondents made the improvements before 1963, while 56 percent made additional improvements between 1963 and 1978, and 33 percent made additional investments between 1979 and 1993. At Kaiani, 3 percent of the housing investments were made after 1979.

**Table 9: Housing type and time of investment in housing improvements (percent of households)**

	Kyamusoi	Kaiani	Darajani	Athi	Total
<i>Distribution of house types in 1998</i>					
Earth wall and grass thatch	22	38	67	50	46
Earth wall and corrugated iron sheet roofing	56	24	33	50	41
Stone/brick walls and corrugated iron sheet roofing	22	38	0	0	13
Total	100	100	100	100	100
<i>Time of housing improvements</i>					
Before 1963	11	13	0	0	5
1964-1978	56	24	34	30	36
1979-1993	33	50	58	60	51
After 1994	0	13	8	10	8
Total	100	100	100	100	100

Source: Field interviews, 1998.

## 6.2 Boundary investments

The main types of farm boundaries fences used are live fence and cut shrubs (Table 10). In Kyamusoi, 88 percent of the respondents have natural live fence covering more than 50 percent of the boundary, while only 12 percent have a post and wire fence covering more than 50 percent of the property perimeter. In Kaiani, 78 percent of the respondents have natural live fence and 11 percent have a post and wire fence. Fifty percent of the farms in the Darajani area are not fenced due to their small size and the limited number of animals in the area. Forty-two percent have natural live fences. These are the farms larger than four hectares. In Athi Kamunyuni all farms have natural live fences, mainly

because the cultivated area is in most cases surrounded by grazing land that has not been cleared.

In Kyamusoi, most natural live fences were established between 1964 and 1978, in Kaiani between 1964 and 1993, whereas in Darajani and Athi Kamunyuni the fences were established between 1973 and 1993. The main improvements made on the boundary fences are sealing with cut bushes, planting additional live fence material, and excavation of trenches to keep off animals.

**Table 10: Type and period of fence (percent of holdings)**

	Kyamusoi	Kaiani	Darajani	Athi
<i>Type of farm boundaries</i>				
No boundary fence	0	0	50	0
>50% live fence	88	88	42	100
>50% post and wire fence	12	12	8	0
Total	100	100	100	100
<i>Period of farm boundary establishment</i>				
1964-1978	75	44	25	0
1979-1993	25	56	67	100
After 1994	0	0	8	0
Total	100	100	100	100

Source: Field interviews, 1998

### 6.3 Tillage and other equipment investments

The status of farm equipment was assessed by observations and interviews. The results show that the percentage of farmers with ox-ploughs varied from 8 to 40 percent (See Table 11). The cost of an ox-plough was reported to be Ksh 3,000 a set. The Darajani area has the lowest percentage, due to the smaller farm sizes and easier access to tractor or oxen hire services.

Ox-ploughs and tractors were introduced at Kyamusoi in the late 1940s, as part of the settlement programme. Approximately 11 percent of the respondents now have ox-ploughs. This decline is attributed to the growing grazing land scarcity, a shift to dairy farming and the availability of tractor hire services.

At Kaiani, 38 percent of the respondents have ox-ploughs, which were first introduced there in 1963. Before that cultivated areas were smaller, and hand hoes (*jembes*) were used. Most of the equipment was purchased between 1963 and 1993. One respondent constructed an impressive haybarn in 1994, while another had two tractors and a lorry.

At Darajani some farmers reported that ploughs could not be used because of tree stumps. Members of the group reported that some have no ploughs, and some soils are too hard to plough. Some have ploughs but no oxen and therefore hire oxen or a tractor because their own animals died.

**Table 11: Farm equipment investments (percentage of holdings)**

	Kyamusoi	Kaiani	Darajani	Athi	Total
<i>Farm equipment</i>					
Hand tools only	89	62	92	60	77
Hand tools and ox-plough	11	38	8	40	23
Total	100	100	100	100	100
<i>Time of investment</i>					
Before 1963	33	13	0	10	13
1964-1978	56	24	50	40	44
1979-1993	11	63	42	50	41
After 1994	0	0	8	0	3
Total	100	100	100	100	101

Source: Field interviews, 1998.

Athi Kamunyuni has the highest percentage of ploughs, owing to the availability of grazing land and poor to tractor hire services. The ox-plough was introduced here in 1978, and most ploughs were bought between 1979 and 1993. Forty percent of the respondents have ox-ploughs. Most of the investment in farm equipment was undertaken between 1979 and 1993. Those who do not have operational ploughs (owing to oxen dying) are assisted by their neighbours at a small fee, or hire tractors from Kambu if they can afford them. But the majority are still using *jembes*.

Tractor ploughing is preferred for the following reasons:

- Deep ploughing improves soil moisture conservation.
- Tractors can cultivate larger areas. A family can cover less than a hectare using *jembes*, whereas with an ox-plough it can cover eight, and with a tractor plough whatever area the family can afford.

