

# **RURAL LIVELIHOOD, LAND MANAGEMENT AND BIODIVERSITY**

## **Community Participation for Biodiversity Conservation**

*The case of Kakamega Forest in Western Kenya*



A doctoral dissertation submitted to the Faculty of Spatial Planning, University of Dortmund, in partial fulfilment of the requirements for the award of the degree of Dr. rer. pol. (Doctor rerum politicarum)

by:  
Wondimu Kenea

Dortmund, August 2008

Doctoral committee:

Supervisor: Prof. Dr. Volker Kreibich, TU Dortmund

Supervisor: Prof. Dr. Günter Kroës, TU Dortmund

Examiner: Dr. Karin Gaesing, TU Dortmund

# DEDICATION

*To Yemewedish, Lydia, and Deborah – whose prayer, encouragement, and patience made this research possible.*

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## Abstract

Rural households often depend heavily on natural resources and transform them for meeting their needs for food and income. This transformation process is often amplified by the presence of such other factors as rapid population growth, poverty, and lack of appropriate resource-management plans and enforcement mechanisms. In Kakamega Forest in Western Kenya, this has led to a devastating destruction of biodiversity.

The biodiversity in Kakamega Forest is under serious threat. The human population surrounding the forest is increasing rapidly and the forest has suffered much destruction from encroachment, and over-exploitation of forest resources. The poverty level in the district is also high and on the increase. Poor households that live near the forest earn their living by using “free” resources from the forest. Furthermore, the institutional arrangements that could have assisted in better management of the forest and the institutional support that could have enhanced the livelihood options and capabilities of these households are either missing or inadequate. Therefore, these unsustainable uses of the forest have resulted in degradation and have threatened its biodiversity.

Since rural livelihoods in the area are mainly based on land, land management is vital for harmonising the often-conflicting interests of economic and social development with the maintenance and enhancement of biological resources. Appropriate land management, involving sustainable use, equitable access and ownership, and spatial linkages and adequate service provision, will enable that these conflicting interests be met simultaneously in a win-win scenario, with the participation of all stakeholders, particularly the local communities.

Using data collected from primary and secondary sources, this study came to the conclusion, among others, that such aspects of current land management as use, access, ownership, and spatial linkages work against rural household livelihood in the area. Biodiversity cannot be secured in an insecure livelihood system, and the security of biodiversity depends on the security of household livelihoods.

This study recommends three main approaches towards the sustainable conservation of biodiversity in Kakamega Forest. These involve measures likely to lead to improved agricultural productivity, the promotion of diversified rural livelihood options, and the enhancement of spatial linkages and regional development through improved land management initiatives that involve collective action by the communities living near the forest.

**Key words:** Land management, sustainable rural livelihood, community participation, biodiversity conservation, spatial linkages, regional development

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## Acronyms

AFC	Agricultural Finance Corporation
AIDS	Acquired Immune Deficiency Syndrome
BIOTA	Biodiversity Transect Analysis
CAP	Community Action Plan
CBD	Convention of Biological Diversity
CBS	Central Bureau of Statistics
CDF	Community Development Fund
CF	Community Forestry
CPR	Contraceptive Prevalence Rate
DAD	District Agricultural Department
DC	District Commission
DFD	District Forestry Department
DFID	Department for International Development
FAO	Food and Agricultural Organisation
FGD	Focus Group Discussion
GTZ	German Technical Co-operation
IIED	International Institute for Environment and Development
IPCC	International Panel on Climate Change
IUCN	International Union for Conservation of Nature and N. Resources
KAAD	Catholic Academic Exchange Service
KDHS	Kenyan Demographic and Health Survey
KLA	Kenya Land Alliance
Ksh.	Kenyan Shillings (1\$ is approximately 65 Kshs.)
KWS	Kenyan Wild life Service
LUPO	Land Use Planning in Oromiya (a region in Ethiopia)
MFP	Ministry of Finance and Planning
MPND	Ministry of Planning and Economic Development
NCPD	National Council for Planning and Development
NEMA	National Environment Management Authority
NGO	Non Governmental Organisation
NRI	Natural Resources Institute
NRM	Natural Resource Management

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OAS	Organization of American States
PFM	Participatory Forest Management
PLUP	Participatory Land Use Planning
PVO	Private Volunteer Organisation
RAS	Royal African Society
RRD	Regional Rural Development
SACCO	Saving and Credit cooperatives
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
SPRING	Spatial Planning for Regions in Growing Economies
TFR	Total Fertility Rate
UCS	Union of Concerned Scientists
UN	United Nations
UNCCD	United Nations Convention for Combating Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USAID	United States Agency for International Development
VAM	Vulnerability Analysis Unit
WCED	World Commission on Environment and Development
WFP	World Food Program

# 1 Introduction

## 1.1 Background

This research is part of Phase II of the BIOTA East Project; under sub-project E14 which has jointly been formulated by the universities of Bonn, Dortmund and Leipzig. The project examines the socio-economic aspects of biodiversity conservation around Kakamega forest in Western Kenya.

The overall BIOTA East research project is aimed “Towards Sustainable Use of East African Rain Forest Systems”. This research entitled “Rural Livelihood, Land Management and Biodiversity” is designed to explore the rural household livelihood and land management in the district and how that affects biodiversity in Kakamega Forest. The study contributes to the overall goal of the BIOTA East Project by exploring and analysing the variables that affect biodiversity conservation and proposing a sustainable strategy for the management of biodiversity in Kakamega Forest.

Kakamega Forest in western Kenya is the main study site for BIOTA East projects. This research does not particularly focus on the forest as such. The focus is the socio-economic activities surrounding the forest.

## 1.2 The study area

### *Location*

Kakamega district lies in the western part of Kenya and is one of the eight districts that make up the western province. The district has seven divisions, comprising twenty seven locations and ninety seven sub-locations. It has four parliamentary constituencies (Iklomani, Shinyalu, Malava and Lurambi) and three local authorities (Kakamega county council, Kakamega Municipal council and Malava town council).

### *Relief and drainage*

The district has a varied topography with altitudes varying from 1250 meters to 2000 meters above sea level. However, the Nandy escarpment is a dominant physical feature forming the eastern border of the district. The southern part is made of rugged granites rising to 1950 meter above sea levels.

The district lies in the northern part of Lake Victoria catchments and consists of about 20 permanent rivers originating from Kakamega forest and Nandy escarpments. These rivers are tributaries to either Nzoia or Yala rivers.

### *Climate*

The district has relatively high temperatures throughout the year that ranges from 28 °c – 32 °c. However, night temperatures are lower ranging from 11 °c – 13 °c.

Generally speaking, the district has favourable climate and receives adequate rainfall that can support a wide variety of crops. The district experiences bi-modal rainy seasons, i.e. the long rains from March-June with the peak in May and the short rains from July-September with the peak in August. The amount of precipitation received is rela-

tively high ranging from 1000mm in the northern parts of the district to 2400mm in the southern parts.

### *Soils*

There are three major types of soils that dominate the district. These are the well drained, dark brown sandy loams mainly in the northern and central parts, dark red soils of volcanic origin in the eastern parts and reddish brown to yellowish brown clay soils in the western and south western parts of the district.

The heavy rainfall the district receives makes the soil vulnerable to erosion and tends to reduce agricultural productivity in the district.

### *Vegetation*

The natural vegetation consists of equatorial rain forests, savannah grasslands, shrubs, swamps and riparian vegetation along the banks of major rivers.

The forest resources are composed of private, community and state forests. Kakamega, Malava, and Bunyala forest are state forests gazetted in 1933 and managed by the district forestry department. The nature reserves of Kisere and Buyangu which are gazetted in 1985 are managed by KWS. There are also private forests on privately owned land and community forests in some areas although inventory of these forests have not been done and the exact sizes are not known.

### *Population*

The district has a total population of 671,400 people in the year 2005. Out of the district's total population about 80 percent, i.e. three out of four people live in rural areas. The predominant ethnic groups are the Luyas comprising 88.75 percent followed by Luos and Kikuyus each constituting 5.3 and 4.3 percent and others about 2 percent of the total population in the district.

### *Economy*

The district's economy is predominantly based on agriculture. More than 90 percent of the rural population depends on agriculture directly or indirectly for their livelihoods. Agriculture alone accounts over 62 percent of the household income. However, the household survey result shows that out of the total rural households, 3.3 percent of the households own no land at all and 34.5 percent own less than one acre of land. The average farm size is 0.7 hectares for an average family size of 4.8 persons per household (MPND, 2001: 10).

Out of the total arable land, 70 percent is under food crops mainly maize production for both commercial and subsistence use and 30 percent is under cultivation of cash crops mainly sugarcane and tea. Out of the total arable land 76 percent is under small holdings and 24 percent under commercial farms (NEMA, 2004: 36).

There are a few agriculture based industries. Some of these industries are sugar factories, saw mills and other small scale enterprises. Wage employment accounts 20 percent of the household income.

Map 1.1 The study district in the national context



Source: After WFP, Vulnerability Analysis and Mapping Unit, 2005

### **1.3 Scope and limitations of the study**

Each of the three concepts analysed in the research, i.e. rural livelihood, land management and biodiversity are all diverse and complicated issues. The constraints of time and resource do not allow addressing these issues in a comprehensive manner. This has necessitated delimiting the scope and coverage of the study. Therefore, the study focuses firstly in assessing how rural livelihood determines conservation of biodiversity in the absence of alternative means of livelihood except a weak agriculture sector. Secondly, it analyzes how rural land management affects both rural livelihood and ultimately conservation of biodiversity in Kakamega Forest.

The research also tries to identify sustainable ways of biodiversity conservation particularly keeping the balance between meeting livelihood needs and conservation needs. Accordingly, the research recommends approaches to involve the community for sustainable ways of biodiversity conservation in Kakamega Forest

### **1.4 Significance of the study**

The research is important for understanding the main factors that determine conservation of biodiversity in Kakamega Forest. It particularly shows how rural land management and rural livelihood determine conservation of biodiversity especially in a livelihood predominantly based on land. It also provides practical approaches for sustainable conservation of biodiversity that take into account the role of local communities based on empirical findings.

The research result also shows an insight into the contribution of biodiversity to the household economy and its potential in reducing rural poverty. Hence, policy makers can make use of the result in the process of designing national and regional development plans and poverty reduction strategies.

The research result can also serve as a framework for action for local government and NGOs engaged in conservation of biodiversity and sustainable rural livelihood development. The local people also benefit from the research output as they are the ultimate beneficiaries of sustainable biodiversity conservation. Furthermore, the research contributes to a scientific thinking in biodiversity conservation through participatory research and action.

### **1.5 Organization of the report**

The study report is organised into ten chapters which can possibly be grouped into four major sections. The first section that includes Chapter 1-3 comprises the introductory part of the research. This section introduces the background of the study, the study area, the main problems and issues related to biodiversity conservation. The second section that comprises Chapter 4 -5 explains the conceptual frameworks of the study and the design and methods followed in carrying out the research. Chapters 5 - 9 deal with the analysis and findings of the research and followed by conclusion and recommendations for action in the 10<sup>th</sup> Chapter.



## 2 Conservation of Biodiversity: Issues and Problems

### 2.1 Introduction

This chapter introduces the main issues of global biodiversity and the challenges humanity faces in conserving it. It elaborates on the importance of biodiversity for the Earth's ecosystem and the simultaneous need to use biological resources, with the intention of identifying the issues for sustainable conservation. It also briefly assesses different conservation approaches to examine the extent to which conservation<sup>1</sup> needs and community needs are integrated in conservation efforts.

### 2.2 Biodiversity conservation - A global issue

The variety of life on Earth and the ecological complexes in which it occurs is commonly referred to as biodiversity. This involves habitat diversity, species diversity within the various habitats, and the genetic diversity of individual species (Kemp, 1998: 45). This diversity of life forms provides an array of benefits that are essential for human existence, often known as ecosystem services,<sup>2</sup> such as provisioning and regulating services (Rashid et al. 2005: 25-29). However, the ability of biodiversity to continue performing these services is being continually degraded, and in some cases destroyed, due to anthropogenic impacts, and particularly through land use and climate changes (Rashid et al. 2005; Chapin, 2000: 234).

Global assessments, particularly on the long-term causes and consequences of human impacts (Meadows et al. 2004), indicate that humanity is at risk. The thinning of stratospheric ozone, the mounting of global temperatures, the widespread persistence of hunger, falling groundwater levels, disappearing species, and receding forests are just a few of the problems that have endangered humanity as results of massive tampering with the world's interdependent web of life (Meadows et al. 2004: xvii; UCS, 1992). These radical transformations of ecosystems and the subsequent decline of ecosystem services have been more rapid during the last 50 years than at any comparable time in human history (Rashid et al. 2005: 127).

However, the stress and damage that excessive demand for ecosystem services, stemming from demographic change, economic growth, and poverty, put on biodiversity (Rashid, et al. 2005: 27), as well as the importance of conserving biodiversity, is well recognised (Heywood, 1995: 5; UNEP/CBD, 2006: 2). This recognition and concern for the loss of biodiversity motivated the creation of a wide-ranging blueprint for action known as the Convention on Biological Diversity during the Rio Summit on the Environment and Development (UNEP, 1992). The convention recognised for the first time that biodiversity conservation is "a common concern of mankind" (UNEP/CBD, 2000: 8). Since then, a number of global and regional biodiversity assessments have been conducted that have further improved the understanding of the status of conserving

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<sup>1</sup> The term 'conservation' has various interpretations; in this context it means the maintenance of some or all of the components of biodiversity and the sustainable use of these components (Heywood, 1995: 15).

<sup>2</sup> An 'ecosystem' is a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Ecosystems provide a number of benefits to people, including provisioning, regulating, spiritual, and supporting services (Rashid, et al. 2005: 25-29).

biodiversity and its importance (Heywood, 1995, 7). Accordingly, the convention's second global biodiversity assessment reports (UNEP/CBD, 2006) underlined the following reasons why biodiversity conservation should be a global concern:

*The services provided by healthy, bio-diverse ecosystems are the foundations for human well-being; biodiversity loss disrupts ecosystem functions, making ecosystems more vulnerable to shocks and disturbances, less resilient, and less able to supply humans with needed services; the consequences of biodiversity loss and ecosystem disruption are often harshest for the rural poor, who depend most immediately upon local ecosystem services for their livelihoods and who are often the least able to access or afford substitutes when these become degraded; part from nature's immediate usefulness to humankind, many would argue that every life form has an intrinsic right to exist, and deserve protection; the future generation has also the right to inherit, as we have, a planet thriving with life, and that continues to afford opportunities to reap the economic, cultural and spiritual benefits of nature. (UNEP/CBD, 2006: 2)*

A similar message was echoed by the General Assembly of the United Nations (UN) when it met in September 2000. The Assembly, in its Millennium Declaration, reaffirmed its commitment to the full implementation of the Convention on Biological Diversity and declared biodiversity conservation to be one of the fundamental issues essential in the twenty-first century (UN, 2000: 2-6).

### 2.3 Why conservation?

This question has been an issue since the modern conservation movement<sup>3</sup> started in the United States (US) in the early nineteenth century (Owen, 1990: 4-9; Miller, 1990: 35-39). It has represented two main groups, the conservationists, who advocated forest conservation to ensure a steady supply of resources for human prosperity, and preservationists, who wanted to preserve forests for aesthetic and spiritual values (Jenkins & Williamson, 2003).

This difference in values in regard to conservation has continued, and the debate has also continued. While environmental economists attempt to address those values attached to biodiversity that may motivate conservation, preservationists insist that biodiversity should be preserved for its own sake, regardless of any tangible economic benefits. As Jenkins and Williamson (2003) noted:

*The recent debate on the subject has shifted the emphasis to the linkage between biodiversity conservation and ecosystem functioning. Perrings et al. (1995) asserted that 'the fundamental goal of biodiversity conservation is not species preservation for its own sake, but the protection of the productive potential of those ecosystems on which human activity depends' (301).*

The primary goal of conservation has shifted towards ecosystem functions, in which all living and non-living organisms are interrelated for the continuity of life on Earth. This is called ecosystem resiliency, referring to the local stability of ecosystems in respect to exogenous stresses or shocks. The argument is that in the process of conserving the ecosystem and its resiliency, individual species will also be conserved (Perrings et al. 1995).

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<sup>3</sup> A political and social movement that seeks to protect natural resources, including plant and animal species, as well as their habitat for the future (Owen, 1990; Miller, 1990).

Accordingly, the need for the conservation of biodiversity can broadly be looked at from three perspectives. These are its benefits, its threats, and the consequences of losing biodiversity.

### **Benefits of biodiversity**

It is a widely held view that the benefits of biodiversity transcend its economic benefits (Heywood, 1995: 14). It supports the full range of goods and services that are vital for human existence. The benefits people obtain from biodiversity, often referred as ecosystem services, include such provisioning services as food, water, timber, and fibre, such regulating services as the regulation of climate, floods, disease, wastes, and water quality, such cultural services as recreation, aesthetic enjoyment, and spiritual fulfilment, and such supporting services as soil formation, photosynthesis, and nutrient cycling (Rashid et al, 2005: 26-28).

Biodiversity provides many of the resources that sustain human life on Earth directly through the provision of subsistence and tradable products, and indirectly through the provision of environmental services. It also offers such non-use values as insurance against future risk and uncertainty that transcend its utilitarian and financial values (Koziell & Saunders, 2001: 3). According to the United Nations Environment Programme (UNEP) (2000), more than 40% of the world's economy and 80% of the needs of the poor are derived directly from biodiversity through a range of land use activities that includes agriculture, herding, forestry, fishing, hunting, and the gathering of wild foods. However, the economic, ecological, aesthetic and spiritual benefits human beings receive from biodiversity have been jeopardised by a number of threats.

### **Biodiversity under threat**

Extinction is a natural event; however, biodiversity is being lost at a higher rate than would be the case with natural extinction (UNEP, 1995: 2; 2002: 3). The main threats to biodiversity come from such human activities as land conversion, mainly in the tropics, and climate change in the higher latitudes (Chapin et al. 2000: 234). Human population growth and the over-harvesting of natural resources, especially by agriculture, fisheries, forestry, and mining, habitat destruction, conversion, fragmentation, and degradation, the introduction of exotic or invasive organisms and diseases, the pollution of soil, water, and the atmosphere, and global climate change all represent threats to biodiversity (Baillie et al. 2004: 85; Heywood, 1995: 12-14). Sub-Saharan Africa faces four major threats to its biodiversity (Perrings, 2000: 11-13). These are the destruction and fragmentation of habitat associated with the expansion of mining, forestry, and agriculture, a persistent tendency towards the degradation of arable and grazing lands, the controlled and uncontrolled introduction of species, and the harvesting and hunting of wild species, particularly wild fauna (Perrings, 2000).

UNEP's (1997; 2000; 2002) global biodiversity assessments have indicated that global biodiversity is changing at an unprecedented rate, this rapid change being ultimately caused by human population growth, together with unsustainable patterns of consumption, the increased production of waste and pollutants, urban development, international conflict, and continuing inequities in the distribution of wealth and resources (UNEP, 2002: 121). Consequently, some 13 million hectares of forest land has been converted to agricultural land every year (FAO, 2005: 13), six million hectares of productive dry land has turned into worthless desert (WCED, 1987, 19), and approximately 60% of the ecosystem services that support life on Earth are being degraded or

used unsustainably. Rashid et al. (2005) found that the harmful consequences of this degradation could grow significantly worse over the next 50 years. The UN's Food and Agriculture Organisation (FAO) (2003) reported that agricultural land is expanding in about 70% of the world's countries, and that in two-thirds of the countries where agricultural land is expanding, forest area is significantly decreasing.

However, the extent to which humans are modifying or converting the ecosystem and the level of threat this poses to biological resources varies, depending on local context (Perrings 2000: 20). For example, Jenkins and Williamson (2003) noted that the effectiveness of ongoing efforts for conservation and the level of threats posed to biodiversity depend, among other factors, on the presence of enabling policies and institutional frameworks for biodiversity conservation.

### **Consequences of loss of biodiversity**

Over history, human well-being has on aggregate improved. Despite variations across geographic regions, incomes have increased, life expectancies have risen, and mortality rates have significantly dropped (Rashid et al. 2005: 125). Although several factors have contributed to these global improvements in well-being, the human capacity to exploit ecosystem services has played a central role (Rashid et al. 2005: 829).

The extensive alteration of the environment to meet these human needs has, however, disrupted our ecosystems' processes and has brought about profound consequences for the services humans derive from ecosystems (Chapin et al, 2000: 234). The Intergovernmental Panel on Climate Change (IPCC) (2007) reported that the resilience of many ecosystems has been affected by an unprecedented combination of climate change and such other drivers as land-use changes and the over-exploitation of resources. These changes in ecosystem functioning and the loss of biodiversity have in turn brought about serious negative consequences for incomes, food security, and other services (Rashid et al, 2005: 135).

Some 1,700 of the world's leading scientists, including the majority of Nobel laureates in the sciences, issued the following appeal and warning in regard to the consequences of biodiversity loss and other global environmental issues:

*Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know.*

*The irreversible loss of species, which by 2100 may reach one-third of all species now living, is especially serious. We are losing the potential they hold for providing medicinal and other benefits, and the contribution that genetic diversity of life forms gives to the robustness of the world's biological systems and to the astonishing beauty of the earth itself. Much of this damage is irreversible on a scale of centuries, or permanent... Fundamental changes are urgent if we are to avoid the collision our present course will bring about. (UCS, 1992: 1)*

This statement summarised the extent of the problem. It also warned that the world's current environmental problems, especially the consequences of the loss of biodiversity, will be beyond anyone's capacity to control unless some practical measures are urgently taken.

## **2.4 Challenges of biodiversity conservation**

The analysis of current trends and the exploration of scenarios of plausible futures indicate that the loss of species diversity and the transformation of habitats is likely to continue (UNEP/CBD, 2006: 5), mainly due to inertia in ecological and human systems and the current challenges to conserving biodiversity. The following sections briefly highlight some of the challenges to conserving biological resources.

### **Poverty and biodiversity**

One of the world's greatest current challenges is how to balance the needs of the society with the need to preserve the environment. This is more evident in developing countries, where the majority of the populations depend heavily on the natural environment for meeting their basic needs.

Although the last century witnessed improvements in the health and education status of many, reflected in declining infant mortality rates, increased life expectancy, and higher literacy rates, poverty remains the central challenge of today's global society. There are roughly 1.2 billion people still living on less than \$1 per day, and almost three billion on less than \$2 per day (G8, 2000: 2). About 75% of the poor live in the tropics and sub-tropics, where most biological species are also concentrated (UNEP/CBD, 2001: 62).

The rural poor, especially those living in areas with low agricultural productivity, depend heavily on biodiversity to support their livelihoods. For example, an estimated 350 million people rely on forests as safety nets or for supplemental income, another 30 million poor people earn their living primarily by fishing, and 60 million poor people depend on herding in semi-arid rangelands, which they share with wildlife (Scherr, 2003: 2). These groups depend directly on these resources for their livelihoods and often do not have alternatives. This presents a clear and imminent challenge to biodiversity conservation.

However, despite the international community having agreed to halve the proportion of people living on less than a dollar a day by 2015, reports have indicated that progress in meeting the adopted development goals has been slow and uneven across regions, with poverty increasing in some countries. If trends of the past decade continue or worsen, these goals are not likely to be achieved (G8, 2000: 1), making the challenge even more complicated.

### **Climate change and biodiversity**

The increasing concentration of greenhouse gases in the atmosphere and its effects on global climate represent pervasive and trans-national challenges for the conservation of biodiversity, whereas most threats are relatively localised. The atmospheric concentration of carbon dioxide, which is widely believed to be the prime cause of global climate change, has increased by 30% since the Industrial Revolution of the eighteenth century, with humans increasingly burning greater amounts of fossil fuels in order to produce more energy (IPCC, 2002: 4-7).

As a result of the continued concentration of carbon dioxide and other greenhouse gases in the atmosphere, the mean global temperature has increased by 0.6°C in the last century. This has resulted in the rise of global mean evaporation from the oceans by 10% to 15%, with a corresponding increase in mean global precipitation. Such other extreme climatic effects as heat waves, droughts, melting polar ice caps and glaciers, thermal expansion of the seas, and the rise of average sea levels are all associated with

the increased concentration of greenhouse gases and resultant global climatic changes (IPCC, 2002; IUCN, 2001: 2-3).

As a result, the IPCC has recently reported that 20% to 30% of the plant and animal species it has assessed so far are at risk of extinction due to the rise in global average temperature (IPCC, 2007: 8). Thus, changes in global climatic conditions are presenting enormous challenges to the conservation of biodiversity.

### **Legal and institutional frameworks for biodiversity conservation**

Despite the importance of choosing effective policies, supporting institutions, adequate monitoring and enforcement, and motivation for compliance in the sustainable conservation of biodiversity (Bell, 2002: 3-5), an assessment of the legal and institutional framework for biodiversity conservation shows that there is a gap in these areas both at the local and global levels (Jenkins & Williamson, 2003).

Ecological interdependence does not respect national boundaries. Issues that were previously considered to be matters of domestic concern have international implications. For example, ozone layer depletion, global warming, loss of biodiversity, the pollution of rivers and hazardous waste disposal are some of the issues that require international agreements in order to be addressed (Sands, 2003: 1). Nevertheless, no comprehensive and effective legal requirements exist to address some of these problems internationally. In cases where there are agreements, there is no political will to invest in their implementation (Sands, 2003), and it is misleading to assume that any arrangement can achieve its purposes without effective implementation.

Bell (2002) stressed that in both designing policies and implementation, active stakeholder involvement is required, asserting that "Public participation is not an add-on; it is an integral part of the process of designing and selecting policies." (Bell, 2002: 5). Therefore, a lack of appropriate enabling policies, legal and institutional constraints, and inadequate political will for implementation at both the local and global levels are challenging the effectiveness of ongoing efforts to conserve biodiversity.

### **Knowledge base on biodiversity**

Another factor which contributes to the challenges of biodiversity conservation is the sheer complexity and immensity of the natural system we are trying to understand and manage. Heywood (1995) described our knowledge of the living world as remarkably limited. There is insufficient knowledge about the interdependence of species within ecosystems and the impact of the extinction of one species on others. It is only for certain groups, such as birds and mammals and flowering plants, that our level of knowledge is comprehensive. The information we do have about species is often inadequate and poorly organised (Heywood, 1995: 11; Jenkins & Williamson, 2003).

The existence of significant gaps in human knowledge about species is ultimately a challenge in any effort to conserve biodiversity. However, the issue of conservation should be related to why biodiversity matters, rather than searching for undiscovered species and learning ecological processes.

## **2.5 Approaches to biodiversity conservation**

Although there is an apparent consensus on the need for biodiversity conservation, there is no unanimity on how to accomplish it. The complexity and diversity of the resources,

coupled with people's philosophical and practical differences on conservation, has led to the lack of a universal value system that could lead to a complete agreement on what to protect and how to protect it (Jenkins & Williamson, 2003).

The existing practice, however, shows that there are two approaches in respect to what to protect. These are species-based conservation approaches that concentrate on individual species of importance and ecosystem-based conservation approaches that concentrate on ecosystems, which utilise a variety of interventions with the intention of benefiting a significant number of species in the ecosystems involved (Jenkins & Williamson, 2003; USAID, 2005: 49-67).

In addressing how to protect biodiversity, fortress conservation approaches and community-based conservation approaches are common (Pimbert & Pretty, 1995). The following sections briefly review all the approaches that have been pursued in conserving biodiversity.

### **Species-based conservation vs. ecosystem-based conservation**

Species-based conservation approaches involve the identification of species for conservation action based on certain criteria, and the classification of species into categories of conservation priorities, or their relative risk of extinction, such as extinct, endangered, vulnerable, or least concern. This type of approach is based on the assumption that priorities have to be made regarding what species to conserve, as resource limitations make it impossible to conserve all the plant and animal species that exist in the world (IUCN, 2001: 5-6; Jenkins & Williamson, 2003).

Accordingly, the conservation of species takes one of two methods. These are ex-situ conservation, in which components of biological diversity are conserved outside their natural habitats, and in-situ conservation, in which the conservation of species takes place in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they developed their distinctive properties (UNEP/CBD, 1992: 89).

However, new studies question the species-based approach to biodiversity conservation, primarily because there is no consensus on what constitute important species. The idea of attaching commodity values to individual species for placing priorities for conservation efforts is open to argument. While some argue that species have intrinsic value, and preferences can be made based on these species' value, others argue that species need to be preserved for reasons other than any known value. Hence, the application of triage<sup>4</sup>, or the assessing and valuing of different species relative to differential opportunity costs, has been rejected by many conservationists. Furthermore, only a small proportion of existing species have yet been assessed (Jenkins & Williamson, 2003), and species conservation through the protection of a handful of species would not be sufficient to save the countless species of plants and animals facing extinction worldwide (Ceballos & Ehrlich, 2006).

The ecosystem-based conservation approach is based on the assumption that the maintenance of a particular ecosystem and its processes is vital for the conservation of biodiversity. This approach combines an area-based approach with the maintenance of such ecosystem processes as the water cycle, energy flows, the mineral cycle, and succession, rather than particular entities (Ceballos & Ehrlich, 2006). It assumes that some

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<sup>4</sup> A medical term referring to priorities made in saving patients. It is a system used by medical or emergency personnel to retain limited medical resources when the number of injured needing care exceeds the resources available to perform care, allowing them to treat those patients most in need of treatment first.

parts of the world, so-called hotspots, have far more species than others, and a concentration of conservation efforts in these areas would have a significant impact on the maintenance and conservation of biodiversity (Jenkins & Williamson, 2003).

This approach considers the socioeconomic dimensions of conservation in particular geographic areas. The well-being of the local people and the value of biodiversity to the economies of the local communities are integrated into conservation efforts (UNEP/CBD, 2002: 6). It focuses on natural processes rather than particular entities, so that the ecosystems may continue providing goods and services to humans. Hence, the Convention on Biological Diversity (CBD) recognises the ecosystem approach as the primary focus for actions to meet the convention's objectives (UNEP/CBD, 2005: 305).

### **Fortress conservation vs. community-based conservation**

Attitudes toward conservation have generally included the notion that people are bad for the environment, and that there is an inverse relationship between human action and environmental well-being. This notion has historically been a dominant ideology underpinning conservation strategies. Conservation strategies have therefore been dominated by attempts to fence off or reserve areas for nature and to exclude people from these reserved areas. This approach to conservation has been called fortress conservation or coercive conservation (Pimbert & Pretty, 1995: 5).

The fortress conservation approach involves the creation of such protected areas as national parks, game reserves, and national forest reserves, in which the consumptive use of natural resources for income-generating activities supporting local livelihoods is not considered appropriate, except for tourism and scientific research. This type of conservation has neglected local people, their indigenous knowledge and management systems, their institutions and organisations, and the value of wild resources to them. The cost of conservation has therefore been high, social conflicts have grown in and around protected areas, and conservation goals themselves have been threatened (Pimbert & Pretty, 1995: 2)

However, it has become increasingly clear that conservation can only succeed in the long run if it takes better account of the needs of rural communities (Homewood, 2004: 129). Recognition of the role of local communities in conservation, alongside a growing understanding of human rights and the need to support and develop local livelihoods and welfare, have underpinned a paradigm shift in conservation (Pimbert & Pretty, 1995: 25; Homewood, 2004: 130). This has led to an emerging ideology of community-based conservation and its implementation in a great variety of initiatives (Homewood, 2004).

Community-based conservation approaches allow the local people surrounding the protected areas the right to conserve their resources and benefit from their products. It is based on the principles of local support, which state that protected areas cannot survive without the support of their neighbours (Brockington, 2004: 411).

Assessment of the implications of the two approaches shows that fortress conservation imposes heavy costs on local people without bringing commensurate benefits to them, and that it fosters the exclusion and marginalisation of local communities. Hence, no protected area can succeed for long in the teeth of local opposition (Borrini-Feyerabend et al. 2002: 11). However, sceptics of community-based conservation argue that its initiatives are relatively new departures, and that in most cases their conservation and development outcomes are still poorly known. Moreover, participatory and inclusive rhetoric can be misleading; by assuming a conservation goal, community-based conservation initiatives pre-empt what may be significantly different local priori-



ties. A handful of well-placed individuals may benefit from the process, and the approach offers little improvement over the fortress conservation approach as far as most people are concerned (Homewood, 2004: 132).

However, supporters of community-based conservation dispute the position that the diversity of community-based initiatives and contexts, and of the interests involved, means a diversity of views on their performance. In addition, the success of community conservation efforts depends on the effectiveness of local institutions, and genuinely operated community-based conservation has managed resources in a sustainable way (Ostrom, et al. 1999: 278).

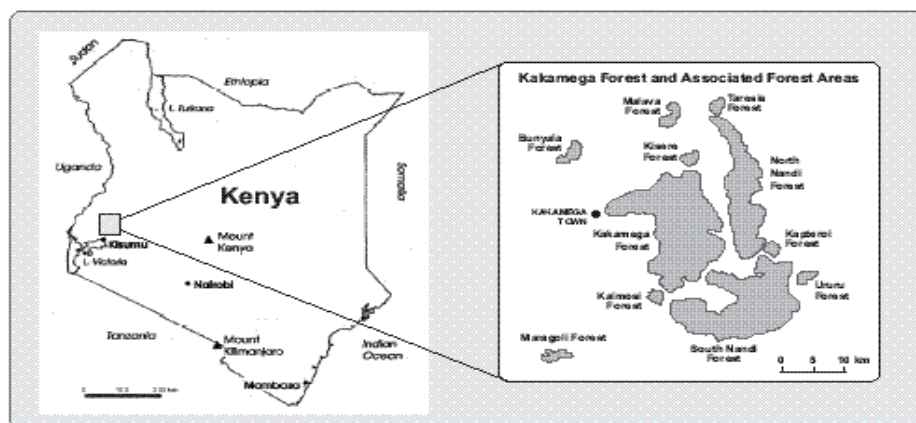
## 2.6 The state of biodiversity in Kakamega Forest

The following sub-sections review the state of biodiversity in Kakamega Forest. They also review the historical trends of its management that have contributed to the current state of the forest.

### Forest size and composition

Kakamega Forest is situated in the Kakamega and Vihiga districts of Western Province in Kenya. It forms the Kakamega Forest Complex that covers an area of 23,632ha, comprising the following forest blocks: the Kakamega main block, Malava forest, Bunyala forest, Kisere forest, Kakamega National Reserve, Isecheno Nature Reserve, and Yala Nature Reserve in Kakamega district, and the Kibiri block lying in and managed as a station of Maragoli forest in Vihiga district<sup>5</sup> (Mitchell et al. 2006: 781-783; Mungatana, 1999: 20; DFD, 2005: 1-5).

Figure 2.1 Kakamega Forest Complex and surrounding forests



Source: Lung and Schaab, 2004: 465

Despite the conflicting figures that exist for Kakamega forest (Mitchell et al. 2006: 781), it has experienced a dramatic loss in forest cover since its gazettement in 1933, as can be seen from Table 2.1. Reports have indicated that between 1972 and 1976, about 8% of the forest cover (1,960ha) was lost (Mitchell, 2004: 73) due to commercial forest operations, farmland expansion, over-exploitation by local communities, gold prospect-

<sup>5</sup> Some reports consider Kaimosi forest (100ha) as part of Kakamega Forest, but it is a private, community forest established on land bought from the colonial government in 1902 by Quaker Christian missionaries and later transferred to Kaimosi Friends Church. A board elected by the church manages the forest (Field survey, 2006).

ing, and later declaration and excisions (Mitchell, 2004: 31-44; Mutangah, 1997: 2; DFD, 2005: 4).

Although Kakamega Forest has suffered major reductions in forest cover and was formerly undoubtedly much larger than today, the assumption that the small forest fragments surrounding the forest might have been connected to the main forest in former times (Lung & Schaab, 2004: 465) lacks evidence supporting that connection in recent years, except for the southern part, where evidence dating back to 1913 and 1916 shows that the South Nanadi Forest and the southern part of Kakamega Forest were tenuously connected (Mitchell, 2004: 14-16).

*Table 2.1 Kakamega Forest size in hectares*

Name of the forest block	Year gazetted	Gazetted forest area in hectares as of 1930s	BIOTA E 02 result in hectares as of 2001 <sup>6</sup>
Kakamega Forest including associated forests	1933	23,777	23,632
Kakamega National Reserve (Buyangu)	1985	3,985	3812
Isecheno Nature Reserve	1967	-	295
Yala Nature Reserve	1967	-	460
Kakamega main block	1933	-	14,500 <sup>7</sup>
Kisere National Reserve	1985	458	420
Malava forest	1933	703	113
Bunyala forest	1956	807	609
Kibiri forest block (in Vihiga district)	1933	-	720

*Source: Mitchell et al, 2006: 781-783; Mungatana, 1999: 20; and DFD, 2005: 1-5*

The forest is composed of indigenous forest cover, such plantations as pine, eucalyptus, cypress, and various tropical tree species, and shrubs and glades which might have been caused by heavy grazing (DFD, 2005: 1, Mitchell et al. 2006: 781). The forest is one of the moist-lowland forest ecosystems in Kenya, holding such important biological resources as various flora, fauna, and avifauna (Mutangah, 1997: 1). It is home to 380 documented indigenous plant species (DFD, 2005: 8), 367 recorded bird species (Savalli, 1989), and several other plant and animal species.

### **The state of biodiversity**

Kakamega Forest is one of the richest biodiversity spots in Kenya. The forest derives its unique biological diversity from its exceptional location as part of the species-rich Guineo-Congolese forest belt, enriched by contact with the montane forest of the Rift Valley escarpments (KIFCON, 1994: 14). The forest harbours concentrations of endemic species and is home to some rare and globally threatened plant and animal species (Piritta, 2004: 3; Bennun & Njoroge, 1999: 10).

More than 397 recorded plant species have been found in the forest so far. Among them, 16 species were recorded for the first time in Kakamega Forest (BIOTA East Africa, 2004: 5). In respect to animal diversity, it has the status of being an important bird area (IBA), with more than 350 recorded bird species (Savalli, 1989). Kakamega Forest is also exceptionally rich in amphibians, insects, and other animal species. Some of

<sup>6</sup> Figures derived from published reports, satellite imagery, aerial photography and old topographic maps in 2001 (Mitchell et al, 2006: 781-783).

<sup>7</sup> Estimate for the year 1999 (Mungatana, 1999: 20).

these species are new to science; others are new recordings for Africa and Kenya (BIOTA East Africa, 2004: 5), and new species are being continually discovered (Bohme et al. 2005: 143).

The diversity and beauty of life in the forest makes it one of Kenya's tourist attractions. The district forestry office's records show that average revenues of 887,000Ksh. per year were collected from 1999 to 2004 from tourist attractions. In addition, the ecological, scientific, and educational services the forest provides are hard to estimate and go beyond the local communities.

However, the biodiversity in Kakamega forest is under serious threat. Forest cover has reduced by at least 52% since 1933, with the human population surrounding the forest increasing from about 390 people/km<sup>2</sup> in 1918 to about 713 people/km<sup>2</sup> in 1991 (BIOTA East Africa, 2004: 16). The forest has suffered much destruction due to farmland expansion, uncontrolled harvesting, and the over-exploitation of forest resources (Onyango et al. 2004: 152). These unsustainable uses of the forest have resulted in degradation and have threatened its biodiversity.

BIOTA East Africa (2004), part of an international research network on biodiversity, sustainable use, and conservation, conducted a number of studies to assess the state of biodiversity in the forest and found that the state of biodiversity there to be deteriorating. An assessment of forest quality using forest disturbance indicators (Muntangah, 1997) showed that the forest cover had been declining significantly (Muntangah, 1997: 4). Other studies conducted in the first phase of the BIOTA East Africa (2004) project also found that all observed plant and animal communities had been negatively influenced by human activities in recent decades and that biodiversity is ultimately being threatened by the shrinking of the forest. Therefore, the conservation of biodiversity in Kakamega Forest requires a sustainable strategy which guarantees the needs of the current beneficiaries without compromising the needs of future generations.

### **Kakamega Forest management**

A review of past forest management practices indicates that the forest has undergone at least four main management phases, each having its own implications for the status of biodiversity in the forest. The earliest stage was management of the forest by the local people through their elders (Mitchell, 2004: 23). During this period, the local communities managed the forest through their own tribal structure, controlled at the lowest level by councils of elders and heads of families. The elders decided which trees to cut for construction, while each clan protected its part of the forest from aggression by other communities. This stage marked the initial period in which the local people had established a harmonious relationship with the forest environment (Mitchell, 2004).

In 1931, the government took over the management of the forest despite strenuous objections from the people, who wished to retain control of its management. Then the Forestry Department (FD) was charged with the management of the forest on behalf of the local people, amid great local resentment. In 1933, despite the local communities' opposition, Kakamega Forest was gazetted as a Trust Land Forest, with the objective of bringing greater economic benefits. Subsequently, the government removed the authority of the clans to govern their forest, all the people who had been living and cultivating in the forest were evicted, and the new forest boundaries were demarcated and reinforced through eucalyptus plantation (Mitchell, 2004). In this second phase such community rights and benefits as farming in the forest and forest resource use were restricted.

The declaration of special rules in 1959 and 1964, allowing the wide-ranging use of the forest, and also reinforcing the customary right of the people to have access to some of the forest's resources, marked a new phase in the management of Kakamega Forest. This opening up of local communities' use rights was fortified by the independence of Kenya from British rule in 1963 and the subsequent appointment of the first African forester (Mitchell, 2004).

This third stage of the forest's management soon ended, with the declaration of the forest as a central government forest in 1964. In addition, the consequent excision and creation of the nature reserves of Yala and Isecheno in 1967, and of Kisere and Buyangu in 1985, brought two completely distinct management regimes. These were the Kenya Wildlife Service (KWS), which strictly prohibited local use of resources in its jurisdictions of Buyangu, Kisere, Yala, and Isecheno Nature Reserves, and the FD, which allowed some rights and privileges to the local communities under its jurisdiction in Bunyala, Malaya, and Kakamega main block (DFD, 2005: 3-5).

The restrictions on local benefits, the banning of the *shamba*<sup>8</sup> system, and the deliberate exclusion of the community from the management of the forest, however, gave rise to a conflict over access to forest products between the authorities managing the forest and the communities surrounding it, often fuelled by population pressure and the consequent increased demand for resources. Recent initiatives in the direction of community conservation, if pursued well, should ease the current tension and transfer the management of the forest into another phase.

## 2.7 Summary of key issues

- Biodiversity conservation is a global concern in the twenty-first century, as it is related to the survival of society. It is, however, under threat from such human activities as the over-harvesting of natural resources, habitat conversion and degradation, pollution, and global climate change.
- Poverty, climate change, the diversity and complexity of biological resources, and weak legal and institutional frameworks have been a challenge to biodiversity conservation.
- Despite a growing consensus on, and commitment to, the need for biodiversity conservation, there is no unanimity on how to achieve it.
- Kakamega Forest is a source of livelihood for the communities bordering it; however, its biodiversity is under serious threat, mainly from population growth, farmland expansion, uncontrolled harvesting, and the over-exploitation of forest resources.

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<sup>8</sup> Non-resident farming in the forest, often by taking care of smaller plantations.

## **3 Sustainable Rural Livelihoods for Biodiversity Conservation: Conceptual Framework**

### **3.1 Introduction**

This chapter provides the conceptual framework for the study and attempts to elaborate the relevant concepts in which the study is embedded. This is done on the basis of the theoretical background of the subject and the existing body of knowledge in the field. It therefore elaborates all the issues and defines the key concepts to clarify the issues.

