

# Contents

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	Page
<i>List of Tables</i>	<i>i</i>
<i>List of Figures</i>	<i>ii</i>
<i>Preface</i>	<i>iii</i>
<b>Part I</b>	
1. Background to the Workshop and Project Area	1
<b>Part II: PRODUCTION POTENTIALS AND DYNAMICS OF AGRO-PASTORAL SYSTEMS</b>	
2. The Agricultural Production Potential and Production Strategies in Kibwezi Division of Makueni District <i>D.M. Nyariki and N.K.R. Musimba</i>	20
3. Paradigmatic Shifts in Rangeland Management of African Savannahs: Implications for Pastoral Development. A Case of Northeastern Kenya <i>Kassim O. Farah</i>	29
4. Summary of Supportive Papers	38
<b>Part III: INTEGRATED DEVELOPMENT APPROACH TO AGRO-PASTORAL PRODUCTION SYSTEMS</b>	
5. Integrated Development Strategies in Greater Kibwezi Division With Special Emphasis on Agriculture and Related Issues <i>R. Kisyula</i>	43

6. Non-Conventional Feed Resources for Agropastoral Production Systems <i>Moses M. Nyangito</i>	51
7. Summary of Supportive Papers	64

**Part IV: RECENT ADVANCES IN PASTORAL EXTENSION SERVICES AND THE ROLE OF INDIGENOUS KNOWLEDGE**

8. Pastoral and Agro-Pastoral Extension Services, How They Differ From Conventional Livestock Development Extension Services <i>N. K. R. Musimba</i>	68
9. Animal Draft Power in Poor Resource Based Rural Agro-pastoral System as a Key to Development and Increased Production <i>Waithanji E. M., Mutua J. M. and Kaumbutho P. G.</i>	76
10. Summary of Supportive Papers	84

**Part V: GROUP DISCUSSIONS** 91

Appendices	98
• Workshop Programme	
• List of Participants	

# List of Tables

		<b>Page</b>
Table 1:	Production of various key crops in Kikumbulyu and Ngwata locations (N = 160)	22
Table 2:	Death of various livestock types in relation to time/season of the year and drought as reported by farmers in Kibwezi Division.	24
Table 3:	Chemical composition (on DM basis) of poultry waste	54
Table 4:	Chemical composition of some common crop residues	56
Table 5:	Comparing attributes of traditional extension systems with those of pastoral systems.	69
Table 6:	Comparing characteristic features of pastoral and livestock development.	72

# List of Figures

		Page
Fig 1:	A map of Kenya showing position of Makueni District	6
Fig 2:	A map showing the major Agro-Ecological Zones in Kibwezi Division.	8
Fig. 3:	The rainfall and evapo-transpiration (mm) pattern at DWA sisal plantation.	10
Fig. 4:	Average annual rainfall of Machakos District (now Machakos and Makueni)	12
Figure 5:	Best practice frontier approach for efficiency determination.	27

## PREFACE

**The Dryland Husbandry Project (DHP)** is an effort to bring together a variety of stakeholders in pastoral development, to identify and develop strategies for addressing the crisis of African drylands in the nineties. A network approach will be used to raise issues of mutual concern to researchers, practitioners and, above all, pastoralists, with particular emphasis on sustainable service provision and water management. For further details of the research project see the back page.

The Regional Office of DHP, OSSREA, has taken the initiative to launch a **DHP Publications Series** for the Dryland Husbandry Project with the view to exchange and share opinions and experiences on issues of dryland husbandry in the Horn of Africa Sub-region in general and in the DHP areas in particular. The **DHP Publications Series** is a forum where researchers in the Dryland Husbandry Project and others inform the research and academic community, the policy makers, interested individuals and institutions the results of their action-oriented and participatory research. It is also a forum where para-vet training experiences, trials research results, ethno-veterinary practices, workshop findings and the relevance and use of indigenous knowledge in the project areas are presented and discussed.