## 7 SUMMARY AND CONCLUSIONS

### 7.1 Settlement

*Settlement dynamics* were influenced by (a) the push factors in high potential areas such as population pressure; decreasing productivity induced by resource degradation; and increasing demand per capita (b) the accelerating factors such as improved infrastructure (roads and water); improved security; employment opportunities (railway station, estates, farms and irrigation projects and government employees and school teachers); government policy on ASAL development (famine relief, drought recovery programme); Favourable crop yield in some years; and speculation on future land value;

and (c) retarding factors such as government prohibition 1935-1956; tsetse fly and wildlife; and climatic risk and low returns on investment.

*Government involvement* in settlement began with reluctant recognition of Akamba rights to use pastures outside the Ukambani Reserve, and proceeded to an organised and disciplined (and subsidised) settlement scheme for retired soldiers in the Wote area in the 1940s, then withdrew from a directive role in spontaneous settlement during the approach to independence, and adopted a service provision role thereafter.

*Spontaneous settlement* took advantage of technical, transport, and administrative support wherever available, but was risk-taking especially with regard to rainfall variability, and especially in the driest locations. This contradicted conventional assessments that semi-arid areas were unsuitable for smallholder farming. Household strategies for farming, livestock production and income earning were highly adaptive and resilient in the face of loss.

*Rural-urban migration:* Urban population has increased 39.2-fold between 1948 and 1989. This is attributed to increases in urban centres and high dependency on off-farm incomes (Nelson, 2000).

## **7.2 Population**

*Population growth:* The population of the area currently covered by Makueni District increased from 190,631 in 1948 to 670,359 in 1989. AEZ 5 and 6 experienced the highest population growth for the period 1948-1989, from 16,813 to 245,768 people. The settlement of the semi-arid areas of Makueni District completed a cycle between c.1940 (when most areas were uninhabited) and c.1980, when in-migration slowed and population growth declined from over 7 percent/yr to just over the rate of natural increase. This story conforms with that given in the earlier study of Machakos.

*The population structure* data for 1979 and 1989 shows that 60 percent of the population is below the age of 19 years and 4 percent of the population is above 60 years. This has implications for the availability of labour for farm investment and on investments on education (Nzioka, 2000).

## **7.3 Land tenure and use**

*Land tenure* facilitated the easy acquisition of private rights to land by the settlers, (most frequently through bush clearance, government allocation, or purchase) and insecurity of rights to land (which are heritable) has not constrained investments. This is in accordance with a policy shift to private ownership. Adjudication of title is still in progress in some villages, and under current competition for land, title is desired. Holdings of land vary between villages according to the individual circumstances.

*Land use* in the semi-arid Kibwezi and Wote Divisions is 29 percent cultivated, 17 percent pasture, 18 percent forest and woodlands, and 35 percent national park and reserve. Land use change is in favour of cultivation, which expanded earliest in long-settled villages, more recently in later settled villages, and increased in response to crop failures as well as population growth.

*Low management input:* The production systems are mainly subsistence-oriented, with low external input and sometimes low labour inputs. Farmers view this as their low-risk strategy in response to erratic rainfall. Grazing land is leased by those with animals from those with fewer.

#### **7.4 Investment in farm structures and equipment**

*Investments* in housing, boundaries, tillage and other equipment followed similar profiles. In historical terms, an accumulation of private investments on smallholdings has consolidated initial settlement, notwithstanding the high level of risk that accompanies farm operations.

*Level of investment:* Only 13 percent of the respondents have modern housing with brick walls and/or corrugated iron sheets. This indicates that most respondents are poor. High investments in housing are mainly made by teachers working in the area, and businessmen who have off-farm sources of income. Improvements in housing were made 5-10 years after the initial settlement.

*Tillage equipment:* Although most of the respondents have large farms of more than 4 hectares, only 23 percent had ox-ploughs. This shows the dependency on hired oxen or tractors for tillage operations.

#### **7.5 Lessons learnt**

1. Planned and facilitated settlement undertaken in the late 1940s and early 1950s demonstrated the potential for the utilisation of semi-arid lands. This led to spontaneous settlement in adjoining areas, particularly after government restrictions on the use of Crown lands were eased. This provided the necessary security for human settlement in these areas.
2. Improved land tenure has resulted in strengthening the security of the investments made in land improvement at the household level, and in facilitating the movement of capital to and from land-related and work-related investments. This has enhanced land productivity and work opportunities, making it possible to reap the benefits of water, crop and livestock investments.
3. As the population in the semi-arid areas increased, farmers made investments in land improvements to support crop production. The percentage of farm holdings under cropland increased from less than 10 percent to 22-50 percent. This has led to increased value of output per ha and income per ha (Mbogoh, 2000).
4. Land scarcity with security of tenure, has created a land market. Sales of land have enabled resource-poor farmers to finance education and make off-farm investments.

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