ROLE OF COMMUNITY IN THE CONSERVATION OF MT. KENYA BIOSPHERE RESERVE

Report submitted to UNESCO MAB for the Award of MAB Young Scientists Awards

By

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LIST OF ACRONYMS

BCC - Biodiversity Conservation Centre
BCP - Biodiversity Conservation Programme
CBO'S - Community Based Organizations
COMPACT - Community Management of Protected Areas Conservation
GOK - Government of Kenya
KWS - Kenya Wildlife Service
FD - Forest Department
DRSRS - Department of Resource Surveys and Remote Sensing
DSE - Department of Sustainability and Environment
GIS - Geographic Information Systems
IFAD - International Fund for Agricultural Development
IFAW - International Fund for Animal Welfare
IUCN - World Conservation Union
KREMU - Kenya Rangeland Evaluation Monitoring Unit
MAB - Man and Biosphere
MDGs - Millennium Development Goals
NGO's - Non-Governmental Organizations
PRA - Participatory Rural Appraisal
PRSP - Poverty Reduction Strategic Paper
SPSS - Statistical Package for Social Science
SIDA - Swedish International Development Cooperation Agency
UNDP - United Nations Development Programme
UNEP - United Nations Environment Programme
UNESCO - United Nations Educational, Scientific and Cultural Organization
WWC - World Water Council
WWF - World Wide Fund for Nature
EXECUTIVE SUMMARY

This report is an analysis of the roles played by community members in the conservation of Mount Kenya Biosphere Reserve. To a large extent, the cultural and economic activities of these communities largely depend on natural and biodiversity resources within the reserve. Mt. Kenya was designated a Biosphere Reserve in 1979 and it covers an area of 71,759ha. The National Park together with parts of the adjacent forest was inscribed as a World Heritage Site (WHS) in 1997 and is listed as one of the WWF’s global 200 eco-regions.

Forests are crucial to a country’s health and development, as they are important in soil and water conservation, production of wood and non-wood products, carbon sequestration, conservation of biodiversity and social benefits. Despite the significant role played by forests, their conservation status has deteriorated due to unsustainable exploitation. Mount Kenya Forest Reserve is an indigenous forest and one of the most important, indispensable, ecological and economic resources in Kenya. It is a major water catchment area supplying water to large a part of the population; produce 70% of hydroelectric power to the national grid and for irrigation. The Biosphere Reserve is a major destination for nature tourism, both domestic and international. In addition it supports over 7 million subsistence Kikuyu, Meru and Embu communities. Despite its critical importance, the forest is facing many and complex threats, including illegal logging of wood for timber and charcoal, excisions, encroachment for settlements and agriculture (Mt. Kenya Management Plan 2001).

Community participation is the key strategy to current Biodiversity conservation and management. If wildlife and all the protected areas are to survive, it is imperative that conservation activities and communities are in harmony so that it does not constraint community livelihoods. For conservation of natural Resources of the Biosphere Reserve to be realized effectively there is need for integrative management that considers local communities’ stake in conservation.
This study examines the roles and level of community participation in conservation of Mount Kenya Biosphere Reserve and gives possible recommendations to enhance their participation.

The key issues addressed in the study were:

- Identification of communities living around the Mt. Kenya Biosphere reserve and their socio-cultural activities.
- Identification of the contribution of local communities to the conservation of Mt. Kenya Biosphere Reserve and factors limiting their participation.
- The role of the community based organizations (CBO’S), achievements, and challenges.
- The extent of human-wildlife conflicts and possible conflict mitigation strategies.
- The importance of natural resources to the local communities.
- Analysis of options to be used by the management as entry points to elicit community participation in biodiversity and natural resource conservation.

The approach and methodology involved a consultative and interactive process in which the respondents were interviewed. Interviews were used to gather data on roles of local communities in conservation, human-wildlife conflicts, attitudes and perceptions towards conservation, challenges and impacts. Other groups interviewed were representatives of community social and economic groups, local NGO’S and Kenya Wildlife Service (KWS) Wardens, Forest Officers and environmental officers. Relevant literature review pertaining Mt. Kenya Biosphere Reserve was also reviewed and analyzed to provide the desk baseline information. In addition fieldwork was complimented by direct observations of range conditions, environmental degradation, types and patterns of land use, extent of local support by NGO’s and other CBOS.

No survey had earlier been done on role of community in the conservation of the
Role of community in the conservation of Mt. Kenya biosphere reserve

Biosphere Reserve. This study demonstrates the importance of integrating local communities in conservation activities. It was noted that the community is actively involved in conservation of Mount Kenya Biosphere Reserve as it is beneficial to them. Their participation supported by community-based groups not only improves the community living standards but also protect the reserve from over-exploitation. To improve their livelihoods and enhance community participation there is need to empower the local communities through provision of credit facilities, awareness creation, capacity building and integrating them in management of the Biosphere Reserve.

Community participation in conservation of Mount Kenya Biosphere Reserve therefore needs to be promoted for its continued preservation. This will be in line with the realization of Millennium Development Goals (MDGs), particularly MDG goal 7 on environmental sustainability.

Striking a balance between satisfying the livelihood needs and wise use of natural resources within the Biosphere Reserve to ensure sustainability is therefore the biggest challenge.
CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND AND JUSTIFICATION

Protection of threatened ecosystems is the cornerstone of conservation strategies at local, national and global levels. Mt. Kenya is a World Heritage Site as well as a Biosphere Reserve under UNESCO MAB. Currently, the reserve is under pressure from human activities such as illegal logging, cultivation, charcoal burning, overgrazing, encroachment, poaching, siltation, visitor impacts and increased human wildlife conflicts. Proper management of Mt. Kenya ecosystem is crucial to the survival of millions of people who depend on its waters. These activities threaten the sustainability of the reserve, yet millions of people depend on its waters for their survival.

Before national parks and reserves were created, different communities used to live in harmony with wildlife and they used wildlife as totems. The importance of linking conservation with human development is crucial for the survival of wildlife today. To ensure continued supply of water from Mt. Kenya catchment area, it is imperative that the forests are fully restored within the existing boundaries and on farm tree planting in transition zone be facilitated. People living adjacent to its boundaries need to accept a greater responsibility for the reserve and cultivate a new sense of ownership, which they have long been denied.

To maintain biodiversity, there is need to focus beyond the parks and the reserves. Agricultural and conservation activities have led to land use conflicts (mostly crop raids by wildlife) that lead to low tolerance for wildlife by farmers. The only remedy to reverse the situation is to do away with old ‘top–down’ approach of natural resource management strategies and adopt the new alternative’ bottom-up’ approach (Chambers 1983). The principle of bottom-up...
approach in planning, implementing and evaluating programs are based on the concept that all power of decision-making rests with the people. In this context, people are involved in deciding which direction and actions to take in managing natural resources (Chambers 1983, Chambers et al 1989). Therefore, a balance has to be struck between environmental protection and local community interests to ensure harmonious co-existence as crucial roles played by the communities in conservation are recognized and appreciated. Consequently, it is imperative to assess the roles played by the community in conservation if we are to appreciate their contributions.

1.2 STUDY AREA

1.2.1 Topography and location

Mt. Kenya is the second largest Mountain in Africa after Mt. Kilimanjaro of Tanzania. It is located at 00°10S and 37°20E, and lies between altitudes 1600-5199m. Mt. Kenya is located on the eastern side of the Great Rift Valley and the northern slopes reach the equator. The Mountain is situated in five districts and two provinces: Nyeri, and Kirinyaga districts in Central Province; Meru central, Meru south and Embu districts in Eastern Province. It is situated 193km north east of Nairobi and about 800km from the Kenyan coast. It is a solitary mountain of volcanic origin with a base diameter of approximately 96km. It is broadly cone-shaped indicating former glaciation. Two of the countries largest rivers, Tana and Ewaso Nyiro have tributaries originating from slopes of Mt. Kenya.

The study covers the lower slopes of Mount Kenya to the Western and Southern parts. The target communities were those living within a radius of 2-15km of the Mt. Kenya Biosphere Reserve. The map of the study area is shown in figure 1.1

1.2.2 History of the Mount Kenya Area

Before about 1650, central Kenya was densely forested and inhabited only by the
Gumba hunters (a ‘dwarf like’ hunter tribe) and by the Athi and Digiri sections of the Ogiek/Ndorobos (Bussman 1994). The Maasai words “Ndorobo” or “Ol toroboni” means one who keeps bees or poor people since they regard cattle as a sign of wealth. Around 1650, the Kikuyu arrived in Murang’a and Kiambu area, occupying the land ridge by ridge by cutting the forest and trapping animals, reaching Nyeri region around 1730. Due to this the hunters and gatherers moved deeper into the forest. However most parts of the former Nyeri-Nanyuki area was at that time inhabited by the Illaikipiak and Illpurko Masaai (Ole Sankan 1971). They were separated from the Kikuyu by a forest corridor (Dondole-everybody’s land) to the south in the area near Naro Moru. The Masai used to burn forests to create grazing areas, thus probably destroying most of the northern Mount Kenya forest and creating the so-called “forest gap” in the Timau area. The Meru arrived in the 14th century in the area east of Mt. Kenya and together with the Kikuyu they cleared large forest areas for small-scale farming and shifting cultivation before the turn of the century. They left only Naro Moru and the large extremely wet forest bulge west of Chuka as no man’s land during the Meru/Embū tribal wars in the 19th century (Muriuki 1974).