This is the second issue of the Dryland Husbandry Project (DHP) **Publications Series**. The first issue (**DHP Publications Series No. 1, November 1996**) was on Dryland Husbandry in the Sudan. This issue contains the proceedings of the papers presented at the first National Workshop on **Dryland Husbandry in Kenya**. The workshop was held in the DHP-Kenya area, in the premises of the Institute of Dryland Research, Development and Utilization (IDRDU) at Kibwezi, University of Nairobi in April 1996. These papers, we believe, could provide the reader information on the status of knowledge on dryland husbandry in Kenya. This publication could also serve to encourage people with interest to do more with people in the pastoral and agro-pastoral areas in Kenya. OSSREA is convinced that in order to understand and to be on top of the problems in the dryland areas in Kenya, more attention and collaborative work both by researchers and policy makers together with the people at the grassroots is timely and vitally important.

## **PART I**

### **1. BACKGROUND TO THE WORKSHOP AND PROJECT AREA**

#### **Introduction**

The Dryland Husbandry Project - Kenya is a collaborative effort between the Division of Range Management of the Ministry of Agriculture, Livestock Development and Marketing, the Department of Range Management at the University of Nairobi, The Organization for Social Science Research in Eastern and Southern Africa (OSSREA) and Environmental Policy and Society (EPOS). It was started in line with the National Dryland Management objectives. The primary objectives of dryland management in Kenya are threefold:

- to develop the national capacity for extracting the substantial production potential of pastoral areas, thereby contributing significantly to the national goals of income generation, employment creation and the attainment of food security;
- to reclaim and protect the diverse, valuable and fragile ecology of the drylands, and
- to create a productive environment with opportunities for improving the quality of life for projects and future pastoralists on a sustainable basis.

The short term objectives of the Dryland Husbandry Project (DHP) are to provide:-

- 1) a venue for interaction among researchers, extensionist and pastoralists.
- 2) trials on new land management practices for community-based range improvement and
- 3) training of Pastoral Development Agents (PDAs) and Veterinary Scouts (VSs)

It was on the basis of this background that a workshop was organised by DHP-Kenya, to address the above issues. This report presents the proceedings of the first DHP - Kenya workshop which was held at the Institute of Dryland Research, Development and Utilisation (IDRDU - Kibwezi), between 17th and 19th April, 1996.

## **WORKSHOP OBJECTIVES**

The main objectives of the workshop were:-

1. to bring together and share experiences of the key players and practitioners of development activities in the semi-arid lands of the Kibwezi Division, and
2. to map out areas of overlap and identify complementarities in community development as being implemented by various government departments, parastatals and NGO

**Participatory Action Research:** A move towards bridging the gap between researchers and extensionists as a renewed effort to enhanced rural development by involving the stakeholders (researchers, extension workers and the agro- pastoralists) was addressed in the meeting. See Workshop Programme (Appendix 1).

## **WORKSHOP PARTICIPANTS**

The workshop brought together key actors in agro-pastoral development in the "greater" Kibwezi Division. This included government officers (extension staff) of the Ministry of Agriculture, Livestock Development and Marketing, NGO experts and officers involved in specific project implementation, research scientists and academic staff from the University of Nairobi, administrators (chiefs and assistant chiefs) and elected leaders, agro-pastoralists and other informal leaders.

It was hoped that this meeting of professional people would provide a forum for exchange of ideas between the various actors, and subsequently identify pitfalls and gaps in the development efforts each department had been aspiring to achieve. The essence of this effort was to ensure development plans initiated by both local people in collaboration with the Project implementers.

A list showing the names, designations and organizations of all the officers who participated in the workshop appears in appendix 2.

## **BIO-PHYSICAL ENVIRONMENT OF KIBWEZI DIVISION- PROJECT AREA**

### **Location and Size**

The project is carried out in Kibwezi Division, Makueni District. Kibwezi Division is situated about 200Km south east of Nairobi. The altitude of the area varies from 600m to 1100m a.s.e. The

actual location of the Division is at the southern portion of Makueni District of the eastern province of Kenya (see fig 1). The area was not inhabited until the 1930's due to its low agricultural potential and it was heavily infested by tsetse flies. Kibwezi Division covers 47 % of the District and has a total area of 3400 Km<sup>2</sup> according to Central Bureau of Statistics (1981, 1986). It has five locations including Makindu, Kikumbulyu, Ngwata, Masongaleni and Mtito Andei. The area lies in the agro-climatic and ecological zone V of Kenya (Braun, 1977; Pratt and Gwynne 1977). It is characterised by low and unreliable rainfall, marginal agricultural lands, dispersed population and low fertility soils.