The conceptual framework of the study is constructed out of three main pillars of concepts. These are that the security of biodiversity depends significantly on the security of rural livelihoods (Pimbert & Pretty, 1995; Brown, 1998; Koziell, 2000; Wood, et al. 2000; Koziell & Saunders [eds.], 2001), that sustainable rural land management enhances rural livelihoods, thereby contributing to the conservation of biodiversity (Shanthikumar, 2002; IIED et al. 2004), and that participatory decision-making is a prerequisite for sustainable rural land management; it is also fundamental in building sustainable rural livelihoods (GTZ, 1999; World Bank, 1994, 1996; Long, 2001).

This chapter will elaborate upon each of these conceptual pillars. It will also thoroughly explain the main arguments behind the concepts, highlight areas of agreement and disagreement among different views of the subject, and identify gaps and unanswered questions for the possible continuation of the research.

### **3.2 Sustainable rural livelihoods and biodiversity conservation**

While human beings require the services of biodiversity for their survival, the over-harvesting of these resources has been a threat to our existence. However, fencing off forest resources and preventing people from getting access to forest products has a negative effect on the livelihoods of the people who depend on these resources for their survival. The challenge is, therefore, how to balance livelihood needs with conservation needs, and how to create a long-term win-win scenario for both livelihood and biodiversity. (See Figure 3.1)

#### **The concept of livelihood**

The concept of livelihood is widely used in contemporary writings on poverty and rural development issues. However, its meaning remains largely elusive due to the various interpretations attached to it. Chambers and Conway (1991) proposed a popular definition of livelihood, and several researchers and organisations who have adopted a rural livelihood approach utilise a modified version of this definition, which is that, “A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a living”. (Chambers & Conway, 1991: 6)

The concept of livelihood encompasses the three other concepts of capability, assets, and activities. Amartya Sen (1999) used capability to mean, “being able to perform certain basic functions, to what a person is capable of doing [or] what people can do or be with their entitlements” (Sen, 1999: 87). Chambers and Conway (1991) found capability to be more a matter of being able to find and use such opportunities as gaining access to

and using information and other services, and to exploit new conditions and resources. Chambers and Conway (1991) also proposed capability to mean being able to adapt to changes in conditions, being able to cope with shocks and stress, and being able to respond to these appropriately.

Ellis (2000), among others, has disputed the use of capability as such as a component of livelihood because its meaning overlaps with assets and activities and is potentially confusing. Ellis (2000) therefore proposed the following alternative definition of livelihood:

*A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household.*  
(Ellis, 2000: 10)

This definition places more emphasis on assets and access to assets that is influenced by such institutions and social relations as gender, class, and belief systems (Ellis, 2000). The other concept embedded in the definition of livelihood is that of asset, which is also called capital in its economic metaphor. Scoones (1998) referred to the capital bases from which livelihoods are constructed as being comprised of natural capital, or the natural resource base of land, water, trees, and such, that yields products utilised by humans for their survival, of physical capital, or such assets brought into existence by such economic production processes as tools, machines, irrigation canals, and such basic infrastructure as transport, shelter, water and energy sources, of human capital, or the educational level and health status of individuals, of financial capital, or the stock of cash, supplies of credit, regular remittances, and pensions that can be accessed in order to purchase either production or consumption goods, and of social capital, or the social networks and associations in which people participate, and from which they can derive support that contributes to their livelihoods (Scoones, 1998: 7; Ellis, 2000: 8; Sherbinin, 2006: 4).

The livelihood concept is based on the premise that the ability to pursue a living is based on the material and social assets, both tangible and intangible (access and claim), that people have in their possession (Scoones, 1998: 7). Out of these tangible and intangible assets people construct and contrive a living. This implies that different assets are combined to create livelihoods and that the assets a household owns determine the options it possesses to pursue a livelihood.

Livelihoods are also composed in complex ways, with multiple and dynamic portfolios of different activities called income sources. These activities represent both the monetary and non-monetary contributions to the household's consumption in the form of farm income, or own-account farming, off-farm income, or wages or exchange labour on other farms, and non-farm income, or non-agricultural income (Ellis, 2000: 11-12). The output of these activities may be consumed immediately or be invested in the acquisition of other capabilities when production leads to surplus beyond the household's immediate needs. However, when a household fails to produce enough and becomes unable to cater for its members, the assets may be consumed and deteriorate. Assets can therefore be either created or destroyed, depending on the context (Conway & Chambers, 1991: 8). This implies that livelihoods are dynamic, changing over time and adapting to evolving circumstances.

### **Sustainable rural livelihoods**

The concept of sustainability lacks precision and remains inconsistent. The different definitions and uses of the concept reflect varying disciplinary biases. Biologists,

economists, sociologists, environmentalists, and other professionals all have their own versions of the concept. However, the basic idea of sustainability is straightforward; a sustainable system is one that survives or persists (Rapport et al. 1998: 231). However, when it comes to what has to be sustained, complicated ideological disputes often arise. Some writers refer to the sustainability of natural resource base, and others emphasise the sustainability of the livelihoods and economic gains which are derived from it (Redclift, 1987: 32; Inkoom, 1999: 33). A review of literature on the subject shows that sustainable rural livelihood has been described in several ways.

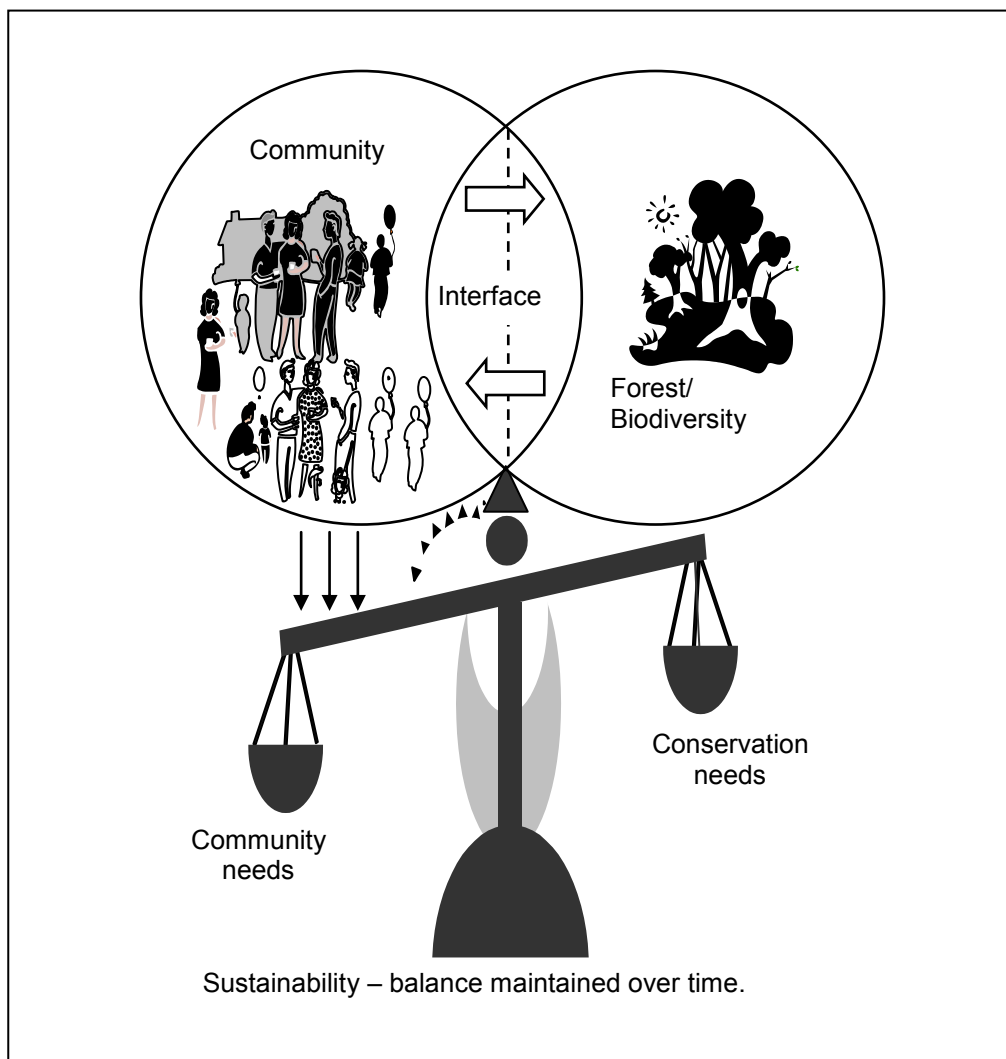
- A livelihood can be perceived as sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets (Chambers & Conway, 1992: 6) both in the present and in the future (Carney, 1998: 4), while not undermining the natural resource base (Scoones, 1998: 5).
- A sustainable rural livelihood can also be understood as a resilient situation in which people have equal access to livelihood resources, are capable of performing activities that are relevant for their living, and are increasingly meeting their different needs without undermining the natural environment and without comprising the needs of future generations (WCED, 1987: 43). This implies that sustainability is a function of how assets and capabilities are utilised, maintained, and enhanced in order to preserve livelihoods.
- A sustainable rural livelihood can also be seen as a relationship between dynamic human economic systems and dynamic, but slower, ecological systems, in which human life can develop indefinitely, human individuals can flourish, human culture can develop, and the effects of human activities remain within bounds so as not to destroy the diversity, complexity, and functioning of their ecological life-support system (Costanza 1992: 106-118).
- Livelihoods can also be considered sustainable when they are resilient in the face of external shocks and stresses, do not depend upon external support, maintain the long-term productivity of natural resources, and do not undermine the livelihoods of, or compromise the livelihood options open to, others (DFID, 1999: 7)

To summarise the concepts of sustainable livelihood presented above, a sustainable rural livelihood is fundamentally a balance maintained over time between the natural resource base and the benefits derived from it. It is a situation in which basic needs are adequately met without undermining the natural resource base. Implicit in all four definitions is the concept of intra-generational and inter-generational equity, or the fair distribution of, and access to, resources within the same generation, and between succeeding generations.

A number of efforts have been made to develop indicators to measure progress towards sustainable rural livelihoods, but both the approaches adopted in constructing such indicators and their outcomes have varied considerably due to differences in their authors' perceptions of sustainability (Simon, 2003: 6). Nevertheless, different dimensions of sustainability may be distinguished in order to conceptualise and provide practical indicators of sustainable systems.

Accordingly, environmental sustainability is achieved when the productivity of life-supporting natural resources is conserved or enhanced for use by future generations; economic sustainability is achieved when a given level of expenditure can be maintained over time, or a baseline level of economic welfare is achieved and maintained; social sustainability is achieved when social exclusion is minimised and social equity maximised; and institutional sustainability is achieved when the prevailing institutional structures and processes have the capacity to perform their functions over the long term (DFID, 1999).

Figure 3.1 The challenge - balancing conservation needs with community needs



Source: After Dr. Karin Gaesing (2006)

### Sustainable rural livelihoods and biodiversity

An understanding of the interaction between livelihoods and biodiversity requires recognition of the multifaceted nature of both the benefits of biodiversity and the nature of rural livelihoods. Biodiversity provides many and diverse subsistence requirements that rural communities need for survival. It provides environmental services that support all natural production systems, and it provides vital benefits from its direct use in the form of products which can be consumed or traded in markets in exchange for capital assets.

However, poverty and capability deprivation (Chambers, 2006: 3) result in a lack of options, forcing people to over utilise forest products and to clear forest cover in order to gain access to land for cultivation. This has often resulted in degradation and loss of biodiversity. Besides, poverty is also associated with higher fertility rates (Schoumaker, 2004: 18; Cincotta & Engelman 2000: 40) that indirectly increase resource demand and pressure on ecosystems.

The other issue is that of biodiversity's potential to aid in poverty reduction efforts, as well as in building sustainable rural livelihoods. Biodiversity is a resource that can be used to expand rural livelihood options. However, enhancing the role of biodiversity in



rural livelihoods requires mainstreaming biodiversity in poverty-reduction strategies and developing appropriate mechanisms for implementation.

From the discussion so far, it is possible to establish the following concepts and to discern the interface between rural livelihoods and biodiversity. First, when income-earning opportunities become limited due to inadequate assets, pressure on natural resources for both subsistence and cash income increases. Hence, the rural poor often have no alternative to forest biodiversity. Next, the threat to biodiversity increases with the deterioration of rural livelihoods, as due to a lack of options rural households are increasingly forced to rely on forest resources. Also, rural livelihoods lose strength when biodiversity is lost due to the deterioration of ecosystem services. The rural poor are more vulnerable and thus are severely affected. In addition, improvement in either biodiversity or rural livelihoods may bring a positive spillover effect on the other. Finally, biodiversity conservation measures tend to fail in the long run when livelihood issues are not addressed because they are undermined by the rural poor's livelihood demands. The success of biodiversity conservation, therefore, depends on poverty alleviation (Pimbert & Pretty, 1995: 39; Brown, 1998: 9).

The belief in a negative downward spiral of poverty and biodiversity is, however, widely challenged (Arnold & Bird, 1999: 4), particularly since the reduction in forest cover and quality is not the prerogative of poor countries alone. There is a diverse range of direct and indirect causes for the loss of biodiversity apart from poverty. For example, pollution and climate change also lead to biodiversity loss. It can therefore be emphasised that poverty and inadequate assets may result in a lack of options, forcing people to clear forest cover in order to get access to forest products in order to maintain their livelihoods.

### **Regional issues in local livelihood**

The linkages between local and regional centres and their implications on rural livelihoods is a subject of debate in regional development. The theoretical underpinnings that have aimed to explain the interaction between regions and their peripheries consist of at least three theories. These are the growth-pole concepts (Perroux 1955; Hirschman, 1958, cited in Richard & Mier, 1993: 32; Friedmann & Weaver, 1979: 125), agropolitan development theory (Friedman & Weaver, 1979: 189; Rondinelli, 1985: 8), and the concept of spatial-functional integration (Rondinelli, 1985: 4-6; Richard & Mier, 1993: 47).

The growth-pole concept suggests that economic growth can be stimulated through investment in capital-intensive industries in the largest urban centres, which can later spread outward to generate regional development through trickle-down effects (Rondinelli, 1985:3; Richard & Mier, 1993: 32). This theory considers investment in industry at the growth pole to be an engine of development for agricultural and commercial activities. However, experience in Latin America and Africa has shown that the growth centres have failed to generate regional development and have remained enclaves of modern activities that have drained raw materials, labour, capital, and entrepreneurial talent from the surrounding rural areas (Rondinelli, 1985: 4).

The theory of agropolitan development, also called the decentralised territorial approach and the selective regional closure approach, is based on the argument that urban growth centres are parasitic. That is, any larger form of settlement in rural regions harbours urban elites, traders, local industries, large corporations, and central government agencies, and all tend to exploit the rural population and drain rural areas of their resources. Therefore, investment should not be located in these places, but dispersed in

rural areas where people have direct access to these services (Rondinelli, 1985: 8). This theory proposes the creation of autonomous territories that are allowed to determine the kind of economic and social development that they require (Richard & Mier, 1993: 48).

These theories have been criticised for ignoring the beneficial functions that the urban centres play in rural development (Richard & Mier, 1993: 51). In addition, it is impossible to expect spatial closure once urbanisation and development has started, and no town is an island unto itself in the economic sphere. Flows of goods, services, information, and personnel between rural and urban regions always exist. The implications depend on how the economies of urban centres develop and the ways in which the linkages between rural and urban regions are organised. Richardson, cited in Rondinelli (1985), concluded that:

*Neither the 'diffusion pole' nor the 'parasitic' views of the role of small cities are correct in general. It rather depends on how the functions of these cities have evolved with respect of their hinterlands, on the institutional and cultural features of the country in question and how policies for strengthening the small cities are formulated and implemented. (Rondinelli, 1985: 12)*

The concept of spatial-functional integration is an alternative approach based on the principle of interdependency, viewing economic development as a process leading to increasing specialisation and greater interdependence, not only functionally, but also in terms of space (Friedmann & Weaver, 1979: 92). This theory is based on three assumptions. These are that a well-articulated and integrated system of growth centres of different sizes and functional characteristics can play an important role in facilitating more widespread regional development, that in developing countries the primary stimulus to regional development must be through agricultural rather than industrial development, aiming at higher levels of food production, expanded employment, and increased income, and that the primary beneficiaries of development must be small-scale farmers, landless labourers, and small-scale commercial entrepreneurs, that is, people living on the margins of an organised economy and living at or below subsistence level (Rondinelli, 1985: 4).

Rondinelli (1985) further argued that if regional development is to be achieved a critical mass of services must first be available in rural areas. Appropriate agricultural technology, research and extension services, adequate credit and other inputs, and accessible financial institutions that increase the flow of capital, promote savings, and create a stable marketing system are vital. Attention must also be given to such basic human services as health and education. Next, building an institutional framework for rural development is essential to promote regional growth. Rural communities must have access to self-sustaining organisations capable of identifying and solving rural development problems and of delivering needed services. Finally, an integrated system of settlement and market centres where farmers can easily sell their products, obtain inputs, modernise their technology and adapt products to consumer demand is required for regional rural development (Rondinelli, 1985: 5).

Practical experience has shown that the creation of integrated systems of services, trade, and production centres in India and Indonesia has achieved remarkable results and benefited both the people in the regions and the governments which have attempted regional development in this way (Fisher & Rushton, 1975; Rondinelli & Ruddle, 1977, both cited in Rondinelli, 1985: 6).

The theory of spatial integration describes the economic relationship between central places and hinterlands and explains how unequal development among regions can be balanced. However, the conditions of natural resources are marginal to the explanation. This study contributes to the relevance of the theory in the management of natural re-

sources by describing the implications of improved spatial linkages on the biodiversity conservation effort.

### **3.3 Rural land management for sustainable rural livelihoods**

The development of sustainable livelihoods in rural areas fundamentally depends on how land is managed and used. This is because land is the basic resource from which rural people derive their livelihoods. It is the main source of food, income, and other factors people require for their livelihoods. This section elaborates upon the concept of sustainable rural land management, particularly rural land use, land right (access to land), and land tenure (ownership), with the objective of identifying the interaction between land management and the sustainable development of rural livelihoods.

#### **Land as the basis of rural livelihoods**

In rural Africa, land lies at the heart of the social, political, spiritual, and economic life of the people, and such land-based activities as agriculture, forestry, and hunting form the basis of rural livelihoods. Land is the resource from which rural people derive almost all of their basic needs for survival. Crop production, livestock herding, and forest-product harvesting all require land as a basic resource. Therefore, access to land and control over it determines the level of poverty and prosperity, particularly in rural areas.

Despite the role of land in rural livelihoods, how is it managed, its quality, and the quality of its resources are often altered over time by human activities that are conducted to meet livelihood needs (Fresco et al. 1994: 65). The rapidly expanding human population and its growing demand for resources, coupled with inappropriate management practices, have exerted unprecedented pressure on land, leading to land degradation. Land degradation has often been exacerbated in the absence of appropriate land management practices (FAO, 1995: 6). Hence, meeting the food and livelihood needs of rural people, particularly in developing countries, requires sustainable land management.

#### **The concept of land management**

There is a clear evidence of impending land shortages in many countries. Land is a finite resource and its attributes are dynamic. Areas which are moderately or well situated for agriculture and other purposes are, for the most part, already in use. In many cases, land is overused and misused, and the livelihood of many people, as well as the natural resources upon which they depend, is seriously at risk.

The need for sustainable land management therefore comes out of the following rationales. Some land-use practices place enormous pressures on land, damaging ecosystem services, degrading soil, and destroying water and forest resources. The maintenance of the landscape and ecosystem services requires land management that ensures sustainable production systems while providing for human needs. Also, land and its resources can be used for a variety of purposes which interact and may compete with one another. Therefore, it is imperative to plan and manage all uses in an integrated manner for ensuring sustainable production for human benefits.

Sustainable rural land management (SLM) is, therefore, the conservation and utilisation of such land resources as soils, water, forests, animals, and plants to meet the material, aesthetic, and spiritual needs of humankind today, while ensuring the productive potential of these resources and the maintenance of their environmental functions

(Shanthikumar, 2002: 8). It is a process of managing the use and development of land resources in a sustainable way. According to the FAO (1993b), sustainable land management:

- *Combines technologies, policies and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously:*
- *Maintain or enhance production/services (Productivity)*
- *Reduce the level of production risk (Security)*
- *Protect the potential of natural resources and prevent degradation of soil and water quality (Protection)*
- *Be economically viable (Viability) and,*
- *Socially acceptable (Acceptability).* (FAO, 1993b, 8)

Accordingly, productivity, security, protection, viability, and acceptability constitute the five main objectives of sustainable land management. They are also the basic indicators against which sustainable practices must be tested and monitored (FAO, 1993b).

### **Land management for enhancing rural livelihoods**

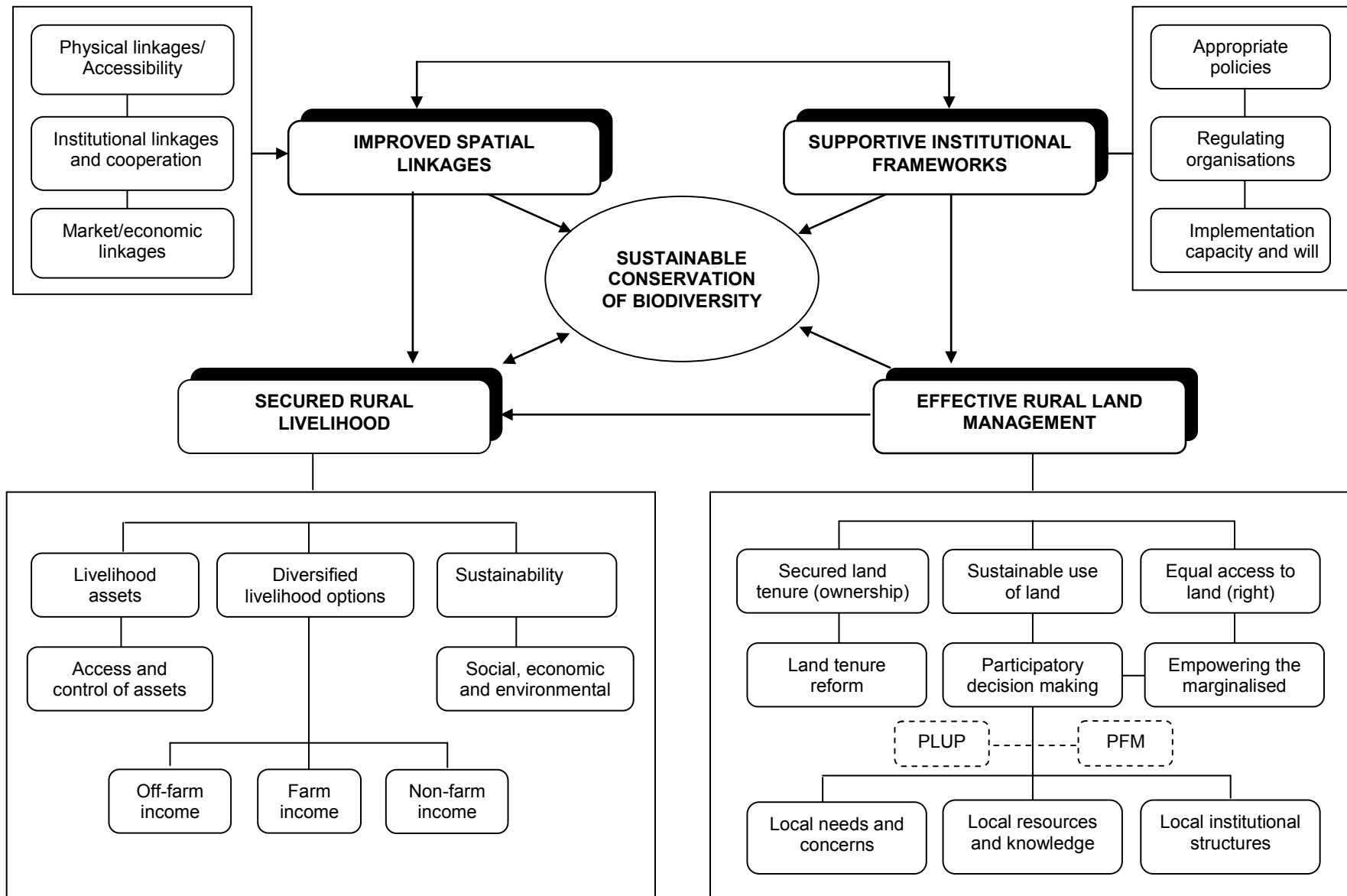
Better governance of land and its resources, or land management, is central not only for curbing land-resource degradation, but also for building sustainable rural livelihoods. Income derived from different types of land use is a major source of livelihood for many people, particularly for rural population, as about 75% of the rural poor depend on agriculture for their livelihoods. It is therefore clear that the continued provision of essential goods and services to the rural poor depends mainly on rural land management.

A number of studies have confirmed that land management has strong linkages to the well-being of rural people. For example, Duncan and Brants (2004) found that improved access to land has promoted social security and gender equity in Ghana, Besley and Burgess (1998) found that land reforms have resulted in poverty reduction and economic growth in India, Roth and Haase (1998) found that land tenure insecurity has affected agricultural productivity in Southern Africa, and the Organization of American States (OAS) (2006) reported in its policy series No.10 that recognition of the property rights of indigenous groups has improved environmental sustainability in Latin America.

The role of effective land management in enhancing rural livelihoods can be explained specifically in the following ways. Effective land management provides innovative solutions to land degradation through such sustainable land-use practises as efficiency, productivity, and conservation. Land management gives due consideration to conflicts among different uses and takes into account planning and conflict-resolution measures to improve such situations. Sustainable land management provides localised approaches for land tenure and land ownership. Finally, effective land management promotes investment in developing services and infrastructure and in maintaining existing linkages.

In conclusion, land management often facilitates such multiple benefits as agricultural production, biodiversity conservation, water quality, soil health, and improved transport accessibility, which are all vital for rural livelihood development. In addition, effective land management and better access to land can help break the downward cycle of poverty by enabling access to the basic assets required for livelihood development, particularly in rural areas.

Figure 3.2 Conceptual frameworks for conservation of biodiversity



(Source: Author's construct, 2006)

### **3.4 Participatory decision-making for sustainable rural land management**

After decades of limited success in eliminating rural poverty and delivering development to poor countries, new paradigms in rural development emerged in the early 1990s (Carney, 1999: 1; Long, 2001: 5). The new approaches shifted emphasis towards people-centred, endogenous, and participatory development initiatives in response to dissatisfaction with the results of previous development efforts.

The main contention of the new approaches is that people are the priority concern, and that factors that constrain or provide opportunities to people require holistic, multi-sector responses involving multiple actors, particularly the local communities (Chambers, 1983; World Bank, 1996; DFID, 1999). The following sections elaborate upon the concept of participation in depth, with particular emphasis on its relevance for sustainable rural land management.

#### **The concept of participation**

Despite the apparent endorsement of participation as an essential component of sustainable development, fewer consensuses exist about what it means and how to achieve it. It has meant anything from passive participation, in which people are told what is going to happen or has already happened, to self-mobilisation, in which people participate by taking such initiatives as defining their own objectives, implementing and monitoring the activities, and evaluating the results themselves (Kumar, 2002: 24).

Nevertheless, the concept of participation can be viewed as “a process through which the stakeholders, particularly the local communities, influence and share control over development initiatives, and the decisions and resources which affect them”. (Tandon & Cordeiro, 1998 cited in Blackburn, 2000: 1) Participation is a process, a process of empowering the local people, particularly the poor and the marginalised, by which they gain more control over deciding matters affecting their livelihood.

Participation is about building partnership and ownership from the bottom up through listening, consultation, commitment, and compliance, and by reaching out to the poor and disadvantaged and building their capacity to act (World Bank, 1996: 3-7). In participation, local people take initiatives and control and share decisions, resources, and responsibilities through their own organisations and self-organised actions.

The main focus in participation is the transfer of power and the creation of changes in power structures. It is about enabling rural people to make the decisions and take the actions which they believe are essential to their own development (Oakley et al. 1991: 9).

#### **Advantages of participation**

The recent drive towards participatory approaches has been based on the assumption that people’s own contributions towards their development, in terms of local knowledge and resources, could be increased through participation, thereby enhancing the efficiency, effectiveness, and sustainability of development activities (Valk, 1990: 7; Kumar, 2002: 27). Experiences in the development field confirm that attempts to increase local participation have a number of benefits. Improved performance of projects, co-operation among stakeholders, cost-sharing, increased self-reliance, equity, and sus-

tainability are just a few of the advantages of community participation in development (Kumar, 2002: 27; World Bank 1996: 205-251).

### **Challenges of participation**

Efforts to introduce and enhance participation, however, are not without challenges, as the practice of participation is susceptible to a wide range of them. Oakley et al. (1991) identified three sets of obstacles which can affect the practice of participation. These are structural obstacles, administrative obstacles, and social obstacles.

Structural obstacles are parts of the centralised political system that deemphasise local mechanisms for administration and decision making, thereby reducing the potential for authentic participation. In addition, the lack of awareness most rural people have of their rights and of the services available to them and the inherent bias in the way legal systems are conducted and maintained frustrate efforts to promote participation. Administrative obstacles are control-oriented procedures that do not provide significant space for local people to make their own decisions or control their own resources. Social obstacles are challenges to participation imposed by such social and cultural factors as a mentality of dependence, cultures of silence, and inequalities in gender and social status that impede participation by all citizens (Oakley et al. 1991: 11-13).

Furthermore, inadequate knowledge of participatory methodologies and the absence of commitment towards their implementation often hinders local participation. Participation can, therefore, be a slow and resource-hungry process (Richards et al. 2004: 15-17).

### **Participatory approaches to land management**

A number of participatory approaches have been practiced in different areas for different purposes. The two most important approaches in respect to land management are Participatory Land Use Planning (PLUP) and Participatory Forest Management (PFM).

#### *Participatory Land Use Planning (PLUP)*

Despite land being a limited and finite resource, it is used for a variety of purposes that may compete with one another. The allocation of land to the uses that provide the greatest sustainable benefits and their management in an integrated manner requires land-use planning. In the absence of land-use planning or its orderly execution, conflicts and competition among different uses become exacerbated (FAO, 1995: 6).

However, a review of the practice of land-use planning in developing countries by Dalal-Clayton and Dent (1993 cited in Bass, 1995: 14) showed that land-use planning has failed to live up to its promises. It has remained centralised, sectoral, and top-down. Experts prepare maps that indicate in considerable detail how the land should be used. There is little participation by the target groups, and sometimes little input from the agencies charged with implementing the plans. The supposed beneficiaries of development plans have neither the opportunity to articulate their needs nor to contribute their own local knowledge and resources towards their implementation. Most of these plans have remained just plans (Bass et al. 1995: 14).

Conventional land-use planning lacks a platform for negotiation between all stakeholders. The emphasis has been on expert-led technical assessments of land and the selection of the best options without community involvement (FAO, 1993: 1). These types of top-down sectoral planning approaches have failed to deliver sustainable land

resource management because they have not considered their communities' needs and have failed to address the structural problems leading to land-resource degradation. Therefore, an alternative approach known as PLUP has emerged.

PLUP is an iterative process based on dialogue amongst all stakeholders which aims for the negotiation of decisions for sustainable forms of land use in rural areas and the initiating and monitoring of their implementation (GTZ, 1999: 1). It has gained recognition, mainly by the UN Food and Agriculture Organisation (FAO) and the German Society for Technical Cooperation (GTZ), as an important tool for achieving sustainable land management based on practical experiences in the field (Christ, 1999: 5).

PLUP creates a framework for sustainable land management with the involvement of local people. Its approach is based on the assumption that sustainable resource management can only be achieved if natural resources are managed by local communities. PLUP can typically be applied in such situations as when the existing resources have been degraded by over-exploitation or other factors, when a lack of land resources exists due to population growth, and when land-use conflicts arise due to competing claims for the available resources (Christ, 1999: 7). PLUP, therefore, aims to optimise actual land use, resolve conflicts arising from conflicting uses and the needs of different interest groups, choose sustainable options that best meet identified needs, rehabilitate and conserve natural resources, support the general development process, and raise awareness concerning environmental problems and processes among the population and authorities (GTZ, 2003: 21).

The practice of PLUP follows certain processes and steps which are based on certain principles. However, the presence of political will and commitment, the need for action to prevent unwanted change, and the ability to put agreed land-use plans into effect are also equally important in order for PLUP to be useful and feasible (Christ, 1999: 7).

### *Participatory Forest Management (PFM)*

The emergence of participatory approaches in the late 1980s to mid 1990s and the recognition of the role local communities could play in natural-resource management have led to the development of the PFM approach. PFM is an umbrella term used to include joint forest management, collaborative forest management, and community forestry.

PFM is a way of approaching forest conservation through building relationships with the local people. It involves the participation of the local communities and all key stakeholders in forest conservation and in sharing the benefits that can be derived from it. Its purpose is to ensure that forest management makes a real contribution to securing the livelihood of the local people, and by doing so it also helps to secure the forest resource.

PFM has been shown to be an important approach to sustainable forest management. Both Lise (2000) and Varughese (2000, cited in Matta, 2003) found a positive association between local collective action and forest status, with areas experiencing a high level of community involvement in forest management enjoying a significant improvement in the condition of their forests. They also found that the participation of communities in forest management is higher where they receive immediate direct returns from the time and labour they spend in such participation. Participation, therefore, improves the forests' condition, while the direct benefits from improved forest management enhance community participation.

However, experience has shown that PFM is not always a successful approach that guarantees sustainable forest management and improved livelihood conditions, due to a number of challenges associated with the practice (FAO, 2003). Some of the conditions



favourable to overcoming the challenges to PFM include organisational change in support of it, mechanisms for trade-offs between multiple interests, the creation of representative, accountable and competent community organizations, the development of forestry practice embedded in an understanding of livelihood strategies, a commitment to participatory approaches in the relevant organisations, the devolution of power within forestry organisations to field staff, policy and legislative changes in support of PFM approaches, and the integration of PFM into mainstream forestry (FAO, 2003).

In conclusion, PFM can be a time-consuming and tedious exercise, but forest management without participation is costly and risky. There is a risk of losing the forest altogether to encroachment and of losing of biodiversity due to over-harvesting.

### **3.5 The role of institutions**

The three main concepts that form the conceptual framework are mediated and regulated through certain structures and mechanisms called institutions. Scoones (1999) defined institutions as “regularized practices (or patterns of behaviour) structured by rules and norms of society which have persistent and widespread use.” (12). This refers to formal and informal norms, rules, procedures, and processes that define the way in which individuals should interrelate and act. Institutions represent the rules of the game that shape human interactions in a society (North, 1990: 3). The interactions could be among humans themselves, with the natural environment, or both.

The terms institution and organisation are often used interchangeably. In this context, however, a crucial distinction must be made between the two. Institutions are viewed as the “rules of the game”, while organisations “are structures of recognized and accepted roles” (Uphoff, 1986: 9). Therefore, institutions represent the rules and organisations the players of the game.

Institutions operate at all levels, from households to the international arena, and effectively determine all aspects of human life. The role of institutions in enhancing livelihoods, facilitating effective land management, and raising participation of local communities in development cannot be overemphasised.

Institutions have a number of interrelated roles. They determine access to various types of capital, livelihood strategies, decision making bodies, and sources of influence. They affect the terms of exchange between different types of capital, as well as the returns of livelihood strategies (DFID, 1999). They can regulate resource use and lay the framework for sustainable land management by mediating access, control, right, and accountability. They also facilitate local participation, as participation is more efficient when practiced through institutionalised mechanisms (Oakley, 1991: 9).

However, it must be recognised that local institutions can produce practices unfavourable to sustainable rural livelihoods or land management (Uphoff, 1992: 2). The efficiency and effectiveness of institutions in achieving the roles indicated above depend on such factors as the types of institutions, institutional relationships and interfaces, and the local contexts in which they operate.

### **3.6 Summary of key issues**

Some conclusions can be drawn from the discussion so far. These are that the security of biodiversity is based on rural livelihood security and vice versa, that rural livelihood security is based on effective land management and the presence of options that can assist in the diversification of rural livelihoods, that active community participation is a

key to building sustainable land management, and that these factors, security of biodiversity, effective land management, and active community participation, are mediated and ultimately determined by institutional frameworks and arrangements.

## **4 Rural Livelihood, Land use and Land Management in Kakamega District: Context and Problem Statement**

### **4.1 Introduction**

The purpose of this chapter is to introduce the key features of rural livelihoods in the study area by exploring and elaborating the context, the livelihoods' resources, and the activities in which the households engage in order to make a living. It also explores how land is used and managed in the district and tries to identify the main problems that the research intends to address.

### **4.2 Rural livelihood in Kakamega District**

The dimensions of rural livelihoods are wide and complex. The realities also vary between regions, communities, and households. The analysis and understanding of rural livelihood, therefore, requires investigation into such particulars of the context in which the people live as agro-ecology, policy setting, and socioeconomic conditions and trends. The following sections will assess these livelihood contexts of the district being studied.

#### *Agriculture - The Main Source of Livelihood*

Rural livelihoods in the district are predominantly based on agriculture, as reflected by its contribution to income generation, food security, and employment. More than 80% of the rural population depend directly or indirectly on agriculture for their livelihood, and most of the small-scale industries found in the district are also agriculture-based. Agriculture alone accounts for over 62% of the household income. The sector is a primary source of income for 47.9% of the population and is a secondary source for 18.5% (BIOTA, 2005).

Although the district has a favourable climate that supports various crops and most of its people depend on agriculture for their livelihood, overall its agricultural situation is negative, being often marred by low productivity, land degradation, and slow or stagnant growth. Farmers too often do not have access to the resources they need to make the most of agriculture. Agriculture's lack of vitality in the district has many causes. The following sections will attempt to explain some of them.

#### *Declining Household Landholding Sizes*

The rapid growth of population that has occurred in the district over the past few decades has been accompanied by a surge in the number of farm households. Farm households have increased from 33,149 in 1969 to 117,514 in 2006, an increase of more than 354%. This rapid growth of population and consequent increase in the number of farm households has brought at least two major changes to the agricultural landscape. The average size of household landholdings has declined from 1.5 hectares in 1969 to 0.7 hectares in 2006, due to land fragmentation through inheritance, for an average family size of 4.8 persons per household (MPND, 2001: 10), and soil fertility has continuously deteriorated due to exhaustion. As land holdings become smaller, households are frequently forced to use and skip or shorten fallow periods so that they can produce

enough to meet their ever-increasing food and income needs. In addition, the heavy rainfall the area receives makes the soil susceptible to erosion.

Land exhaustion and soil erosion, coupled with inadequate soil improvement measures, have led to increased soil infertility and ultimately to low yields. The district is known for its food production deficit and is a net importer of food from the surrounding districts.

#### *Cash Crops vs. Food Crop Production*

A vast majority of the households in the northern, north-western, and southern parts of the district depend on such cash crops as sugar cane and tea as their main source of income. The introduction of sugar cane to the area in 1970s and 1980s has prompted a gradual shift from the cultivation of such traditional food crops as millet, sorghum, and maize to sugar cane, because farmers were able to earn a better income from the cultivation of the new crops. Consequently, food production went down as farmers put greater emphasis on cash-crop production and allocated all their land to sugar-cane farming.

This overemphasis on cash-crop production, combined with falling prices and declining terms of trade for cash crops, has brought challenges to these rural households. In addition, the price of the farm inputs supplied by sugar-cane companies on credit has often been kept high, and delays have occurred in both harvesting the product and in payment. Many small-scale farmers have therefore been forced to venture into other activities, usually casual wage-labour in the plantations and urban centres, as a no food-no income situation has prevailed.

#### *Infrastructure and Access to Services*

Infrastructure is the backbone upon which most development activities flourish. It plays a key role in facilitating development through the expansion of livelihood options and contributes to poverty reduction by enabling access to a range of socioeconomic services and creating new jobs.

However, the services and facilities that are required for the diversification of livelihoods in the district are lagging behind required levels. Although three out of four people live in rural areas, access to services remains mainly restricted to the few urban centres, and most of the rural areas are under-served in terms of basic social and economic services. For example, most of the road networks are composed of dry-weather roads and are in poor condition. As a result, agricultural production areas are not connected to major consumption centres. The three high-potential areas of Shinyalu, Kabras, and Navakholo divisions are not accessible all year, preventing farm produce from being delivered to market on time and farm inputs from reaching the farms.

Credit services are also limited in the district. The existing credit services are concentrated in the district's cash-cropping areas and are often provided by sugar companies in the form of farm inputs. In other areas, these services are not only limited, but most of the households lack the necessary collateral to access them. For example, in order to qualify for credit from the Agricultural Finance Corporation (AFC), the main credit provider, households are required to have at least five acres of land for food crop production and at least two acres for industrial-crop farming. In addition to the size, or value, of the land, households are also required to produce title deeds to qualify for credit. However, most of the households do not have the title deeds for the land they use and do not have access to credit services. Thus, the poor households resort to private moneylenders who normally charge high interest rates.

The availability, quality and affordability of basic social services, particularly education and health, present a challenge for the district's rural households. In some areas where schools and health-care centres exist, the quality of the services is below standard, whereas in areas where the quality of the services is better, most of the households are unable to pay. Access to these basic social services determines the livelihood status of the households, as poverty is linked to poor health and lack of education, and vice versa, among many other things. However, thanks to the government's policy of free primary education for all, most children are able to go at least to primary school, except those who cannot afford to buy school uniforms.

The coverage of rural electrification programmes is significantly low. Farm households do not use electric appliances, as most rural centres do not have electricity. Reliance on charcoal and firewood as a major source of energy poses a challenge to forest conservation.

### *High and Rising Poverty Levels*

The geographic distribution of poverty in Kenya shows that 56% of the population in Malava constituency, 63% in Lurambi, 68% in Shinyalu, and 72% in the Ikolomani constituency are below the poverty line, as illustrated in Map 4.1 (CBS, 2005: 36). Other studies have found that 58% of the total population in the district is below the poverty line<sup>9</sup> (MFP, 2000a; 2000b).