The British administration declared the area north of Naro Moru forest corridor “Maasai African Reserve”, the south “Bantu (Kikuyu) African Reserve” in 1902. At the same time the forest department was started and the first sawmill was established in the Aberdare Mountains. This changed rapidly after 1908, when most of the Kenyan forests had already been declared, “gazetted forests”. By agreement with his majesty’s commissioner of East African protectorate in 1904/1911, the Illpurko Maasai had to move southwards to the area around Narok (the Illaikipiak Maasai had already been defeated by an alliance of all other Maasai sections in the early 1890’s and the survivors had been absorbed by the Illpurko (Ole Sankan 1971). Their land and large areas of Kikuyu territory become parts of the so-called “white highlands” The forests were further cleared about to their present extension.
Forestry on Mt. Kenya started in 1912 with the Nyeri forest office and the establishment of the Castle Forest station. As early as 1915, the first cedar, cypress and eucalyptus plantations were established around Naro Moru, mainly to meet the demand for timber and firewood, which increased tremendously after the construction of the Kenya-Uganda railway. The oldest sawmills within Mt. Kenya area date back to 1912 (Wason timber, Meru) and 1916 (West Kenya sawmills, Southern slopes), long before the Mt. Kenya forest reserve was finally gazetted in 1932. In 1984, the government owned Nyayo tea zones were created on the lower periphery of the forest reserve from northeast to southwestern parts of the mountain. Mount Kenya National Park was gazetted in 1949 comprising the area above 3300m and in 1967/68 the boundary was shifted down to 3150m. However currently it includes parts of the upper forests and two corridors, the Naro Moru and Sirimon, which were later, added to the National Park (Bussman 1994).

Since the early 1970s the indigenous forests have been heavily exploited by selective logging of valuable timber trees like cedar (*Juniperus procera*), olive (*Olea capensis ssp.hochstetteri, Olea europaea ssp.cuspidata/africana*), camphor (*Ocotea usambarensis*) and Meru oak (*Vitex keniensis*). In addition to logging, innumerable grazing licenses were issued and indigenous forest cleared and opened to allow for non-residential cultivation. The rapid recession of the glaciers from 1963 onwards indicates a change in climate involving higher temperature (Mt. Kenya Management Plan 2001).
Figure 1.1: Mount Kenya Biosphere Reserve
CHAPTER TWO

2.0 RESEARCH METHODOLOGY

2.1 DATA COLLECTION

The data collected were used to extract vital information that can enhance peaceful co-existence between wildlife and local communities adjacent to Mt. Kenya Biosphere Reserve by resolving resource use conflicts. The approach and methodology involved a consultative and interactive process in which all the respondents were interviewed. Interviews were used to gather data on role of local communities in conservation of the Mount Kenya Biosphere Reserve, human-wildlife conflicts, attitudes and perceptions towards conservation, challenges and impacts.

Relevant literature review pertaining Mt. Kenya Biosphere Reserve was also reviewed and analyzed to provide the desk baseline information. In addition fieldwork was complimented by direct observations of range conditions, environmental degradation, types and patterns of land use, extent of local support by NGO’s and other CBOS.

2.1.1 Sampling

Stratified sampling procedure was used to select the respondents to be interviewed. The selection of respondents to be interviewed were based on the following criteria:

- Proximity to Mt. Kenya Biosphere Reserve.
- Availability and significance of local natural biodiversity resources.
- Resource use conflicts
- Ethnicity and community cultural clusters
- Community groupings and their socio-economic activities.
- Human-wildlife conflicts prevalence
The study sites were chosen from 3 districts: Nyeri, Embu and Meru South. From the three districts, six sampling sites were randomly selected namely:

- Naromoru (Kieni East Division)
- Karundas (Kieni East Division)
- Sagana/Hombe (Mathira Division)
- Magasha (Manyatta Division)
- Irangi (Runyenjes Division)
- Kiangondu (Chuka Division)

In total 140 respondents (local community members) were interviewed. In addition other target groups interviewed included: representatives of community social and economic groups, local NGOs and Kenya Wildlife Service (KWS) Wardens, Forest Officers and environmental officers. Besides, two focused group discussions (community group discussions) were held, whereby local leaders in the sampled areas and community groups were selected based on local resources use and socio-cultural traits. The purpose was to identify community based groups as well as to obtain further insights into the real perception of local people towards conservation of the reserve, their roles, challenges and recommendations.

2.2 DATA ANALYSIS

Both primary and secondary data were collected. The secondary data collected was mainly qualitative and was centered on review of earlier reports, journals and publications on the study area. Content analysis, which is, defined as any technique for making inferences by systematically and objectively identifying specified characters of messages was employed in analyzing all the qualitative data collected. The statistical package for social scientists was used to analyze descriptive statistics.
CHAPTER THREE

3.0 RESULTS

3.1 INTRODUCTION

The Kikuyu, Meru and Embu communities occupy the western, eastern and southern sides of Mt. Kenya respectively. Other tribes within the Biosphere Reserve include the Maasai communities who are pastoralists and populate mostly the northern parts. There are also few Europeans living around the Biosphere Reserve and they are mainly practicing commercial ranching such as Kisima, Lewa and Borana. Most of these communities (Kikuyu, Embu and Meru) are predominantly agriculturalists. Agriculture is the main economic activity in the area with both small and large-scale farming being practiced. This is because the area has well-developed soils, high rainfall, which supports farming and livestock keeping. The type of farming practiced is influenced by topography and climate of the area. The cash crops grown include tea, coffee, wheat, barley, tobacco, pyrethrum and horticultural crops while the food crops include maize, millet, potatoes and cereals. In addition, fish farming (Tilapia and Trout), agroforestry and bee keeping are also common.

Figure 3.1: Typical household farm from the study area.
3.2 HOUSEHOLD CHARACTERISTICS

The survey was the first of its kind in Mt. Kenya Biosphere Reserve. About 95 percent of the respondents admitted that they have never participated in any interview regarding their role in conserving the reserve. The 5 percent who had participated in other surveys were mainly the CBO leaders, district wardens and forest officers.

The age of the respondents interviewed were as follows; those less than 20 years were 2.5 percent, 20-40 years 66.4 percent and those above 40 years, 31.1 percent. The household sizes for these respondents were: less than or equal to 5 persons were 41.2 percent, more than 5 but less than 10 persons were 50.4 percent and more than 10 persons were 8.4 percent. The population densities of the study areas are shown in Table 3.1

Table 3.1: Population structure of the study areas

<table>
<thead>
<tr>
<th>District</th>
<th>Division</th>
<th>Population 1989 (census)</th>
<th>Population 1999 (census)</th>
<th>Area km²</th>
<th>Density 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>Meru</td>
<td>Chuka</td>
<td>22,281</td>
<td>22,940</td>
<td>45,221</td>
<td>26,113</td>
</tr>
<tr>
<td>Embu</td>
<td>Runyenjes</td>
<td>27,783</td>
<td>28,996</td>
<td>56,779</td>
<td>31,374</td>
</tr>
<tr>
<td>Embu</td>
<td>Manyatta</td>
<td>30,563</td>
<td>31,877</td>
<td>62,440</td>
<td>34,829</td>
</tr>
<tr>
<td>Nyeri</td>
<td>Mathira</td>
<td>70,213</td>
<td>75,589</td>
<td>145,802</td>
<td>72,614</td>
</tr>
<tr>
<td>Nyeri</td>
<td>Kieni East</td>
<td>28,083</td>
<td>27,501</td>
<td>55,584</td>
<td>44,090</td>
</tr>
</tbody>
</table>

(Source GOK 1989; 1999)

3.3 LAND TENURE AND LAND SIZES

Agriculture is back borne of Kenya’s economy, hence land is a vital resource for rural populations. However, only one third of Kenya’s land is arable with high to medium agricultural potential allowing for production of maize, wheat, pulses and
other crops that provide staple food to Kenyans. Moreover, it is estimated that up to 75 percent of Kenya’s population earns its livelihood from agricultural-based economic activities. In the study area land as a finite resource has been decreasing in contrast to population increase as demonstrated in the Table 3.2

Table 3.2: Population densities in relation to land sizes

<table>
<thead>
<tr>
<th>District</th>
<th>Population 1989</th>
<th>Population 1999</th>
<th>Area km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meru South</td>
<td>180,265</td>
<td>205,451</td>
<td>1,093</td>
</tr>
<tr>
<td>Embu</td>
<td>234,737</td>
<td>278,196</td>
<td>729</td>
</tr>
<tr>
<td>Nyeri</td>
<td>607,292</td>
<td>661,156</td>
<td>3,356</td>
</tr>
<tr>
<td>Total</td>
<td>1,022,294</td>
<td>1,144,803</td>
<td>5,178</td>
</tr>
</tbody>
</table>

(Source GOK 1989; 1999)

Family land sizes vary from 1 acre to 18 acres. Majorities of the households have (70 percent) less than 3 acres of land, 22.9 percent have between 4-6 acres, 3.6 percent owns between 6-10 acres, while few individuals (3.5 percent) have more than 10 acres of land. This implies that majority of the population in the study area are small-scale subsistence farmers who in most cases are the poor. From the data it was found that pressure on land is highest in the densely populated fertile areas. Traditionally, in most of the study area land was owned through inheritance and sub-divisions among sons in each successive generation, thus leading to small uneconomically viable land holdings. The farms within Kieni-east however, are settlement schemes previously owned by white settlers, which were later subdivided to squatters/landless in 1960s (Ochieng, 1993). Women do not inherit land from their parents though they have user rights, hence inequalities in land ownership between men and women. Cases of women owning land are only possible when they purchase their own parcels of land.
3.4 IMPORTANCE OF MT. KENYA BIOSPHERE RESERVE

From the study, it was noted that the community is actively involved in the conservation of Mount Kenya Biosphere Reserve. From the survey, 90.7 percent acknowledges the importance of the reserve and that community livelihood depends on its continued preservation and conservation, while 9.3 percent had no idea. As per the responses some of the benefits derived from the Biosphere Reserve includes:

Figure 3.2: Mount Kenya

3.4.1 Water

Freshwater is a precious and finite resource central to sustainable development, economic growth, social stability and poverty alleviation. Access to safe drinking water is fundamental human right and world summit on sustainable development (2002) have underscored its importance for sustainable development. The reserve serves as water source for domestic purposes, agriculture and other uses like irrigation. Two of the country’s major rivers, Tana and Ewaso Nyiro have tributaries originating from the slope of Mt. Kenya. Farmers in the study
area depend mainly on rain fed agriculture, however in some parts those who grow horticultural crops practice irrigated agriculture especially in drier parts like Kieni East.