The principal means of communication in the area are the Nairobi - Mombassa road and railway line and many dry weather roads adjoining them (Michieka and Van Der Pouw 1977, MDDP 1993).

## **Geology**

Geologically, the Division is composed of recent volcanic rocks under the basement complex system. Granitic rocks are found around the Chyullu hills. According to Michieka and Van Der Pouw (1977), half of the area belongs to the erosional plain of undifferentiated basement system gneises which are of Archean age. The rest of the area is almost entirely built up of recent lava flows and some volcanic cones. Flood plains and bottomlands occupy only minor portions. The rocks of the area can broadly be subdivided into basement system rocks, volcanic and superficial deposits (Touber 1983).

The precambrian basement system rocks are composed almost entirely of gneises, except for some small areas with crystalline limestone (Saggerson 1963). The gneises can be sub-divided into gneises that are poor in ferromagnesian minerals and gneises rich in ferromagnesian minerals. The former is composed mainly of quartz-feldspar and granitoid gneises which are chemically poor. The gneises rich in ferromagnesium minerals includes mainly biotite-hornblende, biotite and hornblende-garnet gneises together with amphibolites (Touber 1983). These chemically richer rocks exist extensively in the study area.

Later volcanic activity has significantly enriched large areas of basement system rocks with volcanic materials. This enrichment coincided with major volcanic activities in pleistocene and recent times (Baker 1954). It took place through redeposition of volcanic materials.

Recent volcanic rocks are represented by the string of ash and cinder cones of the Chyullu range and its surrounding lava flows, which consist of various olivine basalts, partly covered by ash deposits of various texture and thickness. The finer textured ashes flow many miles along stream courses (Saggerson 1963). Volcanic ash is evident upto today. Superficial deposits are present in the form of various lacustrine, colluvial, alluvial and aeolian deposits. Geology is one of the main determinants of vegetation types.