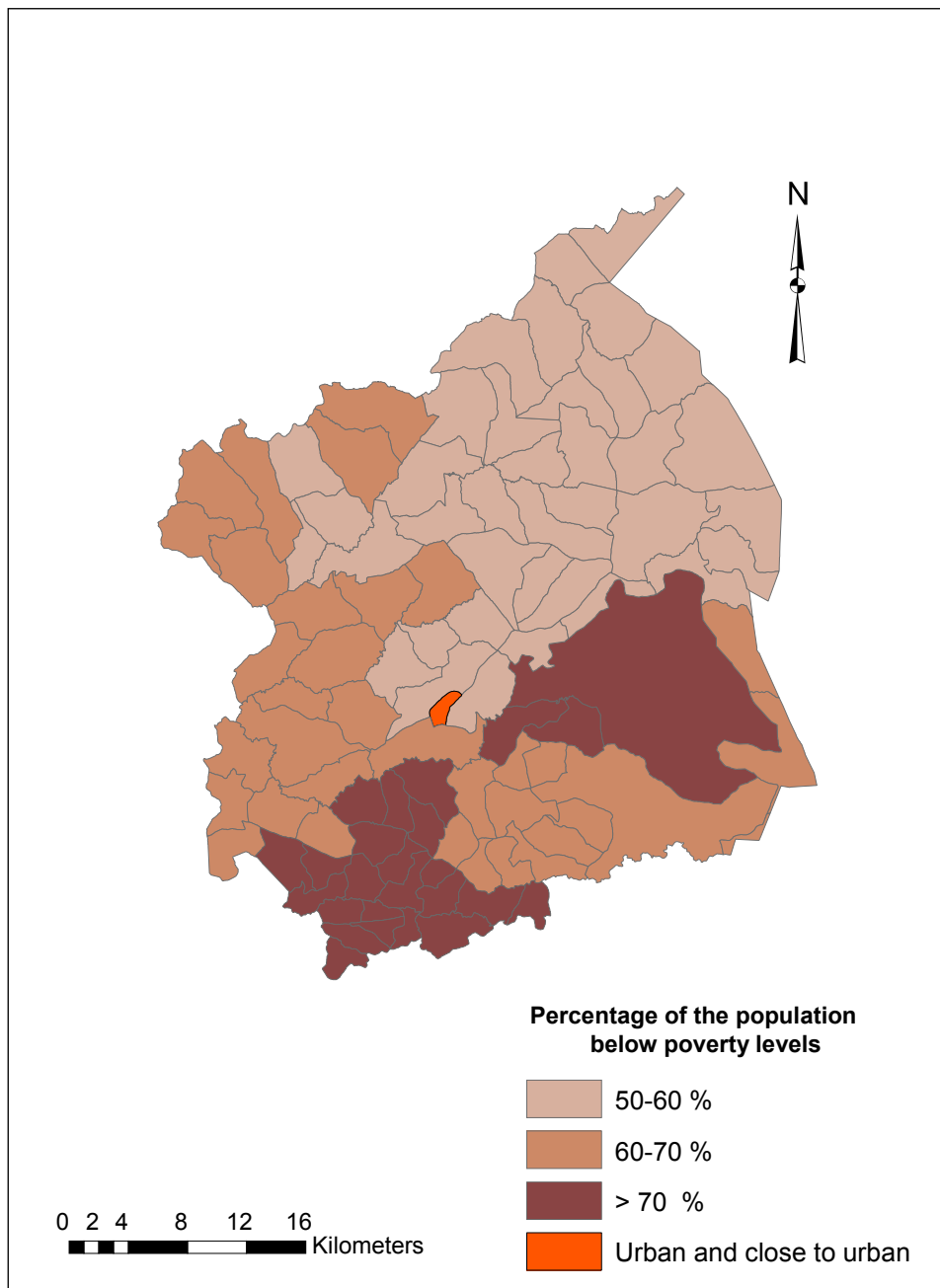
Moreover, poverty in the district has been worsening. The welfare-monitoring surveys of 1994 and 1997 indicated that 52% and 58%, respectively, of the total population lived below the poverty line. They also indicated that the depth of poverty has increased, the condition of the poor being worse in 1997 than it had been in 1994 (MFP, 2000: 40-41). The presence of high and increasing poverty levels indicates the vulnerability of rural livelihoods in the district.

The main causes of poverty in the district are rapid population growth and a lack of corresponding growth in productivity, due to small landholding sizes, low access to farm technologies, lack of credit services, inadequate off-farm employment opportunities, poor accessibility, and inadequate marketing systems.

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<sup>9</sup> The poverty line was computed at 1,239Kshs per month per adult, which was assumed to be a monetary level at which minimum levels of basic food and non-food needs can be met. The poverty line is determined by taking the food energy requirement in terms of a calorie intake of 2250 calories per day per adult person, which was estimated to be Kshs 927 per adult per person per month, plus a non-food expenditure allowance estimated to be Kshs 312 in rural areas (MFP, 2000: 20-21)

*Map 4.1 Percentage of people below poverty level in the district*



*Source: CBS (2003) Geographic dimensions of well being, Where are the poor? Vol. I*

### *Policy Design and Implementation*

The role of local institutions and organisations in enhancing rural livelihood through appropriate policy guidelines and the provision of appropriate technical and financial services cannot be overemphasised. During recent decades, the government has designed and implemented a number of policies intended to enhance rural livelihoods and conserve the natural environment. Despite all its efforts, however, rural livelihoods have shown little improvement and the degradation of natural resources has worsened.

This has partly been because the processes of policy formulation and implementation have left little space for the inclusion of the community's needs, and have also failed to address inequality of access to, and control of, resources. The community's participation

in designing policies and resource management plans and their practical implementation has been limited. However, participation and gender equality lie at the heart of both sustainable livelihood development and the conservation of natural resources.

Despite the presence of a number of local government organisations, parastatals, non-governmental organisations (NGOs), and community-based organisations (CBOs) operating in the district, the capacity of these organisations to provide adequate and good-quality services that would otherwise enhance rural livelihood has been marred by technical and financial limitations. Most of the local organisations function with less than half the staff required to do the job and have critical shortages of material and financial resources. Furthermore, the organisational linkages and cooperation that exist among these institutions is insufficiently strong to bring the desired change, the programmes and activities being prevented from producing the maximum impact by being highly sectoral and fragmented.

### **Livelihood resources and assets**

Being able to identify the livelihood resources and assets that households own and control is basic for understanding rural livelihoods. This is because different types of assets are combined in various ways to construct livelihoods, and the ability to pursue a decent livelihood depends on basic tangible and intangible material and social assets that the households have in their possession (Scoones, 1999: 7). Accordingly, the following sections will review the livelihood resources and assets households in the district possess.

#### *Household Asset Status*

Although differences in asset ownership exist among households, the wealth-ranking exercise conducted in the five villages studied has identified four typical wealth groups, each having distinct asset types. The exercise has also shown that there is a considerable overlap in the definition of wealth categories across the villages. The criteria people usually use to differentiate well-being are often similar. These include landholding size, income level, the presence of non-farm employment, the number of children and their attendance in school, cattle type and number, and food availability throughout the year.

As can be seen in Table 4.1, rich households are classified as those having landholdings of more than 10 acres, having more than 20 cattle of local breed and five or more of improved breed, having a salaried job, hiring non-family labour throughout the year, sending all of their children to school beyond primary level, and feeding their family well throughout the year. Families with medium wealth are classified as those having less of all these assets than the rich ones. They own three to four acres of land and five to 10 local-breed cattle, hire non-family labour seasonally, send all their children to school, and feed their families throughout the year. Families classified as poor or very poor possess few or none of the assets that rich and medium-wealth families own. These categories are characterised by having less than an acre of land, having either no cattle or one or two local-breed cattle, having many children who do not go to school beyond the primary level, being unable to feed their family throughout the year, and usually venturing into casual labour with their children. While families classified as rich and medium-wealth have non-farm employment opportunities and tend to hire non-family labour, families classified as poor or very poor do not engage in non-farm employment and are distinguished by selling labour than buying it.

*Table 4.1 Wealth rank and criteria for ranking in the study villages*

Well-being Category	Criteria	% of the households				
		Buyangu	Shamiloli	Kisaina	Ivihiga market	Ikonyero
Rich	Own more than 10 acres of land, permanently employed, earn at least 100,000Kshs/month, have three to six children, own five or more hybrid and more than 20 local-breed cattle, own a permanent house (iron sheet + cemented), hire non-family labour throughout the year, send all of their children to school beyond primary level, feed their families well throughout the year, and sometimes do not stay in the village.	7	8	5	6	12
Medium	Own three to four acres of land, may be employed or not, earn about 20,000Kshs/month, own five to 10 local-breed cattle, have five to eight children, own a semi-permanent house (iron sheet and not cemented), hire non-family labour seasonally, send all their children to school, and feed their families throughout the year.	45	56	53	43	58
Poor	Own an acre of land and one or two local-breed cows, earn around 2,000Kshs/month, do wage labour, are not permanently employed, have up to 10 children and a semi-permanent house, do not send their children to school beyond primary level, do not feed or clothe their families well.	37	28	32	39	22
Very poor	Own a quarter-acre of land, have no permanent income, earn up to 200Kshs/month, have either no cattle or one local-breed cow, have up to seven children and a grass thatched house or hut, have inadequate food throughout the year, their children do not attend school at all, even the free primary schools, because of inadequate food and clothing, sometimes do wage labour	11	8	10	12	8

*Source: Field survey conducted in five villages from December - January 2006*



## Livelihood Portfolios and Constraints

Rural livelihoods are sustained through a complex and dynamic process of combining a range of activities in both farm and non-farm sectors. These activities combine to meet various household needs at various times, as the assets and entitlements of the households allow. This means that rural livelihood usually involves more than one job, more than one crop or head of livestock, and a range of enterprises and activities that suit different seasons and requirements.

Nevertheless, agriculture in the district remains the most important sector in terms of source of income for its households, contributing 62% of total household income. Self-employment in the non-agricultural sector is the second contributor at 12%, followed by casual labour at 10%, as indicated in Figure 4.1. The agriculture sector is mainly composed of cash-crop production, which accounts for 42% of total household income; food crop production accounts for 35%, and all animal husbandry accounts for 23%. Sugar is the main source of income from cash-crop production, followed by tea and coffee. Maize, beans, and potatoes, although they are in the food crop category, contribute significantly to household incomes.

The district faces critical challenges in meeting the needs of its ever-growing population adequately. While the existence of protected forest land in the district and policies restricting use of the *Shamba* system (non-resident farming in the forest) limit the expansion of agricultural land into previously uncultivated areas, agricultural intensification is limited by low levels of agricultural technology, the capacity limitations of local institutions, and the rural households' asset constraints, among other factors. The main constraints described by the households during focus group discussions (FGD) are summarised below in Table 4.2.

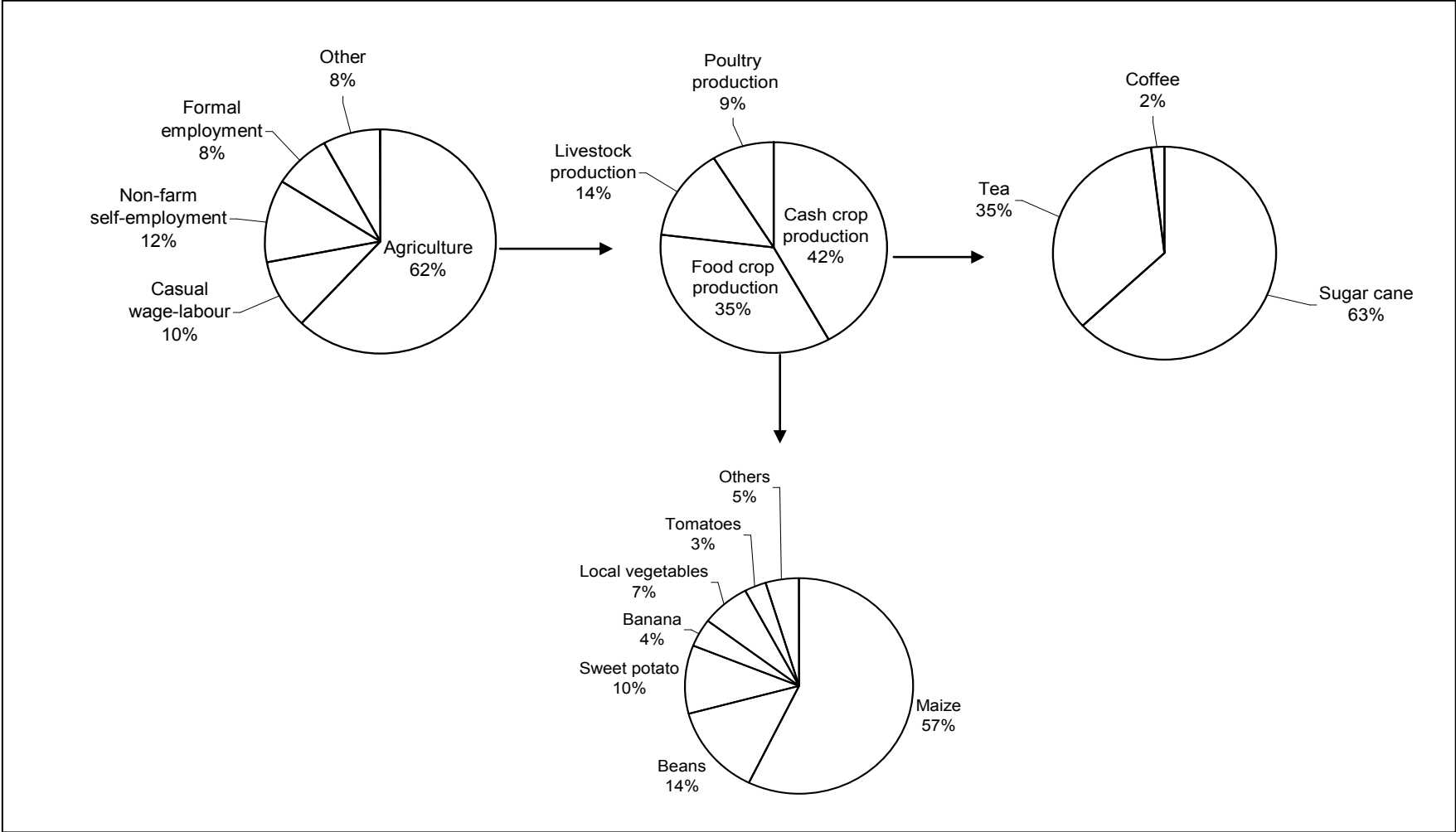
Table 4.2 The main constraints faced by major income portfolios

Livelihood source	Major constraints
Agriculture	<ul style="list-style-type: none"> <li>- Small landholdings</li> <li>- Lack of training on improved farming methods</li> <li>- Lack of credit</li> <li>- High input costs</li> <li>- Lack of pasture/grazing area for cattle</li> <li>- Lack of access to markets</li> <li>- Endemic livestock diseases</li> </ul>
Self-employment in the non-agricultural sector	<ul style="list-style-type: none"> <li>- Inadequate capital</li> <li>- Inadequate training and lack of expertise</li> <li>- Weak financial services</li> <li>- Lack of access to markets</li> </ul>
Casual wage-labour	<ul style="list-style-type: none"> <li>- Unavailability of jobs</li> <li>- Low average wage rates</li> </ul>
Other	<ul style="list-style-type: none"> <li>- Declining natural resources</li> <li>- Legal restrictions of access to forest resources</li> </ul>

Source: Household survey, 2005; 2006

These constraints prevent the diversification of livelihood portfolios and confine many households to extracting increasing amounts from the natural-resource base. This creates greater environmental degradation.

Figure 4.1 Household income sources in the district



Source: Field survey, 2005; 2006

### **Livelihood zones in the district**

A livelihood zone is a geographical entity comprised of areas whose people share similar socioeconomic characteristics and whose livelihood is more or less similar. Of course, all people are not the same. The people in a livelihood zone can have huge disparities in income, expenditure, educational level, and so forth, but they do live near one another, interact frequently, and develop similar methods for making the most of their natural and social environments.

Livelihood zones can be defined spatially by such criteria as their predominant income sources, consumption patterns, land use types, and coping strategies. To avoid too many categories and complexities geographers usually use one or two classifications to define a zone. Livelihood zoning is relatively easier in rural areas with some kind of homogeneity in what people do to support their well-being. The relatively high dependence on natural-resource-based activities and the presence of only a limited number of economically viable agricultural activities in a given area makes zoning easier in a rural setting than in large urban areas where people travel long distances for a living.

Livelihood zones are preferable as units of spatial analysis than are administrative zones because the spatial organisation of resources and human activities does not follow administrative units. Administrative boundaries can also emerge due to social and political processes, and can be arbitrary. Considering administrative units as a sampling frame for socioeconomic analysis is much less efficient than such rational sampling frames as livelihood zones, which can provide an efficient basis for spatial analysis. However, one cannot disregard the relevance of administrative boundaries, since planning and other decisions are made on the basis of administrative areas, not livelihood zones. It is important that wherever possible livelihood zones should follow such lower-level administrative boundaries as sub-locations in their definition.

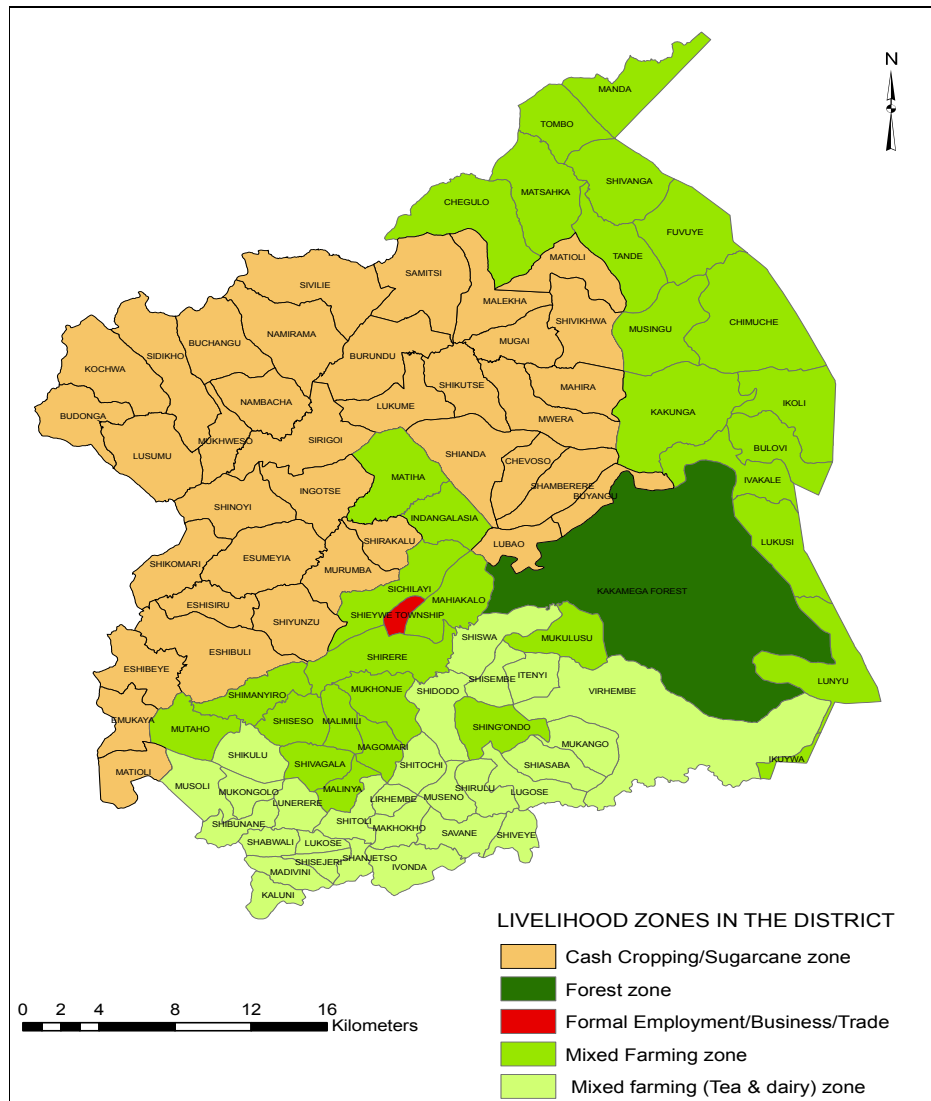
There is a growing interest in using livelihood as a means of analysing a wide range of socioeconomic issues. The method was initially used for the purpose of emergency response and disaster mitigation, and has been refined and extended to other uses. The underlying principle of using livelihood analysis and the growing interest in it rests upon the observations that information about a given area or community can only be properly interpreted if it is put into the context of how people live, or their livelihoods, and also that interventions can only be designed in ways appropriate to local circumstances.

Livelihood zoning was conducted in the district by the United Nations' World Food Programme's (WFP's) Vulnerability Analysis Unit in January 2005 for disaster-early-warning and planning purposes. They performed the exercise by collecting data through interviews and secondary sources. During the survey, data on the main sources of income and food, crop production, livestock ownership, labour patterns, expenditure patterns, market areas, settlement and migration patterns, and so forth were collected, the livelihood zones being mapped based on the survey's results.

The results indicated that patterns of livelihood clearly vary from area to area, and also showed five distinct livelihood zones in the district, as indicated in Map 4.2 below. These are a cash-cropping livelihood zone, specialising mainly in the cultivation of cash crops, particularly sugar cane, which covers most of the northern and north-western parts of the district, a forest livelihood zone covering Kakamega Forest and those of its immediate surroundings that rely most on the forest for their livelihoods, a formal employment and business zone comprising mainly Kakamega township and its immediate

suburban areas which are dominated by non-agricultural activities, a general mixed-farming livelihood zone covering the north-western part of the district and characterised by the mixed farming of crops and animals, and another mixed farming zone covering the southern part of the district which is dominated by the mixed farming of tea and dairy.

Map 4.2 Livelihood zones in the district



Source: WFP, Vulnerability Analysis and Mapping (VAM) unit (2005)

### 4.3 Rural land use and land management in the district

This section presents aspects of land management, particularly rural land use, access to land, land tenure, and ownership in the district with the objective of identifying the main factors affecting biodiversity in Kakamega Forest. Outlining effective land management also requires knowledge of current land use, patterns of management, and the identification of bottlenecks that affect sustainable practices.

## Rural land use in Kakamega District

Land in the district is the most important resource from which the households generate food and income for their families. The majority of rural people are mainly engaged in activities that are entirely based on land. Such land-based activities as agriculture, forestry, and grazing are fundamental to sustaining rural livelihoods.

### *Farming Practices and Types of Crops Grown*

The farming practices conducted by the households in the area can be grouped into four major types. These are mono-cropping, or the cultivation of a single crop, mixed cropping, or the cultivation of several crops together, mixed farming, or crop cultivation combined with livestock rearing, and agro-forestry, or the growing of trees combined with the cultivation of crops. Mono-cropping, predominantly sugar cane farming, is practised in Lurambi, Navakholo, and the western parts of Kabras division. A large proportion of the farmers in the district practice mixed cropping, mainly in the eastern parts of Kabras and Ileho divisions, the northern part of Ikolomani division, and in Kakamega municipality. These households usually mix maize and beans in their fields. The households in southern parts of Ikolomani and Shinyalu divisions are usually engaged in mixed farming of tea and livestock. Agro-forestry is limited and practised by only a few households in the district.

*Table 4.3 Types of crops grown and contribution to food and income*

<b>Crops grown</b>	<b>Contribution to the households' income (Rank)</b>	<b>Crops grown</b>	<b>Contribution to the households' food (Rank)</b>
Sugar cane	1	Maize	1
Maize	2	Beans	2
Beans	3	Sweet potatoes	3
Sweet potatoes	4	Bananas	4
Bananas	5	Local vegetables	5
Local vegetables	6	Kales	6
Kales	7	Tomatoes	7
Tomatoes	8	Onions	8
Onions	9	Sorghum	9
Tea	10	Finger millets	10

*Source: District agriculture office, 2005*

Sugar cane, maize, beans, and sweet potatoes are the four most important crops cultivated in the area in terms of their contribution to household income. Maize and beans are the major food crops as well as significant sources of income for the households, as shown in table 4.3. The overall contribution of tea to household income in the district is low, as its cultivation is restricted to farmers who have relatively large landholdings in the Shinyalu and Ikolomani divisions. Maize, beans, and sweet potatoes are the three main staple foods, respectively, and are grown both for cash income and household consumption.

### *Forest Resource Use and Management*

The district is endowed with rich and diverse forest resources. Most of these are state owned, but private ownership is on the rise due to the increased involvement of the private sector in forest management. There are a few private forests on privately owned land and small pockets of community forests in some areas. However, no inventory has been taken concerning the size of these forests. The gazetted forest area covers 23,777.3 hectares, or 17% of the total area of the district.

Kakamega Forest contributes to rural livelihoods in several ways. It is the main source of wood and non-wood products for the households surrounding it. It is a source of income for the poor households and a source of supplementary income for the better-off ones. Some of these benefits are derived in the form of either licensed use or illegal use. The community has a few rights to harvest forest products, which are limited to household consumption, except in the nature reserves, where no human activities other than protective, educational and research, and tourism are permitted. Illegal use takes the form of charcoal burning, cutting tress, or hunting, at the risk of being arrested and fined.

The quality and quantity of the forest resources in the district have been changing. Since the gazettelement of Kakamega Forest in 1933, forest land has been excised for resettlement and the construction of schools and clinics. More than 752 hectares of forest has been cleared for the construction of these services. In addition, the increasing importance of forest products for the livelihoods of the ever-growing population and the deterioration of farm production and limited off-farm opportunities are posing a threat to the existence of the district's forest resources.

### **Determinants of rural land use**

A number of factors determine rural land use in the district. The most dominant factors, however, are population growth, the introduction of new crops, poverty levels, institutional arrangements, and the accessibility to services. The rapid growth of population and the consequent demand it has created has forced the district's households to use their land intensively in order to meet their growing demand for food and other services. This includes the skipping or shortening of fallow periods and the inadequate use of soil improvement measures due to the inability to access improved technologies.

Access to improved farming technologies is limited due to poverty and limited institutional support, such as limited training on improved methods and limited provision of extension services. In addition, most of the rural areas have limited transportation services. Getting access to farm technology supply centres is a challenge for most of the households, particularly during the rainy seasons, ultimately leading to over-utilisation and land degradation. However, areas which are close to the urban centres and along the main roads use their land intensively in the production of such local vegetables as tomatoes, cabbages, and potatoes that can be sold in the nearby markets to raise additional income.

### **Land tenure and ownership**

Before the advent of colonialism, the people owned land communally and the laws governing land ownership were bound by traditional rules. Land held through the traditional system is known as tenure by customary right. Colonialism brought a new land ownership system in which some land was designated as crown land, which could only be

accessed through the colonial government. The owners had to be registered and issued with a land certificate called a title deed. Such land was either freehold or leased for a definite period, after which it reverted back to the government. The registration of a person as a proprietor of the land vested in that person either the absolute ownership of that land, together with all rights and privileges relating thereto, called freehold tenure, or gave a right to use the land for a definite period, usually subject to the payment of a fee or rent, and also subject to certain conditions relating to the usage and development of the land, called leased tenure (Waiganjo & Ngugi, 2001: 1).

The land tenure system in Kakamega district is mainly freehold, with pockets of trust land under the county and municipal councils. Land in the district is owned by either by the government, county councils, or individuals. The government land, formerly known as crown land and which includes national parks and forest lands, constitutes 17% of the total land area. Trust land consists of areas that were occupied by native people during the colonial period and has not been taken over by the government. This land has not been consolidated or registered by individuals or under group names. It is governed by local authorities designated as councils. Trust land owned by county councils, awaiting registration that will bring it to freehold or leased-land status, comprises 4% of the district, and privately owned land comprises 79% of the district's land area. However, most of the people who claim to own land do not have the title deed. They only have the customary right.

### **Land right and access to land**

Land is a limited yet vital resource and the right to have access to it is basic for rural livelihoods. However, access to land in the district has two main features that cause difficulties. These are that there is a high degree of disparity in land ownership, ranging from 0.25 acres to over 25 acres per household, and that there is gender disparity in access to land.

Land inheritance practices in the district follow a patrilineal inheritance system through which land has traditionally been transferred only to male members of households. The system obviously favours men and has contributed to the deterioration of women's welfare. On average, three women from each household have been denied access to land through inheritance.

Out of all the households interviewed by this study, 90% of the respondents inherited land from their parents. As shown in table 4.2, the number of families who shared the land varied from one to seven members of the household. On average, about four male members of a household inherit their household's land.

### **Land use planning in the district**

The practice of land-use planning in the district has two main features. It is mainly practised to ensure land-use control in urban areas. Land-use planning is mainly restricted to the allocation of urban land for specific uses and the enforcement of legal restrictions about its use and development. Land-use planning also involves the technical assessment and allocation of land for certain uses, based on expert decisions. However, these types of top-down sectoral-planning approaches have failed to deliver sustainable land management, as they do not consider the needs of the communities.

The top-down, sectoral, expert-led and urban-focused land-use planning commonly practised in the district has therefore not been able to tackle the worsening land degrada-



tion in the district, particularly in rural areas. There is a missing link in land-use planning. This is a platform for negotiation between all stakeholders – farmers, government, and others – so that a sustainable land-use strategy can be practiced.

#### **4.4 Rationales of the research and problem statements**

The main goal of this study is to promote the sustainable conservation of biodiversity in Kakamega Forest through improved land-management practices. In order to achieve this goal, it has made certain assumptions. These assumptions intend to keep the research in focus, as well as provide the framework for analysis.

##### **Rationales of the research**

The research is based on six rationales. These are also linked to the conceptual framework of the study.

##### *1. Participation is a Prerequisite for the Sustainable Conservation of Biodiversity*

Participation is a process of enabling and empowering people to share, analyse, and enhance their knowledge of life and conditions, and to plan, act, monitor, evaluate, and reflect (Chambers, 2006: 3). Participation empowers local communities and opens the gate for sharing inputs and responsibilities among stakeholders.

The active participation of communities in matters that affect their livelihood enhances the sustainability of biodiversity conservation initiatives. Participation gives communities a stake in the process, enhances belongingness, and builds confidence among stakeholders. Biodiversity conservation initiatives should involve all the stakeholders around the forest in order to make them sustainable.

##### *2. Direct Benefits Enhance Participation*

The conservation of biodiversity is linked to its usefulness to the people and to their awareness of it. The participation of communities in conservation programmes can be enhanced if they derive some direct benefits from them. These might come in the form of the sharing of revenues from ecotourism, employment opportunities, or user rights and privileges to forest products. The direct benefits communities receive and the assurance that these benefits will continue to trickle down are highly likely to bring a positive orientation towards the conservation of the resource base.

##### *3. Population Growth Affects Land-Use Patterns*

Rapid population growth and increasing demand for resources and services pose a threat to the future of biodiversity. More people require more food, more income, and more energy. This determines how land should be used for different purposes.

Land use can be influenced by many factors, such as markets for goods, technological change, and income inequality. However, all these factors are to some extent influenced by the rate of population growth, which means that population growth is the driving force behind land-use changes.

##### *4. Land-Resource Degradation Intensifies in the Absence of a Land-Use Plan*

Land-use planning is a decision-making process that "facilitates the allocation of land to the uses that provide the greatest sustainable benefits" (FAO, 2003: 10). It is a process

based on dialogue amongst all stakeholders for allocating land according to the best option, which is the one most likely to meet the needs of the people while safeguarding resources for the future.

Land-use planning is a tool for rehabilitating and conserving land resources. In situations without land-use plans which are being implemented in an orderly manner, land-resource degradation intensifies. Land-use planning is also a mechanism to control, redress, and even reverse land-resource degradation.

### *5. The Security of Biodiversity Depends on Household Livelihood Security*

Biodiversity plays an important role in the livelihoods of poor people. It is a source of food, income, medicine, fodder, and much more. The rural poor often have no alternative to reliance on their localities' biodiversity. Nearly all their households' subsistence and income-earning activities in the district involve the use of biodiversity. As a result, poor households tend to overexploit these resources to meet their livelihood demands; poverty threatens biodiversity through the overexploitation of biodiversity.

Unless the issue of poverty is tackled, biodiversity conservation measures are extremely unlikely to succeed, as the lack of livelihood options continues to undermine conservation efforts. Therefore, the security of biodiversity depends on household livelihood security. Biodiversity cannot be secured in an insecure livelihood system.

### *6. Biodiversity Can Support Poverty-Reduction Efforts*

Biodiversity is a resource. It provides a range of non-tradable and tradable commodities which are important sources of income for its beneficiary households. These commodities can be used in poverty-reduction programmes and in building sustainable household livelihoods. As indicated in the previous section, secured and sustainable household livelihoods are a prerequisite for the sustainable conservation of biodiversity. However, enhancing the role of biodiversity in poverty reduction requires mainstreaming biodiversity in poverty-reduction strategies and developing mechanisms for its implementation.

## **Problem statement**

Kakamega Forest is one of the richest biodiversity locations in Kenya. It is home to many endemic, rare, and threatened plant and animal species. The forest represents the last remnants of equatorial rainforest in the country. However, the forest's biodiversity is extremely threatened by human activities, particularly those arising from ever-increasing population growth and consequent land use changes.

The district's population has been growing at a rate of 2.12 percent per annum, while its average population density had reached more than 400 people per square kilometre by the start of this century (MPND, 2001: 8-9). Kenya's national average population density for the same period was 58 persons per square kilometre. As a result of this rapid growth, the number of households looking for land for various purposes, as well as the number of mouths to be fed, has increased drastically in the last few decades, and the demand for land for other social services, especially in the immediate vicinity of the forest, has increased. However, the average size of household landholdings has declined, mainly through land inheritance, as young men have sought ownership rights. Even though population size and density by themselves mean little (Ehrlich & Ehrlich, 1990: 38), the natural environment is under stress sustaining the growing population, given present socioeconomic and technological levels.

While agriculture is the main source of livelihood for most of the district's rural households, agricultural productivity remains notably low, mainly due to the small land holdings and the limited options for expanding farmland into previously uncultivated areas due to the existence of protected forest and of policies restricting the *shamba* system. Agricultural intensification through improved agricultural technologies is also limited, due to inadequate household capabilities to access such technologies and the limited capacity of local institutions to provide adequate services to otherwise enhance the capacity of rural livelihoods. Hence, the households' responses to the situation often undermine the natural environment.

Furthermore, the level of poverty in the district is high, even higher than the national average. More than half of the households fall below the poverty line of 1,239Kshs per month per adult (MFP, 2000: 20-21). Besides low agricultural productivity, off-farm employment options are also limited. Poor households are therefore forced to rely on Kakamega Forest as their main source of food, income, and energy while the better-offs depend on it as a supplementary source of their household needs. However, rural households' over-reliance on Kakamega Forest for meeting their food and non-food demands has caused deterioration and loss of biodiversity there.

The current institutional frameworks and forest management strategies practiced in the district have been unable to resolve the conflict between livelihood needs and conservation needs, as the main actors for sustainable biodiversity conservation have been excluded from the process. The involvement of all stakeholders, particularly the communities surrounding the forest, in the formulation and implementation of conservation activities is a prerequisite for sustainable biodiversity conservation.

The conflict between meeting the household needs and conserving biodiversity in the forest requires a comprehensive approach. It is vital to have an effective land management plan in place that can enhance the rural households' capacity to meet their needs adequately, as well as conserve the land resources for in the present and the future. In the absence of an effective land-management plan and its orderly implementation, the conflicts will intensify and result in increased land-resource degradation and eventual loss of biodiversity.

### **Research objectives**

The main goal of this study is to study the socioeconomic factors that have led to the loss of biodiversity in Kakamega Forest and to outline an alternative approach that would be more likely to ensure the sustainable conservation of biodiversity there. This research specifically seeks to assess the context and characteristics of rural livelihoods in the district, to study rural land use and land management and explore their implications for biodiversity in Kakamega Forest, to explore how rural livelihoods and land management are related and to assess their implications for biodiversity in Kakamega Forest, and to design a livelihood-based approach to biodiversity conservation and management in Kakamega Forest and to outline a framework for practical action.

### **Research questions**

The following research questions emerge from the above objectives. What are the major factors that affect rural livelihoods in the district? How is rural land used and managed in the district and what implications does this have on biodiversity in Kakamega Forest? How are rural livelihoods and land management related, and how does that affect biodi-

iversity in Kakamega Forest? How does better land management improve rural livelihoods and thereby contribute to the sustainable conservation of biodiversity? How is biodiversity important to rural livelihoods? How can the role of biodiversity in the rural household economy be enhanced? How can biodiversity best be maintained in a sustainable way in a changing human environment? What are the requirements and preconditions for this?

#### **4.5 Summary of key issues**

- The existing land management practices such as the current land use, access to land and ownership in the district does not promote sustainable conservation of biodiversity in Kakamega Forest.
- Population growth, rising poverty levels and a consequent lack of options, institutional constraints, and poor spatial linkages have brought land-use change by threatening the forest's biodiversity.
- Sustainable land management based on the intention of both improving agricultural productivity and increasing spatial linkages for the purpose of enhancing rural livelihood options is vital not only for reducing the pressure on Kakamega Forest, but also for contributing to the sustainable conservation of biodiversity in the forest.

## **5 Research Design and Methodology**

### **5.1 Introduction**

This chapter deals with the design of the study and the approaches followed in collecting and analysing the data. It also briefly explains the organisation of the research's findings. It will also briefly highlight the scope of the research, its limitations, and how the limitations have been handled in the course of the study.

### **5.2 Research design and approach**

A research design can be conceived as a plan for the structure and strategy of an investigation to be followed in order to obtain answers to research questions or problems. It is a procedural plan adopted by the researcher to answer questions validly, objectively, accurately, and economically (Kumar, 1996: 74). A research design is a logical sequence that connects the empirical data to the study's initial research questions and ultimately to its conclusions (Yin, 1994: 19). The design of a study can be looked at from three perspectives. These are the number of contacts, the reference period, and the nature of the investigation.

Based on the number of contacts with the study population, this study follows a cross-sectional study design aimed at discovering the effects of land use and livelihood on biodiversity by observing a cross section of the population at the time of the study. However, in order to examine patterns of change over time, secondary data and the study population's own accounts during discussions have been taken into consideration. From the time-frame perspective, this research investigated its variables' past trends, studying them whilst focusing mainly on present conditions, and forecasts of what would be likely in the future given the continuation of present trends, therefore following a retrospective-prospective study design. In terms of the nature of investigation, this study followed a case study approach.

#### **Justification of the research approach**

The choice of a research approach depends on the type of research questions posed, the extent of control an investigator has over actual behavioural events, and the degree of focus on contemporary as opposed to historical events (Yin, 1994: 4). Accordingly, this research used the case study approach for its investigation for the following three reasons.

First, it is a strategy for studying contemporary events preferable to such other social science research methods as surveys, experiments, or archival studies (Yin, 1994: 8). Population, land, livelihood, and biodiversity conservation issues are the current issues and challenges facing the district and beyond. Next, the complexity of rural-livelihood and land-management issues requires the selection of context-specific cases and in-depth analysis of the issues under investigation. The case study approach provides an opportunity for an intensive analysis of details that can be overlooked by other methods. Finally, the case study approach has a distinct advantage when how or why questions are being asked about a set of contemporary events over which the investigator has little

or no control (Yin, 1994: 9). In the study of how land use affects biodiversity when the investigator has no control of the behaviour, unlike with experiments, the case-study approach is the most appropriate research method. In addition, case studies allow an investigation to retain the holistic and meaningful characteristic of real-life events.

Although concern exists that case studies provide little basis for scientific generalisation, it is still possible to make analytical generalisations beyond the case studied without enumerating frequencies in a statistical generalisation (Yin, 1994: 10). This study involves both descriptive and explanatory case-study research approaches. It presents a complete description of a phenomenon within its context, being a descriptive case study, and also analyses cause-and-effect relationships by explaining which causes produced which effects, being also an explanatory case study (Yin, 1993: 5).

### **Quality of the research approach**

The quality of any social science research design can be judged by using certain logical tests. The most commonly used tests used to establish the quality of any empirical social science research design are internal validity, external validity, and reliability.

#### *Internal validity*

Internal validity refers to the process of ensuring that the causalities established are inherent not accidental. Therefore, validity checking mechanisms have been taken to ensure that another researcher may arrive at the same results using the same data collection instrument. These include triangulation, i.e. collecting the same data from different sources such as key informant interview, institutional interview and focus group discussion; and checking the data against existing body of literature.

#### *External validity*

External validity refers to the condition under which the processes identified and the conclusions drawn can be generalised beyond the cases and are capable of being widened to include other areas, i.e. beyond the immediate case study. Although one of the limitations of case study research is whether the findings can be generalised beyond the immediate case study, generalisation can be made if the context that can influence actions in the case study area can be replicated (Yin, 1984: xx).

The interrelationship between the variables selected in the study, i.e. rural livelihood, land management and biodiversity could be replicated in some other areas and this shows that the findings of the study can be generalised in a wider context and the research could be widely be used.

#### *Reliability*

Reliability refers to the conditions under which similar results and conclusions can be produced by another researcher given the same data used by the first researcher or the same researcher at different occasions. In order to make the study reliable, data has been collected into two rounds. In the first round, pilot study with a view of identifying the main issues in the research is done followed by a second round survey was done. Although the main purpose of the second round survey was to fill the data gaps, it was also possible to compare data collected during the first survey with the second round.

### 5.3 The research process

The logical sequence of the research involves formulating the research problem, conceptualising the research design, constructing instruments for data collection, collecting the data, analysing them, and organising the report.

Figure 4.1 shows how this study starts with the conceptualisation of the research problem in the framework of the BIOTA project, followed by a review of the existing body of knowledge in the field. The second phase includes the defining of the research design, the collection of the data, and analysis. It also relates to the research issues identified in the first phase of this study. The third phase organises the research findings resulting from the analysis in relation to the research problems and the study's theoretical and conceptual frameworks. It also presents the recommendations arising from the research findings and the relevance of the findings for theoretical and practical perspectives.

The process of linking the empirical data with the research questions is primarily based on grounded theory as a strategy for a qualitative research (Glaser & Strauss, 1977: 3). It is designed to collect, code, and analyse the data systematically to address the research questions and provide a generalised mode of conceptualisation. The process involves both deductive and inductive reasoning.

#### Data collection methods

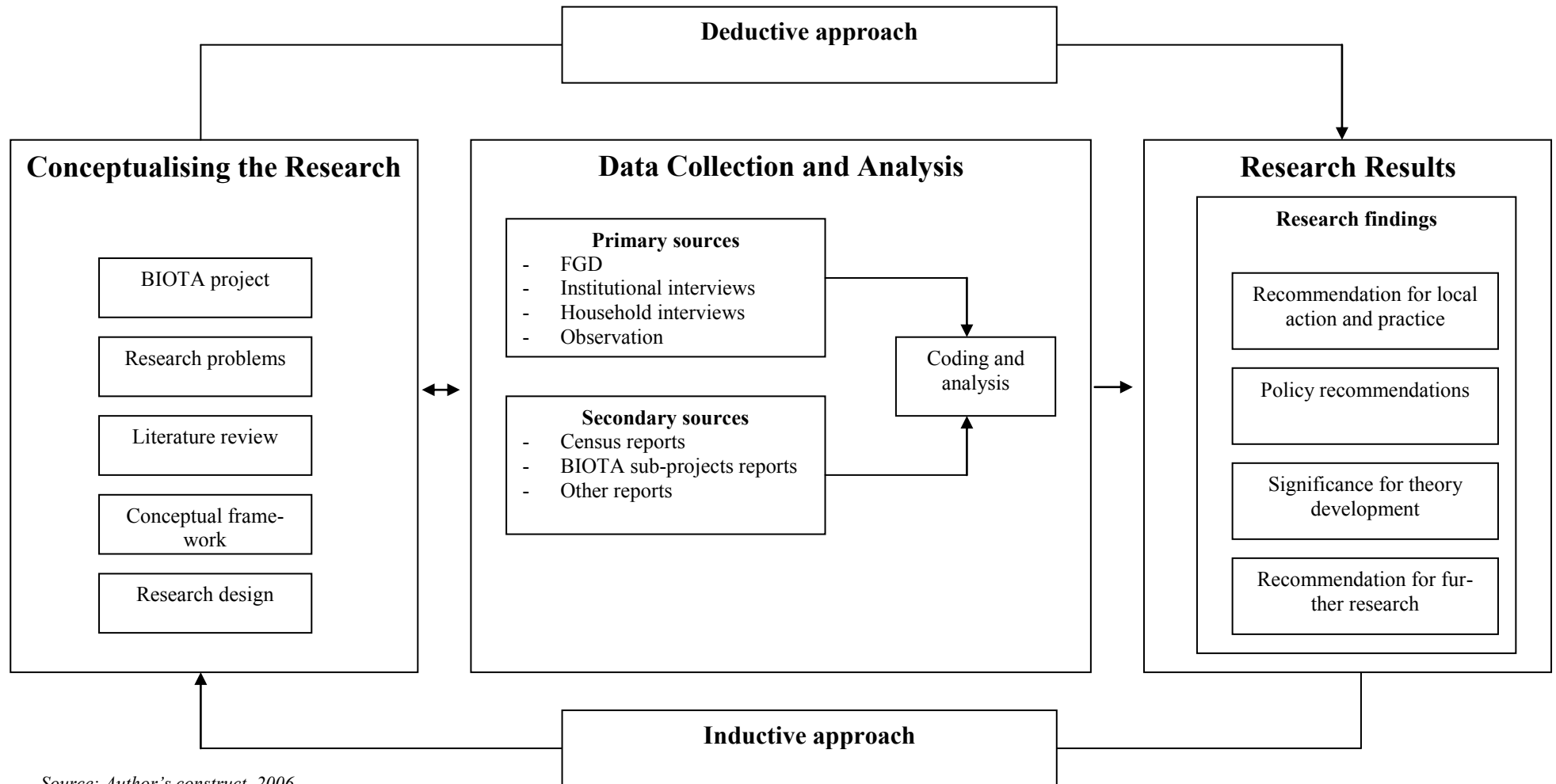
This study relies on both primary and secondary data. The primary data were collected through household interviews, institutional interviews, focus-group discussions, and personal observations, while the secondary data were collected through a review of the relevant published literature, a review of various government publications, and sources from the Internet.