3.4.2 Tourism

The communities around appreciated the importance of the reserve as a major destination for Nature tourism, both domestic and international. From this sector the direct benefits derived by the locals include employment, aesthetic value and income from ecotourism activities.

3.4.3 Source of commercial timber/poles

Communities around get their timber and poles for domestic and industrial use from within the Biosphere Reserve. However due to increase in population there has been increased incidences of illegal logging.

3.4.4 Source of medicinal herbs, glue, grass and firewood

There are controlled human activities within the buffer zone that are compatible with conservation for instance collection of medicinal plants, glue, grass and firewood collection. The community members were in agreement that they do not mind paying a small fee to get grass and firewood from the forest.

3.4.5 Cultural

The Mountain is considered a sacred place where religious rituals are performed in times of need (e.g. to bring rain and bless the community). The Embu, Meru and Kikuyu communities regard it as a traditional, home for their God (Ngai/Murungu) whose presence is strongly associated with the peaks of Mount Kenya. The Kikuyu used Mugumo trees (*Ficus natalensis*) found in the forest as sacred
grounds to offer sacrifices to their God, *Indigofera erecta* is also considered sacred.

### 3.4.6 Grazing and honey harvesting

Grazing is provided for in the forest act (cap 385) and is used as a management tool to suppress weeds in forest plantation. This facilitates faster growth of the young trees and reduces biomass that could otherwise pose fire hazards in the dry seasons. However this has resulted into biodiversity loss and accelerated soil erosion in some areas. Honey harvesting within the reserve is also one of the controlled activities permitted in the buffer zone. Some community-based organizations are involved in bee keeping which is an eco-friendly income generating activity and needs to be promoted further. Grazing was one of the most appreciated benefits from the reserve. However the community’s grazing patterns needs to be improved for example grazing in young forest plantations should be discouraged.

### 3.4.7 Charcoal

Even though this activity is not allowed within the reserve owing to fire risk to the ecosystem and forest destruction, it is still being practiced illegally in some parts.

### 3.4.8 Community projects

Most community members viewed some projects as direct benefit from the Biosphere Reserve. This includes Water User associations, bee keeping projects, tree planting and ecotourism projects. This has led to improvement of communities’ livelihoods and standards of living.

### 3.4.9 Historically

The Mountain is associated with Kenya’s struggle for independence hence of
historical importance not only to local community but also to the entire nation.

3.4.10 Politically and socially

The Biosphere Reserve is an important landmark for district boundaries (Nyeri, Kirinyaga, Meru south, Meru central and Embu districts). The communities living within the Mountain are proud to be identified with the Mountain hence of social importance to them.

3.5 OWNERSHIP

In contrast to the benefits, the reserve ownership was understood differently among the respondents. About 2.9 percent said the forest belongs to the community, 1.4 percent believed it belongs to foreigners and the majority (95.7 percent) said it belongs to the government. This implies the need to sensitize and educate the communities that they are the owners of the reserve and the government only regulates its utilization to ensure posterity.

3.6 NON-RESIDENT CULTIVATION

Initially the surrounding communities were encouraged to practice non-resident cultivation in order to restore degraded indigenous forests in the buffer zone. Some communities through the non-residence cultivation have established individual tree nurseries as a way of conservation. Table 3.3 shows the crops previously grown under the non-residence cultivation or shamba system.

Table 3.3: Crops previously grown under the shamba system

<table>
<thead>
<tr>
<th>Crops</th>
<th>Maize</th>
<th>Potatoes</th>
<th>Beans</th>
<th>Snow peas</th>
<th>Cabbage</th>
<th>Kales</th>
<th>Carrots</th>
<th>Tomatoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>47</td>
<td>58</td>
<td>45</td>
<td>14</td>
<td>28</td>
<td>15</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Percentages</td>
<td>20</td>
<td>24</td>
<td>19</td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>
Previously 53.6 percent of the respondents practiced cultivation in the forest reserve. This shows that majority of community members depended on this system for food crops and as source of income and hence improved livelihoods. Consequently, there is need for the government to consider reviving the non-residence cultivation that was banned recently (March 2004) for not being effective. The ban was due to among others: corruption, political involvement and sabotage of planted seedlings by farmers to ensure continued presence on the land.

3.7 CHALLENGES FACED BY THE COMMUNITY

3.7.1 Human wildlife conflicts

Major problem encountered by the community is mainly human wildlife conflicts affecting 66.4% of respondents, thus causing communities to have negative attitude towards conservation of the reserve.

Figure 3.3: Crops destroyed by wild animals
Human wildlife conflicts were noted in most of the study area and the reasons given for the raids were: increasing animal numbers, expansion of agriculture into the reserve and rangers scaring animals by shooting into air and not killing them hence returning later in their farms. Others said the abolition of *shamba* system has played a role in increasing human wildlife conflicts since the cultivated lands in the reserve acted as buffer and animals never reached their farms. Most of the respondents interviewed had experienced human wildlife conflict. The conflict types were crop raids, damage to properties, deaths, injuries and threat to human life. The conflict animals are illustrated in table 3.4 below.

Table 3.4: Problem Animals in Mt. Kenya reserve

<table>
<thead>
<tr>
<th>Species</th>
<th>EL</th>
<th>BF</th>
<th>LP</th>
<th>SM</th>
<th>VM</th>
<th>HY</th>
<th>WP</th>
<th>PP</th>
<th>BB</th>
<th>OT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>80</td>
<td>22</td>
<td>6</td>
<td>74</td>
<td>70</td>
<td>1</td>
<td>9</td>
<td>8</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Percentage (%)</td>
<td>27</td>
<td>7</td>
<td>2</td>
<td>25</td>
<td>24</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

EL- Elephant, BF-Buffalo, LP- Leopard, SM- Sykes monkey, VM-Vervet monkey, HY- Hyena, WP- Wild pig, PP- Porcupine, BB- Baboons, OT- Others

The estimated losses given by respondents are summarized in the figure below.

![Estimated Loss per annum](image)

Figure 3.4: Estimated loss per year per species
3.7.1.1 Frequency of Raids

Raids occur throughout the year with monkeys being the most problematic animal species. However certain months were found to be the worst with elephant being the most destructive animal species, contributing to 80% of the total raids. These months were mainly the harvesting season and rainy seasons (when the forest is cold). The months were mainly between April to August and October to January. This confirms an earlier study by Ochieng (1993). Elephant also caused huge loses to farmers followed by monkeys, buffaloes and baboons respectively. The summary of the raids by species is presented in figure below.

![Frequency of Raids](image)

Figure 3.5: Frequency of raids by wild animals

3.7.1.2 Conflict resolutions

To address the human wildlife conflicts, the communities have undertaken certain measures such as chasing away the animals, reporting to the rangers, and killing the animals. These conflict mitigation measures are shown in table 3.5 below.
Raids were reported to occur at night hence the households had to be vigilant throughout the night. Communities mainly chased the animals away and the methods used included making noises (shouting), drumming, lighting fires (sometimes use kerosene and diesel), throwing pieces of burning wood, throwing stones and sticks at the animals and a times using dogs as alarms. However some respondents said the elephants were getting accustomed to light from the lodges hence when they see another light they move towards it thinking they are approaching a salt-lick. Some also cautioned against noise saying this attracted elephants and also makes them wild hence may kill people thus preferring beating of drums or ringing of bells.

Table 3.5: Current-conflict mitigation

<table>
<thead>
<tr>
<th>Method</th>
<th>Respondents (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chase away</td>
<td>65.0</td>
<td></td>
</tr>
<tr>
<td>Report to the rangers</td>
<td>1.4</td>
<td>66.4</td>
</tr>
<tr>
<td>Kill the animal</td>
<td>1.4</td>
<td>67.8</td>
</tr>
<tr>
<td>Chase away and report to rangers</td>
<td>32.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Compensation was also proposed to be re-introduced to pay for the farmers damage costs from wild animals and reduce negative attitude towards the park. Most respondents were also of the opinion that the non-resident cultivation be introduced to act as buffer system thus reduce crop raids in their farms. The animal numbers also need to be reduced as the high numbers was mentioned as one of the major causes of conflicts. In addition community members felt that the game rangers and outposts were few to handle the animal control hence they requested for increment of both.
3.7.1.3 Barriers

In areas with electric fencing, for instance in areas bordering Hombe/Sagana fence there were very few incidences of conflicts by wild animals showing that fencing is effective. However fencing could not stop animals like monkeys, baboons and wild pigs thus they suggested that modifications have to be made when designing a fence in future. Most people said they want fences to be erected but they would want it to have gates since they would still want to access forest resources.