Fig. 1. Map of Kenya showing location of Makueni District



## **Topography**

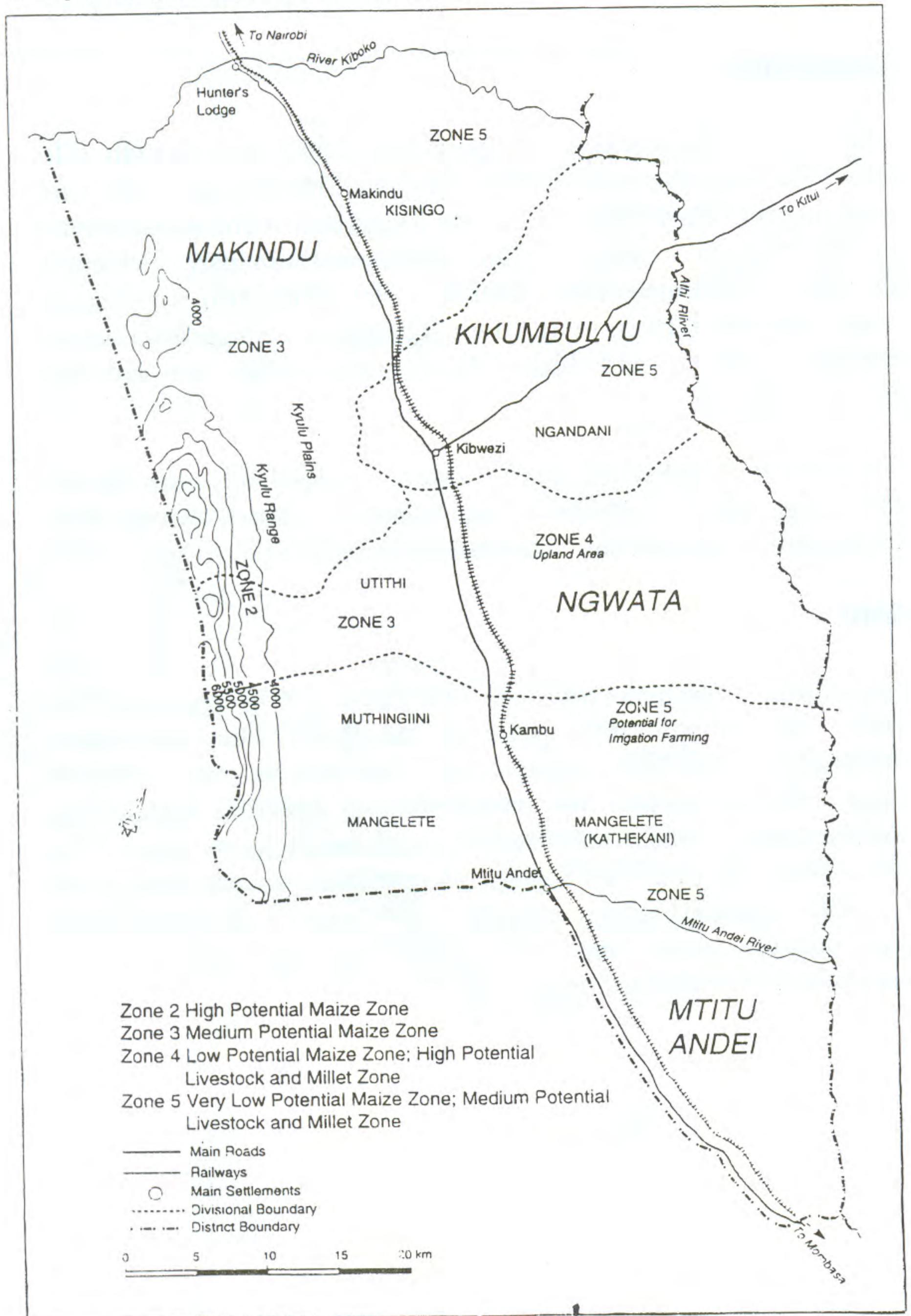
The major land form in the Kibwezi area includes the Chyullu hills which lie along the south-western border of the District. The land rises slightly below 600m a.s.l in the Tsavo area at the southern end of the Division to about 1100m in the northern part (Makueni District Development Plan -MDDP, 1993). The Athi River is the major perennial river in the District and its tributaries Kambu, Kibwezi, Kiboko and Mtito Andei rivers drain the Kibwezi Division (Fig. 2).

The Division is characterised by savannah grasslands with mostly low-lying, gently eastward sloping plains towards River Athi, broken by occasional hills and seasonal and perennial rivers.

## **Soils**

According to Michieka and Van Der Pouw (1977), red to brown sandy clay soils prevail in the erosional plain. They are mainly Ferralsols, but Nitosols, Luvisols, and Cambisols also exist. Most of these soils are compact and have a massive structure with strong surface sealing, which causes much runoff during heavy rains. The soils of volcanic origin are shallow to very shallow; extremely stony to rocky and are highly permeable. The soils of the flood plains and bottom lands range from calcareous and non-saline to extremely calcareous and saline.

Fig. 2. Map showing the major Agroecological Zones in Kibwezi Division



Soils of Kibwezi are Ferral-Chromic Luvisols (Touber 1983). They are well drained, moderately deep, dark reddish brown soils with a well developed A-horizons. The A-horizons have a characteristic dark reddish brown colour and sandy clay loam to sandy clay texture and B-horizons have a characteristic dark reddish brown to dark reddish coloured and sandy clay loam to clay texture.