This study's findings are mainly based on qualitative data. This is because the research primarily deals with complex social processes and linkages that have to be addressed using exploratory approaches. Also, qualitative approaches are inherently multi-method in focus, and the combination of multiple methods and perspectives adds rigor, breadth, and depth to an investigation (Marshall & Rossman, 1999: 57). However, some proponents of this method resist the traditions of qualitative research. They emphasise the measurement and analysis of causal relationships and variables that are rigorously examined or measured in terms of quantity, amount, intensity, or frequency, rather than processes (Denzin & Lincoln, 1994: 4)

Nevertheless, quantitative and qualitative data are both simply different ways of addressing the same set of issues, and there is 'no fundamental clash between the purpose and capacities of both methods and can be used as supplements' (Glaser & Strauss, 1977: 20). Accordingly, this study has benefited from the advantages of both the qualitative and quantitative approaches.

Field data were collected in two rounds. The first round was from September 2005 through January 2006, and the second round was from December 2006 through January 2007. The researcher and one assistant were involved in the data collection process. The assistant's role was mainly in translating to and from the local language and in arranging the place and time of focus-group discussions.

Figure 5.1 The research process and major phases





### *Institutional Interviews*

The primary data collection began with institutional interviews. Interviews were conducted with the officers in charge of district government departments, NGOs, and CBOs operating in the area using a semi-structured questionnaire. A total of seven government departments and four NGOs' officers were interviewed. The main objective of conducting the institutional interviews was to obtain a general picture of the district and to sort out the issues specifically related to the research objectives. In addition, interviewing elites could yield valuable information due to the positions they held in the institutions.

### *Focus-Group Discussion (FGD)*

The institutional interviews were followed by FGDs in selected villages to get a deeper insight into the identified research problems. FGD is a form of group interview that capitalises on group interaction in order to generate data. The method initially comes from marketing research and has been adapted to social science and applied studies. It is often used as a quick and convenient way to collect data from several people at a time. Its flexibility allows exploring unanticipated issues as they arise during the discussion (Marshall & Gretchen, 1999: 114).

The advantage of the method lies in encouraging the participation of people who are reluctant to be interviewed. It also does not discriminate against illiterate people. The method is particularly useful for acquiring an understanding of people's knowledge and experiences and helps to examine what, how, and why people think or behave in a certain way by creating a supportive environment for the participants to express their views (Kitzinger, 1994: 16).

The focus group discussions were initially held in 15 villages around Kakamega forest with selected groups comprised of five to 10 people, using a semi-structured question guide and a checklist. The topics covered during the discussion included issues related to land use, rural livelihoods, forest resource use, household challenges, and how these are being handled and their implications for Kakamega forest. The groups in the discussions included farmers, employed workers, women, youth, and unemployed people selected from the community. The times and places for the discussions were arranged with the village elders or the chiefs in advance. The focus group discussions were often held in open fields in the villages and usually lasted for from one to two hours. The participants in the discussions were not paid for their time and opinions, but refresher drinks were served in some cases during the discussions to keep those discussions alive.

The first round of fieldwork revealed that there was minimum connection between the forest and the communities that exist far from it. Thus, the focus group discussions and the household surveys were limited to villages within two-kilometres of the nearest edge of the forest. One village from each livelihood zone was selected randomly for both the focus group discussions and the household surveys.

### *Household Interviews*

After conducting the focus group discussion during the first survey, the researcher conducted a wealth-ranking exercise to stratify the community into groups and identified the four categories of rich, medium, poor and very poor households in each village, based on each community's own criteria. The researcher then randomly selected and interviewed one household from each category from each village in the study area, a

total of 60 households. In the second round of fieldwork, the survey focused on five villages in close proximity to the forest, interviewing a total of 201 households.

The household interviews covered general livelihood issues, as well as issues particularly related to household land use, access to land, forest resource use and management, local participation, gender issues, household challenges, how these challenges are being handled, and implications for Kakamega Forest. The household interviews were a step toward increasing the level of detail obtained by the data-collection process, providing details of the livelihood situation, land management, individual household decisions, and their implications for forest biodiversity. The survey involved a semi-structured list of questions allowing for both qualitative and quantitative data collection.

### *Observation*

Observation was one of the data-collection methods used for the study. Systematic noting and recording of issues related to the research was done at different times and the recorded information was used as data input for the research. Depending on the context, the researcher used checklists to note and record detailed aspects of the issues observed. In some cases, more general descriptions of the issues observed were noted and checklists were not used.

The observed issues were the households' land uses, such as their amount of land, the condition of the land, the crops grown, their housing type, on farm forestry, their type of cattle and grazing methods, their distance from the forest and the forest's condition. This method was supplementary to the previously discussed methods of data collection.

### *PLUP Workshops*

Participatory land use planning workshops were conducted in the Shamiloli village that borders part of the forest under forestry department's jurisdiction and Buyangu village bordering the forest on KWS jurisdiction. Participatory methods and exercises were conducted with the communities in these villages. The result revealed important information in respect to how the communities view the forest, its management, and their own perceptions of socioeconomic life in their own villages. The results from the workshops were used as background information for this research.

### *Review of Relevant Literature and Publications*

This study reviewed literature relevant to the subject to retrieve secondary data for its research. The reviews of the literature also brought clarity and focus to the research problem and helped in formulating the study's theoretical and conceptual background. Reviewing the literature also improved the methodology and broadened the researcher's knowledge of the subject under study. The literature review covered various published books, government ministries' publications, district development plans and reports, BIOTA project publications, and other research outputs.

### **Data sources**

The main sources of data were mainly the community members, specifically the men, women, men's groups, women's groups, youth, farmers' groups, and traders in the study villages. Local leaders, chiefs, sub-chiefs, village elders, civil servants, officers of

government departments, and NGO and CBO staffs operating in the district also provided primary data.

This study retrieved secondary data from published and unpublished sources. The published reports include population census results and analytical reports for 1969, 1979, 1989, and 1999, poverty reports volumes I, II, and III (2000), and geographic dimensions of well being, volumes I (2003) and II (2005).

Unpublished local government reports, the district development plans for 2002 through 2008, and the National Environmental Management Agency (NEMA) annual plans and reports have provided background information for the research. The WFP vulnerability analysis and livelihood maps were also used as a sampling frame for the study.

### **Data collection levels**

The research covered three levels of data collection. These were the district level, the village or settlement level, and the individual household level.

#### *District Level Data Collection*

At the district level, the researcher conducted institutional interviews with the various district officers to assess the major issues in the district related to the research problem. The district-level data collection mainly focused on secondary data which indicate such patterns and trends as patterns of population growth, trends in land use, aspects of land management, poverty trends, and trends in forest resources.

Accordingly, this study reviews the trend in population growth over recent decades. Based on this trend, it projects the population of the district for the next 20 years, based on certain valuable assumptions, and forecasts the implications of the projected population on land management for the same period, using certain assumptions.

#### *Community/Village Level Data Collection and Selection of the Settlements*

The community/village level data collection initially covered 15 villages surrounding the Kakamega Forest based on livelihood zone of the district. The district has five livelihoods zone according to a survey conducted by WFP in early 2005 as indicated in Map 5.1.

During the first survey, three villages were randomly selected from each livelihood zone as venues for conducting focus-group discussions. One was close to Kakamega Forest, or less than two kilometres from the nearest edge of the forest, one was a medium distance from the forest, or between two and five kilometres from the nearest edge of the forest, and one was far from the forest, or more than five kilometres from the nearest edge of the forest. Accordingly, 15 villages were selected from the five livelihood zones for focus-group discussions.

This classification of the villages as close, medium-distance, and far based on distance from the edge of Kakamega Forest was purely relative. The assumption was that the human impact on biodiversity in Kakamega Forest would likely be higher in villages close to the forest than those far from it.

However, the analysis of the results of the first round of field data collection showed that the interaction between the forest and the communities that exist away from it is minimal. The second field survey therefore concentrated only on those five villages close to the forest, or one village from each livelihood zone less than two kilometres from the forest.

*Household-Level Data Collection, Sampling Method, and Sample Size*

The household-level data collection mainly involved a survey of 60 households during the first round and 201 households during the second survey using a questionnaire that consisted of both open-ended and closed-ended questions. The method followed was a stratified sampling technique based on the following procedure. One sub-location bordering Kakamega Forest was selected from each of the five livelihood zones by simple random sampling. From each livelihood zone's sub-location selected, one village less than two kilometres from the nearest edge of the forest was randomly selected for investigation. The pilot survey conducted earlier had indicated that two kilometres or less is the distance at which the interaction between the forest and the community was high and the impacts could be clearly seen. For each of the five villages selected, systematic random sampling selected 201 households to be considered for the interview from the total of 635 households in the five villages. The head of the household, if present, or the oldest adult who lived there and who was available, was interviewed.

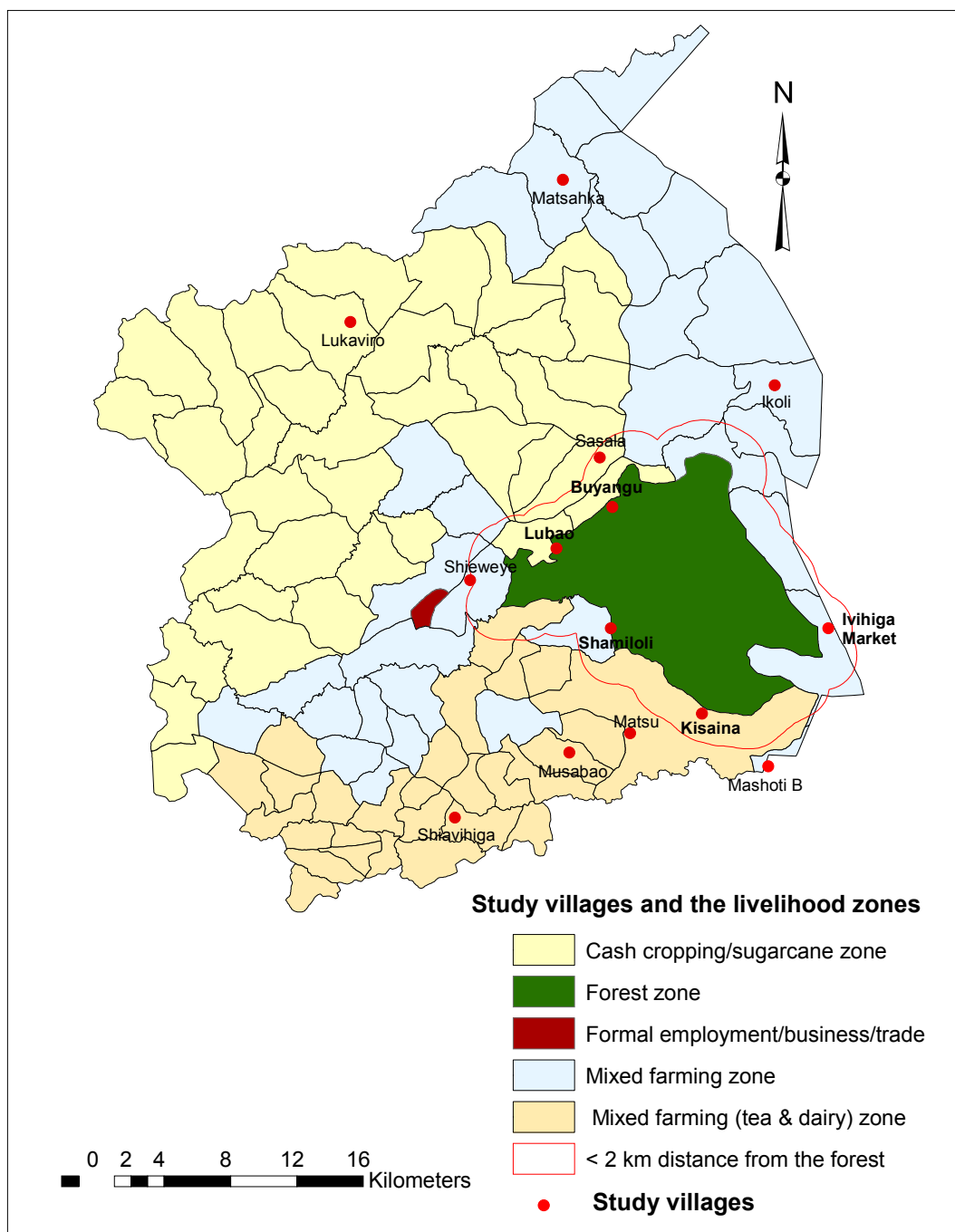
*Table 5.1 Number and percentage of households interviewed*

<b>Sub-location</b>	<b>Name of the village studied</b>	<b>Number of sub-villages</b>	<b>Total number of households in the village</b>	<b>Sample size</b>	<b>Percentage</b>
Buyangu	Buyangu area		109	35	32.1
Mukulusu	Shamiloli		204	64	31.3
Virhembe	Kisaina		52	17	32.6
Lunyu	Chiviga area		150	47	31.3
Lubao	Ikonyero		120	37	31.6
<b>TOTAL</b>			<b>635</b>	<b>200</b>	<b>31.4</b>

*Source: Field survey (2006)*

The households interviewed were chosen at regular intervals. Every third household was interviewed from the sampling frame in the villages. The number of the first household to be included in the sample was chosen randomly from one to three and every third household was interviewed until the sample size was reached.

Map 5.1 Focused Group Discussion (FGD) sites



Source: Based on WFP-VAM, 2005

#### 5.4 Framework for inquiry and analysis

This research is based on the analysis of rural livelihoods and land management in the district with the objective of exploring their implications for biodiversity and of suggesting an alternative method of biodiversity conservation in Kakamega Forest. The research therefore tackles issues from rural livelihood perspectives as its entry point.

### **Livelihood zone as a sampling frame**

Livelihood zones are used as a framework for analysis. The WFP's Vulnerability Analysis Unit (VAM) conducted a livelihood zoning exercise in Kakamega district in early 2005. The purpose of the exercise was to compile a background reference for disaster early warning and district development planning activities. It was done by collecting secondary data from district departments, NGOs, and CBOs, and through interviews with the people and community leaders. Data on main sources of food, source of income, crop production, livestock ownership, labour patterns, expenditure patterns, market areas, major settlements, and migration patterns were collected and the livelihood zones were mapped based on the results of the analysis (WFP, 2005). This study borrowed these livelihood zones as its framework for the analysis of rural livelihoods in the study area, using them merely as a sampling frame for the selection of discussion sites and the selection of individual households within the livelihood zones for interview.

### **Rationale for livelihood zones**

As mentioned in an earlier section, a livelihood zone is a geographical entity comprised of areas which share similar social and economic characteristics. There are various ways of defining a livelihood zone, such as predominant income sources, consumption patterns, land uses, and coping strategies. To avoid too many categories and complexities one or two classifications are usually used to define livelihood zones.

There are two basic assumptions in livelihood zoning. In any one livelihood zone people share the same socioeconomic and cultural characteristics and their livelihoods are similar. Of course, in a livelihood zone all people are not the same. They can have huge disparities in income, consumption, educational level, and so forth, but in a livelihood zone people live near one another, interact frequently, and develop similar methods for making the most of their natural and social environments. Also, livelihoods can be spatially defined, especially in rural areas, where there is some kind of homogeneity in what people do to support their wellbeing.

Livelihood zoning is easier in rural areas and livelihood zones are effective units of analysis in a rural setting. The relatively high dependence on natural-resource-based activities and the presence of diverse agro-climatic zones in many areas means only a limited number of agricultural activities are economically viable in a given place, making zoning easier. In large urban areas where people travel long distances for a living, livelihood zoning may not be applicable. (WFP, 2005)

### **Livelihood zones and discrete boundaries**

A livelihood zone is a discrete spatial entity. However, spatial characteristics are often continuous in space, with a gradual transition from one spatial characteristic to another. For practical reasons, researchers draw clear boundaries between adjacent spatial characteristics, generating discrete spatial entities or livelihood zones based on the average value of certain variables. A village on a map cannot belong to two or more livelihood zones at the same time if clear criteria are used for zoning. Livelihood zones are discrete representations of a continuous variable.

### **Livelihood zones and administrative units**

Livelihood zones are different from administrative zones and are preferable as units of spatial analysis because the spatial organisation of resources and human activities or livelihoods in space does not follow administrative units. Moreover, administrative boundaries emerge due to social and political processes and can be arbitrary.

Considering administrative units as a sampling frame for agricultural, socio-economic, or any spatial variables is much less efficient than such rational sampling frames as livelihood zones. However, one cannot disregard administrative boundaries since service provision and other decisions are made on the basis of them, rather than livelihood zones. Therefore, it is important that livelihood zone boundaries follow lower-level administrative boundaries wherever possible. The lowest administrative units, such as sub-locations, can be used as building blocks for defining livelihood zones.

In the district, patterns of livelihood clearly vary between areas, depending on such local factors as agro-climate, soil fertility, access to markets, and distance from the forest. As indicated by Map 4.1, the district's livelihood zoning exercise shows five major livelihood zones. These zones are used as the framework for the selection of villages for study and analysis.

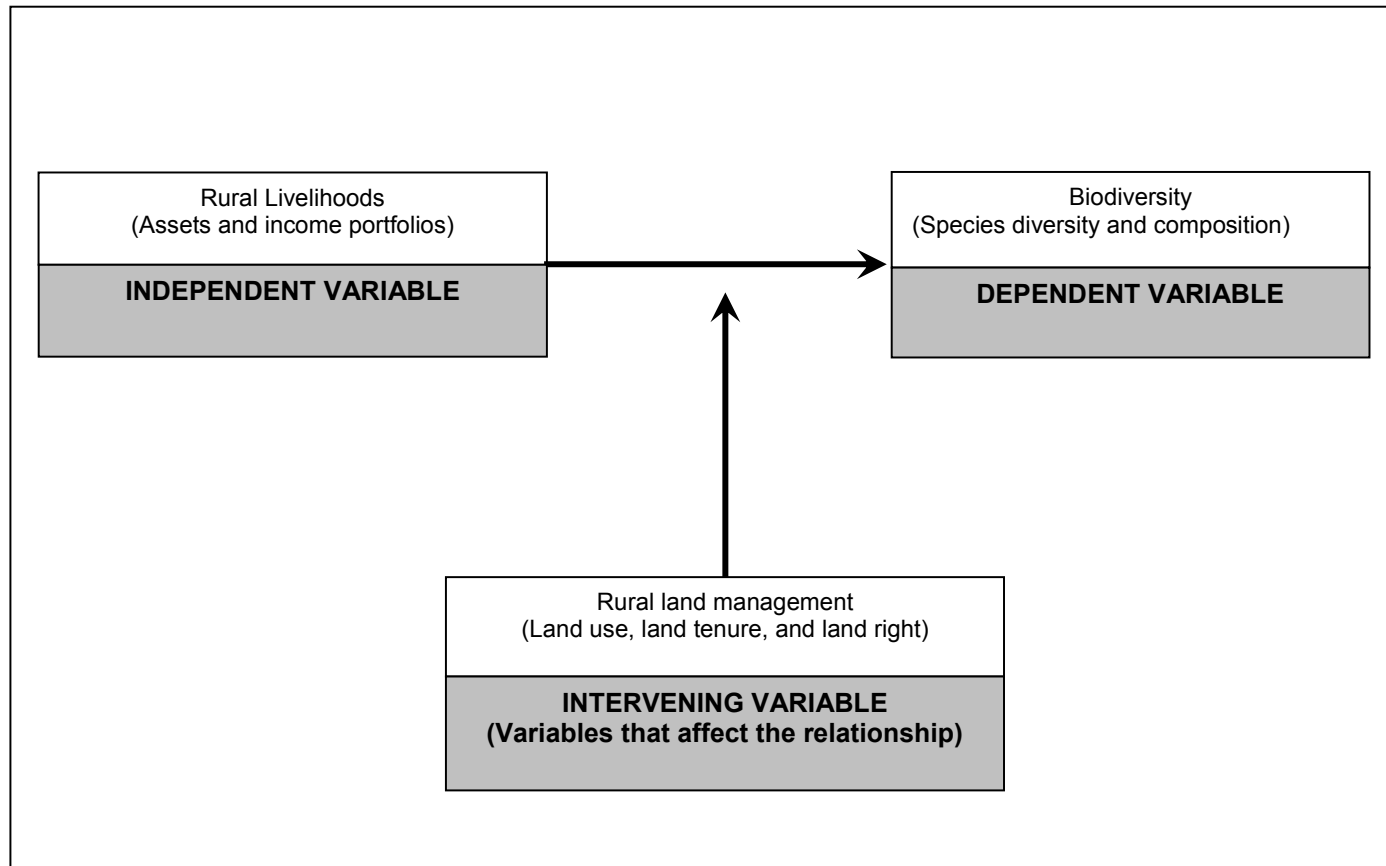
## **5.5 Unit of inquiry and analysis**

This study deals with a single case, the Kakamega Forest in western Kenya. Its primary units of inquiry are the communities surrounding the Kakamega Forest. Sub-units of analysis emerge within the primary unit of analysis from the research propositions. Accordingly, the individual rural households that constitute the communities or villages surrounding the forest emerge as the sub-units of inquiry and analysis of the research.

### **The study's variables**

From a study-design perspective, this research investigated land management as an independent variable, rural livelihoods as an intervening variable, and biodiversity as a dependant variable. This study therefore explores how land management determines biodiversity in Kakamega forest, particularly through rural livelihoods, and how better land management simultaneously improves rural livelihoods and biodiversity in the forest. The relationship is displayed in Figure 4.2 below.

Figure 5.2 The study variables



Source: Author's construct, 2006)



### **Data analysis**

The analysis of the data basically followed grounded theory in order to address the study's propositions. Grounded theory is a strategy for qualitative research. The main theme of the method is the discovery of theory from data systematically obtained from social science research (Glaser & Straus, 1967: 3). The data analysis followed the organising of the data, generating categories, identifying patterns, recombining the evidence, searching for alternative explanations, and putting them in the report.

In addition, this study used a computer statistical data analysis programme called SPSS (version 12) for the analysis of the quantitative data from the household surveys. The district's population projection for the next 20 years also involved a computer program called DEMPROJ (Stover & Kirmeyer, 2005), and a computer-aided mapping technique called ARCGIS 9 to draw the administrative map and analyse various socio-economic attributes of the district.

### **5.6 Summary of key issues**

- The case study approach is used for the investigation of issues.
- The research is based on both qualitative and quantitative data.
- The research involves both deductive and inductive reasoning during the process.
- The research deals with land management as an independent variable, rural livelihoods as an intervening variable, and biodiversity as a dependant variable.

## 6 Biodiversity Conservation under Increasing Population and Rising Poverty Levels

### 6.1 Introduction

This section analyses in detail the effects of rapid population growth on land resources in Kakamega Forest and the role of poverty in exacerbating the situation. Its first part reviews demographic change in the district over the past several decades and analyses its implications for land use and biodiversity; the second part analyses the impact of human poverty on biodiversity in Kakamega Forest.

### 6.2 Review of demographic change in the district

In Kenya, population censuses have been taken in 1948, 1962, 1969, 1979, 1989, and 1999. A time-series analysis of such components of demographic change as fertility, mortality, and migration over the past six censuses indicates that the total population of Kakamega district has more than doubled, from 238,483 in 1969 to 603,422 in 1999. The average population density has grown constantly from 170 persons per km<sup>2</sup> in 1969 to 433 persons per km<sup>2</sup> in 1999. The Kakamega municipality had 1485 persons per km<sup>2</sup> in 1999, the highest in the district, while Kabras division was somewhat more sparsely populated at 352 persons per km<sup>2</sup>. The following sections will briefly review the main components of this demographic change as reported in the census.

#### Fertility

The 1969 and 1979 censuses reported that the total fertility rates in the district were notably high, at 8.7 and 7.1, respectively. This has led to a high growth rate of the population during this period due to a combination of high fertility levels and decreases in mortality resulting from improvement in the health and socioeconomic status of the population (NCPD, 2000). Fertility declined during the 1989-1999 inter-census period, mainly due to intensified family-planning campaigns that led to a reduction of fertility rates from 6.4 in 1989 to 5.1 in 1999, and to the negative impact of the HIV/AIDS pandemic (MPND, 2001).

Sixty-two percent of the women in the reproductive age group indicated during the field survey that they use at least one contraceptive method. The contraceptive prevalence rate (CPR), which is the percentage of currently married women aged 15 to 49 who are using any method of family planning, was 39% in 2003, according to the Kenyan Demographic and Health Survey (KDHS, 2003). This shows that the district has a much higher CPR than the national average.

The survey also found that the most common contraceptive methods used by the women of this group are injectables (38%), pills (23%), and Norplant (12%). However, knowledge of family planning methods is high, with more than 95% of the women of reproductive age knowing at least one contraceptive method. Contraceptive practice, however, is much lower due to inadequate access to family-planning services, a lack of the preferred contraceptive method, which is usually injectables, and many women's desire to have more children.

Nevertheless, a slight decrease in the population growth rate occurred between the 1989 and 1999 censuses, mainly due to a decline in fertility.

## Mortality

Mortality levels in the district have been higher than the national average. However, this trend has been declining since 1969. Infant mortality fell from 224 per 1000 live births in 1969 to 100 per 1000 live births in 1999. The 1989 census reported a constant decline in infant mortality, along with an increase in the level of mothers' education and a relative improvement in access to health services.

An urban-rural difference has existed in the level of infant mortality in the district, with infant mortality about 15.3% higher in rural areas than in urban ones (CBS, 1996).

*Table 6.1 Selected demographic indicators of the district<sup>10</sup>*

Indicator	1969	1979	1989	1999
Population	238,483	350,709	423,509	603,422
Density (Pop./km <sup>2</sup> )	170	251	301	433
Percent urban	2.7	4.2	6.7	9.4
Inter-census growth rate	3.2	3.1	2.98	2.12
Crude birth rate/1000 population	53.9	51.6	51.0	44.0
Total fertility rate	8.75	7.1	6.4	5.1
Infant mortality rate/1000 births	224	193	169	100.6
Life expectancy at birth - Male	46.9	51.8	55.4	50.1
- Female	51.2	54.3	57.7	56.6

*Source: Central Bureau of Statistics, 1979, 1994, 1996, 1999, 2002*

## Migration

Analysis of the census results shows that the district experienced a significant number of lifetime out-migrants from 1979 to 1999. During that period, more than 20% of the population born in the district moved away. Most of the out-migrants were male, the gender ratio being 120 (CBS, 1979, 1996). However, in the 1999 census the number of female out-migrants increased significantly due to females' improved enrolment in schools.

Most lifetime out-migrants have been young adults who move to urban centres and cash-crop growing areas in search of employment opportunities, with 91.5% of out-migrants in 1979 and 44.2 % in 1989 belonging to the 15-to-64 age group (CBS, 2004).

Generally, the trends for lifetime in-migrants, out-migrants, and net migrants in the 1979, 1989, and 1999 censuses follow the same pattern. The district had negative net migration, which means it experienced more out-migration than in-migration (CBS, 2002). This is because the causes of migration in the district remained the same over that time.

The 1989 census reported a high tendency for the district's migrants to move within the province, with the highest proportion of in-migrants, 23.6%, being from Western Province, and the lowest, 0.1%, being from North Eastern Province. This can possibly be explained as a tendency of people to migrate to areas with similar cultures. Migration

<sup>10</sup> **N.B.** Some divisions of Kakamega District were taken to form Vihiga District in 1991, Butere/Mumias District in 1994-95, and Lugari District in 1998. Kakamega District was therefore formerly larger in area than it is today. The population data are estimates for the present Kakamega District from the respective census reports.

within the district is usually motivated by people searching for arable land or employment in urban centres (CBS, 1989).

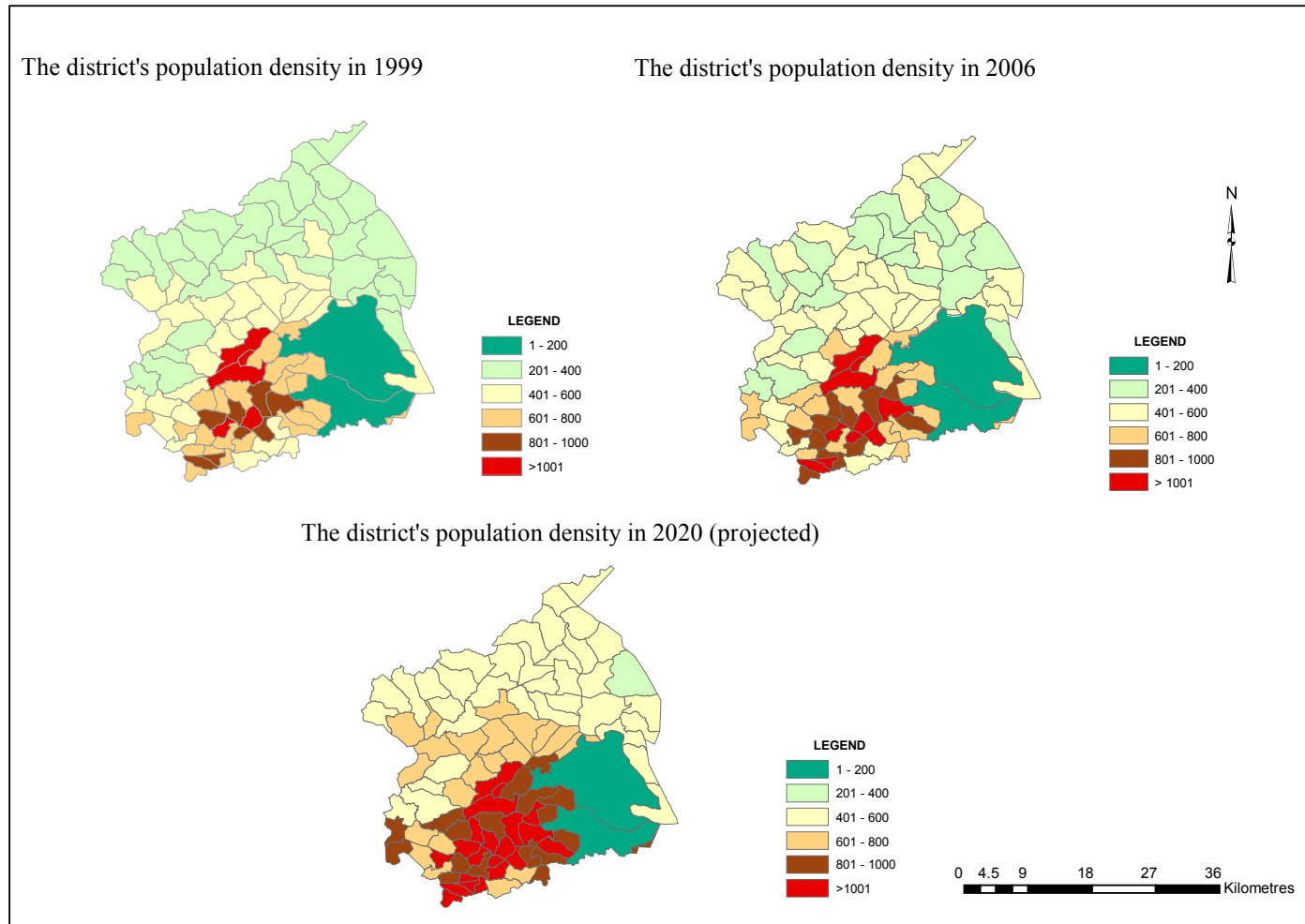
The 1999 census reported that the district experienced a net loss in males aged 10-39. Data by place of birth shows that the majority of the out-migrants went to Nairobi and Mombassa. The out-migration of young adults may be related to the expectation of better social and economic services in these urban centres. The census also reported that the district experienced net gains in children aged birth to nine, and in males aged 40 and older. This may be due to a tendency of rural-urban migrants to send their children back home for education and for unsuccessful job seekers or pensioners to return (CBS, 2004).

### **Urbanisation**

Although the majority of the district's population lives in rural areas, the proportion of the district's urban population increased from 2.7% in 1969 to well over 9% in 1999, with the number of urban centres with a population of more than 2000 increasing from one in 1969 to three in 1999. However, the district's inter-census annual urban-population growth rate of 2.2% has been far below the national average of 5.2%.

The emergence of small-scale industries in some parts of the district, mainly related to sugarcane processing, and the presence of both the provincial and district administrative headquarters in Kakamega town have contributed significantly to the urbanisation process (NEMA, 2004). The opening of Malinde Muliro University at Kakamega town in 2003 has also attracted students and employees from neighbouring districts and has contributed to the high population growth of the district in general and of the urban population of Kakamega town in particular.

Map 6.1 Comparison of density levels for the years 1999, 2006 and 2020



Source: Author's construct based on population density of the district from 1999 census and author's projection for 2006 and 2020

### 6.3 Population growth, land use, and biodiversity

The district has experienced rapid population growth over the past 30 years, its total population reaching 671,400 by 2005. With an area of 1395 km<sup>2</sup>, its population density is 481 people per square kilometre.<sup>11</sup> Adults aged 15 to 49 years old constitute 48.2 % of the total population, and children aged less than 15 years old constitute 43.2 %.

The arable land per capita has declined as a result of this rapid population increase, from 0.49 hectares in 1969 to 0.33 hectares in 1979, 0.27 hectares in 1989, and 0.19 in 1999. It then fell to 0.18 hectare by 2005, and is expected to continue to decline as the population increases. The average household's agricultural holding has also been continuously declining. This decline in average landholding size resulting from population growth has overstretched the district's carrying capacity, considering its present level of technology, market linkages, and institutional arrangements.

The effects of population growth on land use in the district can mainly be observed through agricultural intensification, livelihood diversification, and migration as it is explained in the following sections.

#### Agricultural intensification

In response to population pressure, the people in the district commonly practice agricultural intensification by planting food crops twice a year, with maize during the long season of March to August, and vegetables and potatoes during the short season of August to November. This intensification is mainly labour-based. Capital and technology-based intensification of agricultural production is hampered by the inability to buy modern farm inputs, an inadequate agricultural extension service, inadequate credit services, and poor road conditions.

Due to the small size of landholdings and the large size of families, land tends to be kept busy throughout the year for the purpose of producing enough food for domestic consumption. Farmers usually skip or shorten fallow periods, leading to soil infertility and land exhaustion. During the past 10 years, 79% of the households interviewed had not fallowed their land and 70% reported that they had a serious problem with soil fertility, mainly related to land exhaustion and the inadequate use of fertilisers.

The decline in land fertility, coupled with the limited use of agricultural technology, an inadequate agriculture extension service, restrictions on non-resident farming, and the protection of plantations under the *shamba* system has led to declining agricultural production in the district since the 1980s. This study's survey found that 64.5% of the responding households reported producing insufficient crops to feed their families throughout the year.

Rapid population growth in the district has therefore caused deterioration in the land's fertility and a decline in food production, as the adoption of technological changes in agriculture has not kept up with population growth. Table 6.1 shows that the production of such main food crops as maize and sorghum has deteriorated in the district over the last decade as the total population has continued to increase.

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<sup>11</sup> Estimate for 2005 from the projected population.

Table 6.2 Food production for selected crops in the district in tonnes

Crop	Food Crop Production in tonnes per year										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Maize	29805	27096	30198	31004	29450	30320	29500	26008	27566	25355	24200
Sorghum	1680	2186	1768	1200	880	884	483	526	703	660	540
Cassava	2960	2946	1798	1132	962	425	210	332	202	206	206

Source: District Agriculture office records, 2005

### Agricultural diversification and change in cropping patterns

Rapid population growth has also brought diversification to the agriculture practised by smallholder farmers. The presence of protected forests and policies restricting the use of the *shamba* system of non-resident farming in the forest has limited the expansion of agricultural land to previously uncultivated areas. In order to meet the growing demand for food and to ensure household food security, more than 80% of the district's smallholder farmers diversify their crops. This involves mainly the growing of food crops, vegetable gardening, and animal production. Some households which have money lease land and cultivate it in order to raise more food and income.

Furthermore, a gradual shift has taken place from the cultivation of such traditional crops as millet, cassava, and sorghum to maize and beans, particularly since the 1980s. This is primarily because the growing areas are small and fragmented and therefore prevent the efficient growing of millet and sorghum, as the yield per unit of area for these crops is lower than that of maize and beans. A farmer can get five to six bags of maize per acre, while millet yields only two bags per acre. Also, millet and sorghum do not mix in the field. Millet grows alone. Maize and beans can be intercropped. In addition, millets and sorghums are easily attacked by birds and pests in the field, and cassava by mice, leading farmers to avoid planting the traditional crops.

The biological resources inherent in the traditional crops are therefore under threat from the households' preference for modern crops due to the comparative advantages modern crops offer.

### Livelihood diversification

The district's rural households have developed wide income-earning portfolios to meet the growing demand for food and other services caused by the population's growth. However, livelihood diversification is limited to land or labour-based activities, as limited non-farm employment opportunities are available for the households' members. Discussions with the communities studied showed that agriculture is the main source of livelihood for 73% of the population in the area. Small-scale trading and non-formal employment, particularly such casual employment as digging farm land, weeding, harvesting, plucking tea leaves (in the tea-growing areas), harvesting sugarcane, and fetching water by women and children are the primary source of livelihood for 10.5% of the households. However, these jobs are seasonal, and their wages are minimal, mostly 50 Ksh per day. Most of these households could not feed their families and had to resort to additional means of raising income, particularly from forest-based activities.

In areas close to Kakamega Forest, households use forest resources to supplement their needs through either licensed or illegal means. The community has few rights in

harvesting forest products, which is limited to household consumption, except in the nature reserves of Buyangu, Kisere, Yala, and Isecheno, where no human activities other than protective, educational and research, and tourism are permitted. Households located close to the forest usually collect firewood, grass, and some other forest products and sell them in the villages and nearby markets to get additional income. However, the rules governing community-use rights are unclear to most of the households. Such illegal use of forest products as charcoal burning and hunting are also practised as ways of diversifying household income in most of the villages surrounding Kakamega Forest.

Asked if they had accessed any forest product from Kakamega Forest during the previous 12 months, 88% of this study's respondents replied that they had. Furthermore, 80.5% reported that the major reason for going to the forest was firewood collection, 45.5% harvesting medicinal plants, 41% charcoal burning, 40.5% cattle grazing and watering, 15% fruit collection, 10% seedling collection, 10% recreation, 8.5% hunting, and 1% wild honey collection.

The people who collected products from the forest either used them for household consumption or sold them in their villages and nearby markets to raise additional income. Accordingly, 49.2% of the households sold forest products, while 50.8% responded that they used them for their own household consumption. The income households earned from the sale of forest products ranged from 1000 Ksh. to 3000 Ksh. per month.

The households' reliance on Kakamega Forest to meet their economic needs and to fill gaps created primarily by population growth and a lack of corresponding increases in agricultural productivity has serious implications for its biodiversity, as the excessive demand of the households surrounding the forest for biological services has put it under threat. The decline of the forest's size and composition over the past several decades indicates that its biodiversity is being threatened and reduced.

## **Migration**

This study's survey found that 64.5% of the district's households' land produces insufficient food to feed the whole family throughout the year because the holdings are small, exhausted, and infertile, while the size of the families is relatively large, with an average of six people. Other income opportunities are also limited, which forces younger family members to migrate to other areas, mostly urban centres, in search of employment. Two patterns of migration can, therefore, be found.

### *Rural-urban migration*

Rural-urban migration is particularly common among the younger members of the households. Each household has at least one and a maximum of six members who live off the farm. On average, three members of each household have migrated to other areas in search of employment opportunities.

Males constitute 65% of the migrants and females 35%. The migrant population's mean age is 30 years. The survey also reveals that 65.9% of the district's out-migrants were married, 28.5% single, and 5.6% widowed, divorced, or separated. Their preferred destinations were Nairobi (38.2%), Eldoret (8.9%), Kakamega (7.3%), Kisumu (4.1%), Mombassa (4.1%), and Nakuru (3.3%).

Most migrants had relatively low educational levels prior to migration, with 48.8% having only a primary education, 27.6% having attended secondary school, and only 5.5% having college-level training. That means that 37.4% of the migrants could only



be employed as casual labourers and 21.1% at low-paying, unskilled jobs, with salaries of 800 to 1000 Ksh. per month. However, they managed to remit an average of 500 Ksh per year back to their households, which have resulted in some investment in agriculture, education, and other small scale enterprises.

However, the responding households reported that most of the remittances were used to purchase foodstuffs. The survey asked the members of households who had received remittances during the previous 12 months how those remittances had been used. In response, 49% reported using the money to buy foodstuffs, 38% for medical expenses, 13.5% to buy agricultural inputs, 11.5% to pay school fees, 7.5% to repay loans, and 2% to pay rent for leased land.

While migration has contributed to households by providing them with additional income, it has also brought them some challenges. Asked if migration has affected their livelihood, 84.3% responded that migration had affected them positively by bringing in additional income and removing the cost of supporting those who had migrated, while 15.7% responded that it had affected them negatively, complaining about cost of migration and a shortage of labour to work the farm. In the absence of labour to work the farm, the only option to supplement household needs has been to obtain forest products from Kakamega Forest.

Nevertheless, in 53.9 % of the households an average of two people was planning to migrate to other areas in search of employment.

#### *Rural-rural migration*

Rural-rural migration also takes place, both within the district and with adjacent districts. However, this type of migration is less common and mostly limited to marriages, although some farmers who have money have migrated to the Rift Valley region and the Lugari settlement area to buy land and settle, as land is relatively cheaper and more available in those areas.

## **6.4 Demographic trends and scenarios**

The previous sections explained the district's historical population growth trends and their implications for land use and biodiversity in Kakamega Forest. The following sections assess the population's social and economic requirements for the coming 20 years by projecting the district's total population growth up to 2019, based on the 1999 census data. The projection anticipates future changes in population size and characteristics based on historical trends and patterns. The computer programme DEMPROJ has been used for making the population projection (Stover & Kirmeyer, 2005). This study made several assumptions for these projections, which are explained below.

#### *Basic assumptions in the projection*

The basic data for the population projection are taken from the 1999 Population and Housing Census Report for Kakamega District (CBS, 1999). This study used these data as a base for projecting the population of the district from 1999 to 2019.

This 20-year projection assumes that the status quo will largely continue and that no major changes to the determinants of population growth will occur.

It assumes that the Total Fertility Rate (TFR), which is the average number of children born alive to women during their lifetimes, will decline gradually from 5.1 in 1999 to 3.9 at the end of the projection period, as the census report assumed, based on intensified family planning campaigns with consequent positive outcomes in the district.

Life expectancy is the average number of additional years a person would live if the current mortality rate were to continue. The census report calculated a life expectancy of 50.1 years for men and 56.6 for women in 1999. The assumption here is that it will increase to about 62 for men and 66 for women by 2019. The life expectancy for females is hypothesised to be higher due to an expected reduction in maternal mortality, or deaths related to child bearing, which is also a result of decreased TFR.