![Sagara/ Hombe fence](image)

Figure 3.6: Sagana/ Hombe fence

Game moat was not a common way of conflict resolution in the study area. Many people do not know about it and its purpose. The moat was dug around the time of emergency to protect the plantations and at the time of its digging, people associated it with freedom fighting hence looked at the labour involved in construction as a form of punishment and the moat itself as a barrier preventing
MAU-MAU veterans from getting food from people outside the forest. As a result not everybody has positive attitude towards the moat. Ochieng (1993).

3.7.1.4 Others

Some respondents suggested that people near the forest should be encouraged to plant crops not consumed by wild animals. Crops like tea are not consumed but are destroyed through trampling on, others suggested tobacco crop.

3.7.2 Poverty

Poverty is identified as a major contributor to resource degradation. Many conflicts between people and protected areas are brought about by scarcity of resources available in the protected areas but are lacking outside and also aggravated by the fewer options that the people have.

Most of the people in the study area are small scale farmers with very low incomes hence are struggling to meet the basic needs. The abolishment of non-resident cultivation has further aggravated the situation for some who depended on it for their livelihoods. Therefore majority cannot afford to spare money to support any conservation initiatives

3.7.3 Encroachments

Mount Kenya Biosphere Reserve is facing threat from encroachments by surrounding communities due to population increase. With population increase there is more demand for arable land and also for settlement. Unsustainable land use practices results from this scenario leading to further degradation of the ecosystem.
3.7.4 Lack of tangible returns

Since there is no revenue sharing with communities, they do not see conservation of the reserve as a profitable venture.

3.7.5 Poor infrastructure

Poor road network affect agricultural production and marketing, which subsequently impacts on household income especially in areas not close to the tarmac road. Most of the areas covered in the study are remote and lack accessible roads making accessibility difficult thus being a constraint to development.

3.7.6 Environmental degradation

Some of the farmers in the study area practice shifting cultivation involving slash and burning of vegetation, thus posing danger of spreading fires to the forest. This practice also results in huge tracts of bare land without vegetation cover with negative environmental degradation such as soil erosion, deforestation and hence reduced soil fertility. Low productivity and increased demand for forest resources like firewood, timber and poles eventually results.

3.7.7 Market

Lack of market to produce compounded with inadequate market knowledge by farmers therefore selling their produce for much lower prices. Inadequate storage facilities are also a problem especially for those practicing horticulture. Poor marketing structure, Exploitation by middlemen, lack of clear policy on liberalization, lack of guaranteed minimum returns are among the major challenges. Many small-scale farmers are involved in alternative crop production activities especially the growing of horticultural crops through irrigation. However this initiative is negatively affected by poor functioning of markets and
3.7.8 **Land subdivision**

Decrease in land sizes due to population increase has led to smaller uneconomically viable pieces.

3.7.9 **Lack of credit facilities**

Lack of access to credit facilities to buy farm inputs is also another challenge and the mismanagement of most cooperative societies has worsened the situation further. The major obstacle for some tree planting groups is lack of seeds, equipment and labour since most young people do not want to volunteer their time for free.

3.7.10 **Lack of technical expertise**

This is due to inadequate field personnel to provide assistance to farmers for instance on new farming techniques, agroforestry, germination, propagation and horticulture. Those involved in conservation also lack adequate skills on nursery management, project management, leadership skills and group dynamics.

3.7.11 **Water scarcity**

Water for domestic and agricultural use is one of the major constraint and challenge in some of the study areas especially in Kieni-east, which is drier. Community members proposed that water projects should be supported in the area.
3.8 COMMUNITY PARTICIPATION

3.8.1 Roles played in conservation

59% of the respondents are involved in tree planting whereby most groups have established tree nurseries of both indigenous and exotic trees. Most groups were formed with the aim of averting desertification by carrying out re-afforestation and establishing new forest lots within the Forest Reserve and also on their lands. An outstanding example was the Magasha community (Manyatta Division, Embu) who are planting trees on huge track of forestland, previously destroyed by the earlier community through the non-residence cultivation locally known as Shamba-system (shows clearly the destructive effects of the shamba system). They also donate seedlings to other community members and schools but sell a few to get income.

Most of the communities living around the biosphere reserve act as watchdogs of the reserve by reporting any illegal activities for instance charcoal burning, poaching and illegal grazing. 13 percent of those interviewed are involved in
Role of community in the conservation of Mt. Kenya biosphere reserve

vigilance. In addition 9 percent of respondents participate in conservation awareness campaigns mainly to other community members and schools, thus ensuring others are aware of conservation issues.

Other respondents (4%) had contributed towards barrier construction for instance fencing (good example in Sagana) and Moat digging (for example a 15km one in Kangaitha, Embu). They contributed towards fencing either by offering labour during construction, donating poles or are involved in its maintenance for example by clearing vegetation. Another 4% have participated in clearing of invasive species in the forest before planting trees, for instance Kiangondu community in Chuka. Fire fighting mainly by those community members who live next to the forest accounted for 2%.

Other contributions were protection of catchment areas, buying forest products, not farming in forestland and being involved in ecotourism initiatives. Some farmers have established their own woodlots or are involved in agroforestry thus reducing pressure on forest products. In addition when animals stray to their farms most community members chase them back to the forest or report to rangers and do not kill them, this shows they appreciate wildlife conservation.
3.8.2 Community Based Organizations

Community-based organizations (CBOs) are grassroots or locally based organizations formed and run by community members themselves to pursue certain objectives of collective or mutual interest to the members. They often meet basic needs of the members and play major role in building trust and a sense of belonging for its members. In the divisions covered, there are several community-based projects mainly geared towards conserving Mt. Kenya Biosphere Reserve.

Majority of groups were formed on basis of common interest to conserve Mt. Kenya Biosphere Reserve as well as improve the livelihoods of the members. About 42.9 percent of the groups were formed based on age, 28.6 percent on income levels, 14.3 percent on gender basis of the members while 14.2 percent
were on the basis of common interests. The communities around the reserve have realized the importance of belonging to a CBO. About 70.7 percent of the respondents belong to a CBO while the remaining 29.3 percent do not belong to any group. Their reasons of not joining these groups are shown in table 3.6 below.

Table 3. 6: Reasons for not joining CBOs

<table>
<thead>
<tr>
<th>Reason</th>
<th>Respondents (%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No time</td>
<td>30.6</td>
<td>36.2</td>
</tr>
<tr>
<td>Lack of CBO around</td>
<td>5.6</td>
<td>41.8</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>22.2</td>
<td>64.0</td>
</tr>
<tr>
<td>New in the area</td>
<td>11.1</td>
<td>75.1</td>
</tr>
<tr>
<td>Not interested</td>
<td>8.3</td>
<td>83.4</td>
</tr>
<tr>
<td>Women oriented</td>
<td>8.3</td>
<td>91.7</td>
</tr>
<tr>
<td>Lack of finances</td>
<td>13.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
The activities of the groups are summarized in Table 3.7

<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wendani self help group</td>
<td>Runyenjes</td>
<td>10 M, 7 F</td>
<td>• Inadequate funds • Poor market • Lack technical advice • Conflicts among members</td>
<td>• Bee-keeping • Horticulture • Awareness campaigns; -HIV/AIDS -Conservation</td>
<td>• Members</td>
<td>• School fees • Improve members welfare • HIV/AIDS awareness</td>
</tr>
<tr>
<td>Mt. Kenya youth self help group</td>
<td>Runyenjes</td>
<td>42 M, 8 F</td>
<td>• Inadequate funds • Poor market • Lack of technical advice • Low motivation • Human wildlife conflict</td>
<td>• Planting trees • Raising tree nursery • Awareness campaigns</td>
<td>• Members</td>
<td>• Awareness campaigns • Social interaction • Soft loans • Aids awareness</td>
</tr>
</tbody>
</table>
## Role of community in the conservation of Mt. Kenya biosphere reserve