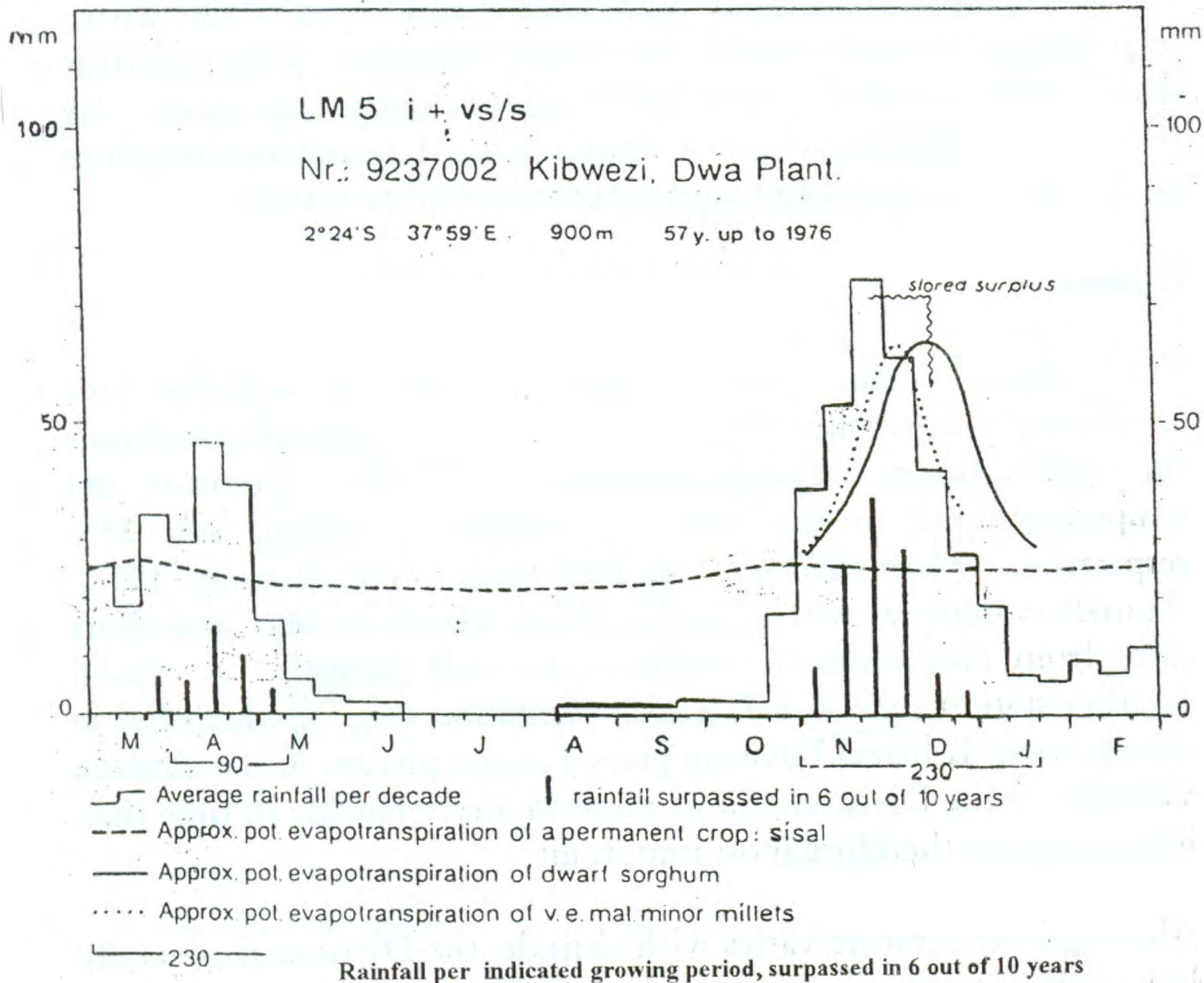
## **Climate**

The climate of this region is typically semi-arid and the area represents many other zones with similar ecological conditions throughout Kenya. The average annual rainfall, evaporation and temperature are in the order of 600mm, 2000mm, and 23°C respectively (Michieka and Van Der Pouw 1977; Braunn, 1977). Rainfall is bimodal with long rain from March to May and short rains from November or December to early January. A typical weather station such as DWA sisal plantation (Fig. 3) which lies in the centre of Kibwezi Division gives a classic picture of the climatic variables of the Division. Short rains are more reliable in time than long rains and therefore most important.