Adequate migration data are unavailable. However, scattered information about migration in the district has been consolidated and incorporated into the projection, which uses the average lifetime net migration and the gender ratio from 1979 to 1999 to estimate future annual net migration, resulting in an estimate of 2,736 male and 2,510 female net migrants per year for the projection period, with a gender ratio of 109.

According to a report from the district health office, the first Kenyan HIV/AIDS case was identified in Kakamega in 1984, so that is assumed to be the initial year of the epidemic. The prevalence of HIV/AIDS in the district was estimated to be 7.1% in 1999 and 14% in 2005. These figures are used for the years 1999 and 2005 and interpolated for the years in between. From 2005 to 2019 the projected national HIV prevalence rates for Kenya are used as an estimate for HIV prevalence in the district. The National AIDS Control Council provided the estimates (CBS, 2002). A survey conducted in 1994 indicated that 40% to 60% of TB patients suffered a co-infection with AIDS. The assumption here is that 40% of TB patients in 1999 and 80% in 2019 will have a co-infection with AIDS, and the result is interpolated for the subsequent years.

These assumptions imply the following population growth trends in the district. The demographic trends are separated into two major scenarios, as illustrated in Figure 5.2.

### **Scenario I – without considering the impact of HIV/AIDS**

The results of the projection show that without considering the impact of HIV/AIDS, the total population of the district can be expected to grow from 603,422 in 1999 to about 1.05 million by 2019.

The annual growth rate is projected to increase further for the next 10 years and then to decline slightly thereafter to a level of about 2.5% in 2019, implying a doubling time for the total population of only 25 years. As a result, the demand for food, land, jobs, and services would increase rapidly.

### **Scenario II – considering the impact of HIV/AIDS**

The effects of HIV/AIDS on population growth were estimated using a sub-programme of DEMPROJ called the AIDS Impact Module (AIM). Its analysis suggested that HIV/AIDS is likely to have a significant impact on the size and characteristics of the district's population. Under the impact of HIV/AIDS, Kakamega District's total population is likely to increase from 603,422 in 1999 to 823,940 in 2019.

Population growth is likely to slow down to 1.48% per year by 2019, extending the doubling time to 47 years by then.

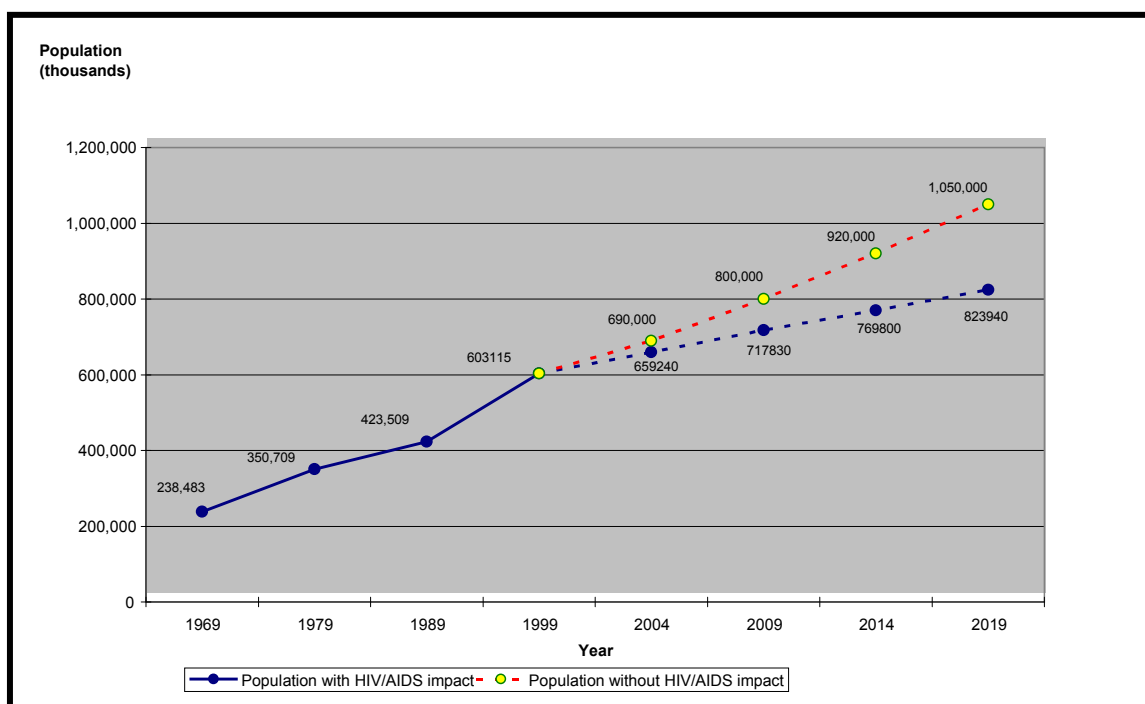
Due to a growing number of women of child-bearing age, the total population is projected to continue to increase despite the assumed fertility decline. The total fertility rate is estimated to decline from 5.1 live births in 1999 to 3.9 by 2019, while the mean age of childbearing remains 27.9 years throughout the projection period. The infant mortality rate is also projected to decline from 84.4 per 1000 births in 1999 to 58.4 in 2019, contributing its share to the total population increase.

The projection assumes that the average number of additional years a person may be expected to live at birth is likely to decline due to the impact of HIV/AIDS, life expectancy dropping to 49 years for men and 51.4 years for women by the end of the projection period.

Almost half of the population is younger than 15 years. This extremely high proportion of young people is projected to decrease only slightly during the projection period.

Out-migration is projected to intensify with the rapidly growing population and the resulting pressure on land, jobs, and services in the district. It is estimated that more than 5,000 migrants are likely to leave the district for urban centres every year till the end of the projection period, mainly in search of jobs, education, and health facilities.

*Figure 6.1: Enumerated and projected population of Kakamega District with and without HIV/AIDS (1969-2019)*



Source: Author's construct, October 2005

### **Impact of future population growth on land use and biodiversity**

The impact of HIV/AIDS on the future growth of the population is real; the impact is already being felt and cannot be ignored. Hence, Scenario II is the most likely scenario to eventuate in respect to the district's demographic trends. This study further analysed and projected this scenario with the aid of a computer programme called RAPID (Abel, 1999). To supplement the computer analysis, the survey's responding households were also asked for their opinions about the impact of population trends on their livelihoods.

The total arable land in the district is 0.1174 million hectares, as reported in the District Development Plan 2002-2008 (MPND, 2001), and the assumption here is that it will remain the same during the period projected. This study also assumes that the creation of new non-farm jobs will remain at a low level. These assumptions will generate several implications, which are explained below.

- Arable land per capita is likely to decline from 0.19 hectares in 1999 to 0.15 in 2019. The average amount of arable land per household is now 0.7 hectares. It is

also likely to continue to decline as a result of rapid population growth. The agriculture sector faces pressure, especially from the demand for land. The continued decline of the average landholding's size will intensify land fragmentation and increase the pressure on forest reserves and other protected areas.

- With shrinking farm size, the intensity of land use will have to increase in order to maintain its output per area. In the absence of investment capital, farmers will tend to shorten or skip fallow periods, thus depleting soil fertility more quickly.
- The increasing fragmentation of farms will increase the time farmers have to spend to access their plots, thus decreasing their actual time working.
- It will also render it more difficult to apply improved farming technologies, especially mechanisation and irrigation.
- As a result of rapid population growth, the demand for new jobs is likely to increase by 12,000 per annum from 1999 to 2019. This would have a negative impact on the district's development, especially if the local economy is unable to absorb the growing labour force.
- The growing number of unemployed, landless youths and smallholder farmers is likely to increase poverty and, consequently, social unrest and insecurity.
- Overall, rapid population growth is likely to have a deep and continued negative impact on biodiversity in Kakamega Forest.

## 6.5 Poverty and biodiversity in Kakamega Forest

Poverty assessments indicate that a high level of poverty exists in the district. For example, the Welfare Monitoring Survey of 1997 found that 58% of the district's people live below the poverty level.<sup>12</sup> Similar studies conducted at different times have also revealed that poverty levels in the district have been increasing over time.

Although it is hard to establish a direct correlation between poverty and the loss of biodiversity, the growing poverty levels and associated trends in the district in general, and particularly in areas surrounding the forest, have pushed the households to rely increasingly on forest resources to fill their income and food needs. Poverty often forces people to give priority to immediate needs and deprives them of options by forcing them to use resources unsustainably. The household survey found that 49.2% of its respondents harvested forest products from Kakamega Forest for sale and for household consumption during the 12 months prior to the survey. The expansion of farmlands, human settlements, and other infrastructure surrounding it have all had a negative affect on Kakamega Forest's biodiversity.

However, biodiversity is a resource upon which people depend for food and other resources. Biodiversity in Kakamega Forest could be used to alleviate poverty in the households surrounding it by mainstreaming biological resources into poverty-reduction efforts.

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<sup>12</sup> The poverty line is established at Ksh. 1,239 per month per adult [1\$ = 67 Ksh.]

## 6.6 Summary of key issues

- The population of the district has been increasing rapidly due to its high but declining fertility rates.
- The rapid increase in population growth has prompted such survival strategies among rural households as agricultural intensification, livelihood diversification, and migration by young people in search of better opportunities, each having its own implications on land use and biodiversity in Kakamega Forest.
- Labour-based intensification of agriculture and the skipping of fallow periods has accelerated soil infertility and eventually led to a decline in farm productivity.
- In areas adjacent to Kakamega Forest, efforts by households to raise additional income for their livelihoods have intensified their reliance on the forest and have affected its biodiversity negatively.
- The district's population projection for the next 20 years indicates that the population is likely to continue to grow over that period, leading to more pressure on agricultural land, worsening poverty, the deterioration of forest resources, and, ultimately, the loss of biodiversity in Kakamega Forest.
- High poverty levels in the district, particularly in the households surrounding the forest, have affected biodiversity in the forest negatively. However, biodiversity could be used to alleviate poverty through the mainstreaming of biological resources into poverty-reduction efforts

## 7 Rural Land Management and Biodiversity Conservation

### 7.1 Introduction

Land is the basis of terrestrial biodiversity. It provides the biological habitats and gene reserves for plants, animals, and micro-organisms, both above and below ground, and provides the biotic environment. Therefore, land management, the process by which the resource of land is utilised, is the key for the conservation or loss of biodiversity. In addition to how the resource of land is used, it includes the policies and institutions that regulate its use and management, including land tenure, land rights, and access.

This section examines in depth the manner in which rural land is managed in the district and the extent to which rural land management determines biodiversity in Kakamega Forest. It also tries to form linkages between the district's rural land management, rural livelihood, and biodiversity.

This chapter will also analyse rural land management using data from selected villages in the district to obtain a clearer picture of it. The villages studied are Buyangu, Shamiloli, Kisaina, Chiviga, and Ikonyero, all of which are less than two kilometres from the nearest edge of Kakamega Forest.

The analysis integrates the findings from field survey one in 2005 and field survey two in 2006, which collected both qualitative and quantitative information.

### 7.2 Aspects of land management in Kakamega district

The district has a total area of 1394 km<sup>2</sup>, of which 220 km<sup>2</sup> is gazetted forest, and has 1174 km<sup>2</sup> of arable land, of which 76% is small holdings and 24% commercial farms. Forest covers approximately 15.7% of the district's total area.

#### **Agricultural land use**

Agriculture is the mainstay of the district's economy and directly or indirectly supports more than 90% of the population. Most of the small-scale industries operating in the district are agriculture-based. Of the total farm land, 70% is in food crops, mainly maize production for both commercial and subsistence use, and 30% is under cultivation for cash crops. These consist mainly of sugarcane in the Navakholo, Lurambi, and Kabras divisions, and tea and small-scale livestock rearing in the Shinyalu and Ikolomani divisions.

#### *Farm size*

The average household's farm size in the district is 0.7 hectares (1.7 acres). This has been declining continuously due to land fragmentation through inheritance. The holdings range from 0 to 25 acres (0-10 ha), as indicated in Table 7.2.

Table 7.1 Average land size in acres in the villages studied

Name of the Village	Livelihood zone	Minimum	Maximum	Mean
Buyangu area	Cash cropping	0.0	4.0	0.94
Chiviga area	Mixed farming	0.0	8.0	1.47
Kisaina	Mixed tea and dairy farming	0.12	2.0	1.07
Shamiloli	Forest	0.10	25.0	1.62
Ikonyero	Formal employment/business	0.13	8.0	2.18
<b>All villages</b>	<b>-</b>	<b>0.0</b>	<b>18.0</b>	<b>2.57</b>

Source: Field survey, 2006

In general, the holdings of the households closer to the forest are particularly low, with 67.7% of those households owning less than the district's average land size of 1.7 acres. It is only in Ikonyero village that the average farm size is larger than the district average. This is may be due to most of the village's residents also being engaged in non-agricultural activities, which allows them to purchase additional land.

Table 7.2 shows the high disparity in land ownership in the district. While most of its households own less than one acre of land, some own large tracts of land which are often underutilised.

#### *Availability of farm land*

The majority of the households acknowledged that they have no other parcel of land except the one they work, as indicated in Table 7.3. In most cases, the households' farmland is located around their homesteads. The respondents also reported that land for farming is no longer available within their own villages and that they have had difficulty in obtaining new land.

In Kisaina village, some respondents reported that they owned more than one parcel because their households used to live inside the forest until recently, when the government relocated them, and that they still use their former lands. Disagreement exists whether these plots lie within the forest's boundary.

Table 7.2 Availability of farm land in the villages

Households having separate parcels of land	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
None	91.4	72.9	47.1	65.6	64.1	70
One parcel	2.9	16.7	29.4	24.6	28.2	20
Two parcels	5.7	10.4	17.6	8.2	7.7	9
More than two	-	-	5.9	1.6	-	1
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Field survey, 2006

Many respondents also expressed the opinion that the availability of land and the size of household plots will continue to decline due to the expansion of settlements, the decline of soil fertility into exhaustion, and the expansion of family sizes. This is likely to worsen the land-use conflicts that have already become rampant in the district.

Although the size of landholdings has been declining continuously, the key question is not land size as such, but also the type of technology being used. This influences how much land size determines productivity. Increases in productivity are possible with the support of improved agricultural technologies, but this is not happening in the area being studied.

### *Farm history*

In order to determine whether changes have occurred recently in land-use patterns in the vicinity of the forest, the survey asked the respondents about their farming history, particularly about how the land was used before they acquired it, and 7.5% said the land had been forest land, 13.5% that it had been grazing land, 31.5% that it had been bush, and 78.5% that it had been farmland before they acquired it. As Table 7.4 shows, a high percentage of the households have converted grazing land and bush land to farming, and 7.5% have changed forest into farmland, which indicates that deforestation has occurred for the purpose of opening up land for farming.

*Table 7.3 Type of land use before the land was acquired*

Type of land use	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
Forest	11.4	4.2	5.9	8.2	7.7	7.5
Grazing land	17.1	16.7	-	8.2	20.5	13.5
Bush land	22.9	43.8	35.3	24.6	33.3	31.5
Farmland/crops	62.9	68.8	82.4	85.2	92.3	78.5
Other	-	2.1	-	-	5.1	1.5

*Source: Field survey, 2006*

When asked when they had acquired their land, 5.7% reported that it had been before independence in 1963, and 35.5% that it had been between 1963 and 1980. The majority of the respondents, 59.1%, said that they had acquired their land between 1980 and 2006. Also, 15.2% of the respondents reported that the size of their land had increased since acquiring ownership of it due to buying more land, while 34% reported that the size of their household's land had decreased since they acquired it due to subdividing it among the family members. This implies that there has been a continuous clearing and farmland expansion, or pressure being put on existing land to produce more to meet the households' needs. Also, 50.8% reported that the size of their land had remained the same.

### *Farming practices*

The respondent households indicated that since they first acquired their land, 30.7% have practiced mixed cropping, which is the cultivation of several crops together, 80.2% said that they have practiced mixed farming, which is crop cultivation and raising livestock, and 13% said that they have practiced agro-forestry, which is crop cultivation and tree management.



Table 7.4 Percentage of households using different farming practices

Type of land use	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
Mixed cropping	14.3	41.7	52.9	29.5	15.4	30.7
Mixed farming	88.6	75.0	76.5	78.7	82.1	80.2
Agro-forestry	5.7	6.1	2.9	4.0	2.4	13.0
Mono-cropping	-	-	-	-	-	-

Source: Field survey, 2006

As Table 7.4 shows, most of the households diversify the types of crops they grow on their land and also diversify the type of agriculture they pursue. This is one of their coping mechanisms to the challenge posed by declining farm size. However, the survey also found that the practice of agro-forestry in the villages studied is relatively rare. This implies that a need exists to increase the practice of agro-forestry for the dual benefit of meeting household energy demands and other uses for wood, such as construction, and also helping to maintain soil fertility and taking the pressure off the demand for these products from Kakamega Forest.

#### *Soil fertility and management*

Eighty-five percent of the responding households reported that they had a problem with soil infertility in their fields. Of these, 46.5% said the problem was very critical, while 38.5% said that although they had the problem, it was not critical. Furthermore, 48.5% reported that soil infertility had worsened in recent years, while 17.5% said it had remained the same, and 34% reported that their fields' soil fertility had improved over time due to the use of soil-fertility enhancement measures, particularly crop rotation, the use of manure, and agro-forestry. Table 7.5 shows the main causes of soil infertility in the villages studied.

Table 7.5 Causes of soil infertility in the villages studied, in percentages

Main causes of soil infertility	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
Soil erosion	34.3	4.2	17.6	24.6	7.7	17.5
Inadequate use of manure	8.6	68.8	58.8	36.1	56.4	45.0
Lack of inorg. fertiliser	37.1	77.1	70.6	54.1	69.2	61.0
Land exhaustion	45.7	85.4	64.7	73.8	69.2	67.0
Poor farming techniques	50.0	59.2	66.5	62.1	66.7	60.9
Other	-	14.6	23.5	4.9	17.9	10.5

Source: Field survey, 2006

Table 7.6 shows that lack of fallow time and land exhaustion, poor farming techniques and the inadequate use of fertilisers are the main causes of soil infertility in the area. Soil erosion, although one of the causes of soil infertility, has the lowest percentage for causing infertility in all the villages studied. This implies that a need exists to use such alternative ways of enhancing soil fertility in the area as crop rotation, inter-

cropping, and agro-forestry. The study also found that a fairly large number of respondents did not use any soil-improvement measures, as indicated in Table 7.6 below.

The farmers who have been using these soil-improvement measures indicated that they have been able to maintain and even increase the fertility of the soil on their land.

*Table 7.6 Use of soil improvement measures in the study area in percentages*

Soil improvement measures	Frequency of use		
	Most often	Some times	Do not use
Animal manure	57.3	22.1	20.6
Household residues	50.3	26.7	23.0
Inorganic fertiliser	35.4	28.7	35.9
Crop rotation	50.2	16.6	33.2
Fallowing	6	15	79
Agro forestry	16	29.1	54.9
Intercropping	22.9	39.1	38.0

*Source: Field survey, 2006*

Generally, the responding households were aware of the various factors that have been contributing to increased soil fertility on their farms. The challenge, however; was how to manage the soil in their fields in a sustainable manner.

#### *Access to and use of agricultural inputs*

The use of such agricultural inputs as animal manure, fertilisers, or improved seeds was low in the area studied. This implies that the nutrients taken from the soil were not being replenished after crop harvests, which had also led to a decline of agricultural production. In addition, the majority of the respondents did not use improved varieties of seeds. The use of the same local seed varieties every season might also lead to reduced productivity due to genetic degeneration.

*Table 7.7 Use of non-labour agricultural inputs in percentages*

Agricultural inputs	Frequency of use		
	Most often	Some times	Do not use
Improved seed	21	30.0	48.5
Animal manure	57.3	22.1	20.6
Inorganic fertiliser	35.4	28.7	35.9
Insecticides/herbicides	12.2	16.0	71.8

*Source: Field survey, 2006*

Most of the respondents also confirmed that a lack of agricultural inputs is one of the major problems affecting agricultural production in the area. The most common reasons given for the non-use of agricultural inputs were the farmers' inability to afford the cost of inorganic fertilisers (97.6%), difficulty with these fertilisers' lack of availability (7%), a lack of cattle for producing manure (19.5%), and insufficient labour to be able to use the manure in cases when enough cattle were available (2.5%).

The high cost of agricultural inputs in the area is the most critical problem, and therefore requires a review of such public policies related to the financing of agricultural inputs as credit services and improving rural accessibility.

#### *Availability of credit services*

Seventy-five percent of the respondents in all the villages studied reported that they were unable to access agricultural credit, with 25% reporting that they regularly have access to credit services. This is mainly due to financial services and credit services being limited to urban centres and cash-crop growing areas and to unfavourable rules and regulations for farmers, as few institutions operate in the local financial market.

As Table 7.8 below indicates, respondents reported fear of high interest rates and a lack of collateral to be the main obstacles for accessing credit services in the area. This implies that a need exists to introduce policies to regulate financial markets, particularly ones to protect farmers from private moneylenders, as well as others to promote credit services as a means of increasing agricultural productivity in the area.

*Table 7.8 The major reasons for not accessing credit services*

Reasons for not accessing credit services	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
No credit services	6.1	4.5	4.8	11.5	2.6	5.9
Lack of collateral	52.5	47.5	50.0	35.1	33.1	43.6
High interest rates	48.3	31.1	44.9	48.6	25.4	39.7
Bureaucracy	2.1	13.1	9.3	11.4	5.1	8.2
Don't need credit	9.1	7.9	8.3	5.3	10.3	8.9
Other	3.2	5.2	4.3	3.1	0.0	3.7

*Source: Field survey, 2006*

Among the households which have accessed credit services regularly, 15.8% borrowed less than Ksh 1000, another 15.8% borrowed from Ksh. 1001 to Ksh. 3000, 14% borrowed from Ksh. 3001 to Ksh 5000, and 54.4% borrowed more than Ksh. 5000. The length of time for which the households borrow the money ranged from one month to 24 months. The average interest rate of the money borrowed ranged from 10% to 20%.

The respondents reported that the main purpose of accessing credit services was to purchase agricultural inputs (85.7%), followed by paying school fees (13%), expanding their businesses (8%), purchasing food items (4.5%), and other purposes (3%).

#### *Land use dynamics*

Discussions with members of the community revealed a general concern among the households about the decline of farm sizes. This has brought adaptive changes in agricultural land use, mainly due to population growth, economic development, and climatic changes. Prior to independence, agricultural land was relatively available and the people also had *Shamba*, the freedom to clear up forests and open up farm lands. The forests and the land's fertility were also in good condition. However, the increase in population has brought a consequent expansion of agricultural land and changes in types of land use.

The change in land use has been exacerbated by economic growth, especially in areas along the main roads, and by climate change, particularly since 1987. The timing

and amount of rainfall has changed in recent decades, with delays in the rain's onset and it finishing early. The amount of rainfall has also increased over a relatively short time.

In general, two patterns of land use dynamics may be observed in the study area. These are the population increase causing declining farm sizes resulting in changes to the cropping pattern, and the introduction of sugarcane leading to increased incomes resulting in changes to land-use patterns.

#### 1. Population increase → decline of farm size → change in cropping pattern

The discussions revealed that cultivation of maize and beans has gradually replaced such traditional crops as millet, cassava, and sorghum, as explained in the previous chapter.

#### 2. Introduction of sugarcane → increased income → change in land use pattern

The introduction of sugarcane to the area in late 1970s and early 1980s brought a gradual shift from the cultivation of the traditional food crops of millet, sorghum, and maize to the cultivation of sugarcane as a cash crop. The gradual shift was due to the economic benefit obtained from the production of cash crops instead of food crops, as farmers were able to get better income from the cultivation of sugarcane.

Consequently, food production has declined because many farmers allocated all their land to sugarcane farming and have put greater emphasis on cash-crop production. This shift in land use has brought temporary benefits to the sugarcane-growing farmers in the northern half of the district. It has helped their communities by increasing income, leading to the conversion of grass-thatched houses to corrugated iron-covered houses and a relative improvement in the living condition of the people.

The income from sugarcane farming has declined over time due to such problems in the industry as delays in payment and delays in harvesting, as it is the sugarcane companies that decide when to harvest it, and high prices for inputs, which are often supplied by the sugarcane companies. This means that the households do not receive the income from the production of their cash crop when they need it. Furthermore, the income is inadequate for buying the food they require. Therefore, a no-food, no-income situation prevails in most of the smallholder households that cultivate sugarcane. However, households owning more than 20 acres of land seem to be able to benefit from the production of sugarcane.

In a bid to reverse the situation, the district's agriculture department is trying to promote the production of food crops as a priority by setting a minimum acreage for growing sugarcane and by enforcing contracts between farmers and sugarcane companies that assure that some land is set aside for food-crop production. They are also advising farmers to grow horticultural crops, as they are high-value, short-season crops that can grow two or three times a year.

However, even if all the farmers were to revert back to the production of food crops, food production would be insufficient for the fast-growing population, given the present situation in the district. Such measures as enhancing the households' livelihoods, introducing improved agricultural technologies, and the participatory planning and use of land resources are very much required.

### **Forest resource use and management**

The area's forest resources are composed of private forests, community forests, and state forests. Private forests are grown on privately owned land and involve mainly

growing eucalyptus trees for commercial purposes. There are also small community forests in some areas, although no inventory has been done regarding their sizes.

#### *Private forests and woodlots*

Asked if they had woodlots on their land, 58.8% of the respondents reported that they did, with their size varying from 0.1 acres to 2.0 acres, with an average 0.25 acres. The other 41.2 % of the households had no woodlots on their land. This implies that private forestry and on-farm woodlots have to be encouraged to meet household energy and wood requirements, as well as to reduce the pressure on Kakamega Forest.

Of the households that reported having their own woodlots on their land, 47.5% explained that they used them as sources of fuel for household consumption, 97.4% as sources of fuel for selling, 42% as sources of construction wood for the household, 17% as sources of construction wood for selling, and 14% for other purposes.

#### *Forest use from protected government forests – Kakamega Forest*

Of the respondent households, 88% admitted using products from Kakamega Forest in the 12 months prior to the survey. Table 7.9 shows the percentage of households that accessed the forest's products during that time.

*Table 7.9 Percentage of households who have used forest products*

Forest product use	Percentage of households that have used products from Kakamega Forest during the previous 12 months	
	Yes	No
Buyangu	77.1	22.9
Chiviga	93.8	6.3
Kisaina	94.1	5.9
Shamiloli	93.4	6.6
Ikonyero	79.5	20.5
<b>All villages</b>	<b>88.0</b>	<b>12.0</b>

*Source: Field survey, 2006*

The percentage of the households using Kakamega Forest's products is relatively lower in Buyangu, due to KWS's strict control of access to the forest's resources, and in Ikonyero, where some of the households may be otherwise engaged in formal employment and business activities. Otherwise, Kakamega Forest has continued to be the single most important source of forest products for the households surrounding it.

Of the households surveyed, 32.1% reported accessing forest products more than twice a week and 15.3% reported accessing them at least once a week.

*Table 7.10 Frequency of access to Kakamega Forest's products*

Forest product use	Frequency of access to Kakamega Forest's products by households during the previous 12 months, in percentages				
	Once a week	Twice a week	More than twice a week	Once or twice a month	Other
Buyangu	8.6	11.4	17.1	42.9	20.0
Chiviga	19.1	14.9	34.0	23.4	6.4
Kisaina	17.6	29.4	23.5	23.5	5.9
Shamiloli	17.2	15.5	46.6	15.5	5.2
Ikonyero	12.8	25.6	25.6	12.8	23.1
<b>All villages</b>	<b>15.3</b>	<b>17.9</b>	<b>32.1</b>	<b>22.4</b>	<b>11.7</b>

*Source: Field survey, 2006*

Households in Buyangu accessed the forest's products less frequently than those in other villages. This is also related to the KWS's strict forest-management activities.

The respondents reported using a variety of products from Kakamega Forest near the area studied. Of these 80.5% harvested firewood, 41% charcoal, 45.5% herbal medicines, 40.5% cattle watering and forage for cattle grazing, 15% wild fruits, 8.5% hunting, 11% seedling collection, 10% recreation, 1% wild honey collection, and 6% other uses. The households' high reliance on Kakamega Forest implies that alternative sources of household energy will be required to reduce their excessive demand for firewood and charcoal from there.

In reply to a follow-up question, 49.2% of the respondent households reported that they had sold products from Kakamega Forest during the 12 months prior to the survey, the remaining 50.8% claiming that they used these products for household consumption only. Among the households which sold the forest's products, 34.5 % of them sold them in their villages, 30% sold them in markets, and the other 35.5 % sold them in both the village and in markets. This shows that a robust demand exists for forest products, with many transactions taking place inside the villages. That such products are not displayed abundantly in the markets does not mean that they are not being exploited.

Despite the forest's closeness to the households, a good market for forest products thrives in the villages. This is primarily due to a labour shortage in some of the households, which are unable to spare members to go into the forest to harvest the products. Also, the harvesting of some these products has risks. For example, farmers can be fined if caught burning charcoal in the forest. In order to avoid the risk of being caught and fined, most people prefer to buy these products in the village. Those willing to take the risk go to the forest, burn charcoal, and sell it in the village. Finally, most of the forest products are unprocessed and can only find a market in the villages.

Table 7.11 shows that a large percentage of the households use firewood, bush meat, fruits, and herbs for household consumption, while people tended to harvest charcoal and construction wood for selling.

*Table 7.11 Purposes for accessing forest products during the previous 12 months*

Type of forest products used during the previous 12 months	Percentage of households which have used products from Kakamega Forest for these purposes		
	Household consumption	Sale	Both sale and consumption
Firewood	56.0	1.9	42.1
Charcoal	19.3	28.4	52.3
Wood (for construction)	18.7	20.0	61.3
Grass	55.9	3.5	40.6
Herbs	76.8	3.7	19.5
Fruits	68.8	6.3	25.0
Wild honey	50.0	-	50.0
Bush meat	78.2	-	21.8

*Source: Field survey, 2006*

As Table 7.12 summarises below, the majority of the households selling forest products earned an average of between 1,000 Ksh and 3,000 Ksh during the 12 months prior to the survey. However, the households in Shamiloli village earned relatively more than the others. This shows that most of the products from Kakamega Forest are used for household consumption rather than for selling possibly due to weak market linkages and a lack of processing to add value to the area's forest products. This implies a need for the promotion of the processing and marketing of forest products so that they can contribute more to the local household economy. However, this would require considerable research and planning for sustainable forest use in order not to add unnecessary pressure on the forest.

*Table 7.12 Amount of income earned from selling forest products*

Amount of income earned from harvesting forest products	Frequency of use			
	< 1000Ksh.	1000 – 3000Ksh	3001 – 6000Ksh	> 6000Ksh
Buyangu	55.6	33.3	11.1	-
Chiviga	12.1	72.7	15.2	-
Kisaina	50.0	30.0	20.0	-
Shamiloli	15.4	73.1	7.7	3.8
Ikonyero	56.3	43.8	-	-
<b>All villages</b>	<b>19.1</b>	<b>61.7</b>	<b>17.0</b>	<b>2.1</b>

*Source: Field survey, 2006*

### *Kakamega Forest management*

Kakamega forest is jointly managed by the District Forest Department and KWS. The Forestry Department manages the Kakamega, Malava, and Bunyala forest blocks, while KWS is in charge of the Kakamega Forest Reserves. The assessment of the two offices' management approaches reveals both similarities and differences, each having its own implications for the sustainable use of the district's natural resources.

Table 7.13 Comparison of the two forest-management regimes of Kakamega Forest

Assessment parameter	District Forestry Service	Kenya Wildlife Service
Forest area managed	23,777.3 hectares	3,984.9 hectares
Management objective	Conservation	Protection
Management style	Command and control	Command and control
Linkages with each other (among the offices)	No	No
Consultation with the community in forestry matters	Low	No
Community involvement in forest management	No	No
Privileges to local communities	Have few rights	No
Encourage and support private on-farm forestry	Yes	No
Level of community dissatisfaction in the management	Very high	Very high

Source: Field survey, 2005.

As Table 7.13 indicates, the District Forestry Service (DFS) and the KWS have different objectives in regard to managing the forest. While the DFS emphasises conservation and allows local communities to have a few user rights, the KWS concentrates on protecting the forest from human action and allows no human activity there. These departments follow a command-and-control style of management and do not consult with the communities near the forest in matters related to its use or management. Community involvement in forest management in such areas as planning, implementation, monitoring, and evaluation is therefore extremely low or nonexistent.

Asked if they are involved in forest management of any kind, 74.5% of the respondents reported that they were not, leaving only 25.5% with any involvement. The percentage of households involved in forest management is higher near the part of the forest managed by DFS than that managed by the KWS, as Table 7.14 shows below.

Table 7.14 Community involvement in Kakamega Forest management

Involvement in Kakamega Forest management	Percentage of responding households		Location
	Yes	No	
Buyangu	17.1	82.9	On KWS side
Chiviga	25	75	On DFS side
Kisaina	29.4	70.6	On DFS side
Shamiloli	39.3	60.7	On DFS side
Ikonyero	10.3	89.7	On DFS side
<b>All villages</b>	<b>25.5</b>	<b>74.5</b>	<b>Both DFS &amp; KWS</b>

Source: Field survey, 2006

Of the households reporting involvement in forest management, 84% indicated that they participated in the monitoring stage of the process, 5.7% in the planning stage, 7.6% in the implementation stage, and 1.9% in other processes. This implies a need for opening up space for community participation in all stages of Kakamega Forest's management in order to ensure its sustainable use and conservation as a resource.

When asked about the need for community involvement, 90.5% expressed the opinion that involving the community is necessary, with only 9.5% saying that they did not think that community involvement matters. In reply to a follow-up question, 61% of those respondents who had said that they thought community involvement was neces-



sary indicated that this was so because community participation is important for better management, 38% for shared responsibility, 11% for shared costs, 62.5% for sustainability, and 2.5% for other reasons.

The two departments use command-and-control style management practices and engage in only low levels of consultation with the communities around the forest in matters related to it. This approach has alienated the local communities from the management of their own resources and has undermined their potential contribution to the sustainable conservation of biodiversity in the area. The relevance and sustainability of conservation efforts would be likely to improve if the local communities were to take part in the whole management process. Community members' participation in matters that affect their livelihoods would therefore enhance the sustainable conservation of biodiversity.

The conservation of biodiversity is linked to its usefulness for the people and to their awareness of it. However, in the KWS-managed part of the forest, the local communities do not have any tangible rights or privileges. Although the DFS admits that local communities have the privilege to use certain parts of the forest for cultural and religious purposes, passage, and recreation, the rules and regulations for the harvesting of firewood, honey, and medicinal plants are poorly communicated and remain ambiguous to the members of the communities involved. In some cases this has led to their committing offences and subsequently receiving fines, as Table 7.15 shows below.

In some areas, farmers pay to get some of these benefits, while in others they cannot; there is no standardised procedure for exercising forestry rights and privileges. This has led to the unaccounted collection of fees by forest guards in return for allowing members of local communities to get such benefits as the ability to harvest firewood and grass and permission to graze cattle. This means that whatever the community gets from the forest is acquired by unmanaged bribery, poaching, and stealing. Furthermore, members of the communities closest to the forest said that they believed that they were marginalised in job opportunities in the forest department. Most of the department's workers, especially the forest guards, come from other areas, leading to further dissatisfaction with the management of the forest's resources.

*Table 7.15 Offences committed against Kakamega Forest in a year*

Type of offence (December 2004-December 2005)	No of cases	Fines	
		Ksh.	Community Service Order
Illegal grazing in young plantations	135	289,145	18 cases for 4 months each
Cutting trees for firewood, construction, etc.	76	6,800	16 cases for 1-4 months
Charcoal burning	71	15,500	50 cases for 4 months each
Illegal cutting and transportation of grass	23	6,200	15 cases for 1-4 months
Illegal timber production	22	30,000	11 cases for 1-3 months
Collecting forest products in the nature reserves	4	800	-
Illegal possession of indigenous trees	2	200	1 case for 1 month
<b>TOTAL</b>	<b>333</b>	<b>348,645</b>	<b>111 cases</b>

*Source: Forestry Department Record, 2005*

A discussion with the DFS and KWS revealed that they have capacity limitations in terms of personnel, finance, and infrastructure. However, the institutional linkages and cooperation between the two institutions entrusted with managing the forest's resources is notably low. Institutional conflicts between them occur over a wide range of issues involved in the management of the forest. This has led to confusion and a lack of trust within the communities around the forest. It is centrally important for the management services to pool resources, and also to use the local communities as potential resources for the sustainable conservation and management of the forest as a resource.

It must be emphasised that the current forest-management approaches of both the DFS and KWS do not guarantee the sustainable conservation of biodiversity in Kakamega Forest. There should be room for the inclusion of local community needs, ideas, and potential in conservation efforts. Community participation in the forest's management should enhance the sustainability of conservation efforts there. A planned, systematic process needs to be developed for members of local communities to harvest forest products.

When asked their preference of forest-management approaches, 74.2% of the respondents replied that they preferred that of the DFS, 18.7% preferred that of the KWS, and 7.1% replied that they preferred neither. Their reasons for preferring DFS were more transparency, more participation, and more access to forest benefits, while their reasons for not preferring any approach were lack of involvement, corruption and mismanagement, lack of transparency, and the deterioration of forest conditions.

### **Major land-use problems and conflicts**

A number of land-use problems have posed a great challenge to the livelihood of the people in the study area. The main land-use problems noted by the households, as described in Table 7.16, were a lack of non-labour agricultural inputs (70%), the small and declining landholding sizes due to land inheritance and population increases (63%), a lack of capital and the inability to access credit and related services (55%), soil infertility (51%), a lack of manure (42%), wild animals and birds destroying crops (29.5%), soil erosion (24%), poor crop yields (24%), labour shortages in the households due to the temporary migration of the head of the household in search of casual labour, or long-term migration in search of employment in bigger towns and cities (15.5%), and poor farming techniques and a lack of knowledge about improved farming methods (7.7%).

These land-use problems have led to a reduction in agricultural productivity and the deterioration of rural livelihood in the area. A large number of the households, 64.5%, reported that they were unable to produce adequate food to feed their families due to these problems, with only 35.5% reporting producing enough to feed their families. The resolution of all these land-use problems requires a comprehensive approach in terms of land-use policies and practices from both local and regional perspectives.

Table 7.16 Major land-use problems in the study area

Major land-use problems	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
Lack of non-labour agricultural inputs	82.6	95.8	58.8	49.2	89.7	70.0
Small and declining land size	62.9	72.9	70.6	49.2	69.2	63.0
Lack of capital/credit	57.1	58.3	70.6	47.5	53.8	55.0
Soil infertility	42.9	60.4	64.7	39.3	59.0	51.0
Lack of manure	22.9	52.1	47.1	37.7	51.3	42.0
Wild animals and birds destroying crops	54.3	47.9	17.6	19.7	5.1	29.5
Soil erosion	57.1	2.1	11.8	41.0	0.0	24.0
Poor crop yields	34.3	20.8	23.5	29.5	10.3	24.0
Labour shortage in the household	17.1	12.5	17.6	4.9	33.3	15.5
Poor farming techniques	7.1	8.5	8.4	5.0	9.4	7.7
Other	2.9	2.1	17.6	0.0	0.0	2.5

Source: Field survey, 2005, 2006

Land-use conflicts have taken place in the studied villages, mainly due to the increasing demand for land and to policies related to land ownership. Although most of the households owned the land they used, they didn't have the title deeds indicating its legal boundaries. As the population has increased and land has become scarcer, more people have wanted to acquire more land for cultivation, resulting in conflicts.

The respondents reported that certain forms of conflict are common in their villages. These are conflict over farm boundaries (69.5%), conflict among relatives over land inheritance (47%), conflict between farmland and grazing land, and conflict between their community and KWS and DFS over the use of Kakamega Forest. These conflicts are serious, and the discussion with local administration officials revealed that most of their time is spent in mediating conflicts among local residents in regard to land. Furthermore, 70.2% of the respondents indicated that these conflicts are tending to increase in both number and in the magnitude of their seriousness. This implies urgency in the need for the district to develop participatory land-use plans which involve all the stakeholders in solving land-use conflicts. It is also important to design an easier means of guaranteeing land ownership in the area studied.

For more on this topic, please refer to the section on land tenure in the next page.

### Community land-conservation programmes

Of the respondent households, 61.5% were not involved in any resource conservation programmes. The remaining 38.5% were involved in such conservation programmes as tree-planting, the conservation of indigenous trees, seedling production, and terracing. This implies that a need exists for the promotion of land-resource conservation programmes in the community if resources are to be used sustainably.

Those households that responded that they were participating in land or forest conservation programmes also reported that 41.1% of the programmes were spearheaded by village committees, 32.9% by CBOs and NGOs, and 26% by government departments,

particularly DFS, KWS and the Agriculture Department. That the largest numbers of the conservation initiatives were being conducted through village committees implies that the promotion of conservation has to target these local-level structures more than higher-level institutional structures.

### Land acquisition and tenure

Before the advent of colonialism, land was owned communally and the laws governing land ownership were simple; whoever cleared the forest had the right to use the land and pass it to their clan or sons. Colonialism brought a new land-ownership system in which some land was designated as *Crown land* which could only be accessed through the colonial government. Owners had to be registered and issued with land certificates called title deeds. Such land was either freehold or leased for 99 or 199 years, after which it would revert back to the government (Muchiri, 2005: 36). Accordingly, most of the residents acquired their land in this process. The land-tenure system in the district is mainly freehold, although there are small pockets of trust land held by the county and municipal councils, which are being sold to developers.

As Table 7.17 below indicates, 91% of the households have inherited the land they use from their families, 17% bought theirs, and the remaining 2.5% rent their land. Inheritance is clearly the major means of acquiring land in the district.

Table 7.17 Land acquisition methods in the study area

Land acquisition method	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All vil-lages
Bought	2.9	18.8	11.8	21.3	23.1	17.0
Inherited	97.1	97.9	88.2	91.8	76.9	91.0
Rented	-	4.2	-	4.9	-	2.5
Government allocation	-	-	-	-	-	-
Pioneering into forest	-	-	-	-	-	-

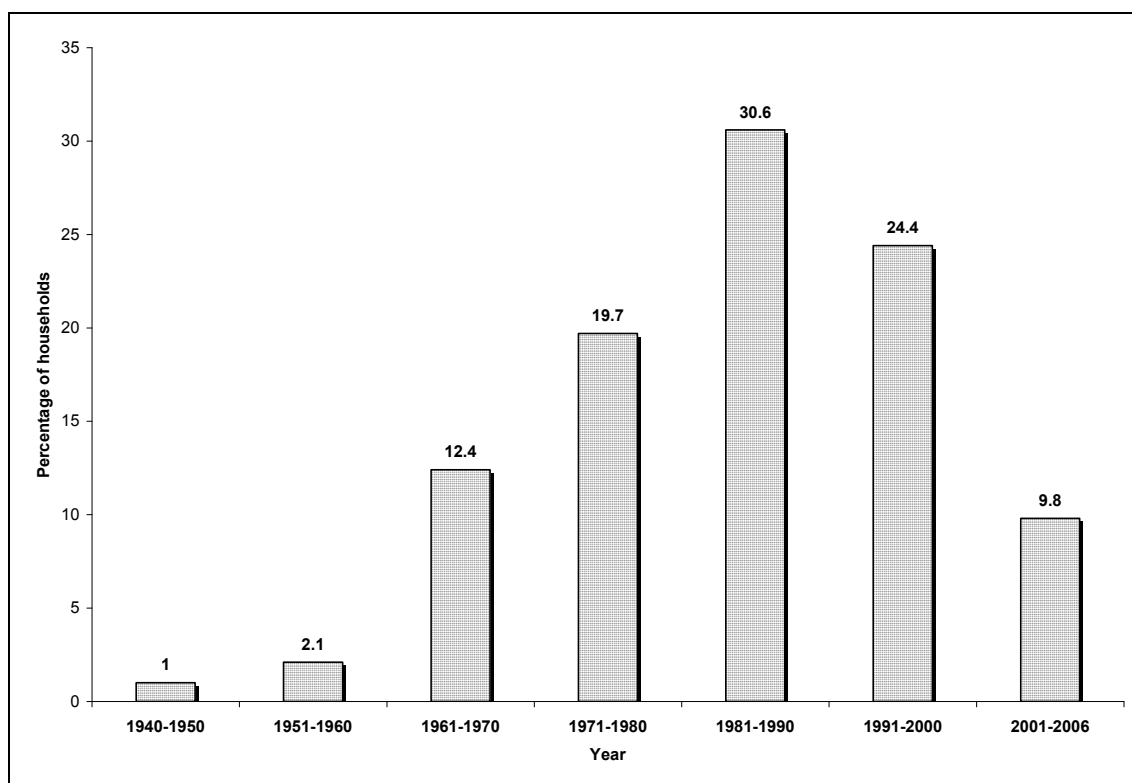
Source: Field survey, 2006

The survey revealed that the size of land inherited varies from 1.0 acre to 2.0 acres, with a mean of 1.4 acres. The number of men who have inherited land varies from one to 10 per household, with an average of five (see Table 7.18). This has naturally resulted in land being continuously subdivided into tiny, uneconomical units as families grow and new, young households expand and create their own inheritors.