<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
</table>
| Kieni Kagaari (Munyange) self help group | Runyenjes 10 | 0 | • Inadequate funds  
• Poor market  
• Lack of knowledge on group dynamics | • Bee keeping  
• Tree planting  
• Raising nursery | • Members | • Honey  
• School Fees  
• Firewood |
| Kararitiri water Project        | Runyenjes 40 | 35 | • Inadequate funds  
• Poor market  
• Lack of technical advice  
• Lack of transport facilities | • Water supply  
• Horticulture | • Members | • School fees  
• Food  
• Clothing |
| Munyutu youth group             | Runyenjes 30 | 0 | • Inadequate funds  
• Conflict btw members  
• Poor market  
• Lack technical advice | • Running a shop  
• Providing transport services | • Members | • Income to members  
• Loan from group |
<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magasha conservation group</td>
<td>Manyatta</td>
<td>5 60</td>
<td>• Inadequate funds • Members’ conflicts • Lack of seeds • Poor market • Lack of technical advice</td>
<td>• Tree planting • Awareness</td>
<td>Members, BCP</td>
<td>• School fees • Improve member’s welfare.</td>
</tr>
<tr>
<td>Nyanjara fisheries self help group</td>
<td>Manyatta</td>
<td>24 5</td>
<td>• Inadequate funds to expand • Management problems • Lack of motivation • Poor market • Lack of technical skills on fisheries management</td>
<td>• Watchdog to forests • Fish keeping</td>
<td>Members, UNDP-Compact, KWS</td>
<td>• Employment • Improve member’s welfare.</td>
</tr>
<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
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<td>-------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Wamiti women conservation group  | Manyatta | 5 60         | • Inadequate funds  
• Poor market  
• Lack of technical skills  
• Lack of seeds  
• Management problems | • Tree planting  
• Improving welfare of members | Members  
Sale of tree seedlings | Social network  
Improve member’s welfare. |
| Mwienderi women self help group  | Manyatta | 5 45         | • Inadequate funds  
• Poor market  
• Lack of technical skills  
• Poverty | • Tree planting  
• Improving welfare of members | Members | School fees  
Improve welfare of members |
| Kiandani horticultural group      | Manyatta | 12 0         | • Inadequate funds  
• Poor market/transport  
• Lack of technical skills | • Growing horticultural crops | Members | Improving welfare of members |
<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Munyange bee keepers</td>
<td>Manyatta</td>
<td>65 0</td>
<td>• Inadequate funds</td>
<td>• Honey</td>
<td>• Members</td>
<td>• Improving welfare of members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Poor market</td>
<td>• Tree planting</td>
<td></td>
<td>• Social network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of technical skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wamiti women group</td>
<td>Mathira</td>
<td>5 60</td>
<td>• Inadequate funds</td>
<td>• Tree nursery project</td>
<td>• Members</td>
<td>• School fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Poor market</td>
<td></td>
<td></td>
<td>• Improving welfare of members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of technical skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanjo urumwe self help group</td>
<td>Mathira</td>
<td>40</td>
<td>• Inadequate funds</td>
<td>• Farming</td>
<td>• Members</td>
<td>• School fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Poor market</td>
<td>• Merry go round</td>
<td></td>
<td>• Helping the disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of technical skills</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
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</tr>
</tbody>
</table>
| Juhudi self help group         | Mathira  | 10 35        | • Inadequate funds  
• Poor market  
• Lack of technical advice  
• Conflict among members | • Rearing goats  
• Tree planting  
• Merry go round | Members  
NGOs                                      | School fees  
Improving welfare of members |
| Kirimukuyu women conservation group | Mathira  | 25 35        | • Inadequate seeds  
• Inadequate funds                                                                 | • Tree nursery cultivation  
• Planting trees                                     | Members                                      | School fees  
Welfare advancement  
Group cohesion     |
| Sagana fresh produce           | Mathira  | 10 50        | • Poor market  
• Lack of technical skills  
• Lack of credit facilities | • Farming horticultural crops                      | Sale of farm products  
Members                                      | School fees  
Welfare advancement     |
<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sagana fish farming</td>
<td>Mathira</td>
<td>50</td>
<td>• Lack of funds</td>
<td>• Fish farming</td>
<td>• Members</td>
<td>• Improving welfare of members</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>• Lack of markets</td>
<td>• Selling horticultural crops</td>
<td>• Sell of fish</td>
<td>• Social cohesion improved</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Poor infrastructure</td>
<td></td>
<td></td>
<td>• School fees</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rafiki self help group</td>
<td>Mathira</td>
<td>0</td>
<td>• Inadequate capital</td>
<td>• Tree planting – assist green belt</td>
<td>• Members</td>
<td>• School fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>• Lack of motivation</td>
<td>• Merry go round</td>
<td>• Green Belt</td>
<td>• Loan facilities</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Muungano women self help</td>
<td>Mathira</td>
<td>0</td>
<td>• Inadequate capital</td>
<td>• Planting trees</td>
<td>• Members</td>
<td>• Social cohesion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40</td>
<td>• Lack of support from government</td>
<td>• Education to members</td>
<td></td>
<td>• School fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Conflicts between members</td>
<td>• Aids awareness</td>
<td></td>
<td>• Soft loans</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Morally upright community</td>
</tr>
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<td></td>
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<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
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<td>-----------------------------------------------</td>
</tr>
</tbody>
</table>
| Magutu women self help          | Mathira  | 0  46         | • Lack of seeds  
• Lack tubes  
• Lack of transport for seedlings                                                   | • Tree nursery                                                        | • Green belt movement              | • Reforestation  
• Established tree nurseries               |
| Iganjo/Oromo Group               | Mathira  | 0  40         | • Inadequate capital.  
• Awareness creation  
• Farming                                                                      | • Members  
• Sell of crops                                                        |                                   | • School fees for disabled  
• Source of income                         |
| Sagana water project            | Mathira  | 10  200       | • Conflicts among members  
• Inadequate funds to buy materials  
• Lack of technical skills  
• Lack of markets for produce  
• Group dynamics                                                                 | • Tapping water for irrigation and domestic use  
• Bee keeping  
• Cultivation of horticultural crops | • Members  
• Harambees from politicians                                          | • Social cohesion  
• School fees  
• Water for irrigation  
• Food security                         |
<table>
<thead>
<tr>
<th>Name of CBO</th>
<th>Division</th>
<th>No of members</th>
<th>Challenges facing</th>
<th>Roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ngonde water project</td>
<td>Kieni East</td>
<td>40 200 M F</td>
<td>• Lack of taps&lt;br&gt;• No donor</td>
<td>• Water distribution</td>
<td>• Community contribution</td>
<td>• Still in process of construction</td>
</tr>
<tr>
<td>Mathira youth women group</td>
<td>Kieni East</td>
<td>0 46 M F</td>
<td>• Lack of equipment&lt;br&gt;• Lack of seeds&lt;br&gt;• Lack of water pump</td>
<td>• Planting trees&lt;br&gt;• Merry –go-round</td>
<td>• Members</td>
<td>• Income to buy food&lt;br&gt;• Social cohesion&lt;br&gt;• Loan to members</td>
</tr>
<tr>
<td>Mweitheria conservation group</td>
<td>Kieni East</td>
<td>0 25 M F</td>
<td>• Lack of equipment&lt;br&gt;• Poor market&lt;br&gt;• Lack of seeds</td>
<td>• Tree planting&lt;br&gt;• Raising tree nursery</td>
<td>• Action aid&lt;br&gt;• Revenue from sale of produce</td>
<td>• Source of revenue&lt;br&gt;• Trees planted in the community.</td>
</tr>
<tr>
<td>Young women group</td>
<td>Kieni East</td>
<td>10 40 M F</td>
<td>• Human wildlife conflict&lt;br&gt;• Poor market&lt;br&gt;• Inadequate water supply</td>
<td>• Tree planting&lt;br&gt;• Merry go round</td>
<td>• Members contribution&lt;br&gt;• BCP</td>
<td>• Income&lt;br&gt;• Get trees to plant in own land</td>
</tr>
<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
</tr>
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<td>-----------------------------------</td>
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<td>---------------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Mathena young women group</td>
<td>Kieni East</td>
<td>0 33</td>
<td>• Lack of markets</td>
<td>• Tree planting</td>
<td>• Action Aid</td>
<td>• Self reliance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of equipment and seeds</td>
<td>• Merry go round</td>
<td>• BCP</td>
<td>• Tree planting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Ministry of Agriculture (technical advice)</td>
<td>• Social cohesion</td>
</tr>
<tr>
<td>Mt. Kenya community conservation group</td>
<td>Kieni East</td>
<td>7 14</td>
<td>• Lack of seedlings</td>
<td>• Donate tree seedlings to forest department</td>
<td>• Members</td>
<td>• Loan to members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of technical skills</td>
<td>schools, and the local community</td>
<td>• Sales from seedlings</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of materials for seedlings</td>
<td></td>
<td>• Donation from friends</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Inadequate funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Githinga self help</td>
<td>Kieni East</td>
<td>18</td>
<td>• Lack of water</td>
<td>• Merry go round</td>
<td>• Members</td>
<td>• Trees in schools</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Inadequate funds</td>
<td>• Horticulture</td>
<td>• Source of Income</td>
<td>• Income source</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Maize, peas and vegetable cultivation</td>
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<td></td>
</tr>
<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
</tr>
<tr>
<td>-----------------------------------</td>
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<td>--------------------------------------------------------</td>
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</tr>
<tr>
<td>Gitugi women conservation</td>
<td>Kieni East</td>
<td>0 30</td>
<td>• Lack of seeds, polythene tubes&lt;br&gt;• Lack of water</td>
<td>• Tree nursery management</td>
<td>• Members&lt;br&gt;• Selling of seedlings</td>
<td>• Aesthetic value of trees&lt;br&gt;• Income to members</td>
</tr>
<tr>
<td>Kariri-Kaga (ACK-Manyatta Church)</td>
<td>Kieni East</td>
<td>10 20</td>
<td>• Low income&lt;br&gt;• Lack of seedlings, pesticides, polythene tubes&lt;br&gt;• Poor market</td>
<td>• Merry go round&lt;br&gt;• Tree planting</td>
<td>• Members</td>
<td>• Loan to members&lt;br&gt;• Getting seedlings from group</td>
</tr>
<tr>
<td>Mt Kenya community afforestation development Project</td>
<td>Kieni East</td>
<td>9 12</td>
<td>• Lack of seeds, polythene tubes&lt;br&gt;• Inadequate capital to run venture&lt;br&gt;• Inadequate labour</td>
<td>• Tree planting&lt;br&gt;• Fire fighting&lt;br&gt;• Tree nursery&lt;br&gt;• Donating trees to institutions&lt;br&gt;• Educating public on conservation issues</td>
<td>• KWS&lt;br&gt;• Bill woodley trust&lt;br&gt;• BCP</td>
<td>• Aesthetic value e.g. trees in schools, village and forest&lt;br&gt;• Donated trees to schools and to members&lt;br&gt;• Conservation awareness</td>
</tr>
<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
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<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Kabraini tree project</td>
<td>Kieni east</td>
<td>10 10</td>
<td>• Lack of seeds</td>
<td>• Tree nursery</td>
<td>• Members</td>
<td>• Income to members</td>
</tr>
<tr>
<td>Muthiria nyoni Environment group</td>
<td>Chuka</td>
<td>15 25</td>
<td>• Lack of seeds</td>
<td>• Afforestation</td>
<td>• Members contribution</td>
<td>• Income for members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of tools and equipment</td>
<td>• Vigilance</td>
<td></td>
<td>• Planting trees on deforested land, thus get grass, honey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of market</td>
<td>• Bee keeping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Inadequate funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rafiki women group</td>
<td>Chuka</td>
<td>2 40</td>
<td>• Lack of training</td>
<td>• Planting trees</td>
<td>• Members contribution</td>
<td>• Money for school fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Poor market</td>
<td>• Building houses</td>
<td></td>
<td>• HIV/AIDS awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Inadequate funds</td>
<td>• Awareness</td>
<td></td>
<td>• Welfare improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of vital equipments</td>
<td></td>
<td></td>
<td>• Taught cooking methods, and local resources use</td>
</tr>
<tr>
<td>Ciakaburu women group</td>
<td>Chuka</td>
<td>1 29</td>
<td>• Inadequate funds</td>
<td>• Planting trees</td>
<td>• Members contribution</td>
<td>• Paying school fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of efficient equipment</td>
<td>• Building houses</td>
<td></td>
<td>• Improved members welfare</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lack of market</td>
<td></td>
<td></td>
<td>• Piped water</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name of CBO</td>
<td>Division</td>
<td>No of members</td>
<td>Challenges facing</td>
<td>Roles of the group</td>
<td>Source of funding</td>
<td>Benefits received</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------</td>
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<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
</tr>
</tbody>
</table>
| Kamiri group of honey harvesters | Chuka    | 30            | • Lack of capital  
• Poor market for honey  
• Lack of ready market                | • Planting trees  
• Vigilance                          | • Members                | • School fees  
• Improved welfare                  |
| Ndigia bee keeping group        | Chuka    | 63            | 57  
• Lack of ready market  
• Inadequate funds for equipment to produce quality honey  
• Lack of food             | • Tree planting  
• Bee keeping  
• Awareness campaigns      | • Members                | • Education  
• Social interaction  
• Source of income from sale of honey |
| Ngoi women group                | Chuka    | 23            | 16  
• Lack of technical support  
• Lack of money  
• Inadequate in-puts like seeds  
• Inadequate food            | • Tree planting  
• Building houses            | • Members                | • Pay school fees  
• Installed tap water  
• Improved welfare of members  
• Social interactions       |
Most of these groups (71.4 percent) have not had assistance both in kind and cash. They therefore, rely on their members for all the activities they undertake. Only 28.6% of the groups got contribution either in kind or cash from Donors, non-governmental organizations, local leaders, government or Kenya Wildlife Service. Despite the fact that these community based groups do not have other sources of funding, they have continued to conserve Mt. Kenya Biosphere Reserve because they understand its importance in influencing the local climate and provision of essential products and services.