Although temperature varies with altitude, the Division is generally hot. High temperatures are expected during day time and low temperatures during nights. During the dry periods, i.e., between May and October the Division experiences intense heat. It experiences less wind and a high evapotranspiration rate. Highest mean temperatures (32-33°C) prevail during February- March, while the lowest (15-16°C) during July-August (MDDP 1993).

Fig. 3. The rainfall and evapotranpiration (mm) pattern at DWA Sisal Plantation, Kibwezi.

Note:- The bimodal pattern of rainfall, and the evapotranspiration which exceeds total rainfall implying moisture deficit for most parts of the year.



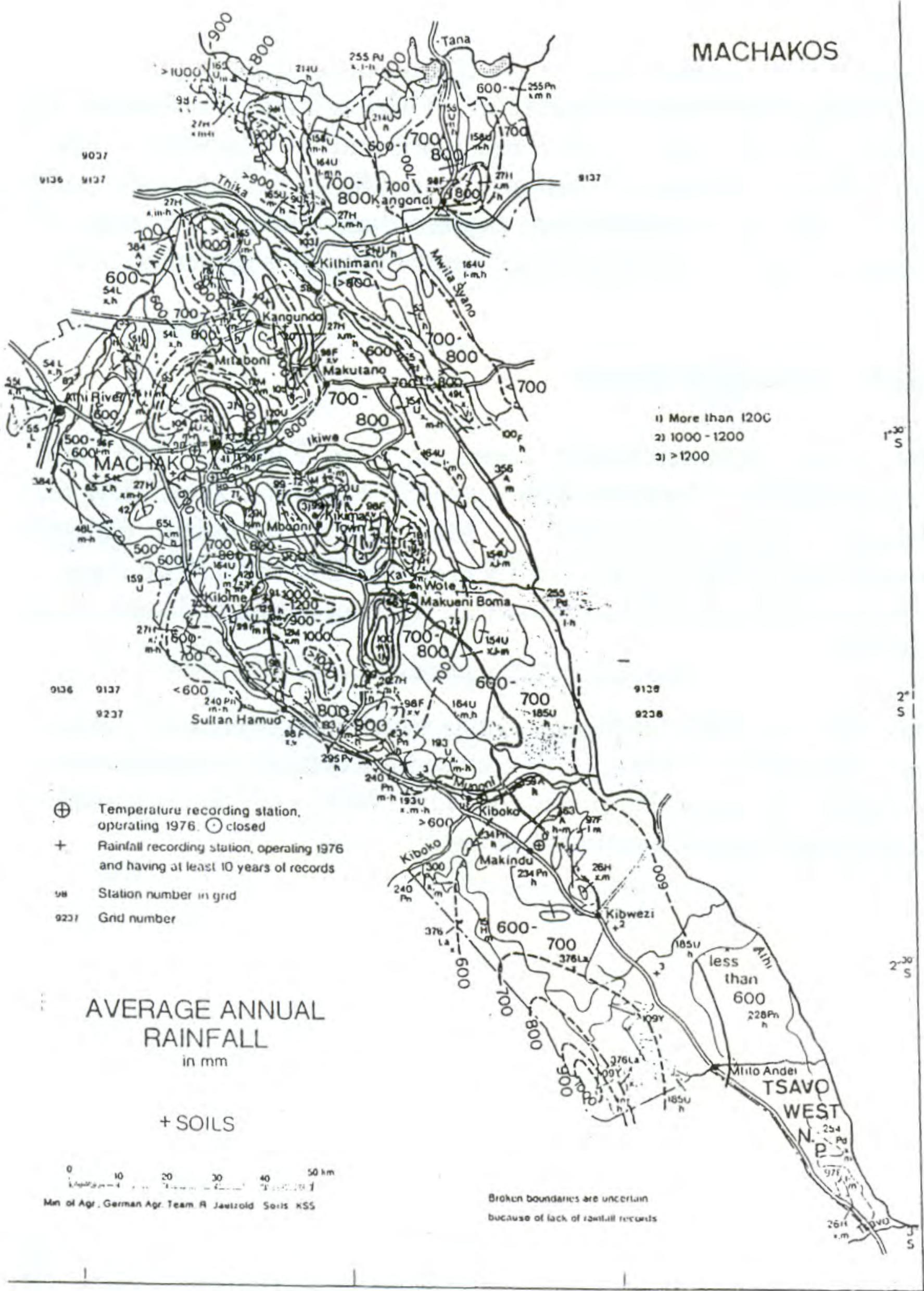
Braunn (1978) showed that there is a concentration\* of rainfall at the beginning of the long or short rains. There is a lot of variability in rainfall amounts both in time and space and its reliability is low. From Fig. 4; Kibwezi Division covers the most southerly part where the mean rainfall may be less than 600mm. A map of Makueni District showing average annual rainfall is presented in Fig 4.