As Figure 7.1 shows, more than 60% of the households inherited their land after 1980, while fewer than 3% inherited theirs before independence in 1963, so much of the local land inheritance and subdivision has taken place in recent decades and is likely to continue unless urgent measures are taken to control population, create alternative means of livelihood, and transform the agricultural sector.

More than 40% of the farmers in the district currently have no title deed for the land they use. They inherited the land from their families, and most of the people mentioned on the title deeds are dead, with the inheritors having only customary rights. The process of getting a title deed is too expensive and complicated a legal procedure for poor households to make.

Figure 7.1 Percentage of households who have inherited land



Source: Field survey, 2005, 2006

The lack of title deeds has serious implications for the productivity of the agricultural sector. For example, farmers without title deeds cannot get loans from credit institutions by using the land as collateral, as they have no the legal proof of ownership. Hence, most of these farmers resort to private lenders, who charge higher interest rates (15%-25 %) than government institutions, which normally charge interest rates of approximately 10%. The other problem arising from not having title deeds is that farmers cannot legally sell their land, although some do it informally. If a farmer wants to sell his land, the buyer processes the title deed and the expenses are deducted from the land's selling price. This has led to the expansion of informal land markets in the district, which have always worked against poor farmers.

Land-tenure security is a key for promoting long-term investment in improving land, dealing with informal land markets, and enabling farmers to access credit services. This implies that a less complicated and modern land-registration system for securing land-title deeds is required for better land management in the district.

### Land rights and access

Land-inheritance practices in the district follow a patrilineal system in which land is traditionally transferred to male members of households only. In 96.7% of responding households which have inherited land from parents, women were excluded from sharing ownership of the land. Only 3.1% of responding households reported that women also benefited from part of the inheritance. This was an exceptional case in which the family may not have had any sons.

*Table 7.18 Average size of land inherited and number of families involved*

<b>Size of land, number of families, and their share of the land</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>
Total size of the land before divided	0.4	40	7.55
Number of families (sons only) who shared the land	1	10	4.21
Share of each family in acres	1.0	2.0	1.40
Number of women in the family	0	9	3.11

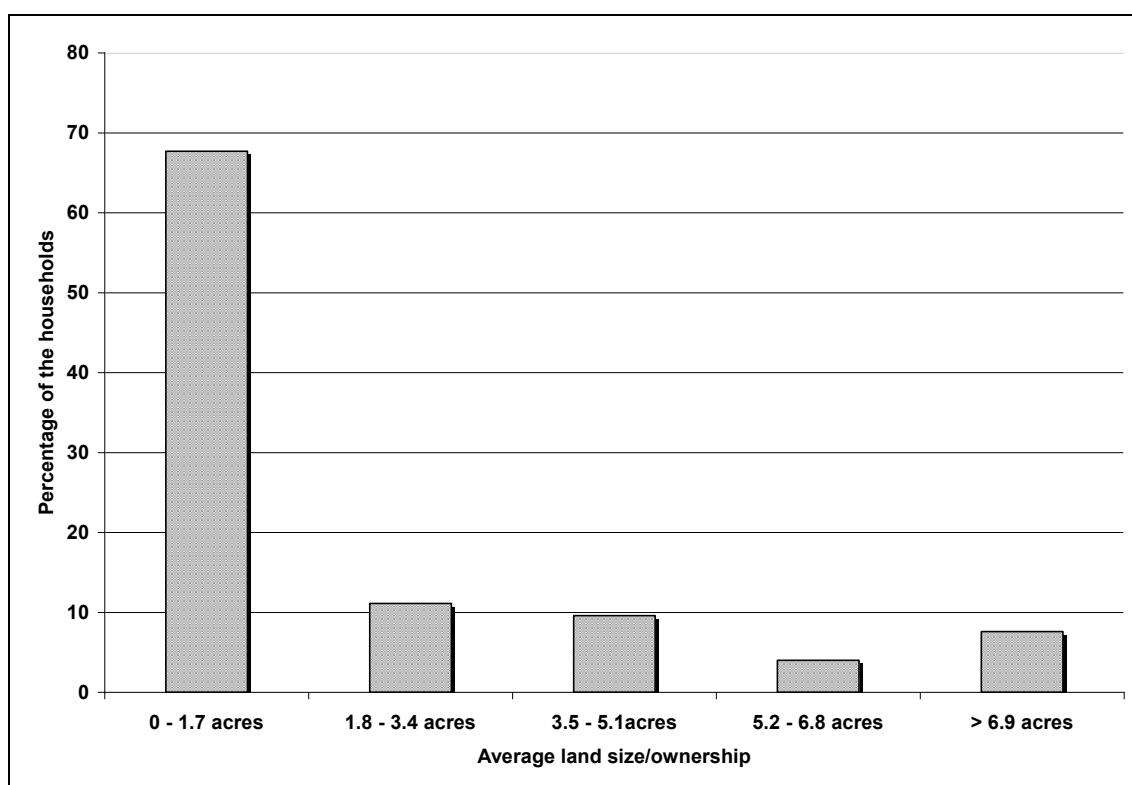
*Source: Field survey, 2005, 2006*

Of the responding households, 90% had inherited land from their parents. As Table 7.18 shows, the number of families sharing a parcel of land varied from one to 10. While an average of about five male members of a household inherit the household land, about four women from each household are denied access to land through inheritance. This system generally favours men and has contributed to the deterioration of women's welfare in the area.

The district has a gender ratio of 93:100, with women constituting more than half of the population. Data from the district planning office also shows 40,288 women-headed households in the district, or 32% of the total number of households (MPND, 2001:9). The marginalisation of such a large portion of the population's right to own land in an economy based predominantly on agriculture has far-reaching social, economic, and environmental implications and requires land reform which guarantees women the right to inherit and own land.

This study also found a high degree of land-ownership inequality in the district. While some households owned large tracts of land left idle in the villages, others owned a miniscule fraction of these. The government has to look at ways of ensuring equity in land ownership by redistributing large, unused parcels of land within their communities. As Figure 7.2 shows, 67.7% of the households own less than the average household land size of 1.7 acres (0.7 hectares), while less than 20% own four to five times more land than average. This calls for equity in land distribution in the district.

Figure 7.2 Average amount of land owned by percentage of households



Source: Field survey, 2005, 2006

### Land markets and agricultural productivity

Land is a scarce resource, and the selling or buying of land rarely occurs in rural areas of the district. The land being subdivided into small, uneconomical units also discourages potential buyers. However, the households widely practise the leasing of land as an adaptive strategy for meeting household food and cash needs. Approximately 2.5% of the responding households reported that the land they used was rented, at an average price of 1,000 Ksh per year for maize production and 8,000Ksh for two to four years for sugarcane production.

Although the leasing of land is used as a strategy to supplement household incomes, the practice has negative repercussions for land fertility, as the land is kept busy year after year and the farmers who rent it are usually unconcerned about its long-term fertility. Furthermore, no legal framework or institutional arrangements are in place to regulate the leasing of land. Chiefs usually mediate leasing for sugar farming, as it requires more than two years, while the farmers themselves conduct leasing for maize farming.

This implies a need to develop a framework for the leasing of land in order to regulate the practice and for generally better land-management in the district.

### Land-use planning and policy

Despite the importance of land-use planning for dealing with land-use problems and conflicts, the district has no appropriate land-use plan. Since Kenya itself has no clearly defined and codified land-use policy, such important issues as land administration, access to land, land-use planning, land information-management systems, environmental

concerns, and land-use conflicts are inadequately addressed (Ministry of Lands and Settlement, 2004:5).

Existing land-use policy and practices have focused on urban and peri-urban areas. This has exacerbated land-use problems and conflicts in the area and has led to eventual land-resource degradation. The land-resource degradation facing the district today therefore emanates partially from a lack of clear land-use policy and implementation.

If the status quo is maintained, the current trend of land-resource degradation is likely to lead to a further deterioration of natural resources and loss of biodiversity in Kakamega Forest. Besides, the resolution of land-management problems is a requirement for sustainable livelihood development in the area. Therefore, a clearly defined and comprehensive land policy for the use, access, and conservation of land resources is urgently required. Likewise, participatory land-use planning and policy implementation are also vital to reverse land degradation and to maintain a balance between the conservation of natural resources and the satisfaction of current household livelihood needs without compromising the needs of future generations.

### **7.3 Implications of land management practices on the biophysical environment**

Land management involves the proper management of different types of land uses, land rights, ownership, duties, and responsibilities toward the land. The assessment of these aspects of land management in the district has a number of implications, which are examined below.

#### **Land degradation**

The actions of a strongly growing population and its increased livelihood expectations and demands, along with failing land-management practices that otherwise could have controlled, redressed, or even reversed. Current trends, has enormously increased land degradation in the district, particularly soil infertility and deforestation, in both extent and severity.

About 96.4% of the households surveyed reported that they understood that the quality of land resources in the district has been deteriorating over the previous 20 years. In addition to a general downward trend in global land resources, the households surveyed indicated that the area studied has specific problems with soil infertility and deterioration and with deforestation. Small and declining landholding sizes, frequent farming, lack of fallow periods and soil exhaustion, soil erosion, the inadequate use of fertilisers and soil improvement measures, lack of credit, and other problems have all led to land degradation in the area. Land degradation has in turn resulted in declining productivity and the deterioration of rural livelihoods in the district.

#### **Deforestation and loss of biodiversity**

Land mismanagement has also contributed to deforestation and loss of biodiversity in Kakamega Forest. The decline of agricultural productivity and deterioration of rural livelihoods have forced the households surrounding the forest to look for alternative means of raising additional income, but these are limited outside the agricultural sector.

As a result, 88% of the households surrounding the forest depend on it for meeting their needs for such things as firewood, charcoal, grass, construction wood, and herbal



medicine, both for household consumption and for selling. Therefore, 65.3% reported that they go to the forest between one and three times per week to harvest these products, which has resulted in deforestation and has threatened biodiversity in Kakamega Forest.

*Table 7.19 Trend in forest-resource availability in Kakamega Forest over the past 20 years*

Trend in forest-resource availability over the past 20 years	Percentage of respondents					
	Buyangu	Chiviga	Kisaina	Shamiloli	Ikonyero	All villages
Increased	40	-	-	6.6	2.6	9.5
Decreased	60	100	100	78.7	94.9	85.5
Remained the same	-	-	-	14.8	2.6	5.0
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

*Source: Field survey, 2005, 2006*

As Table 7.19 above shows, 85.5% of the households reported that the district's forest resources have declined over the past 20 years. All the respondents in the Chiviga and Kisaina communities reported that the forest has decreased, while in other villages some of those surveyed responded that improvements in forest resources had occurred. These were asked what type of improvements they had witnessed and they replied that the government had conducted reforestation programmes and that the number of wild animals and some tree species had increased; particularly in the KWS-managed forest bordering Buyangu.

### **Conflicting land use types**

One of the major problems of land management in the district is the lack of adequate information regarding the land and its potential, which, coupled with a lack of appropriate land-use plans, has resulted in land-use conflicts. The main land-use conflicts the responding households described are (a) emphasis on cash-crop production, with declining income from the sale of cash crops conflicting with increasing demand for food and declining food-crop production, (b) the demand for farmland expansion conflicting with the conservation of Kakamega Forest and other forests and woodlands, (c) the conservation of Kakamega Forest conflicting with increased demand for land for settlement and such other services as schools, clinics, and roads, (d) the destruction of farmland surrounding Kakamega Forest by wild animals coming out of it, (e) food-crop production conflicting with using land for rearing and grazing livestock, and (f) the demand for grazing land conflicting with the preservation of Kakamega Forest and other woodlands.

Discussion with the communities and the assessment of these conflicts revealed that the magnitude of these conflicts has worsened over time. This calls for the need to take urgent actions in order to resolve them, as well as for the need for a comprehensive framework for sustainably managing the many conflicting land uses in the district.

#### **7.4 Rural livelihood, land management, and biodiversity nexus**

The linkages between rural livelihood, land management, and biodiversity are complex, and understanding these linkages is relevant to any attempt to finding solutions for the sustainable conservation of biodiversity. In order to meet their livelihood needs and maintain their livelihood system, rural households often transform their natural environment. Increased population and poverty levels intensify this transformation process, which normally leads to the deterioration and loss of biodiversity. However, improved land-resource management can contribute to the better and more sustainable conservation of biodiversity.

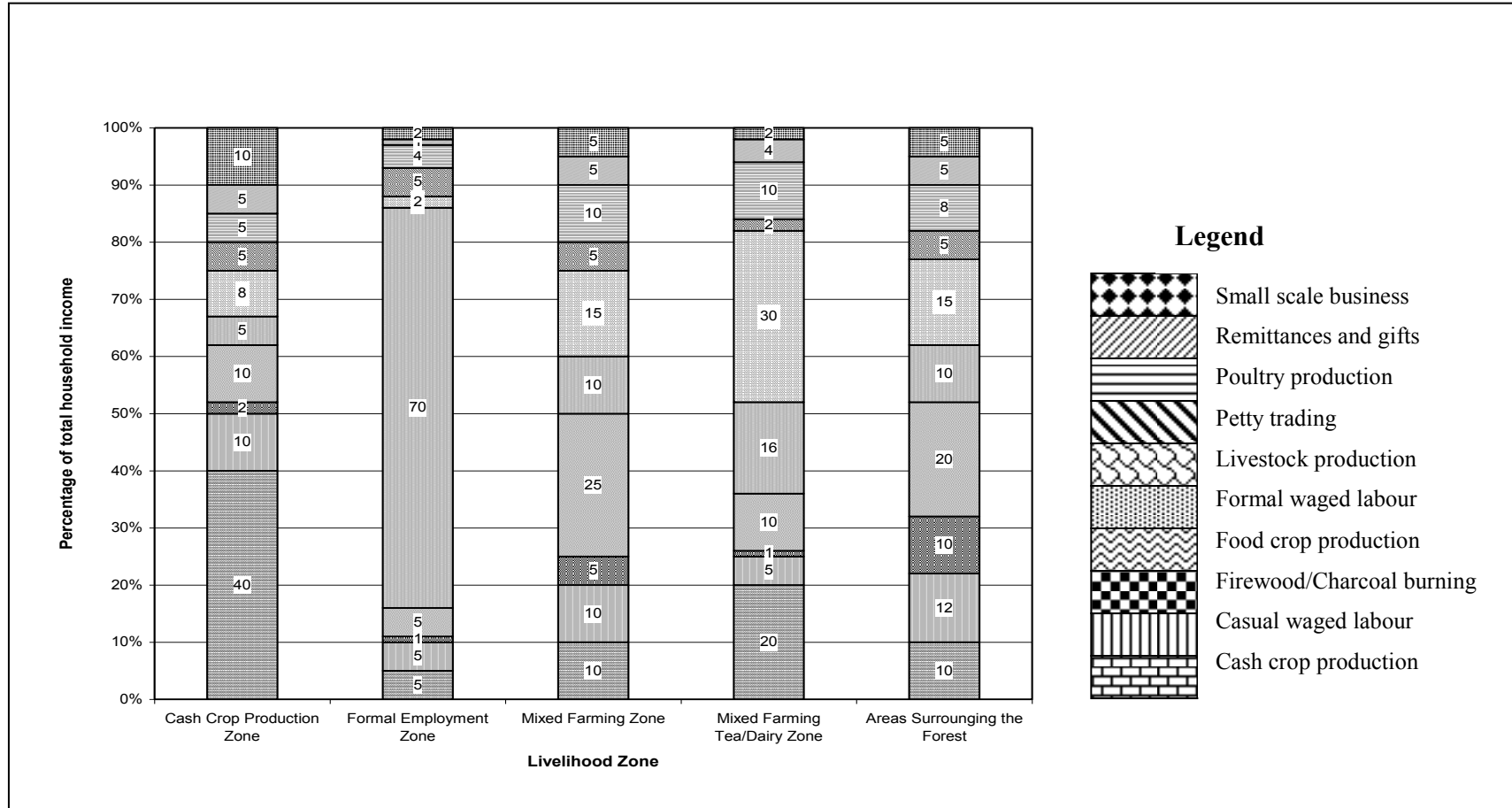
An analysis of the livelihood system in the district, as Figure 7.3 shows, the top 10 income sources amongst the district's households are cash-crop production, food-crop production, poultry production, livestock production, petty trading, such small-scale businesses as crafts and non-farm production, casual and formal waged labour, firewood collection, charcoal burning, and remittances.

However, the contributions of these livelihood sources vary depending on the households' location within the livelihood zone. Nevertheless, the major source of income for households in all livelihood zones is agriculture in the form of cash-crop production, food-crop production, poultry production, and livestock production, followed by such casual waged labour as digging, weeding, and harvesting on other people's farms. Firewood collection and charcoal burning from Kakamega Forest are also sources of income for households in all livelihood zones, although the amount these activities contribute to household income varies with location. In the areas surrounding the forest, firewood collection and charcoal burning account for approximately 10% of total household income.

The above-mentioned livelihood sources are all land-based, making land management crucial for maintaining a sustainable balance between the land's resources and the benefits derived from them. However, as the previous sections emphasised, land management is not functioning properly in the district, with widespread land-resource degradation, low and declining agricultural productivity, inequitable access to land, inequitable land-tenure arrangements, weak spatial linkages, and inadequate provision of services. This is mainly due to poverty, a lack of options, and such other institutional factors as a lack of appropriate policies and the political will to implement them when they do exist.

Such gaps in land management as unsustainable use, inequitable access, and inappropriate land tenure and rights have led to conflicts between meeting household food and income needs and maintaining and enhancing biodiversity in Kakamega Forest. The conflict has been intensified by the growing population and poverty levels, as well as a lack of corresponding growth in both farm and non-farm productivity.

Figure 7.3 Sources of income in the different livelihood zones



Source: WFP, VAM and author's construct 2006

The current rural livelihood situation in the district, in summary, is that (a) the main source of livelihood is subsistence agriculture, (b) farm productivity is declining due to declining land sizes, soil infertility and a lack of inputs, (c) non-farm income sources are inadequate, (d) spatial linkages are inadequate and service-delivery is weak, (e) it is highly dependent on Kakamega Forest as a source of household income, (f) appropriate policies and institutional frameworks are lacking, and (g) the use of forest resources is unsustainable and threatens biodiversity.

Sustainable land management, however, can bridge the gap between rural livelihoods and the use of land resources. Improved land management could lead to (a) increased farm productivity, (b) the development of spatial linkages and adequate-quality service provision, (c) diversified farm and non-farm livelihood options, (d) appropriate and supportive institutions and policies being put in place, (e) reduced dependence on Kakamega Forest as a main income source, (f) the sustainable use of forest resources, and (g) biodiversity conservation.

Therefore, sustainable land management could reverse biodiversity's current downward trend in Kakamega Forest.

## 7.5 Summary of key issues

- Soil fertility in the district has deteriorated over time due to land exhaustion, poor farming techniques and inadequate use of fertilisers as well as inadequate use of soil improvement measures. There is a need to use alternative ways of enhancing the soil fertility in the area such as crop rotation, inter-cropping and agro-forestry.
- Access to farm inputs is limited. This is partly due to the households' limited capacity to access credit services, as well as collateral and other requirements unfavourable to poor households. A need is present to promote credit services as a means of increasing agricultural productivity and of introducing policies that regulate the financial markets, particularly to protect farmers from private money lenders in the area.
- The communities surrounding Kakamega Forest have a high and increasing dependence on forest products. In order to diffuse the high level of resource demand, such other sources as community forestry and on-farm woodlots have to be encouraged.
- A number of land-use problems have posed a great challenge to the livelihood of the people in the study area. These have led to a reduction in agricultural productivity and the deterioration of rural livelihoods in the area.
- Current land-management practices, which include land use, land tenure, and land access, have resulted in land degradation and deforestation, and have led to conflicts in land use. This calls for reform and the design of a participatory framework for managing land resources in the area.
- The current rural livelihood situation in the district has negative implications for biodiversity in the forest. However, improved land management can lead to better livelihood conditions that should favour biodiversity conservation in Kakamega Forest.

## 8 Community Participation in Land-Resource Management in Kakamega District

### 8.1 Introduction

This chapter discusses and analyses the state of community participation in land-resource management in Kakamega District and its implications for land-resource conservation, particularly for biodiversity in Kakamega Forest.

It also will briefly describe and analyse the role of women in land-resource conservation and the contribution they could make in land-resource management, compare different forest-management governance in respect to the space the community receives in that management, and recommend the best way forward.

### 8.2 Community participation in the management of Kakamega Forest

The following section analyses aspects of community participation in Kakamega Forest's management, in particular the involvement of the community in Kakamega Forest's management, community perceptions about forest-resource management, the main players in community participation, and the rights and privileges involved in forest management.

#### The role of the local communities in the management of the forest

Despite the significance of community participation in any development process, particularly natural-resources management, information obtained from the respondents in Kakamega identified a disconnect in respect to describing the management of the Forest. Only 25% of the respondents reported management involvement of the forest in one way or another. The other 75% reporting no involvement in any aspect of forest management.

Further analysis indicates that community participation was limited to only certain stages of the management process, with 86.3% of those involved being active mainly in the monitoring aspect of the forest's management, participating in neither its planning nor the implementation stages. Only 5.9% reported that they were involved in a planning stage and 7.8% that they were involved in the implementation stage of the forest-management process.

*Table 8.1 Nature of involvement of the community in the management of the forest*

Nature of involvement/Stages	Frequency	Percentage
Not involved in management	149	75
Involved in forest management	51	25
• <i>Planning</i>	3	5.9
• <i>Implementing</i>	4	7.8
• <i>Monitoring</i>	44	86.3
<b>TOTAL</b>	<b>200</b>	<b>100</b>

*Source: Field Data 2006*

The level of the community's involvement in the forest's management was still clearly limited, and the stakeholders' participation in any forest's management tends to be more effective if it covers all the key stages, i.e. planning, implementation, monitoring, and evaluation of the of the forest-management process.

The involvement of the community in forest-resource management is critical, as it is at this level that different views are best solicited before developing intervention strategies and other aspects of the management design. A lack of community participation in forest management indicates that members of the local community lacked an adequate platform to communicate their views and negotiate their concerns. Such alienation also poses a great challenge to the community's sense of ownership, and can ultimately lead to unsustainable management of the conservation of biodiversity in Kakamega Forest.

### Perception of the community in forest management

Considering the low level of community participation in Kakamega Forest's management, 90.5% of the respondents agreed that community participation in the management of the forest is important, with only 9.5% considering it unnecessary.

*Table 8.2 Community perceptions of involvement in the forest's management*

Response	Frequency	Percentage
Yes	181	90.5
No	19	9.5
<b>TOTAL</b>	<b>200</b>	<b>100</b>

*Source: Field data, 2006*

Reasons identified for supporting community participation in the management of the forest included: 62.5% noted the enhancement of the forest's sustainability, 61% better management, 76% shared responsibility, 23% shared cost, and 5% other reasons. In their view, it is through community participation that indigenous knowledge and skills, which are more manageable and affordable, can be integrated in the process, thus enhancing the sustainability of biodiversity conservation. They also noted that participation enables stakeholders to learn from each other and promotes a sense of shared responsibility among them.

Kakamega Forest conservation initiatives lack the community's input critical for sustainability. This could be a result of such common obstacles to popular participation that hinder community participation as over-centralised governance systems. As noted earlier, the forest's management is highly centralised and local people struggle to find adequate space to exercise their rights and responsibilities as conservation partners. KWS and DFS work for the people instead of with them. Other constraints include poor leadership, a lack of viable structures for participation at the local level, corruption, and gender imbalances.

### Main actors in community participation

It also emerged that those who were involved in Kakamega Forest's management had different entry points as identified in the survey. These included village committees, which involved 41% of the respondents, and CBOs and NGOs, which involved 32.9%. The other 26% of the respondents indicated that they were involved in various natural-

resource conservation initiatives of various government departments, particularly the district forestry and agriculture departments.

*Table 8.3 Actors in the natural resource conservation programs*

<b>Actors</b>	<b>Frequency</b>	<b>Percentage</b>
Village committee	30	41.09
CBOs and NGOs	24	32.87
Government Departments	19	26.02
<b>TOTAL</b>	<b>73</b>	<b>100</b>

*Source: Field Data, 2006*

The findings show that the village committees, the CBOs, and the NGOs played a central role in the management of the forest. Consequently, any conservation initiative which targets the forest should focus on village committees and community-based initiatives. It also indirectly implies that any conservation initiative which attaches value to community participation should avoid assigning the central role in regard to the management of the forest to government departments, as this can constitute an obstacle to the process.

It also emerged that 68% of the respondents were still dissatisfied with the current management of the forest, with only 30.5% indicating satisfaction. Their reasons for dissatisfaction were corruption and mismanagement (42.5%), limited community (41.5%), deterioration of forest conditions (40.5%), lack of transparency (10.5%) and other reasons (3.5%).

*Table 8.4 Community's dissatisfaction with the way the forest is being managed*

<b>Reasons/Problems</b>	<b>Frequency</b>	<b>Percentage</b>
Corruption and mismanagement	85	42.5
Limited involvement	83	41.5
Deterioration of forest condition	81	40.5
Lack of transparency	21	10.5
Others	7	3.5
<b>TOTAL</b>	<b>200</b>	<b>100</b>

*Source: Field Data, 2006*

Respondents who replied that corruption and mismanagement were the main problem reported that they were asked to pay illegal fees for accessing forest products, and that some people who paid these fees were able to access forest resources. They also found it difficult to get similar employment opportunities as forest guards were limited for local people. They further linked the problem to lack of community involvement in decision-making, and indicated that the problem could be addressed by enhancing community involvement in the forest's management. Those who replied that lack of community participation was the main problem also shared this view. Some respondents indicated that the condition of the forest continued to deteriorate in spite of various initiatives to address the situation, fundamentally due to lack of community participation, reinforced by corruption, mismanagement, and lack of transparency.

The findings indicate that initiatives towards the conservation of the forest are likely to yield little progress unless the above-mentioned problems are adequately addressed;

the key assumption is that the community's members are the ongoing custodians of community resources and will therefore act in the best interests of the community whenever they are involved in such initiatives.

Although different actors were involved in the management of the forest, 73.5% of the respondents preferred the management of the Forestry Department. The respondents gave different reasons for their preferences. They indicated that the department's style enabled them to get more benefits from the forest than those of the KWS and the Quaker Church, which were preferred by 18% and 5.5% of the respondents, respectively. Their reasons for dissatisfaction with these styles included heavy fines and the KWS's exclusion of the community from forest management. The other 2.5% of the respondents replied that they did not like any of the styles.

*Table 8.5 Relative preference of the current forest management style*

<b>Relative preference of management style</b>	<b>Frequency</b>	<b>Percentage</b>
Forestry department	147	73.5
KWS	37	18.5
Quaker Church	11	5.5
None of them	5	2.5
<b>TOTAL</b>	<b>200</b>	<b>100</b>

*Source: Field Data, 2006*

These findings may be interpreted to mean that any form of intervention intended to enhance the management of the forest is likely to be more productive if it aims at either strengthening the approaches used by the DFS or replicates them, particularly increased access to forest products and more space for community participation in forest management. In addition, both KWS and the Quaker church need to re-examine their approaches for the sustainable conservation of biodiversity in Kakamega Forest.

### **Rights and privileges of the local communities from Kakamega Forest**

This study also established that issues of rights and privileges are critical to natural-resource management, and should therefore be properly addressed by all the parties involved in the forest's management. This was evident when 84% of the respondents indicated that as members of the community they also had some rights and privileges in regard to the forest's natural resources. Only 16% were unaware of these rights and privileges.

Some of the rights and privileges of the respondents mentioned were collecting dead firewood, collecting grass, picking fruits, cutting creepers, beekeeping, and watering cattle. Despite this, some of the respondents were quick to point out that these rights and privileges were not guaranteed, with 49.5% reporting that they were enjoying the privileges and the remaining 50.5% stating that they were not. Of those who did, 27.7% collected firewood, 25.3% burned charcoal, 18.9% cut trees for construction, 16.8% grazed cattle, 13.5% harvested grass, 4.9% produced timber, 1.6% hunted, 1.1% used it for recreation, and 3.3 % used it for other purposes.



Table 8.6 Forest uses accessed by the community

Privileges and rights enjoyed	Frequency	Percentage
Firewood collection	54	27.7
Charcoal burning	47	25.3
Tree cutting	35	18.9
Grazing cattle	32	16.8
Grass harvesting	25	13.5
Timber production	9	4.9
Hunting	3	1.6
Recreation	2	1.1
Others	6	3.3

Source: Computed from the Field Data, 2006

Contrary to the expectation that the forest could be of great benefit to community members in terms of rural livelihood enhancement, little of this had been realised, mostly due to the management governance in place. This regime limited the community's access to the forest's products as well as to the management of its resources. The findings therefore underscore the need to balance conservation with the community's access to the forest so that its members could benefit from it. The underlying assumption is that natural resources are critical sources of livelihood to rural people, making the question of access one factor that should be sufficiently addressed.

Table 8.7 Number of households fined for accessing forest products

Type of fine	Number of households fined	Minimum	Maximum	Mean
Fine in cash in Ksh.	99	300	7000	4306.49
Fine in Community Service Order in months	5	1	8	3
<b>TOTAL</b>	<b>104</b>	-	-	-

Source: Field survey, 2005, 2006

The need to strike a balance between conservation and the community's access to both rights and privileges is evident because some community members had already violated some of the rules in place to regulate access to the forest. This study established that out of the 200 members of households interviewed, 99 of them had been fined at least once for intruding in the forest. Further analysis shows that most of them had been fined at least three times, while others had been fined as many as nine times. This study also found that the households involved had been forced to pay an average total of Ksh 4,306.19 in fines for accessing the forest illegally during the 12 months before the survey. Generally, the minimum fine was Ksh 300 and the maximum was Ksh 7,000. Those who were unable to pay in cash were subjected to community service orders (CSOs), and had served for an average of three months, the shortest duration being one month and the longest eight months. The magnitude of the fines may be interpreted to mean that the local community has put much pressure on the forest, and by extension, on its significance to local community. This observation also reinforces the need to re-examine the issue of community access to the forest.

### **8.3 Community participation in land-use planning**

The lack of clearly-defined land-use policies at all levels and such poor land-use practices as deforestation, overgrazing, excessive fuel-wood harvesting and charcoal burning, and excessive pressure on natural resources expose the underlying causes of land mismanagement in the district.

Unfortunately, land-use planning practices that could resolve the problem are limited in the district. This study found that land-use planning is primarily limited to urban land. However, the district is predominantly rural, with only two urban centres, indicating the limitation of the district's land-use planning. Furthermore, the district practices land-use planning in the form of top-down sector plans which have failed to bring the sustainable use of land to the district, creating instead unsustainable production, poor environmental management, land deterioration, and land-use conflicts.

The importance of community participation in land-use planning cannot be over-emphasised due to the role communities play in managing their own resources. Community participation in land-use planning empowers the intended beneficiaries, enhances ownership, and improves the sustainability of land-use plans. It ensures that various needs are accommodated in the process and is instrumental in ensuring that multiple views are shared and concerns negotiated for better outcomes. Through community participation, the skills and knowledge of the communities involved can be integrated into the process.

It also enables communities to stand independently, think progressively, plan and implement changes systematically, and accept outcomes rationally. Another positive effect of community participation is that it enhances the intended beneficiaries' sense of ownership of the resources, which is also critical in sustainable land management.

A lack of land-use planning and failure to involve communities produced such negative outcomes in the district's land management as misplaced priorities, conflicting land use, land-resource degradation, and loss of biodiversity.

### **8.4 Participation of women in land management**

Women in the district do not normally own land or control land resources. Decisions about how to use and manage land come solely from men, even though women do the bulk of agricultural work. Because of their limited rights in decision-making regarding land, their contribution to land management is also limited in scope and extent. The following sections analyse the role of women in land management in the district.

#### **Analysis of gender roles in the district**

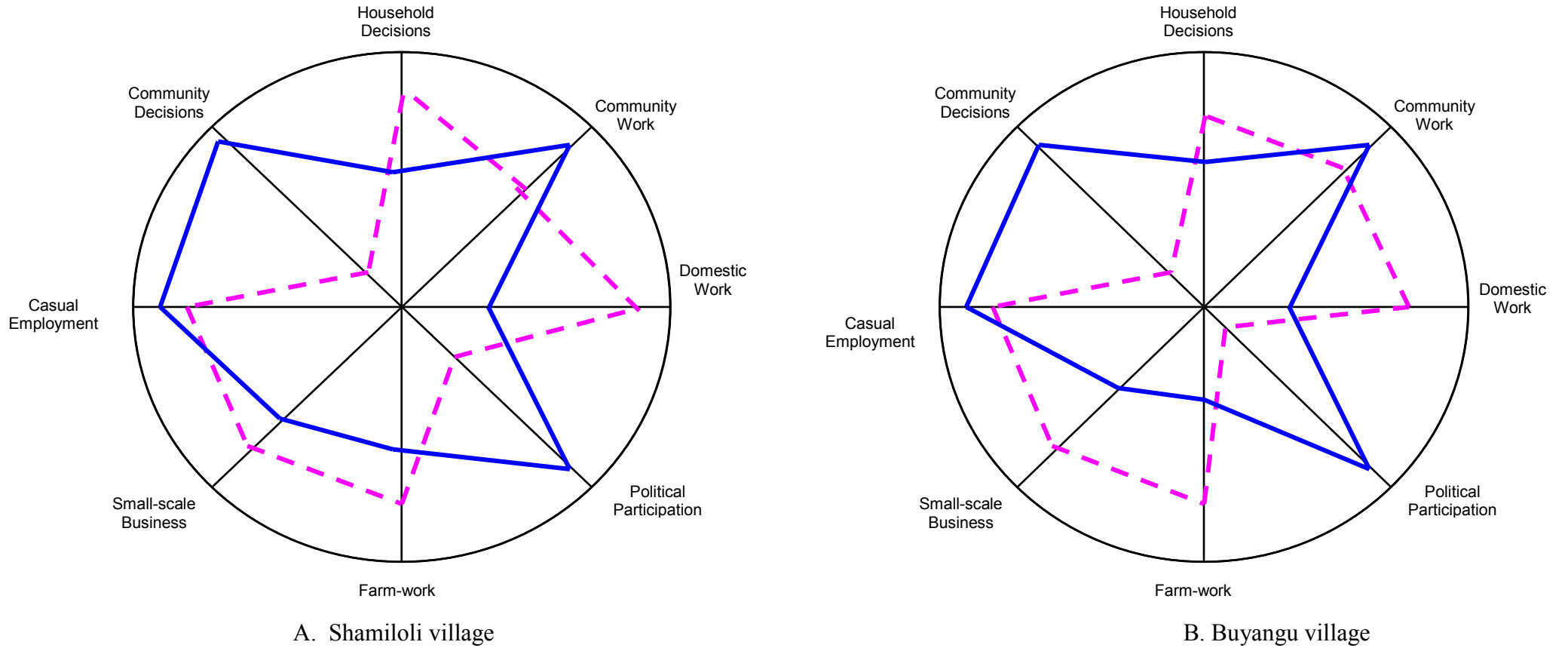
In order to establish the nature of gender roles in the district, this study asked a group of women and men from Buyangu and Shamiloli villages to differentiate gender roles in their communities. The respondents identified eight gender roles. These were community decisions, household decisions, community work, domestic work, small-scale business, and casual employment. The respondents discussed each gender role separately and scored the levels of participation men and women have in each from zero to 10, zero at the centre of the circle and 10 at the extreme. Men's and women's scores were joined for each role by using a dotted line for women and a continuous line for men.

Figure 8.1 shows that the genders play different roles in both villages. Their roles varied in terms of both their nature and their level of involvement. The analysis shows that in both villages the women's presence was more prominent in some roles than

men's and vice versa. Women were more involved in domestic work, household decision-making, farm-work, and small-scale business, while men were more involved in political participation, community work, community decision-making and casual employment.

The domestic work women performed included fetching water, collecting firewood for cooking, looking after children, cleaning, and cooking. The respondents attributed women's dominance in domestic work to the nature of activities involved, noting that the society is culturally socialised to believe that these are jobs which are only supposed to be performed by women. Nonetheless, it emerged that some men were also involved in domestic work. They were, however, few compared to women. The respondents attributed this to the gradual changes taking place in various societies throughout the world. Because of such changes, some men are gradually beginning to perform such roles which were once considered to be strictly women's work as cooking. They attributed this to such factors as education and religion, which to some extent have played a major role in shaping people's mindsets in any society. Another reason was that some men were forced by circumstances to perform these roles, such as by not having spouses for various reasons and being forced to perform such roles for their own upkeep.

Figure 8.1 Gender roles in Shamiloli and Buyangu villages



Source: Field survey, 2006 and author's construct

This study also found that women in both villages were more involved in household decision making than men. The respondents attributed this mainly to women being the ones who perform most of the domestic work. For instance, since women are the ones who prepare food for the entire family, they decide what to prepare. The respondents also reported that women often make decisions regarding such other family matters as health care, especially for their children and other dependants. As with domestic work, men still scored fewer points in household decision-making, with cultural factors the main determinant.

Women also played a dominant role in small-scale business in the two villages. The respondents identified such businesses as selling grains, vegetables, groceries, and food-stuffs and running small retail shops as women's work. They attributed their involvement in micro and small-scale business enterprises to women's lack of the high levels of education and technical skills required in the formal sector of the economy. The respondents also cited women's lack of the capital required to start medium or large enterprises and such institutional constraints as male land ownership and a lack of credit due to not having collateral as factors that have confined most of the women to only small and micro business enterprises.

This study also established that the women in the two villages were more involved in farm-work than men. They were mainly involved in such tasks as planting, weeding, and harvesting. Some of them performed these tasks on other people's farms in order to earn additional income for their families.

The respondents attributed men's dominance of community work in both villages to the nature of the work involved, noting that most of it requires much physical strength. This community work included the construction of education facilities, cattle deeps, and rural access roads. Women were often unable to participate in such work due to the demands of their domestic work, and were represented by their husbands. Some men participated in community work mainly because they were unable to contribute to the projects financially. As with other roles, a few women did take part in community work, performing such tasks as fetching water for local primary-school classroom construction. Some respondents reported that sometimes women participated in community work if they had no one other than themselves to represent their households.

The respondents made the same observation in regard to community decisions. Men in both villages had the upper hand in community decision-making. The respondents attributed men's dominance in this realm to the men's perception that they are superior to women and their control of the resources, which gave them leverage over women. Another explanation was that marriage customs result in women living in their husbands' communities and therefore to some extent being considered as not natives of the areas in which they reside. The respondents made similar observations about political participation, and in both villages men took the lead role in political matters.

This study also found that male members of households dominated casual employment in both villages. Most of these activities were temporary and were performed mainly just for money. Casual employment includes a range of activities, such as working on other people's farms, sugar, and tea plantations. The respondents reported that due to the lack of permanent employment, men often looked for anything temporary that could earn them money to provide for such family needs as buying food and paying school fees, medical expenses, and whatever other costs arose. According to the respondents, most

men in rural areas relied on casual employment mainly because they did not have the skills required to work in the formal sector of the economy or the capital required to start a small-scale business enterprise. As in the case of community work, this study also established that many women also undertook casual employment. Their reasons for doing so were similar to the men's. However, women's level of involvement in casual employment was significantly less than men's.

### **Role of women in land management**

Sustainable land management is a result of several factors. Key among them is the active participation of all stakeholders in order to ensure that all needs and concerns are adequately factored into the management process. This study found that women, especially in the rural areas, ought to play a central role in any land-management process, as it affects their main source of livelihood. The findings from the two villages focused on above are a case in point, showing that women were more involved than men in both farm and domestic work. Given that most women rely on the land for their livelihoods, it is possible that any land-management initiative which neglects to bring them on board from the planning stage is unlikely to factor in their needs.

Although women are the ones who work on the farms and play a major role in the land's productivity, they are sidelined from access to land management because of the dominance of their male counterparts in the key decision-making processes. Male domination of both community and political decisions at the expense of women implies that men had the upper hand in various community land-management initiatives. For instance, the men determine the kind of technology used on the land, the type of crops planted, land purchases, land leasing, and similar matters. The outcomes therefore are likely to be gender-insensitive or outright biased against women. Since women constitute 51% of the total population (CBS, 1999) and also play a critical role in the operation of land management, such approaches would end up sidelining a major segment of the society from a process which is critical to their well-being. The overall result is unsustainable uses of land in a country where most of the population relies on agricultural production.

Sustainable land management in the district is therefore unlikely to achieve its intended objectives unless some critical factors are addressed. The situation therefore requires a policy to streamline gender issues, with specific reference to women's role in land management.

## **8.5 Summary of key issues**

- Although community involvement in forest-resource management is crucial, the local communities are inadequately involved. Inadequate community participation in Kakamega Forest's management means that the community's members have an inadequate platform to air their views and negotiate their concerns, which definitely undermines the sustainability of conservation efforts, and 68% of the respondents were unsatisfied with the current management of the forest.
- The village committees, the CBOs, and the NGOs played a central role in the management of the forest. Efforts to build the capacity of the village committees and local

CBOs could positively contribute to sustainable conservation of biodiversity in Kakamega Forest,

- Although women are the ones who work on the farms and play a major role in the land's productivity, they are being sidelined from access to land ownership and management. Due to women's limited rights to make decisions regarding land, their contribution to land management is also limited in scope and extent.

## **9 Spatial linkages and Service Provision for Improving Rural Livelihood**

### **9.1 Introduction**

This chapter will analyse the role of spatial linkages and service delivery in rural livelihood development and assess their implications for the conservation of biodiversity, with a view of promoting the sustainable conservation of biodiversity in Kakamega Forest.

Previous chapters have concluded that rural household livelihoods are determined jointly by the activities, in which the households engage, the assets they own, and the resources and services to which they have access. Therefore, the level of access to the socioeconomic services that exist in an area partially determines the process by which households in that area construct diverse portfolios of activities in order to survive and potentially improve their livelihoods.