3.8.3 Interviews with CBO leaders

Most of the CBO'S in the area have an overall goal of protecting the Biosphere Reserve with most groups being involved in tree planting, donating and selling of seedlings to schools or to local communities. Vigilance and fire fighting were also cited as important contributions towards conservation of biodiversity. Human wildlife conflicts are a major problem in the study area and hence lasting conflict mitigation measures should be developed.

The leaders agreed that joining the groups has improved the members’ living standards. However despite the benefits, all the community-based organizations faced several constraints including inadequate finances, lack of motivation/morale and lack of technical advice. This has contributed to low community participation in conservation issues.

The groups whose leaders were interviewed include:

- Wendani self help group
- Wamiti women conservation group
- Ngonde water project
- Kieni-Kagaari self help group
- Juhudi self help group
• Mungano women group
• Rafiki self help group
• Ndigiup bee keeping group
• Kiandani horticultural group
• Nyanjara fisheries group
• Magasha conservation group
• Munyange bee keepers group
• Mt. Kenya community conservation group
• Mathena young women group
• Mt. Kenya community afforestation and development project.

3.9 LIVELIHOOD SYSTEMS

3.9.1 Conservation and livelihoods

Ironically the search for livelihoods negatively affects the environment resulting in reduced land productivity and reduced resource bases, negatively affecting those same livelihoods. In essence, immediate survival needs of the population conflict with the long term needs for preserving and maintaining the viability and integrity of the environment. From the study area it is evident that search for livelihoods, poverty and environmental concerns are intertwined and need to be addressed simultaneously. However common awareness of these relationships seems to be poorly developed probably due to breakdown in social structures. Improving livelihoods in an environmentally and socially sustainable manner need to be promoted for instance by establishing ecotourism projects.

3.9.2 Policy conflicts and enforcement

The management of Mt. Kenya Forest Reserve falls under two institutions, the Kenya Wildlife Service and the Forest Department. The two institutions use two
pieces of contradicting legislation, the forest Act (Cap 385) and the wildlife conservation and management Act (Cap 376). The forest Act allows for the utilization of the forest products, access to the forest and traditional rights to the community. This contradicts the Wildlife Act that does not allow any form of utilization or access to the area gazetted under the Act. Although the two institutions have signed a memorandum of understanding, they still do not work in harmony presenting serious implications to the management of the natural resources.

It is therefore evident, that the existing environmental laws are inadequate to arrest environmental degradation and to offer protection to the natural resources in the Biosphere Reserve. The laws have not been adequately enforced due to several constraints including weak administrative structures, lack of adequate resources, political interference, inadequate incentives, lack of awareness and gaps and overlaps in institutional responsibilities. Weaknesses in law and policy enforcement and institutional conflicts are evident in the management of the reserve since illegal activities like charcoal burning and illegal logging are still prevalent. The presidential ban on the exploitation of indigenous forests of 1986 has created a shortage in the supply of timber products. Consequently, it has caused increased demand on farm trees for timber thus threatening the natural resources and environment in most areas.

3.9.3 Women

Women are a special group deserving attention because of vulnerability; they do not own land since the society is patriarchal. The cultural set up of the society leaves them very vulnerable, pushed to the role of taking care of homes with very little decision making powers and at times with very little support from men. They have no access and control over benefits from farm produce despite the fact that they do most of the work and are responsible for most productive chores. However they are in charge of income earned through casual labour or petty
business.
Many women have joined women groups as a coping mechanism. However most women groups in the study sites generally were found to be weak in terms of capital mobilization and articulation of new development initiatives. They mainly concentrated on merry go round, small-scale enterprises that do not involve much money and not in ventures that involved large capital base. This clearly shows the low economic power of women as compared to their male counterparts.

Despite their disadvantaged position in society women constituted the majority in CBO membership (59%), while males constituted 41% implying they contribute significantly towards conservation of the reserve. Efforts should therefore be made to empower women, narrow the gender parity hence improve their livelihoods if women are to continue making significant change in conservation of the reserve. Women should also be involved in all aspects of the management of the reserve in contrast to what has been happening where mostly men are consulted whenever a community opinion is sort.

3.9.4 Youth

Youth formed another target group of interest because most are unemployed and depend on their parents for a living awaiting the sub-division of the father’s land. Due to small farm sizes many are not assured of ever owning a piece of land that will reasonably secure their livelihoods. Many try to earn an additional income mainly through casual labour, which causes frustrations thus posing a challenge to the community.

From the study area there were very few youth groups involved in conservation. Only about 2.1% of those interviewed participated in the conservation of the ecosystem. The main reason was that they could not see any tangible benefits
from participating in conservation and few said the groups were women oriented or did not appeal to the youth. Therefore if the youths are to play a major role in conservation, awareness campaigns should be stepped up in schools, conservation ventures made profitable and by involving the youths in management of the Biosphere Reserve. This will instill some sense of ownership and responsibility if they know that they will benefit from the conservation of the reserve.

3.9.5 Socio-economic constraints to development

The following were identified as the major constraints to development in the area;

- Low incomes among the communities, hence inability to venture into alternative sources of livelihoods. Poverty prevalence for example in Chuka district is one of the major development challenges the district is facing (90% are poor according to 1999 population and housing census). It is manifested in various forms and can be defined in both monetary and human capability terms. It has significantly reduced disposable incomes of large part of population over the years. This phenomenon has impacted negatively on general welfare of the community particularly in terms of access to basic services like education and health care.

- Lack of market for agricultural produce for instance coffee, which showed signs of failure since 1997 hence farmers shifted to growing other crops. Thus the crop has been neglected and instead it is intercropped with maize, bananas, fruits and vegetables. Since coffee was a major cash crop in the study area this has led to low-income levels hence poor livelihoods.