### **Agro - Ecological Zones**

The major agro-ecological zones in the Kibwezi area are: Sorghum\Millet\Livestock Zone (LM 5), Ranching Zone (LM 6), Marginal Cotton Zone (LM 4), Main Cotton\Marginal Cotton Zone (LM 3-4), IL 6, LH 2 and LH 4 (MDDP 1993). The Agro - Ecological Zones (AEZ) are shown in fig 2 according to Jetzold and Schundt.

The LM 5 and LM 4 ecological zones which are covered by reddish clay soils and black cotton soils are used for cotton, sisal and millet. Livestock rearing is also practised. The LM 6 is suitable for millet growing and livestock rearing (See fig 2).

**Fig. 4. Average annual rainfall of Machakos District (now Machakos and Makueni)**



## **Vegetation, Livestock and Crops**

### **Vegetation**

The distribution of the vegetation in the area is controlled by a number of complex interrelated factors such as, climate, geological formation, soil type and the presence or absence of ground water (Gachimbi 1990). Man, through cutting trees, clearing, burning and grazing, is the most important factor which has modified the original vegetation. According to Pratt and Gwynne (1977) and Touber (1983), it is a typical semi-arid rangeland dominated by *Commiphora*, *Acacia* and allied genera, mainly of shrubby habitat. Baobab trees (*Adansonia digitata*) are common. Perennial grasses such as *Cenchrus ciliaris*, *Enteropogon macrostachyus* and *Chloris roxburghiana* can dominate but many succumb to continuous abuse over a long period. Intermediary or several stages of succession exist with herbaceous woody vegetation and grasses such as *Eragrostis superba* in previously cleared sites.

### **Livestock and Crops**

Livestock herds are composed of cattle, sheep and goats. During the wet season, the animals depend on free access grazing for sustenance. Physical overlapping of the pastoral and agronomic sectors takes place in the dry season when livestock are temporarily moved into cultivated fields to utilize crop residues (MDDP 1993). Rabbits, poultry and beekeeping production are also undertaken. Mbinda (1992) found out that the vast majority of farmers (97 %), keep poultry, a few (9%) keep donkeys for transport and about 35 % keep bees in hives constructed from hollowed out logs.

Crop production is minimally undertaken with crops such as Katumani maize, pigeon peas and sorghum. Small scale irrigation of horticultural crop production is carried out in some parts of the Division (MDDP 1993) especially along the Athi River and its tributaries-Kibwezi, Kambu, Mtito-Andei, Makindu and Kiboko streams.

## **Demographic and Settlement patterns**

### **The People and Their Life Style**

The largest ethnic group in the project area is the Wakamba. As in the pre-colonial times, they depend partly on a pastoral and agronomic economy to meet most of their needs (Munro 1975). Most production systems include cultivated plots and access to communal grazing lands. Other activities are beekeeping and charcoal making.

### **History of Settlement**

The following history of the area is derived from Tiffen (1991), Mbithi and Barnes (1975) and Rostom and Mortimer (1991).