The preceding chapters also explained the importance of rural livelihood diversification for the sustainable conservation of biodiversity in Kakamega Forest. However, livelihood diversification can only be achieved through improved access to social and economic services which are its prerequisites. This chapter analyses the nexus between rural livelihoods, access to socioeconomic services, and biodiversity conservation in Kakamega Forest by focusing on the local communities' access to education, health, market, agricultural extension, and credit services. This study will not examine access to other services, such as improved water, electricity, and telephones, due to space limitations.

### **9.2 Patterns of settlement and functions in the district**

This study has examined the settlements in the district and their functions in order to understand (a) the regional settlement pattern, (b) the degree of access that people in the settlements have to various services and facilities, (c) the degree to which the settlements serve the populations surrounding them, and (d) the distribution and patterns of association among socioeconomic services within the settlements that are relevant for the enhancement of rural livelihoods.

The analysis of the settlements in the district reveals a highly skewed, hierarchical distribution of settlements there. Out of the district's 52 recorded settlements, only two, Kakamega and Malava, have populations of more than 2500 people, while 50 of the settlements have populations of less than 2500 people. Consequently, only the towns of Kakamega and Malava are considered to be urban settlements and the rest are rural settlements.





The Local Government Act, Cap 265 of the laws of Kenya entrusts local service delivery, local governance, and local development to County Councils. One county council, the County Council of Kakamega, encompasses the district, and under it are one municipal council, the Municipality Council of Kakamega, and one town council, the Town Council of Malava, which are responsible for providing local service delivery. However, these local authorities fall short of providing the necessary services for a number of reasons.

The setting up of local authorities is arbitrary and based on political decisions rather than studies and consultations with their stakeholders, as the government created them to fulfil the political agendas of the elites. They face structural challenges to providing necessary services. Also, these local authorities can raise only an average of 20 million Ksh per year from licences, market fees, direct taxes and other means for development, and the 50-80 million Ksh per year they receive from the government is also inadequate to provide the necessary services and facilities the settlements require. Most of the settlements are characterised by inadequate social and economic services, services which are needed for livelihood diversification.

Furthermore, most of the settlements provide utilities and services that are not required for generating economic development in the area, as Figure 9.1 above indicates. A complete inventory of services and facilities in all the 52 settlements surveyed revealed that provision shops exist in 49 of them, restaurants in 41, bars in 48, and hair-dressing salons in 46, while such economic services relevant to rural livelihood enhancement and diversification as credit institutions exist in only eight of these settlements, agricultural extension offices in only nine, agro-processing facilities in only three, and farm-supply stores in 29 of them.

The existing services and facilities in the district are also concentrated in a few central places, such as the towns of Kakamega and Malava. However, these central places are not easily accessible for people in other, smaller settlements due to inadequate transportation linkages and travel costs most households cannot afford. The services and facilities in the district being poorly integrated with the settlements, they cannot enable most of the local households to increase their productivity or diversify their livelihoods. The solution to this problem therefore requires regional planning and development, and that calls for the rearrangement of the spatial structure and existing land-use patterns through the introduction, promotion, and location of new services, facilities, and linkages relevant to raising agricultural production and maximising rural livelihood options.

### **Distribution of services and facilities**

This section assesses the distribution of basic social and economic services and analyses their implications for the people's quality of life. This analysis covers the distribution of education, health, agricultural extension, market, and financial services in the district.

#### *Education facilities and services*

According to human-capital theory, access to education is a means for enhancing livelihoods. It raises the productivity of workers by imparting useful knowledge and skills, thereby raising workers' income (Becker, 1964: 42-65). Other studies have also provided explanations linking investment in education with increased wages and eventual improvement on livelihoods (Cohn & Addison, 1998: 253-307; Belanger & Tuijnman, 1997: 1-16). However, the extent of the applicability of the theory that more education leads to greater economic success has been questioned for the Kakamega context, as since the 1970s school-enrolment rates have continued to increase while average in-

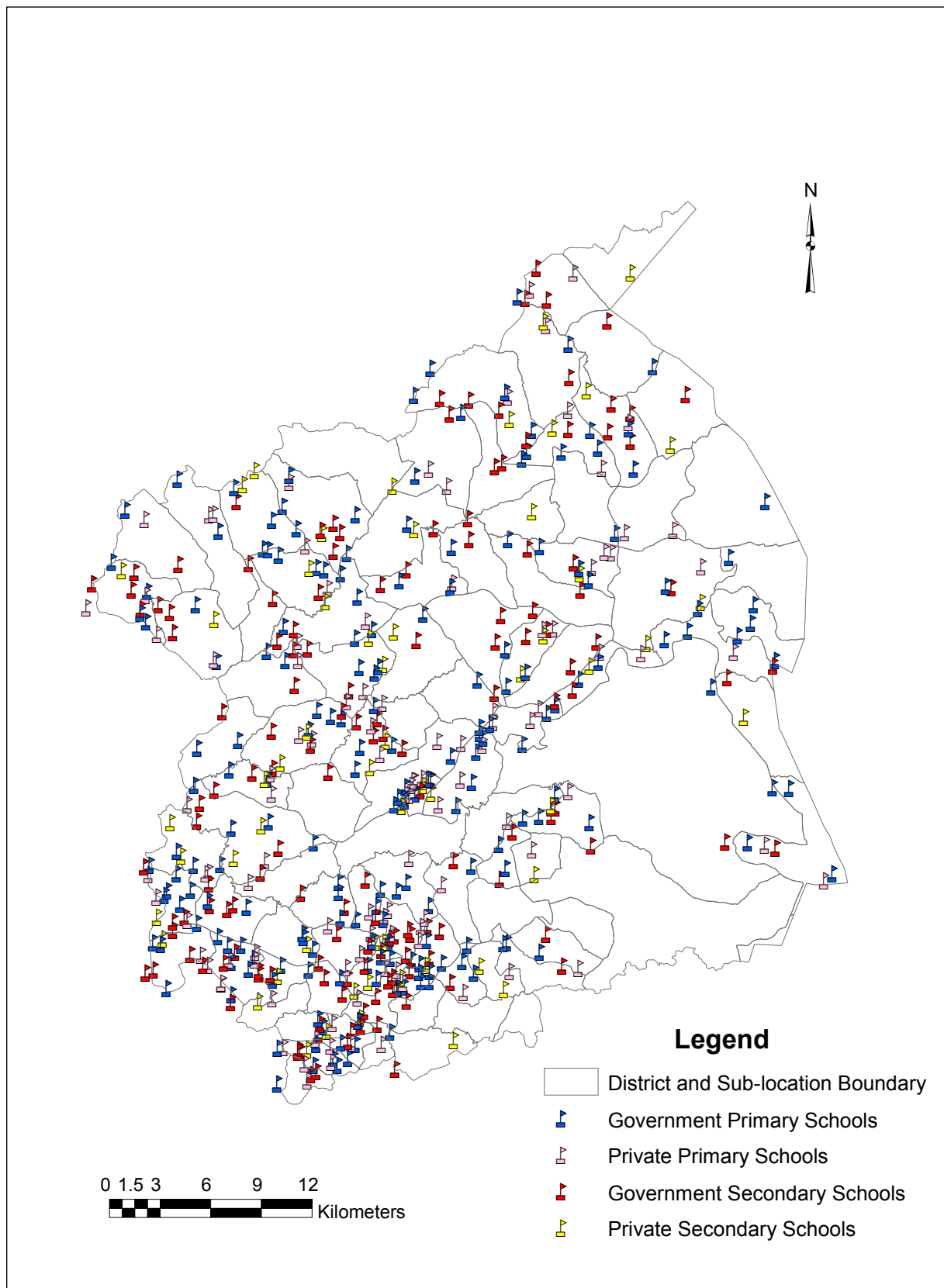
comes have stagnated, unemployment rates have worsened, and the under-employment of highly schooled people has been recognised as a social problem (Livingstone, 1997:9-14). Some continue to argue that increased school participation rates and income earned are directly related, but if the quality of schooling and on-the-job training are neglected, the human-capital concept becomes theoretically flawed (Xiao 2001: 19-21).

Nevertheless, it should be emphasised that educational services are vital for the development of human capital, which refers to the skills and knowledge crucial for the pursuit of diversified livelihood strategies. With this in mind, the field survey assessed the formal educational facilities and services in the district and found, as Map 9.1 below shows, that the district has 333 registered primary schools, 116 of them private, 223 secondary schools, 64 of them private, and three tertiary institutions, including one university. The walking distance to primary schools in the district varies from a minimum of 200 meters to a maximum of 2.5 kilometres. For secondary schools the minimum walking distance is 200 meters and the maximum is five kilometres. Educational facilities are therefore physically accessible within reason, and the distribution of primary and secondary schools in the district is relatively good.

Enrolment during the period of the study was 98.7% for boys and 97% for girls in primary schools, while in secondary schools it was 35% for boys and 32% for girls. That enrolment is so much higher in primary schools is mainly due to the recently introduced free primary education for all. However, although the new government policy of free primary and secondary education has given many children a new opportunity to attend school, there are still many who are still unable to take advantage of this new opportunity due to their inability to pay for school uniforms.

Enrolment in the primary schools is higher in the district than the national average, which is 76% and 77% for boys and girls, respectively; while in the secondary schools the enrolment is lower than the national average of 40% for both genders (UNICEF, 2006: 149). Female enrolment is lower than male enrolment due to such socioeconomic and cultural factors as early marriage, a higher number of girls dropping out to care for siblings and perform other household services, and some parents' perception that investment in girls yields the household lower returns than in boys. The teacher-pupil ratio was 1:50 in primary schools and 1:25 in secondary schools in 2006. This is slightly lower than the national average which is 1:44 for primary schools and 1:19 for secondary schools (CBS, 2006: 12).

Map 9.1 Spatial distributions of formal education facilities in the district



Source: Field survey and author's construct 2007

Furthermore, 69% of the responding households reported that the quality of education in the primary schools was adequate and 71.6% that the quality of the secondary schools was adequate, 28% reported that the quality of the primary schools was good and 23.7% that the quality of the secondary schools was good, while 3% found the quality of primary schools unsatisfactory and 4.6% found the quality of the secondary schools unsatisfactory.

Generally, access to educational opportunities in the district is relatively good, although the quality of education needs improvement. The socioeconomic and cultural factors that have kept girls' school attendance low should be resolved as increasing women's educational achievement is a key ingredient for women's empowerment.

Another issue the survey raised was that although many young people have attended college-level education, they find it difficult to get jobs. The unemployment rate in the district in 2006 was 30%. It is therefore important for the government to create jobs and to encourage young graduates to engage themselves in self-employment by providing the necessary financial and technical support.

### *Health facilities and services*

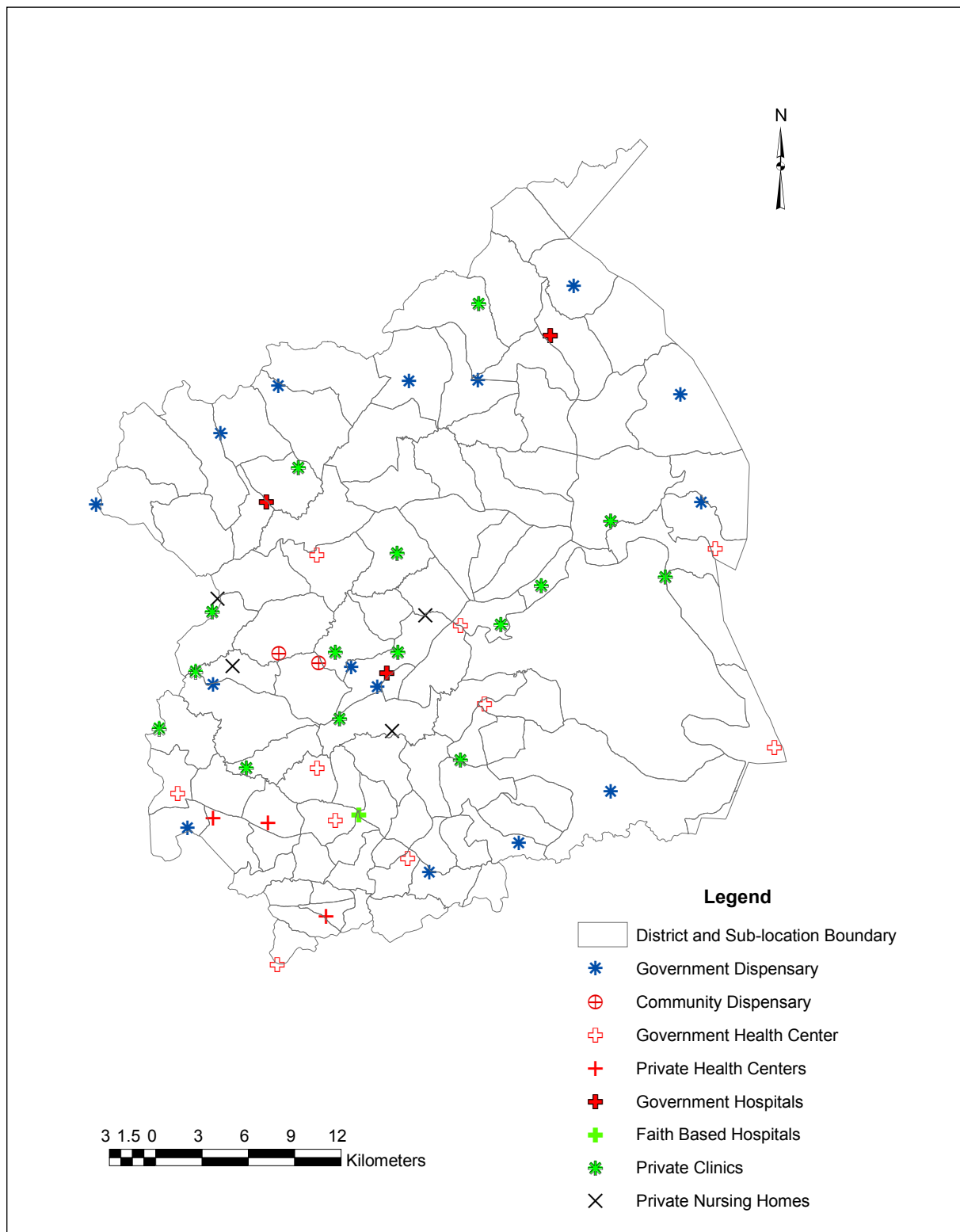
Access to good-quality healthcare services is a major development issue and a priority in the district's development agenda. Nevertheless, providing increased coverage and equitable access to healthcare services has been a challenge due to inadequate funds, a shortage of drugs and medical equipment, poor infrastructure, traditional and religious beliefs, and inadequate staffing. Most of the households' inability to pay for health services is also an obstacle.

In 2006, all the health facilities in the district together had a total of 31 doctors, 503 nurses, and 40 laboratory technicians. The health-worker-to-population ratio was therefore 1: 22,026 for doctors, 1:1,357 for nurses, and 1:17,070 for laboratory technicians. This compares favourably with the national ratio of 1: 27,770 for doctors and 1:1,636 for nurses, but not for laboratory technicians, whose national ratio was 1:14,285 (WHO, 2007: 20).

The district had 24 dispensaries, 16 of them government, four faith-based, and four community-based, 22 government clinics, seven private maternity and nursing homes, 13 health centres, 10 of them government and three faith-based, and four hospitals, three of them government and one faith-based. However, the quality of the health services remained a challenge, with 43.4% of the respondents rating them as good, 53.6% as adequate, and 3.0% as unsatisfactory.

The distance between the respondents' households and the closest health facility ranged from one to 12.5 kilometres. However, 73% described the prices for the services in the health facilities as very expensive and unaffordable to them at 10Ksh to 130 Ksh. As a result, 18.6% of the responding households resorted to traditional methods and consulted herbalists for their health-related problems.

Map 9.2 Spatial distributions of health facilities in the district



Source: Field survey and author's construct 2007

### Major markets in the district

Market centres in this context are nucleated settlements in which the public gathering of buyers and sellers of commodities takes place at an appointed or customary location at

such regular intervals as daily, weekly, and monthly, or on certain days of the week. The size and importance of market centres vary, depending on the markets' activities.

This study made an assessment of the existing market centres from the municipal and county councils' records and field surveys, focusing on the size and type of goods traded, and found that 50 market centres operated in the district periodically. Of those 50 centres, 38 were small, with less than 1000 Ksh tax income collected by the municipal and county councils during market days. The other 12 were big markets generating greater revenue for the municipalities.

*Table 9.1 Market centres, size and type of goods traded*

<b>Major Market centre</b>	<b>Revenue collected during market days in Ksh.<sup>13</sup></b>
Kakamega	>500,000
Malava	200,000
Lubao	45,000
Nambacha	40,000
Musoli	25,000
Kakunga/Kambi	20,000
Shinyalu	20,000
Khayega	20,000
Malaha	10,000
Lutaso	7,500
Kambiri	5,000
<i>Bukura</i>	5,000

*Source: Kakamega Municipality records, 2006*

As Table 9.1 above shows, Kakamega is the largest market centre, with tax revenue of more than 500,000 Ksh per market day, followed by the Malava market with tax revenues of 200,000 Ksh per market day and the Lubao market with 45,000 Ksh revenue each market day. This indicates that access to good market services is limited for most parts of the district, with people from the smaller settlements having to travel to these main centres to get particular goods and services, which is often difficult to do because of the condition of the local transport infrastructure.

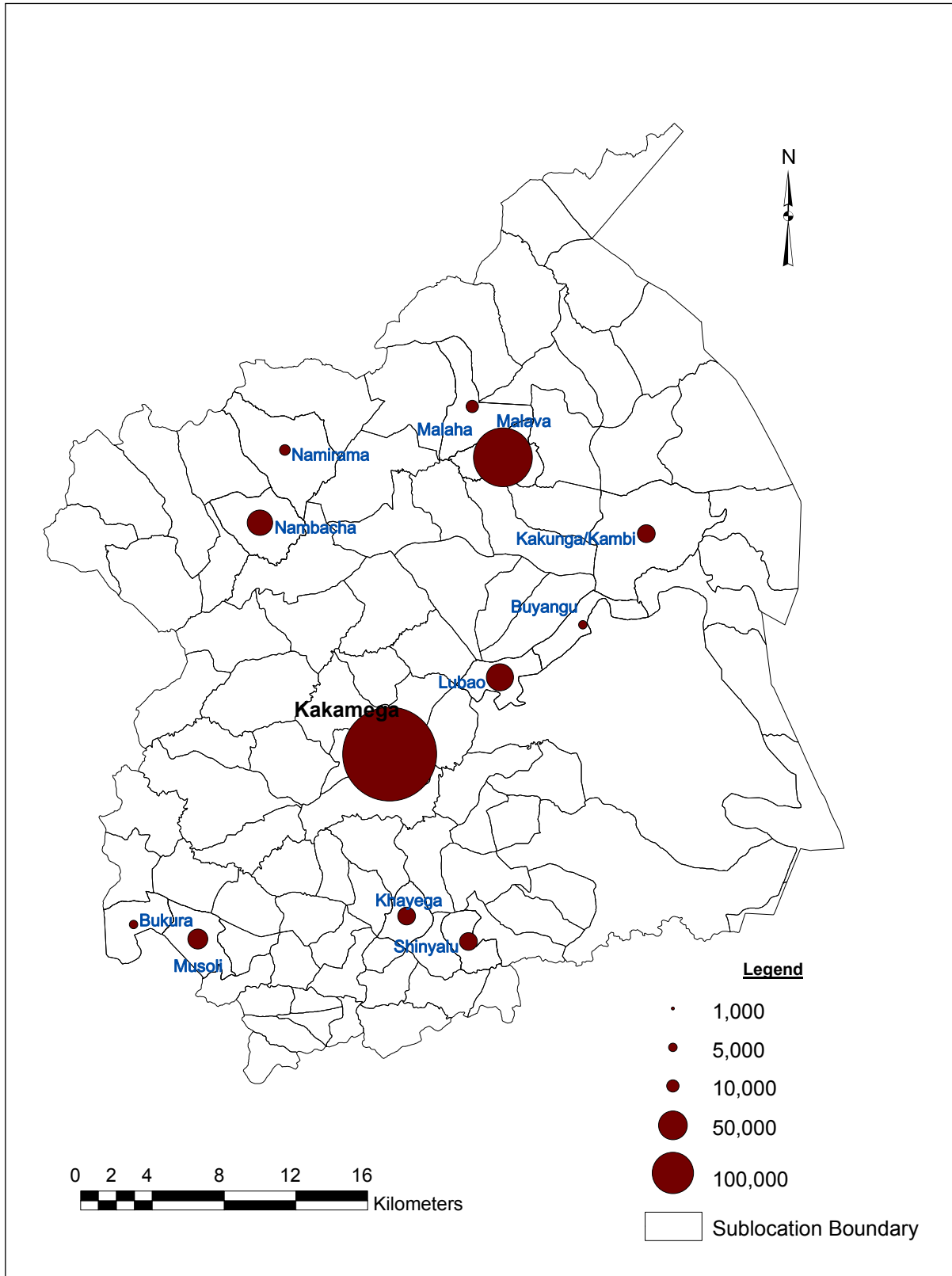
Most of the goods traded in these markets are such agricultural commodities as maize, beans, sugarcane, vegetables, fruits, milk, meat, and cattle. They are mainly produced in the district, although some are brought in from such neighbouring districts as Nandi. Other goods traded at these markets are such manufactured items as farm tools, household equipment, construction materials, second-hand and new clothes, electronics, stationery, drinks, and prepared foods. Map 9.4's analysis of origin and destination of these commodities shows that nearly all of the manufactured goods and most of the agricultural commodities come from outside the district, making the district a net importer of both agricultural and manufactured goods.

It is therefore clear that the district's marketing system is poorly organised, suffers from poor transportation systems, includes weak cooperatives, and provides inadequate credit services. The major agricultural production centres are badly linked with the dis-

<sup>13</sup> The amount of revenue collected shows the size of the market's activity.

trict's consumption centres due to poor transportation systems, which also helps make the price of farm inputs extremely high compared to the prices farmers can get for the agricultural commodities they produce.

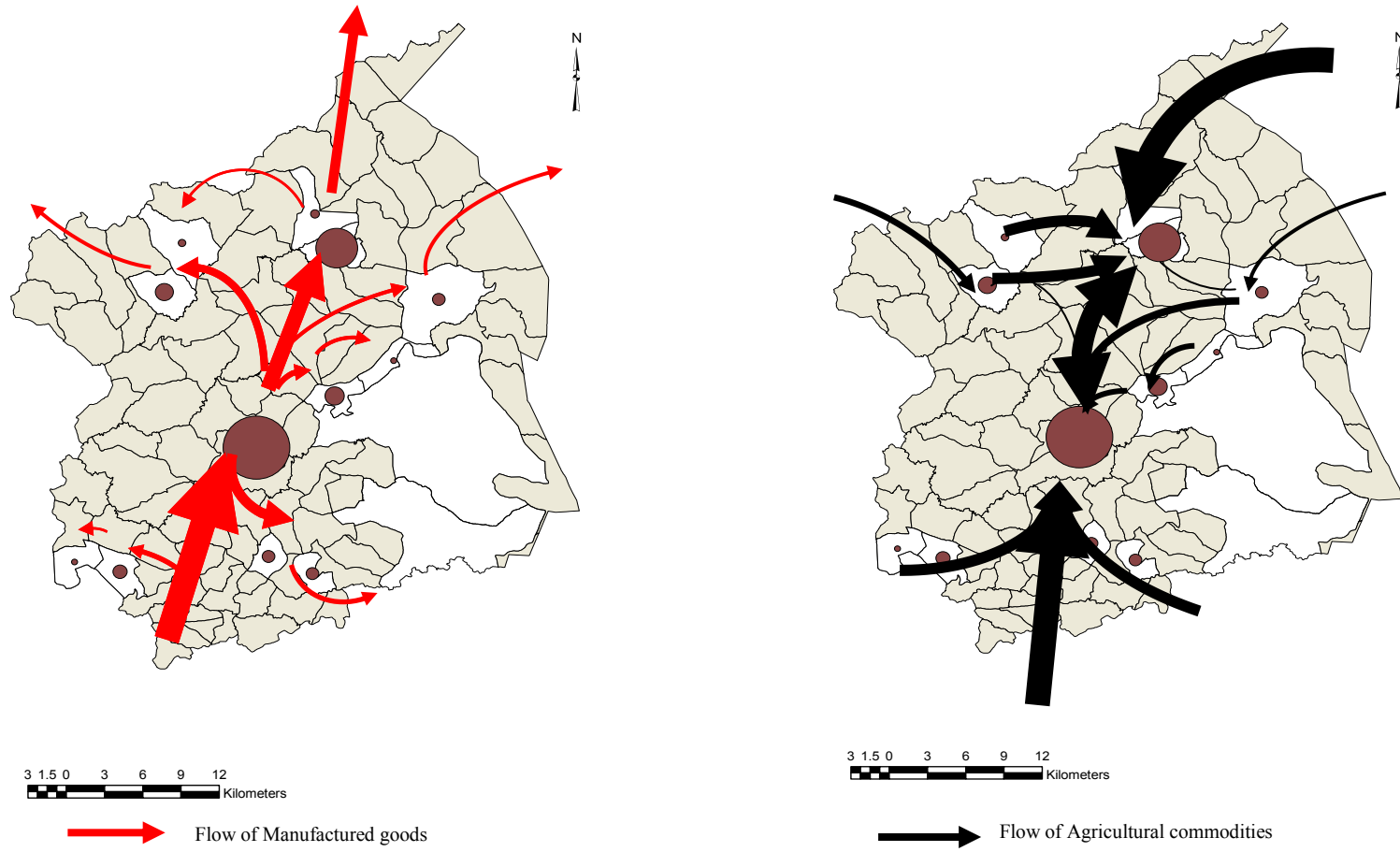
*Map 9.3 Spatial distributions of market centres in the district*



Source: Field survey and author's construct 2007



Map 9.4 Flow of manufactured and agricultural commodities in the district



Source: Field survey, 2006

### *Rural financial services*

Rural financial services play a key role in providing rural households with access to credit services and in opening up options for livelihood diversification and improvement. Reliable access to financial services enables entrepreneurship, innovation, and increased productivity, thereby facilitating economic growth and poverty reduction (World Bank, 2003:5).

The availability of rural financial services is also an essential component of an enabling environment for rural economic growth. Access to working capital or investment credit offered by rural finance institutions can substantially accelerate the adoption of modern agricultural technologies and production patterns which improve the ability of the rural sector to provide for the subsistence needs of its poor people. It can also assist the production of the surpluses in primary and intermediary products required for urban consumption and export. Adequate and appropriate access to credit services can also permit entrepreneurs to take advantage of investment opportunities in processing and in off-farm enterprises (Ibid.).

This study assessed access to rural financial services in the district from this perspective and found them to be inadequate. Within the district are 23 active savings and credit co-operatives with 44,179 members and share capital of 1.6 billion Ksh. Seven of these cooperatives are based in rural areas and 16 are urban-based. They provide services mainly to the parts of the district growing tea and sugarcane as cash crops. This means that those areas growing food crops have inadequate access to efficient rural financial services.

Although most of the rural households needed credit for agricultural production, 60% of them could not get access for various reasons, with 44.6% of responding households citing fear of high interest rates, 26.8% lack of collateral, 10.7% lack of access to financial services, and 3.6% time-consuming bureaucracy, as Table 9.2 shows.

For the 40% of responding households which were able to access rural financial services the main sources of credit were self help groups (32.2%), relatives (28.6%), cooperatives (12.5%), banks (10.7%), private money lenders (8.9%), and friends and neighbours (7.1%).

*Table 9.2 Constraints of accessing rural financial services in the district*

<b>Reasons for not accessing financial services</b>	<b>Percentage of the respondents</b>
Fear of high interest rates	44.6
Lack of collateral	26.8
Don't need credit	12.5
No financial services available	10.7
Time-consuming bureaucracy	3.6
Other	1.8
Total	100

*Source: Field survey, 2005 and 2006*

This study also found that most of the households in the areas of the district producing mostly food crops who were able to access financial services accessed it from the informal sector, particularly relatives and self-help groups.

To summarise the characteristics of rural financial services in the district, they are concentrated in urban and cash-cropping areas and most rural households have no ac-

cess to formal financial services. The only financial services available to most of them are provided by the informal sector, such as relatives and friends. Only a small amount of credit can be provided in this way (5000Ksh on average), and its coverage is also limited. This lack of finance limits the ability of the households to benefit from investment opportunities or a diversification of their livelihood.

*Table 9.3 Main sources of financial services in the district*

Source of credit	Percentage of responding households	Remark <sup>14</sup>
Credit and saving groups (self-help)	32.2	Informal source
Relatives	28.6	Informal source
Cooperatives	12.5	Semi-formal source
Banks	10.7	Formal source
Private money lenders	8.9	Informal source
Friends and neighbours	7.1	Informal source
Total	100	

*Source: Field survey, 2005 and 2006*

Furthermore, such factors as a lack of property rights and title deeds resulting in a lack of collateral, the absence of a legal system that regulates rural financial markets by reinforcing contracts and dealing with defaulters, the credit institutions' financial capacity being insufficient for reaching a large number of clients, a lack of collaboration and networking among financial service providers, inadequate road networks and communications infrastructure, and the borrowers' inadequate knowledge of financial management prevent the district's existing rural financial services from operating efficiently. The financial institutions also complain that some households use credit for unplanned purposes. Also, no one has conducted impact assessments in regard to the benefits or losses resulting from the loans provided. For all these reasons, the sector has been unable to provide the services households require to support economic growth and livelihood diversification.

Expanding access to rural financial services and strengthening their role in sustainable rural livelihood development through investment in improved agriculture and non-farm enterprises requires a legal framework and an enabling policy environment that enforces contracts and regulates and facilitates secured transactions. It is also important to develop the existing financial institutions' capacity to provide financial services and to create viable, efficient rural financial-service providers. This is particularly so with community-based initiatives, as most of the district's services have been provided by self-help savings and credit groups. Finally, improving rural households' financial management skills, providing business-development advisors, and investing in social and economic infrastructure are also important.

<sup>14</sup> "Formal institutions are defined as those that are subject not only to general laws and regulations but also to specific banking regulation and supervision. Semi-formal institutions are those that are formal in the sense of being registered entities subject to all relevant general laws, including commercial laws, but informal insofar as they are, with few exceptions, not under bank regulation and supervision. Informal providers (generally not referred to as institutions) are those to which neither special bank law nor general commercial law applies, and whose operations are also informal so that disputes arising from contact with them often cannot be settled by recourse to the legal system" (Ledgerwood 1999:13).

### *Agricultural extension services*

The application of improved methods of farming to agricultural practices through research and farmer education has been provided in the district through such actors as agriculture offices, such research institutions as KARI, NGOs, CBOs, and farmer-to-farmer knowledge transfers. However, the main extension-service provider that has been operating with the objective of sustained agricultural productivity is the District Agriculture Office (DAO).

The DAO runs seven agricultural extension stations in the district. However, several factors have diminished the effectiveness and efficiency of their extension services. These are inadequate extension officers and limited contact with farmers, the farmers' inadequate capacity for accessing improved inputs, and the farmers' small land holdings. In 2006, 45 extension officers worked in the district and the extension-worker-to-farmer ratio was 1:2000, which is much lower than the national average of 1:560 and lower still than the recommended 1:400. Due to the small number of extension workers, contact with farmers and visits by extension workers are relatively infrequent, limiting the chances for knowledge and skill transfer.

This study's survey asked farmers if extension workers visited them or if they went to the extension offices for consultations, and 58.8% replied that they had not been visited by an extension officer nor consulted one during the previous year, 38.8% replied that they had had contact with extension workers at least once during the year, and 8.5% reported having contact at least once a month. Asked if they had received any training on improved methods of farming or farming technologies during the previous 12 months, 65.3% replied that they had received no training, with the other 34.7% reporting having received training from extension officers, farmers groups, CBOs, and NGOs.

Although sustained agricultural productivity has been the main objective of the extension service, it is impossible to establish a positive correlation between the district's extension services and its agricultural productivity. Most of the farmer respondents indicated that farm productivity has been continuously declining for several reasons, and that the provision of extension services could not reverse the trend.

In summary, the relatively small number of extension workers, the low level of farmer-extension worker contact, inadequate training and low knowledge transfer, and declining agricultural productivity suggest that the district's agricultural extension services are inadequate both in terms of efficiency and effectiveness.

### **Spatial linkages and accessibility**

The role of spatial linkages in sustainable rural livelihood development cannot be over-emphasised. Spatial linkages are the means through which rural households obtain access to services and facilities that exist in urban areas. Through these linkages rural households get the farm inputs needed for increasing agricultural productivity as well as access to markets to sell their produce and raise the income required for sustaining their livelihoods.

The following sections assess the spatial linkages in the district with the objective of discovering their implications for biodiversity conservation in Kakamega Forest.

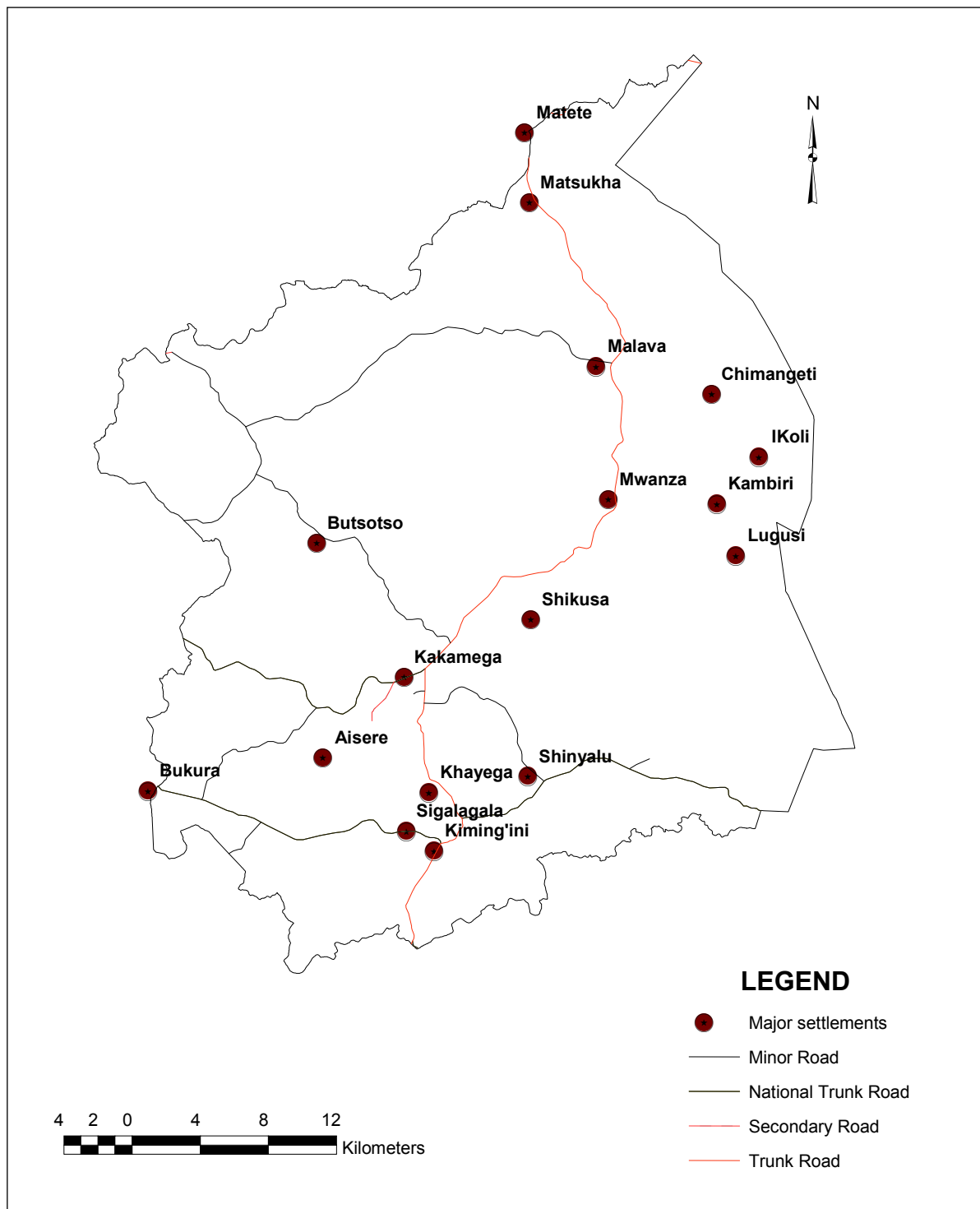
### *Transportation and Market linkages*

Roads are the only means of transportation that provide the district's households with basic access to markets for agricultural products and farm inputs. The district has 762

km of roads, with 77 km asphalted, 544 km gravel, and 141 km unimproved earth. This makes the road density, or the number of kilometres of roads per square kilometre of land, 1.8, which is relatively better than the national average of 3.7. However, the condition of the district's roads is inadequate, and the feeder roads are frequently impassable throughout the rainy season, from March to September. The impassability of most of the rural roads during the rainy season affects incomes, as farmers are unable to take their produce to markets on time or access farm inputs on time, at the normal market price, or both.

This study's survey found that the areas of the district with high potential for agricultural production are poorly connected with the district's major markets, and that basic access to markets was one of the main livelihood constraints cited by the respondents. Parts of the Nandi district which are famous for their production of maize, milk, cattle, and other agricultural products are not easily accessible to the major markets in Shinyalu and Kakamega. The majority of transportation of grain and milk from Nandi District is on foot and bicycles, which are also used widely for personal travel for a small fee.

Map 9.5 Road networks in the district



Source: WFP, VAM, 2005 and author's construct 2006.

The lack of road access to markets for agricultural inputs and produce has affected rural livelihoods negatively and reduced the diversification options of the rural poor. Although the accessibility problem cannot be solved by the construction of roads alone, it could be argued that the creation of new transport linkages and the strengthening of the existing ones would stimulate interaction between production centres and consumption centres and facilitate rural-livelihood development and regional development. Im-

portantly, improved transportation linkages also make farm technology transfers easier and stimulate diversification of the means of rural livelihoods.

### *Institutional linkages and service delivery*

This study assessed the level of linkages among institutions in the district to determine the degree to which they are integrated and to examine the extent to which they provide the necessary services to the district's households and found formal institutional linkages, semi-formal institutional linkages, and informal networks present. These formal linkages, semi-formal linkages, and informal networks are either sectoral, geographic, faith-based, or gender-specific.

District government departments dominate the formal institutional linkages, which are more pronounced at the district level, while semi-formal and informal linkages are stronger at the sub-district and village levels and are mainly comprised of CBOs, farmers' groups, women's groups, youth groups, and similar associations. The formal institutions are highly formal and reflect formal government structures, while the informal networks are based on informal exchanges of resource and information.

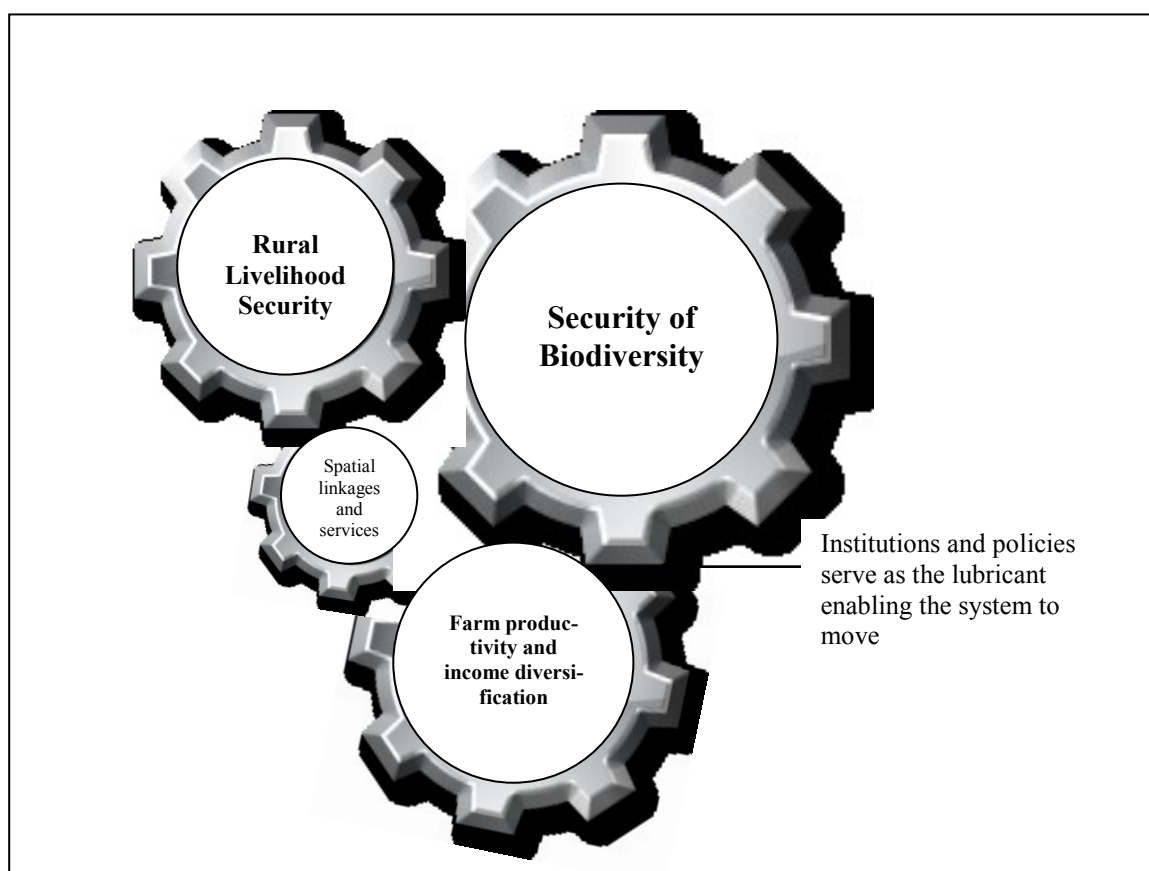
This study also found that the formal institutions in the district are characterised by both technical and financial capacity limitations. Most of the local government departments reported that they have inadequate staffing, inadequate budgets, and inadequate equipment, and the services these institutions provided was in most cases consequently not up to standard. The semi-formal and informal institutions are usually characterised by joint planning, joint implementation, and the sharing of information and resources in situations characterised by inadequate and weak linkages among the formal institutions. These have intensified the livelihood constraints of the district's rural households.

### **9.3 Implications of spatial linkages and service delivery on biodiversity conservation in Kakamega Forest**

In summary, (a) rural livelihood security in the communities surrounding Kakamega Forest is crucial for conserving biodiversity in the forest, (b) rural livelihoods in these communities could be improved or secured by promoting agricultural productivity and promoting non-farm income sources, (c) agricultural productivity and non-farming income sources could be promoted through the promotion of spatial linkages through the infrastructure development and high-quality service provision, and (d) appropriate land management and land use is required to raise agricultural productivity in a sustainable manner and to promote spatial linkages capable of supporting regional development.

As figure 9.2 shows, the sustainable conservation of biodiversity in Kakamega Forest is a function of rural livelihood security in the local communities, which is dependent on increased farm productivity and income diversification, which is also dependent on spatial linkages and service provision. The necessary policies and enabling environmental conditions act as catalysts in these interactions, and the failure of one can hamper the success of the other. The solution has to therefore be looked at in its entirety.

Figure 9.2 Rural livelihood, biodiversity, and spatial linkages and interactions



Source: Author's construct, 2006

This study found that the district's spatial linkages were weak and its socioeconomic infrastructure and service provisions inadequate. This implies that the necessary conditions for raising agricultural productivity and diversifying rural livelihoods were missing or inadequate. Most of the households lacked the means for sustaining their livelihoods and tried as much as possible to rely on such available resources as Kakamega Forest for meeting their food and other needs.