- Deteriorating agricultural extension services due to the following factors: limited facilitation (equipment, transport etc), laxity/lethargy of staff, Poor monitoring and follow up and poorly remunerated staff.

- Communities are not involved in the project cycle management (PCM). The locals should participate in problem identification, analysis, priority
setting, project design, monitoring and evaluation. There is inadequate community mobilization due to poor governance, lack of both financial and human resources.

- Poor linkages, networking and cooperation among government and other conservation stakeholders. This is evidenced by their poor facilitation, duplication of roles and lack of support to community development initiatives.

- Poor governance as evidenced by weak policy enforcement and lack of participatory practices in the management of the reserve. Politicians are also responsible for deterioration of governance situation at community level. They do not take a leading role of ensuring that communities are empowered economically or through awareness creation about their rights and benefits from conservation.

- Low levels of awareness of the importance of the Biosphere Reserve hence continued destructive practices for example their preference for hardwood leading to further destruction of forests.

### 3.9.6 Livelihood improvement

From the study the following suggestions were proposed regarding livelihood improvement;

- Promoting better farming practices to reduce natural resources degradation for instance encouraging agroforestry to relieve pressure from gazetted forests.

- Supporting community projects and other income generating activities so that communities can link conservation issues to development.

- Community empowerment and participation in conservation initiatives. Though there is noticeable shift from a policy of regarding people as passive beneficiaries by seeking their opinions especially with regards to women, from the responses, government workers still need to improve
their outlook. Communities need to be looked as main stakeholders or as
technocrats and politicians have to change their misguided view that they
know what the communities want.

- Enhance closer working relationships with all stakeholders to increase
capacity of forest management. This will encourage collaborations and
avoid role duplication.
- Enforce laws relating to environmental protection to control destruction of
water catchments.
- Stepping up awareness on the roles of communities in conservation of the
Biosphere reserve.

3.9.7 Interviews with leaders involved in conservation

The Leaders interviewed include the Game wardens (Mt. Kenya, Embu and
Meru), community wardens (Mt. Kenya and at the headquarters), District forest
officers (Nyeri, Embu and Chuka) and District environmental officers (Nyeri,
Embu and Chuka) all of whom gave us the highlights on what the community
around is doing towards conservation. They were positive in confirming that now
the community is actively involved in the conservation of Mt. Kenya Biosphere
Reserve.

The local leaders interviewed have lived in the area for a varied period of time.
About 40 percent have lived in the area for more than 20 years while 20 percent
have lived in the area for about 5 years and 40 percent have lived less than one
year. To them the locals have been very cooperative towards conservation of the
forests due to the benefits derived from the forest such as firewood, timber, food,
medicinal plants, water and grazing grounds for their livestock.

The communities have shown commitment to conservation through participation
in tree planting, construction of forest barriers such as moats, electric fence and
reporting illegal activities to them. The main challenges facing these CBOS are
lack of funding, lack of technical skills, lack of corporation among members and lack of motivation due to conflicts of interest.

The leaders were all of the opinion that to enhance Integrated Natural Resource Management, community participation must be prioritized. Secondly, awareness creation through education needs to be promoted to sensitize the communities on the role of CBOS and their roles in Natural Resource Management. In addition cooperation among all stakeholders should be promoted. To help minimize the human wildlife conflicts the game scouts /rangers should be deployed and when necessary, the outposts should be increased. In addition, they also suggested that the forest reserve be enclosed with barriers such as electric fence and moats as a way of mitigating human-wildlife conflicts.

3.10 CONSTRAINTS

A number of constraints were experienced in the course of this study including:

Poor accessibility to the study sites
Most of the areas covered in the survey are remote and lack accessible roads making accessibility difficult if not impossible. This extended the period within which the survey activities could have been completed as per the project timetable. This also increased the cost of transport that was not captured in the budget.

Language barrier
Some of the respondents could not understand English or Kiswahili languages hence the need to have a local guide to translate.

Study area
Mount Kenya Biosphere Reserve covers a very large area and this study could not cover the entire area, studies for the entire reserve are still needed.
CHAPTER FOUR

4.0 CONCLUSION AND RECOMMENDATIONS

The cultural and economic activities of communities around Mt Kenya Biosphere Reserve largely depend on Natural and Biodiversity resources within the Mountain. The adjacent communities play important roles in conservation of the reserve. Their participation supported by community-based groups not only improves the community living standards but also protect the reserve from exploitation. To strengthen the groups there is need to empower the local communities through provision of credit facilities, awareness creation and capacity building in terms of civic education to improve on the conservation, leadership and management skills.

To improve their livelihoods and enhance community participation most respondents suggested that they should be integrated in management of the Biosphere Reserve and be seen to be the main stakeholders. Most of the respondents also suggested they should be allowed to benefit from the reserve for instance through non-resident cultivation, which would enhance their food security as well as their income base hence their livelihoods. Other suggestions were employment provision to the locals when opportunity arises, revenue sharing, water projects, improving infrastructure and market facilities. Fencing to mitigate human wildlife conflict was also proposed by majority of respondents. Finally others felt that awareness creation on the importance of the Biosphere Reserve and the impacts of unsustainable land uses on the ecosystem be promoted as the level of awareness is still low. Studies on valuation of natural resources in the reserve will be timely so that people can view natural resources as economic goods and not public goods.

Poverty is identified as major contributor to natural resource degradation. Many
conflicts between people and protected areas are brought about by scarcity of resources available in the protected areas but are lacking outside and also aggravated by the fewer options that the people have. From the study area, majority of the people are small scale farmers therefore supporting community-based initiatives geared towards poverty alleviation is recommended. Water provision should be a priority in drier areas as it plays a critical role in conserving and sustaining natural resource base and reducing environmental hazards. Integrating conservation and development at all levels will be the key to ensuring long-term sustainability of Mount Kenya Biosphere Reserve.

The success of the Community-based projects with community participation in all stages from the study area demonstrates the importance of Participatory management practices. Gender-sensitive participatory processes at community level are highly recommended, thus empowering of women, youth, indigenous peoples, marginalized communities must be a key focus if conservation of Mount Kenya Biosphere Reserve for posterity is to be realized.

Good governance in Natural Resources Management requires effective and accountable socio-political and administrative systems adopting an Integrated Natural Resource Management (INRM) approach with transparent and participatory processes that addresses ecological and human needs. Gender inclusive policies and pro poor policies will be imperative to improve their livelihoods. Holistic approach in management to come up with results that is beneficial to the ecosystem and community, as a whole should be promoted.

To avoid duplication of responsibilities by different organizations in the area the coordination of local development programmes need to be centralized. Moreover, partnerships between all stakeholders need to be promoted. Participation in collaborative information and knowledge sharing initiatives at appropriate local, regional, national and international levels also need to be encouraged. Having a land use policy in place will also be timely in eliminating
resource use conflict.

The local communities are active in conservation of the reserve thus this needs to be promoted for its continued preservation. This will be in line with the realization of Millennium Development Goals (MDGs), particularly MDG goal 7 on environmental sustainability.

Striking a balance between satisfying the livelihood needs and wise use of natural resources within the Biosphere Reserve to ensure sustainability is therefore the biggest challenge.
REFERENCES


Ford, R. (1992). *Sustaining development through community mobilization; a case study of participatory rural appraisal in the Gambia*. Clark University, USA.


## APPENDIX 1: BUDGET ESTIMATES

<table>
<thead>
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<th>Item No.</th>
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<th>Amount (USD.)</th>
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<td>1253.33@26.67</td>
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<td>47,000@ksh.1000</td>
<td>626.67@13.33</td>
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<td>Local field guide</td>
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<td>10,000@ksh.500</td>
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<td></td>
<td>Camera</td>
<td>1</td>
<td>20,000</td>
<td>266.67</td>
</tr>
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<td><strong>Travel and subsistence</strong></td>
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<td>110,000</td>
<td>1466.67</td>
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<td></td>
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<td>6,000</td>
<td>80.00</td>
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<td>1.3</td>
<td><strong>Materials and discussions</strong></td>
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</tr>
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<td></td>
<td>Computer diskettes and office stationeries</td>
<td>4 rolls</td>
<td>10,000</td>
<td>133.33</td>
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<td></td>
<td>Films and processing</td>
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<td>5000</td>
<td>66.67</td>
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<td></td>
<td>Group discussions</td>
<td></td>
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<td>1.4</td>
<td><strong>Data analysis and reporting</strong></td>
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<td>1.5</td>
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APPENDIX 2: QUESTIONNAIRE

ROLE OF COMMUNITY IN THE CONSERVATION OF MT. KENYA BIOSPHERE RESERVE QUESTIONNAIRE

Respondent
code…………………….. Date……………………………

1) Questionnaire for Community Members

Province------------------------District-------------Division ------ Location-----------------
Sub location/Village-----------------------------
Gender Male-------- Female-------------
Age 15-20 (   ) 20-30 (   ) 30-40 (   ) 40-50 (   ) 50+ (   )

1. Have you ever participated in such an interview? Yes (   ) No (   )
   If yes where and when?

2. Education level: No formal schooling (   ) Primary (   ) Secondary (   ) Tertiary
   (   ) Other (specify)

3. Do you have a family? Yes (   ) No (   ) If yes wife/wives (   ) Husband (   )
   Children (   ) Other dependants (   )