Between 1925 and 1936, the colonial government declared as Crown Land areas settled by the Kambas around and on Ngulia hills (present day areas of Ngulia Lodge in Tsavo National Park) and traditionally recognized as part of Kambaland. Although most of the people migrated due to pressure by the government, some people remained especially in Chyullu hills (Mbithi and Barnes 1975).

Before 1961, most of the areas in Kibwezi Division were unoccupied and uncultivated. In 1948, the Ngwata location which is mainly made up of bush\scrub\grazing land and forest was virtually unoccupied. By 1961, most of the forest in the Division and around the District had been cleared to pave way for cultivation. In 1978, a wave of settlements from the north of the District and the neighboring districts of Machakos and Kitui had brought 20% of the area under cultivation. In the same period (1961-1978), bush encroachment increased from 52 - 62 % and the amount of forest decreased by 62% (Tiffen 1991; Rostom and Mortimore 1991).

In the years of 1964, the people had began returning to the area between Kibwezi and Mtito Andei and the area was declared and designated for settlement. No other section in Ngwata (part of the Project area) had been formally settled although squatters had established their own administrative system for settling new comers. This unorganized settlement has led to the present land deterioration prevalent in the area (Mbithi and Barnes, 1975).

The newly opened settlement schemes in Kibwezi Division (Kibwezi, Masongaleni, Kiboko and Nguu Ranch) have caused a large influx of people from other divisions and surrounding districts, thus soaring the population density in the Division. A case in point is the settlement of squatters in the Masongaleni and Kiboko settlement schemes where squatters from Machakos and other surrounding areas were settled in 1992 (MDDP 1993).

## **Population**

According to the Central Bureau of Statistics (1986), Kibwezi has an area of 3,400 Km<sup>2</sup> and a human population of 98,980 by 1979 and a density of 29 people per Km<sup>2</sup>. It had been projected that the figure would have risen to 130,414 and a density of 38 people per Km<sup>2</sup> by 1995. The 1993, 1994 and 1996 projected figures, worked out from the 1979 population census and on the assumption that the annual population growth rate to be 3.09%, were 151,558, 156,241 and 166,046 with population densities per Km<sup>2</sup> as 45, 46.9 and 49 persons, respectively (MDDP 1993). Although these densities are much lower than in the neighboring medium potential areas such as Makueni Division which had a population density of 49 persons per Km<sup>2</sup> in 1979, this is a high figure for Kibwezi Division which is marginal and of low potential (Central Bureau of Statistics 1981).

FAO (1982) recommends semi-arid areas to support 7 persons/Km<sup>2</sup> at low input of technology and 21 persons/Km<sup>2</sup> at intermediate technology and 98 persons/Km<sup>2</sup> at high level technology, which is not available in such areas. The potential population density of Semi arid areas is given as 21 persons/Km<sup>2</sup> and this is when all measures are instituted to prevent the occurrence of natural catastrophes or setbacks against utilization of available resources. The main problems in the area are lack of water, capital and labour to make land productive (Ferguson et al. 1985).

Population structure is made up of 50% young people (0-14 years) and 5.2% population above 59 years (MDDP, 1993). From these figures, it is apparent that the dependency ratio in the Division is approximately 124:100, i.e., every 124 dependents rely on 100

productive persons in the division. Population projection by sex showed that Kibwezi had a total of 14,140 households with population distribution showing a relatively higher female to male ratio (MDDP 1993).

### **Economic Potentials**

Land and soils have a great potential for sorghum, millet, cotton, sisal and livestock production as explained earlier in the Agro-Ecological Zones (MDDP 1993). The Athi River and its tributaries are major water resources in the Kibwezi Division, making it possible for irrigation and livestock production as well as for promoting honey production in the Division. Kibwezi forest, covering 5849ha. managed by the Forest Department, is a natural forest which provides indigenous timber for building, fuel and woodwork. This can be a good source of nectar and pollen for the bees if managed properly. Wildlife attraction centres like Chyullu Hills Reserve, the Tsavo East Game Reserve and the Kiboko Reserve in the Division accommodate a substantial number of large and small game animals which are important in the development of the Division. Sand harvesting and locally made clay bricks are also other major economic activities.

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