The sustainable conservation of biodiversity in Kakamega Forest could therefore be promoted through the promotion of sustainable land management and spatial linkages, which in turn could trigger livelihood diversification. The diversification of the rural households near Kakamega Forest's livelihood options would likely take pressure from the forest's resource by contributing to its sustainable conservation.

#### 9.4 Summary of key issues

- The district has a highly skewed hierarchical distribution of settlements and the existing services and facilities there are concentrated in Kakamega and Malava. These central places are difficult for people in the smaller settlements to access due to inadequate transportation linkages and affordability. The arrangement of the settlements and the district's services and facilities is badly integrated, making it difficult for most of the households to increase productivity or diversify their livelihood sources.



- Financial and extension services are inadequately distributed in the district, while its education and health services, although better distributed spatially, lack quality.
- The district's formal institutions are characterised by both technical and financial capacity limitations.
- The district's marketing system is badly organised due to poor transportation and inadequate financial services. As a result, the major agricultural production centres are also poorly linked to consumption centres, and the price of farm inputs is also extremely high compared to the price of agricultural commodities, leaving farmers in a dilemma.

## 10 Conclusions and Recommendations

This study has reached at some useful findings that could help explain the interactions among rural livelihood, land management, and biodiversity in Kakamega Forest and answer the main research questions. The first section of this chapter summarises the main findings and conclusions while the second chapter provides practical recommendations for sustainable conservation of biodiversity in Kakamega Forest and for protecting rural livelihoods, with the purpose of creating a win-win scenario involving rural livelihoods and biodiversity. In the last section, issues beyond the scope and coverage of this study are mentioned and recommendations for further research are provided.

### 10.1 Conclusions

#### Population growth and land use

The population of Kakamega district is growing much faster than its social and economic development. As the result of this fast population growth, the demand for new jobs, schools, health facilities, and other services has increased over the last few decades and will likely increase in the future. This will have a negative impact on the development of the district, especially if the local economy is unable to absorb it.

Rapid population growth and meeting its consequently increasing demand for food and services require an increase in agricultural productivity and improvement in socio-economic services. However, agricultural production and productivity can only be increased either through agricultural expansion into previously uncultivated areas, usually at an extensive and constant technological level or through intensification on already-cultivated land through such labour or capital-intensive technologies as irrigation, improved seeds, and fertilizers, or both. Given the presence of the protected Kakamega Forest and a high population density, farmland expansion is impossible. On the other hand, such other factors as unfavourable policies, institutional capacity limitations, low level of agricultural technology and limited access to improved methods by most households, agricultural productivity will continue to decline, with the district remaining a food and farm-income deficit zone.

#### Rural livelihood and land resource management

The subdivision of land through inheritance into ever-declining small, uneconomical units, the use of labour-intensive farming practices in order to maintain output, the absence of investment capital, the abandonment of fallow periods, and the inadequate use of soil fertility improvement measures have led to increased soil infertility and subsequently reduced agricultural productivity.

However, agriculture remains the main source of livelihood for the majority of the people, and non-farm livelihood options are limited. Apart from casual labour, Kakamega Forest is the main source of non-farm income for most of the households surrounding it. Approximately 88% of the households adjacent to the forest reported that they accessed products from the forest one to three times a week, both for household consumption and for sale, in order to supplement their food and income needs.

This has exerted unprecedented pressure on the forest, leading to deforestation and threatening the forest's biodiversity.

On the other hand, the current forest-management approaches of both DFS and KWS fail to guarantee the sustainable conservation of biodiversity in Kakamega Forest, primarily due to their inability to open up space for community participation. The communities' needs, ideas, concerns, and potential for conservation efforts should be considered for the forest to be conserved in a sustainable way. The survey showed that 61.5% of the responding households were not involved in any resource conservation initiatives in their communities.

The absence of livelihood option outside of the agricultural sector and the lack of forest-management approaches that include all stakeholders make conservation of biodiversity in Kakamega Forest particularly challenging and unsustainable.

Furthermore, the lack of land-title deeds by most of the households has brought tenure insecurity and limited their opportunities for accessing credit services for farm inputs. The long and complicated process of getting land-title deeds has left a large number of local households without them. This has discouraged investment in land, made access to credit services difficult as the title deed is a requirement for accessing credit services, opened up informal land markets, and created a market for money lenders, who usually charge very high interest rates.

The level of poverty in the district is high and increasing. About 60% of the district's population lives below the poverty line. The increasing poverty levels, the growing number of unemployed, landless youths, and the increasing number of smallholder farmers is, consequently, highly likely to increase social unrest and insecurity in the area.

Most of the products harvested from Kakamega Forest are either be consumed or sold in the villages due to lack of processing capacity and limited accessibility to the nearest markets. However, if properly streamlined by participatory planning and management, the forest's resources could contribute to sustainable livelihoods development of the rural households. In other words, biodiversity could support poverty-reduction efforts and help make rural livelihoods sustainable, which in turn can contribute to sustainable conservation of biodiversity.

The district's government departments also lack the capacity to provide adequate services that could otherwise uplift the rural households. Most function at less than half the staffing required and also have outstanding financial and technical limitations. For example, the agricultural extension service is inadequate due to an insufficient number of extension workers. Forty-five extension workers operate in the district, although 97 are required. Hence, most of land-resource conservation initiatives are all spearheaded by grassroots institutions, particularly village committees and CBOs.

### **Rural livelihoods land management and implications for biodiversity conservation in Kakamega Forest**

The land-management or mismanagement issues mentioned above have intensified land-use conflicts in the area and led to land degradation and deforestation, negatively affecting both rural livelihoods and biodiversity. The rate of land degradation may continue or even increase, considering such other factors as global climate change. However, land degradation can be controlled, redressed, or even reversed if land resources are used wisely and in a planned manner, particularly with the involvement of all the stakeholders in the area.

Hence, the sustainable conservation of biodiversity in Kakamega Forest largely depends on the livelihood security of the communities surrounding it, as the livelihood security of the households guarantees the security of the forest and its biodiversity. For example, the destruction of the forest for meeting household needs for energy and income through firewood gathering and charcoal burning cannot be stopped before alternative energy sources and income generating options are found.

If the current trends in population growth and land management continue, competition for land and natural resources is highly likely to intensify and generate wider conflict and insecurity in the area.

The sustainable conservation of biodiversity in Kakamega Forest can be achieved only if: alternative means of off-farm and non-farm livelihood is made available, agricultural productivity is enhanced and participatory and inclusive land-resource management is developed and implemented.

### **Spatial linkages and service provision for sustainable rural livelihood development**

The distribution of settlements in the district is highly skewed hierarchically, with existing services and facilities being concentrated in Kakamega and Malava towns, which are difficult for people in smaller, more remote settlements to access due to inadequate transportation linkages and affordability issues. In other words, this spatial arrangement of the district's settlements, services, and facilities prevent most rural households from increasing productivity and diversifying their livelihood options.

In addition, the district's socioeconomic services are inadequately distributed and such existing services as schools and health centres are substandard and of poor quality. The district's formal institutions are also characterised by both financial and technical capacity limitations, which has affected rural households negatively and constrained the diversification of rural livelihoods.

The district's marketing system is also poorly organised due to poor transportation systems and inadequate financial services. As a result, the major agricultural production centres are not adequately connected with the consumption centres and the price of farm inputs is extremely high compared to the price of agricultural commodities, leaving the farmers in a dilemma.

## **10.2 Recommendations**

### **Encouraging family planning and making services available**

The district's rapid population growth has to be controlled primarily. None of the recommendations below could be sufficient to ensure both the sustainable conservation of biodiversity in Kakamega Forest and adequate food supplies for future generations unless the growth in the human population is simultaneously curtailed.

Therefore, family planning has to be encouraged and appropriate services of the people's choice have to be made available in the communities.

### **Improving agricultural productivity**

The agricultural sector has to be transformed so that agricultural productivity increases to meet the district's growing food and income needs. This should be done through the

introduction of improved farming methods and by making new technologies available to the farmers.

Agricultural intensification, supported by favourable policies and improved techniques and inputs, is required to improve the current situation. However, agricultural intensification through use of chemical fertilisers, pesticides, and so forth, with the objective of increasing output per area without regard for the long-term consequences for the natural-resource base and biodiversity, would be less rational than more low-cost, nature-based methods of increasing productivity.

For example, the deterioration of soil fertility and the subsequent decline of food production calls for such alternative ways of increasing soil fertility as agro-forestry, crop rotation, and other indigenous practices and forms of knowledge. The government must encourage and promote such organic soil-improvement measures.

One of the bottlenecks to increasing agricultural productivity has been a lack of credit services for agricultural inputs and outputs purposes, particularly in the district's food-crop production areas. Agricultural credit services have to be made available to the farmers. Furthermore, the provision of credit services needs to be promoted by establishing policies to regulate the financial markets, something which is not currently done, and to pave the way for accessing credit services by making land certification easier and simpler.

### **Improving land management for improved rural livelihood**

Land-management issues need to be mainstreamed into the district's general development agenda. A lack of attention to land use, land tenure, and the security of land rights has increasingly undermined rural livelihoods and discouraged investment in land, which has had a negative effect on agricultural growth and productivity.

The lack of land-use planning and practice, particularly the exclusion of the communities from a role in land and forest management has intensified land-use conflicts, which have resulted in land-resource degradation. Therefore, a framework for land-use planning and guidelines for its implementation have to be developed and put in place in order to manage the land-use conflicts that are prevalent in the area, and which are also threatening biodiversity in Kakamega Forest (See PLUP section below for more on this).

The lack of land tenure security by a large number of the district's households poses a challenge to land-resource conservation in the area. Secure land rights are critical to economic growth and sustainable use and management of land resources. The government therefore needs to reform the land-tenure system and develop a legal and institutional framework for securing land tenure, including customary tenure, by designing a less complicated way of registration and issuing certificates of occupancy.

Although a majority of the district's people are women, and women do most of the agricultural work, customary practices of land ownership have adversely affected their property rights in regard to land ownership as well as their welfare in general. It is time to design mechanisms to ensure gender equity in land ownership, in particular to enact legislation protecting women's formal right to own land, and to ensure the implementation of such laws.

The district has no functional land-information management system, which has resulted in an increasing amount of conflict between families and tensions among them, their communities, and the different land-use types. This has eventually led to land-resource degradation. These land-use conflicts, the land's potential, and opportunities in the district have been insufficiently studied and documented. The district therefore

needs the establishment of an efficient land-information management system for its land resources to be used and managed effectively.

Improved land management is clearly vital for an economy based entirely on agriculture, as it must ultimately have a positive impact on improving rural livelihoods, which must be accomplished for the conservation of biodiversity in Kakamega Forest.

### **Promotion of alternative livelihood options**

The over-dependence on subsistence agriculture, as this study has often mentioned, has a consequence of threatening biodiversity in Kakamega Forest. It is important to diversify rural livelihoods by creating alternative means of farm, off-farm, and non-farm production in order to ease the pressure on farmland and forest reserves in the area.

Although recommending specific viable options is beyond the scope of this research, the promotion of small-scale crafts and industries, small-scale trade, skills training and capacity building, business development services, and business advisory support, as well as making financial support available through credit services, are just a few alternatives to consider.

The processing and marketing of forest products can be another alternative means of supporting rural livelihoods in the area. However, this requires research and planning in order not to create unnecessary pressure on the forest.

### **Integration of local livelihood development with regional development**

The sustainable improvement of rural household livelihoods requires interventions both at the local level as well as regional and national levels; as such interventions are vital for sustainable livelihood development. Local level interventions recommended by this research such as improving farming systems, organizational development and service provision etc..., can only be sustainable if supported by regional development activities.

In order to achieve broad-based and sustainable improvements in the welfare of the people in the district, regional plans that provide a framework for sustainable regional development and guidelines for its implementation, short, medium, and long-term spatial and sector development plans need to be developed and implemented. Such regional development plan must complement local approaches to development. They must also link household-level interventions with regional efforts such as development of market linkages, services, and infrastructure.

### **Promotion of Participatory Land-Use Planning (PLUP) methods**

As noted often earlier, communities need to be involved in land-resource conservation. One of the methods in which communities can participate is through participatory land-use planning (PLUP).

PLUP provides a forum for community participation in the analysis, planning, and implementation of land-related problems. Experiences in other countries have shown that the application of the method has brought about the effective and sustainable conservation of land resources.

This method has received a pilot test in the district in April 2006 in the two villages of Buyangu and Shamiloli. The pilot exercise showed that (a) it provides a platform for discussions of local issues, concerns, problems, potentials, and solutions involving all interested stakeholders in the community, (b) it provides room for the inclusion of local knowledge and traditional strategies for solving the community's problems in a trans-

parent and all-inclusive manner in regard to women and other disadvantaged groups, (c) it raises the local people's confidence by building on their own capacity to solve their own problems and to conserve their own land resources, and (d) all participants, including government, NGOs, and CBOs appreciated it.

PLUP is therefore crucial for optimising land use, for resolving the conflicts that arise between competing land uses, and for rehabilitating and conserving the district's land and forest resources.

The pilot PLUP exercise's training and workshops in the two villages also revealed that (a) the designing of action plans after PLUP workshops has to be followed by their implementation or else the stakeholders lose confidence in the approach, (b) the government should make a strong commitment and allocate sufficient resources for the facilitation and implementation of PLUP workshops, (c) favourable policies and a legal institutional framework for the promotion of PLUP as an approach have to be drafted, and (d) guidelines and standardised steps that fit the local context for implementing and conducting PLUP have to be worked out.

### **Opening up space for community participation in forest management**

The need for community participation in the sustainable management of Kakamega Forest cannot be overemphasised. Community participation is critical for managing conflicts and deciding the most appropriate way for conservation of the resources. However, KWS's and DFS's current governance of Kakamega Forest provides insufficient space for community participation. This means that the local government conservation agencies are not engaging the local communities and their complex forms of local governance, social institutions, and livelihood concerns and priorities in the management of the forest. However, the approach does not guarantee the sustainable conservation of biodiversity, as the main actors and stakeholders are missing from the process.

The primary users of the forest's resources should be made responsible for developing protection and management strategies according to their own priorities and concerns. For example, the communities' over-dependence on the forest can be properly managed through the development of community forest-use and management plans and by encouraging policing of the resources by members of the community rather than by DFS and KWS forest guards.

The sustainable conservation of biodiversity in Kakamega forest requires the introduction of participatory forest management (PFM) approaches. PFM, while enhancing the participation of the community in conservation efforts, also ensures the proper use of forest resources through properly controlled community forest-use plans. However, participatory forestry and conservation approaches require basic changes in the institutional framework in terms of designing policies to govern forest-management decision-making.

Several steps can be used to initiate PFM in some parts of Kakamega Forest to test the approach on a pilot level. These include (a) identifying the many self-initiated community forest committees and conservation groups, (b) assessing and studying the institutional and organisational capacity and limitations of these groups and helping to develop their capacities, (c) assisting these committees and groups in developing community forest-use and management plans, (d) assisting in developing a code of community forest-user rights and regulations to control and monitor forest-product use, and (e) developing mechanisms for periodically monitoring and evaluating community forest use and management, and working on improving the system jointly with the stakeholders.

### **Promoting on-farm forestry and woodlots**

In order to reduce the excessive demand for resources from Kakamega Forest, the government has to encourage on-farm forestry, on-farm woodlots, and community forestry in areas surrounding the forest. There are efforts already by the communities surrounding the forest in creating their own on-farm forestry and woodlots but due to the small size of land ownership, this couldn't be done as much as required.

Therefore, there is a need to combine agro-forestry and promote plant species that could be used for improving soil fertility and meeting the household firewood and construction requirements without necessarily competing for the available small land.

### **Strengthen community initiatives and organizations**

Local community initiatives and organisations have been playing an important role in spearheading land and forest-resources conservation programs. As indicated earlier, 41% of the responding households had participated in conservation efforts organised by village environmental committees, 32.9 % participated in programmes conducted by CBOs, and 26% participated in programmes organised by governmental departments, particularly the DFS, the KWS and the Agriculture Department.

The fact that most of the conservation initiatives are being conducted through village committees and CBOs implies that the promotion of conservation has to target these local structures more and should build on existing land-conservation initiatives. This would not only enhance participation by the local stakeholders, but also makes both the approach and the outcome sustainable.

### **Building the capacity of local government and improve institutional linkages**

The capacity of local government institutions in terms of manpower, technical, and financial resources has to be strengthened so that appropriate and adequate services can be made available to the households surrounding the forest. Furthermore, the isolated effort of local government institutions to achieve sustainable livelihood development and resource conservation in the district requires to be integrated to one another. The district needs greater institutional linkages and harmonisation of conservation and development efforts through consultation and discussion for the betterment of the people and the environment.

It is also important to design appropriate policies that favour rural livelihood development and promote the sustainable conservation of biodiversity in Kakamega Forest. Although there are some policies to this effect, the implementation and follow up is missing. Therefore, both the existing policies and the new ones that support the recommendations in this work have to be implemented.

### **Strengthen spatial linkages and service provision**

This study found gaps in the district's spatial linkages and its provision of services. For example, transportation linkages are inadequate, the marketing system is badly organised, and institutional linkages are weak. These situations hinder the diversification of rural livelihoods and have put enormous constraints on the sustainable development of livelihoods in the district. It is therefore important to strengthen the spatial and institutional linkages for sustainable rural livelihood development through regional development.



There are also backlogs in the provision of major socioeconomic services such as education and health, mainly due to inadequate linkages and other institutional capacity limitations. The expansion of access to these services would strengthen the incentives of rural households to diversify their livelihoods. Service delivery should also be improved to stimulate diversification of rural livelihoods.

### **10.3 Areas of further research**

The issues of livelihood and resource conservation are broad and complex. Some of the issues are beyond the scope of this study and will require further research. Possible areas of further research include (a) the identification of viable non-farm and off-farm options for rural livelihood diversification in the area, (b) the linking of local household livelihood development with regional development through the identification of growth centres and regional linkages, (c) the promotion and development of non-timber forest products (NTFPs) such as processing, marketing, and identification of forward and backward linkages, (d) the promotion of other local benefits such as eco-tourism and carbon trading for the communities surrounding the forest, (e) the institutionalisation of participatory approaches such as PLUP and PFM into the district development planning and management process, and (f) developing the means for equitable access to land resources and its sustainable conservation

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## 12 Appendices

### 12.1 Questionnaire format

<p><b>RURAL LIVELIHOOD, LAND MANAGEMENT AND BIODIVERSITY</b>          (The case of Kakamega forest in Western Kenya)          Research Conducted by BIOTA E14 B          December 2006          Field Questionnaire for Household Case Study</p>
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HOUSEHOLD IDENTIFICATION	INTERVIEWER IDENTIFICATION
QUESTIONNAIRE NUMBER _____	NAME: _____
SEX OF THE RESPONDENT _____	DATE: _____
VILLAGE: _____	TIME: _____

### SECTION I – GENERAL HOUSEHOLD LIVELIHOOD CONTEXT

#### A. General Household Characteristics

No	QUESTION	RESPONSE CODE	
1	Livelihood zone	1	Cash cropping
		2	Mixed farming
		3	Mixed tea and dairy farming
		4	Forest
		5	Formal employment/ business
2	Distance from the nearest edge of the Kakamega forest in Kilometres	1	Less than 1 km
		2	1 – 2 km
		3	More than 2 km
3	Wealth rank of the household head	1	Rich
		2	Better-off
		3	Poor
		4	Very poor
4	Sex of the household head	1	Male
		2	Female
5	Total family size		
6	Ethnicity of the HH	1	Luhya
		2	Luo
		3	Kikuyu
		4	Other
7	Place of origin of the HH head	1	With in the village
		2	Outside the village but within the district
		3	Outside the district but within the region
		4	Outside Western region
8	Period moved into the village (if place of origin is outside the village)	1	Before 1963 (before independence)
		2	1963 - 1991
		3	1992 to date

9	Reason for moving into the village	1	Looking for farmland/grazing land
		2	Following relatives
		3	Marriage
		4	Looking for casual labour/employment
		5	Other

### B. Household Demographic Characteristics

		1	2	3	4	5	6	7
No.	Relationship to household head	Age (yrs)	Sex	Marital status	Religion	Level of education	Occupational status	
	1		Household head (HHH)	1 Fe-	1 Single	1 Protes-	None	1 Too young to work
2	Spouse of HHH	2	2 Male	2 Married (living to-	2 Catholic	2 Adult education (non-	2 Student	
3	Son			3 Married (not living	3 Muslim	3 Primary level	3 Unemployed	
4	Daughter			4 Widowed	4 Other	4 Secondary level	4 Em-	
5	Relative			5 Divorced/separated		5 Vocational training	5 Other	
6	Other					6 Tertiary (college and		
7								
8								
9								

**C. Income Sources** (for all members marked “4 “under section b-7 above)

		1	2	3	4	5	6	
No.	Primary occupation		How many days do you spend per month in this occupation?	How much do you earn in this occupation (in KSh) per month	Secondary occupation		How many days do you spend per month in this occupation?	How much do you earn in this occupation (in KSh) per month
	1	Farming			1	Farming		
	2	Trading			2	Trading		
	3	Salaried worker			3	Salaried worker		
	4	Self-employed in other sector			4	Self employed in other		
	5	Non-paid domestic worker			5	Non-paid domestic worker		
	6	Other			6	Other		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

**D. Financial Services**

No.	QUESTION	RESPONSE CODE	
1	Are you a member of a credit scheme or group?	1	Yes
		2	No
2	Have you borrowed money during the last 12 months?	1	Yes
		2	No
3	If no, what are the reasons?	1	Don't need it.
		2	I need it, but lack collateral
		3	There are no credit services
		4	Fear of high interest rates
		5	Time consuming bureaucracy
		6	Other
4	If yes, from where/whom?	1	Friends/neighbours/relatives
		2	Credit and saving groups
		3	Banks
		4	Cooperatives
		5	Private money lenders
		6	Other
5	Family member who accessed the credit?	1	Household head
		2	Spouse
		3	Others (Son/daughter)
6	The main purpose the credit is taken?	1	To purchase farm inputs
		2	To purchase food items
		3	To pay school fees
		4	Expand business
		5	Other
7	The actual purpose the credit is used for?	1	To purchase farm inputs
		2	To purchase food items
		3	To pay school fees
		4	Expand business
		5	Other
8	Amount of credit taken in Ksh.	1	Less than 1000 Ksh.
		2	1001 – 3000 Ksh.
		3	3001 – 5000 Ksh.
		4	More than 5000
9	Duration of the credit in months (repayment time)		
10	How much is the interest rate?		

**E. Family Planning** (for women of reproductive age group 15 – 49 years old)

No.	QUESTIONS	RESPONSE CODE	
1	Have you heard about family planning methods?	1	Yes
		2	No
2	Which ones?		
3	Have you used family planning methods in the last 12 months?	1	Yes
		2	No
4	If you have used, which ones have you used?	1	Natural method/calendar
		2	Injectables
		3	Condoms
		4	IUCD
		5	Pills
		6	Implants/Norplant
		7	Other
5	If not what are the reasons?	1	Lack of access/too far
		2	Cost too much
		3	Wanted more children
		4	Knows no method
		5	Religious prohibition
		6	Health concerns
		7	Other(Specify)
6	Are all of your children alive?	1	Yes
		2	No
7	If no, at what age did they die?	1	Under 1year
		2	1-5 years
		3	More than 5 years of age

**SECTION II - AGRICULTURAL LAND USE****A. Land acquisition and tenure**

No	QUESTION	RESPONSE CODE	
1	Do you work mainly on your own land or rented land or someone else's land?	1	Own land
		2	Family land
		3	Rented land
		4	Someone else's land
2	How do you acquire your farm?	1	Bought
		2	Inherited from parents
		3	Rented
		4	Government allocation
		5	Pioneering into new forest land
		6	Other(specify)

3	What was on the land when you acquired it?	1	Forest
		2	Grazing land
		3	Bush
		4	Crops
		5	Other (specify)
4	If you have inherited land, what was the size of your		
5	Number of families who inherited the land?		
6	Did women get their share?	1	Yes
		2	No
7	How many women were in your family?		
8	When were you inherited the land? (Year)		
9	Which type of land rights do you hold?	1	Title deed
		2	Customary rights
		3	Other
10	Since you acquired the farm, how has the size of the farm changed?	1	Increased
		2	Decreased
		3	The same
11	How have these changes occurred?	1	Sold out land
		2	Bought land
		3	Rented land
		4	Divided land
		5	Inherited land
		6	Loss of land due to erosion
		7	Other
12	Total land size of your farm now (in acres)		
13	Do you have separate parcels of land, if yes, how many?	1	No
		2	One
		3	Two
		4	Three or more
14	If yes, how did you acquire the other plots of land?	1	Bought
		2	Inherited from parents
		3	Rented
		4	Government allocation
		5	Pioneering into new forest land
		6	Other(specify)
15	If yes, what was on the other plot?	1	Forest
		2	Grazing land
		3	Bush
		4	Crops
		5	Other (specify)



**B. Land use dynamics**

No	QUESTION	RESPONSE CODE				
1	What type of farming system do you practice?	1	Mixed farming (crops and livestock)			
		2	Mixed cropping (different crops)			
		3	Mono cropping (single crop)			
		4	Agro-forestry (trees and crops)			
		5	Other (specify)			
2	Total size of land under cultivation during the long					
3	Total size of land under cultivation during the short					
4	How do you judge the land you currently own/ use against the household needs?	1	Sufficient			
		2	Moderately sufficient			
		3	Insufficient			
5	How do you see the land sizes of the households in this village in the last 20 years?	1	Declining			
		2	Increasing			
		3	The same			
6	If you think that the farm sizes are declining, what factors do you consider are the causes?	1	Expansion of settlements			
		2	Declining soil fertility/exhaustion			
		3	Expanding forest size			
		4	Expansion of family sizes			
		5	Soil erosion			
		6	Other			
7	Are there conflicts regarding resource use in the village?	1	Yes			
		2	No			
8	If yes, what type of conflicts do you observe?	1	Conflict over farm boundaries			
		2	Conflict between cultivators and			
		3	Conflict between relatives over land			
		4	Conflict between KWS/DFO and the			
		5	Other (specify)			
9	How do you see these conflicts in the last 20 years?	A. Number		B. Seriousness		
		1	Increasing	1	Increasing	
		2	Decreasing	2	Decreasing	
		3	The same	3	The same	
10	What are the major land use problems in the village (Put ranks and omit if not applicable)	Soil erosion				
		Lack of agricultural inputs				
		Low soil fertility/exhaustion				
		Wild animals destroying crops				
		Labour shortages for farming				
		Lack of draft animal				
		Lack of manure				
		Lack of capital				
		Poor farming technique				
		Poor crop yields				
		Conflicts over farm boundaries				
		Food shortages				

**C. Use of agricultural inputs**

No	QUESTION	RESPONSE CODES	
1	How many household members (18 +) work on the farm?	1	Part time
		2	Full time
2	Do you hire people to work on your farm?	1	Yes
		2	No
3	How many hired workers work on your farm?	Temporary____Permanent_____	
4	If you hire, why do you hire?	1	Farm land is far
		2	Labour shortage
		3	Large farm land
		4	The owner is engaged in non-farm
		5	Other
5	Have you increased or decreased the number of people you hired in the last 5 years?	1	Increased
		2	Decreased
		3	The same
6	Do you or any family member work on other people's farms?	1	Yes
		2	No
7	If you work, for how long?	1	One day a week
		2	Two days a week
		3	Three days a week
		4	More than three days a week
8	How much do you get in a day in Ksh?		
9	How do you prepare your field for planting?	1	Ox plough
		2	Tractor
		3	Hoe
10	Have you received any training on improved farming in the last 12 months?	1	Yes
		2	No
11	Where do you get agricultural information most?	1	Agricultural extension workers
		2	Farmer groups/farmer associations
		3	Community based organizations
		4	NGOs
		5	Church
		6	Other
		7	None
12	How often are you visited by an agricultural extension officer?	1	Never
		2	Weekly
		3	Once every month
		4	Once every year
13	Which of the following inputs do you use?	1	Improved seed
		2	Inorganic fertiliser
		3	Manure
		4	Pesticides and or herbicides
		5	Other (specify)

**D. Soil fertility**

No.	QUESTION	RESPONSE CODE	
1	How fertile is the soil in your main field?	1	Very bad
		2	Medium
		3	Very fertile
2	Since you started cultivating this field, has the soil fertility changed?	1	No change
		2	Worsened
		3	Improved
3	What major causes of soil infertility do you see in your land?	1	Soil erosion
		2	Inadequate use of manure
		3	Inadequate use of fertilisers
		4	Lack of fallowing
		5	Poor farming technique
		6	Land exhaustion/tired
		7	Other (specify)
4	Is there erosion on the field?	1	No erosion
		2	Yes, little erosion
		3	Yes, much erosion
		2	No
6	Do you use one of the following in your field?	1. No	2. Yes
	1. Animal manure	Sometimes	Often
	2. Inorganic fertiliser		
	3. Insecticide		
	4. Household residues		
	5. Crop rotation		
	6. Agro-forestry		
	7. Intercropping		
7	If you do not use manure, what are the reasons?	1	The soil is fertile ( no need)
		2	Lack of cattle/manure
		3	Lack of manpower to use it
		4	Other
8	If you do not use inorganic fertiliser, what are the reasons?	1	The soil is fertile ( no need)
		2	Fertiliser is expensive
		3	Use manure instead
		4	Difficulty in availability
		5	Other
9	Have you fallowed (rested) your land?	1	Yes
		2	No
10	If yes when did you last fallow?	From _____ to _____	
11	What is the size of the fallow plot in _____?		

No.	QUESTION	RESPONSE CODE	
12	What was the duration of this former fallow? (in months)		
13	How has the fallow duration changed in the last 10 years?	1	Increased
		2	Decreased
		3	Stayed constant
14	Do you produce enough to feed your family throughout the year under normal conditions?	1	Yes
		2	No
15	If not how do you supplement your family needs?	1	Casual labour
		2	Small scale business
		3	Selling firewood and charcoal
		4	Planting and selling vegetables
		5	Leasing land
		6	Share cropping
		7	Remittances
		8	Other
16	What are the major challenges of meeting the household needs?	1	Small land size
		2	Large family size
		3	Lack of job opportunities
		4	Soil infertility
		5	Other

### E. Farm land expansion

N	QUESTION	RESPONSE CODES	
1	Have you bought land in the last 3 years?	1	Yes
		2	No
2	How large is the size of land bought?	1	Less than an acre
		2	1-3 acres
		3	More than 3 acres
3	Have you rented your land out to somebody in the last 3 years?	1	Yes
		2	No
4	If yes, why?	1	Farm land is far from residence
		2	Labour shortage
		3	Large farm land
		4	Engaged in non-farm employment
		5	Other
5	Have you rented somebody's land in the last 3 years?	1	Yes
		2	No
6	If yes, what are the reasons?	1	Land size is very small
		2	In order to meet the household food
		3	For market/selling
		4	Land is infertile
		5	Other

No	QUESTION	RESPONSE CODES	
7	What is the average land price per acre in this vil-		
8	What is the average leasing price per year for maize		
9	What is the average leasing price for sugar cane		
10	How has the land leasing price changed in the last 3 years?	1	Increased
		2	Decreased
		3	The same

### F. Woodlots

No	QUESTION	RESPONSE CODES	
1	Do you have wood lots on your land?	1	Yes
		2	No
2	What is the size of the wood lot in acres?		
3	If you have, what benefits do you derive from it?	1	Source of fuel for HH consumption
		2	Source of fuel for sell
		3	Source of construction wood for the
		4	Source of construction wood for sell
		5	Other

## SECTION III FOREST RESOURCE USE AND MANAGEMENT

### A. Forest resource use

No	QUESTION	RESPONSE CODE		
1	What are the main sources of energy for cooking for the household?	1	Firewood	
		2	Charcoal	
		3	Kerosene	
		4	Other	
2	What is the source of the following forest products for the household in the last 12 months?	1. Kakamega forest	2. Own farm	3. Market
	1. Firewood			
	2. Charcoal			
	3. Construction wood			
	4. Medicinal plants			
5. Fodder/grass				
3	How often do household members go into the forest?	1	Once a week	
		2	Twice a week	
		3	Several times a week	
		4	Once a month	
		5	Never	
4	Have you used any product from Kakamega forest in the last 12 months?	1	Yes	
		2	No	

No	QUESTION	RESPONSE CODE		
5	Which ones? (What are the main reasons for going in to the forest in ranking order?)		Collect firewood	
			Charcoal burning	
			Harvest medicinal herbs	
			Cattle grazing and watering	
			Fruit collection	
			Wild honey harvesting	
			Hunting	
			Seedlings collection	
			Recreation	
	Other			
6	Did you sell any product from Kakamega forest in the last 12 months	1	Yes	
		2	No	
7	If you sell, where did you sell it?	1	In the village	
		2	In the market	
		3	Other	
No.	QUESTIONS	RESPONSE CODE		
8	How much did you get from the sell of this product in the last 12 months?	1	Less than 1000 Ksh	
		2	1000 – 3000 Ksh	
		3	3001 – 6000 Ksh	
		4	6001 – 9000 Ksh	
		5	> 9001 Ksh	
9	Which forest products do you use for sell, house- Forest Product	1. Household consumption	2. Sell	3. Both
	1. Firewood			
	2. Charcoal			
	3. Grass			
	4. Herbal medicine			
	5. Fruits			
	6. Wild honey			
10	How has the forest resource changed in the last 20 years?	1	Increased	
		2	Decreased	
		3	The same	
11	If increased, how has the change affected you?	1	Increased income	
		2	Increased wild animals	
		3	Increased availability of resources	
		4	More rain	
		5	Other	
12	If decreased, how has the change affected you?	1	Declining HH income	
		2	Declining availability of	
		3	Declining rainfall	
		4	No effect at all	

**B. Forest Resource Management**

No.	QUESTIONS	RESPONSE CODE	
1	Do you think the Kakamega forest is important?	1	Yes
		2	No
2	Why do you think is it important?	1	It attracts rain
		2	Source of income for the HH
		3	Recreation purposes
		4	Source of forest products
		5	Tourist attraction
		6	Other
3	Are you involved in forest management in some aspects?	1	Yes
		2	No
4	If yes, in what aspects/levels?	1	Planning of activities
		2	Implementation of activities
		3	Monitoring and evaluation
		4	Other
5	Do you think that it is necessary to involve the community in the management of the forest resource?	1	Yes
		2	No
No.	QUESTIONS	RESPONSE CODE	
6	Why do you think that it is important to involve the community in forest management?	1	Better management
		2	Shared responsibility
		3	Shared cost
		4	Sustainability
		5	Not necessary to involve
		6	Other
7	Have you involved in any natural resource conservation programs in the village?	1	Yes
		2	No
8	If yes, who is spearheading these programs?	1	Village committees
		2	CBOs/NGOs
		3	Government departments
		4	Others
9	Are you satisfied in the way the forest is being managed currently?	1	Yes
		2	No
10	If no, why?	1	Limited involvement
		2	Deterioration of forest condition
		3	Corruption and mismanagement
		4	Lack of transparency
		5	Other
11	Which forest management regime/style you like most?	1	KWS style
		2	Forestry department style
		3	Quakers' church style
		4	None of them

No	QUESTIONS	RESPONSE CODE	
12	If you like one of them, what are the reasons?	1	More transparency
		2	More participatory
		3	More benefits from forest products
		4	Improved forest status
		5	Other
13	Do you know the rights and privileges of the community regarding forest resource use?	1	Yes
		2	No
14	Which ones?	1	Collecting dead wood for firewood for domestic use only and not for sale
		2	Collecting thatching grass
		3	Pick wild berries and fruits for own consumption
		4	Cut and remove creepers and lianas for building purpose
		5	Place honey boxes and have access to them provided no damage is done to any
		6	Take stock other than goats to such watering places within central forests as are adjacent to grasslands or along recognized
15	If yes, do you enjoy those privileges?	1	Yes (which ones? Write the number) __ __
		2	No

16	Have you been fined in the last 12 months for one of the following activities in the forest?					
		No	Yes	17	18	
				How many times?	Total fine in	
				Ksh	CSO	
	1. Grazing cattle					
	2. Firewood collection					
	3. Charcoal burning					
	4. Hunting					
	5. Grass harvesting					
	6. Timber production					
	7. Cutting trees for construction					
	8. Visiting the forest/recreation					
	9. Other					



## SECTION IV - LAND USE AND ACCESS TO SOCIO-ECONOMIC SERVICES

### A. Accessibility to social services

	Accessibility to social services	Distance to the nearest service in Km	Time it takes to reach the service in minutes	Cost of transportation in Ksh.
1	1. Primary school			
	2. Secondary school			
	3. Clinic			
	4. Health centre			
	5. Hospital			

	How do you rate the quality of these services in your area?	Very good	Adequate	Unsatisfactory
2	1. Primary school			
	2. Secondary school			
	3. Clinic			
	4. Health centre			
	5. Hospital			

	How do you see the affordability of these services?	Not affordable	Affordable
3	1. Primary school		
	2. Secondary school		
	3. Clinic		
	4. Health centre		
	5. Hospital		

### B. Market accessibility

1	2	3	4	5	6	7
Name of market used to BUY product	Periodicity of visit Everyday Once a week Twice a week Once or twice a year	Type of Product bought Fertilisers Farm implements Improved seeds Credit services Food items Clothing Other household items	Mode of transport used 1. Foot 2. Boda boda 3. Matatu 4. Other	Distance in KM	Price in Ksh. (going and coming)	Time taken to reach the market (minutes)

8	9	10	11	12	13	14
Name of market used to SELL product	Periodicity of visit Everyday Once a week Twice a week Once or twice a year	Type of Product sold Cereals Cash crops Cattle Milk Other farm products	Mode of transport used 1. Foot 2. Boda boda 3. Matatu 4. Other	Distance in KM	Price in Ksh. (going and coming)	Time taken to reach the market (minutes)

No.	QUESTION	RESPONSE CODE
15	Type of road to the market	1 Asphalt
		2 All weather gravel road
		3 Dry weather road
		4 Other
16	Do all of your children 6-15 attend school?	1 Yes
		2 No
17	If no, why ?	1 The school is far
		2 School fees are high
		3 Can't buy school uniform
		4 Other
18	Do you consult a herbalist/witch doctor often ?	1 Yes
		2 No
19	If yes, why ?	1 Poor quality of services in the clinics
		2 Fees are expensive in the clinics
		3 The clinic is far
		4 Other

## SECTION V – CROSS CUTTING ISSUES

### A. Gender Aspects

No	QUESTION	RESPONSE CODE	
1	Do you work (most of the time) on your own land or family land or rented land or other?	1	Own land
		2	Family land
		3	Rented land
		4	Someone else's land
2	Do you do this for a member of your family, self-employed or for someone else?	1	For family member
		2	For someone else
		3	Self employed
	Do you usually work at home or away from home?	1	Home
		2	Away
3	Do you usually work seasonally or throughout the year?	1	Seasonally
		2	Throughout the year
		3	Once in a while
4	Are you paid or not at all for this job ?	1	Cash only
		2	Cash and in kind
		3	In kind only
		4	Not paid
5	If you are paid, who decides how the money you earn will be used ?	1	Respondent
		2	Husband/partner
		3	Husband/partner jointly
		4	Someone else
		5	Someone else and respondent jointly

### B. Community participation

No.	QUESTION	RESPONSE CODE	
1	Is anybody of this household a member of an organization or self help group ?	1	Yes
		2	No
2	Which ones ?	1	Work group
		2	Women group
		3	Credit group
		4	Farmers group
		5	Youth group
		6	Other
3	What are the major activities conducted by the group?	1	
		2	
		3	
		4	
		5	

4	Do you participate in development activities in your village?	1	Yes
		2	No
5	If yes, at what level?	1	Pre-planning
		2	Planning
		3	Implementation
		4	Monitoring and evaluation
6	How do you participate?	1	Am told what is going to happen or has happened already
		2	Information giving when asked
		3	Being consulted at various level s and Influencing decisions
		4	Providing resources (labour, finance, materials...)
		5	Forming groups to meet predetermined objectives
		6	Joint analysis of problems and solutions
		7	Taking initiatives, self mobilization and action
		8	No involvement at all
7	How do you rate the benefit you get from the socio-economic development in the area?	1	No benefit
		2	Low
		3	Satisfactory
		4	Good
		5	Other (specify)

## 12.2 Focus Group Discussion guide questions

1. What are the major socio-economic trends in the last couple of decades and how are you affected by them? (Trends)
  - Positive/ negative trends? (Social/Economic/Environmental)
  - Cause-effect relationships
  - Role of institutions (GO, NGOs, CBOs) and the community?
  - Future trends? Implications to the rural livelihood?
  
2. What do you do (or what not) to maintain your livelihood? (Strategy)
  - Current livelihood activities and strategies in meeting family needs?
  - Challenges in meeting household family needs?
  - The Rich's and Poor's adaptive strategies?
  - Adaptation strategies vs. the forest?
  - Adaptation strategies vs. land use?
  
3. What are the current land use types in the area? (Land use)
  - Land use types? Major problems in land use?
  - Changes in land use in the last two decades? Causes of land use changes?
  - Role of institutions and the community?
  - How is land accessed in the district?
  - How is the socio-economic development in the area affecting land use? (Infrastructure development and improved service provision etc...)
  - Land fragmentation through the heritage system and land use?
  - Land use and response to population growth and traditional system?
  - Future trend? What are the forces affecting future land use?
  
4. How do you benefit from the forest? (Forest resource use)
  - Trends in forest resource use and availability?
  - Reasons for forest resource decline and/or increase?
  - Implications of forest resource decline to the rural household?
  - Strategies of the poor and rich households to forest resource decline/increase?
  - How rich and poor households use/depend on the forest?
  - Threats to the existence of the forest?
  - Actors in forest resource management?
  - Level of community participation? Potential contribution of the community towards conservation of the forest?
  - Rules and regulations that govern access to forest resources?
  
5. How are social and economic services, facilities and infrastructures distributed in the area?
  - Distribution of service facilities?
  - Accessibility to these service centres? (distance and affordability)

### 12.3 Institutional interview guide questions<sup>15</sup>

1. What are the functions of your organization? What are the limitations/challenges of the department in carrying out the functions?
2. What are the major demographic, social and economic changes that have been observed in the district in the last 20 years? What are the forces behind these changes? How are people adapting to these changes?
3. What do you think are the main challenges the district is facing? What mechanisms /strategies being used to overcome these challenges? Do the majority of the small farmers produce adequate food to support their families? What do you think are the reasons? What roles does your organization play in enhancing the rural livelihoods?
4. Have you observed changes in the land use in the district in the last 20 years? In what ways? What do you think are drivers of land use change? (forces) Do you consider the changes to be positive or negative? Why? What do you think should be done to reverse the negative changes? What action does your department is taking to improve the situation?
5. What role does your organization play in forest resource management? What do you think are treats to the existence of the forest? What measures do you think have to be taken? Do you think more action is needed? In what aspect? What do you think are the main challenges of the forest resource in the district? Why? What measure is your department taking to enhance productivity and to protect the agricultural /forest biodiversity?
6. How is the forest resource managed? Reserve and off-reserve? What are the major problems you face in managing the Kakamega forest resource? What do you think are the possible solutions? How are the communities around the forest involved in the management of the forest resource?
7. What do you think are the best strategy for sustainable use of the Kakamega forest resource?

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END

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<sup>15</sup> The institutions interviewed include government departments such as: the District Assembly, Agriculture and Livestock, Fishery Development Department, Natural Environment Management Authority, District Forestry Office, KWS, Agriculture Finance Corporation and CBOs such as: KEEP, Isuka Heritage and other forest conservation initiatives.