4. How is the land ownership? Individually (   ) communally (   )

5. What is the approximate size in acres? Less than 3 (   ) 4-6 (   ) 10 (   ) over
   10 (   )

6. How long have you lived near the forest? Less than 10 years (   ) 10-20 years
   (   ) 20-30 years (   ) 30+ years (   ).
7. Who owns the forest and the resources in the forest? The community ( )
   Foreigners ( )
   Government ( )

8. Does Mt. Kenya National Park/Forest Reserve benefits you in any way?
   Yes ( ) No ( )

9. If yes in 8 above, what are the benefits of Mt. Kenya Biosphere Reserve to you? (Tick where appropriate)

<table>
<thead>
<tr>
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<th>No</th>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber, poles, firewood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water, food plants</td>
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<td></td>
</tr>
<tr>
<td>Charcoal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicinal plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community projects</td>
<td></td>
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</tr>
<tr>
<td>Others (specify)</td>
<td></td>
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</tr>
</tbody>
</table>

10. Were you previously cultivating crops in the forest department land? Yes ( )
    No ( ).

11. If yes in no. 10 above what crops were you growing?

12. What are the implications of being chased out of the forest? /how has the abolition of shamba system affected you?

13. What problems do you encounter in crop production and rearing of animals?
    Inadequate capital ( ) Crop raids by wild animals ( ) Other (specify)
14. Do wild animals come to your land? Yes (    ) No (    ) I don’t know (    )

If yes, fill the table below:

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Type of conflict</th>
<th>Priority ranking</th>
<th>Months/period of the year</th>
<th>Estimated loss per year (ksh.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Elephant</td>
<td></td>
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<tr>
<td>2 Buffalo</td>
<td></td>
<td></td>
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<tr>
<td>3 Leopard</td>
<td></td>
<td></td>
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<tr>
<td>4 Sykes monkey</td>
<td></td>
<td></td>
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<tr>
<td>5 Vervet monkey</td>
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<tr>
<td>6 Hyena</td>
<td></td>
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<tr>
<td>7 Wild pig</td>
<td></td>
<td></td>
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<tr>
<td>8 Porcupine</td>
<td></td>
<td></td>
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<tr>
<td>9 Baboons</td>
<td></td>
<td></td>
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<tr>
<td>10 Others</td>
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</tbody>
</table>

15. Why do you think animals come out of the forest? For water (    ) Food (    )
Crop raiding (    ) Regular migrations (    ) I don’t know (    ) Increase in
numbers (    ) Human settlement/encroachment (    ) Salt lick (    ) Other
(specify)

16. a) What do you do to counteract the conflicts /problems? Kill the animals (    )
Chase away (    ) Report to KWS (    ) Other (specify)

b). What recommendations do you propose to curb human/wildlife conflicts (Tick
where appropriate).

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric fencing</td>
<td></td>
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<tr>
<td>Ranger outpost</td>
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</tbody>
</table>
17. If the forest were completely fenced would this affect your livelihood? Yes (   ) No (   ) I don’t know (   )

18. In areas with electric fencing, has there been a reduction in the stated conflicts (Tick where applicable)

<table>
<thead>
<tr>
<th>Type of conflict</th>
<th>None</th>
<th>A little</th>
<th>A lot</th>
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</thead>
<tbody>
<tr>
<td>Crop damage</td>
<td></td>
<td></td>
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<td>Loss of livestock</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Damage to property</td>
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<td></td>
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<tr>
<td>Loss of life</td>
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<td>Threat to life</td>
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<tr>
<td>Human injury</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

19. Do you belong to any Local Community Based Group? Yes (   ) No (   )
   If yes answer the questions in the table below.

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>No. of members</th>
<th>Major challenges faced by the group</th>
<th>Major roles of the group</th>
<th>Source of funding</th>
<th>Benefits received</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
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</table>
If the answer is No. In (19) above go to question 20

20. (a) What problems have hindered you from joining any local community based group?

   (b) In your opinion, what do you think can be done to improve the livelihoods of the local people?

21. Have you contributed in any way towards the conservation of Mt. Kenya Biosphere Reserve? Yes ( ) No ( )
   If yes what roles do you play in the conservation of the Biosphere Reserve?

22. In your opinion, what do you think can be done to solve the problems and enhance community participation in conservation issues?

**Focus group discussion guide for Communities**

**Note to researchers:** It is imperative that the composition of the persons presents in the FGD to be noted in terms of gender, status and roles played in conservation.

**Theme 1:** the background information of the respondents (gender, age, education level, and household size and land ownership)
**Theme 2:** The basic concerns of the community (food, shelter, education, roads, and water) also probe for socio-economic and cultural life of the community.

**Theme 3:** Benefits from Natural resources in the area (probe for benefits from the biosphere reserve)

**Theme 4:** Problems encountered in production and recommendations to mitigate the same (human wildlife conflicts, poverty)

**Theme 5:** Community participation in conservation (CBO membership and roles played)

**Theme 6:** Recommendations to improve livelihoods and enhance community participation in conservation issues

**ROLE OF COMMUNITY IN THE CONSERVATION OF MT. KENYA BIOSPHERE RESERVE**

Interview with community leaders, NGOs, CBOs (Intended for leaders of various groups involved mainly in Conservation issues)

Questionnaire No………..

Name of the group----------------------Province------------------District----------------------
Location---------------------------------------------Community-----------------------------
--
Number of members-----------------Male----------------------Female----------------------

1. When was the group started?

2. What are the main roles/activities of the group?
3. What criteria were used in drawing together the group members?
   Gender issues ( ) Income class ( ) Age ( ) Others (specify)

4. What are the achievements of the group since its inception?

5. What challenges has the group faced in trying to realize its objectives?

6. Where did you get advice in case of problems arising from the group?
   Government ( ) Local Leaders ( ) NGO’s ( ) Consultancy ( ) Others (specify)

7. Has this group received any assistance? Yes ( ) No ( )
   If yes from whom? Church ( ) Government ( ) International Donors ( ) Others (specify)
   Kind of assistance. Money ( ) Materials ( ) Others (specify)
   (Amount) (Specify)

8. Do the local people experience any conflict with wild animals? Yes ( ) No ( )

9. If yes in No. (8) above which animals create the conflicts and what are the major conflicts. List the names of the animals starting from the most problematic animal.

<table>
<thead>
<tr>
<th>Problem Animal</th>
<th>Major Conflicts/Nature of conflicts</th>
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</table>
10. What do people normally do to mitigate human/wildlife conflicts? Report to KWS ( ) Kill the animals ( ) Chase them away ( ) I don’t know ( ) Other (specify).

11. What are the main benefits that the local communities get from the Natural Resources in the region? Firewood/Timber/Poles ( ) Medicinal plants ( ) Water ( ) Food plants/meat ( ) Community projects ( ) Employment ( ) Other (specify).

12. Have the local communities affected the state of Natural Resources in the region? Yes ( ) No ( )

If yes how have they affected the state of Natural resources? Clearing the forest ( ) Poaching ( ) Encroachment ( ) Illegal grazing ( ) Other (specify)

13. Generally, what challenges does community faces as it exploits the Natural Resources in the area?

14. What are the attitudes and perceptions of the local people towards the conservation and protection of the local Natural resources?

15. Has the community helped in any way to protect the Natural resources in the region? Yes ( ) No ( )

16. If yes in 16 above what roles has the community played towards the conservation of Mount Kenya Biosphere Reserve?

17. In your opinion what are the factors that hinder/affect the local community members from participating in conservation issues in the region
18. How can the above problems be rectified?

Role of Community in the Conservation of Mt. Kenya Biosphere Reserve

Interview/Discussion with Local Leaders (Game Wardens, Forest and Environmental Officers)

Questionnaire No…………..

Name………………………………Organization……………………position………….

Province………………………...District……………………………Location………

1. How long have you worked in this region/area?

2. What is the relationship between your organization and the community?

3. What are the attitudes and perceptions of the local people towards the conservation and protection of the local Natural resources?

4. What roles has the community played towards the conservation of Mount Kenya Biosphere Reserve?

5. What type of Community Based Organizations (CBO’s) do you have within your area of jurisdiction?

6. What roles /activities have the CBO’s played in conservation issues?

7. From experience what are the main problems that face the CBO's
8. In your opinion what do you think can be done to solve the problems and enhance community participation in conservation issues?

9. How effective are the various methods of resolving human wildlife conflicts – compensation, fencing, moats, killing, translocation, game scouts, Ranger outpost etc.

10. What do you think can be done to resolve the conflicts in integrated Natural resource management?
APPENDIX 3: PHOTOS FROM THE STUDY SITE

Figure 1: open land within the Forest Reserve in Magasha, Embu, previously destroyed by non-resident cultivation

Figure 2: Tree Nurseries- most community-based organizations are involved in tree planting
Figure 3: Clearing of invasive species on forest land before planting trees by Kiangondu community, Chuka.

Figure 4: Tree nurseries
Role of community in the conservation of Mt. Kenya biosphere reserve

Figure 5: community participation

Figure 6: discussion with women group
Role of community in the conservation of Mt. Kenya biosphere reserve

Figure 7: women involved in conservation

Figure 8: Tree nursery near Mt. Kenya National Park planted by the Mt. Kenya community Afforestation and development project group members. Some group members and volunteers in the background.
Figure 9: tree planting by Magasha community members

Figure 10: Plantation forest within the biosphere reserve