AN ASSESSMENT OF SOCIO-ECONOMIC LINKAGES BETWEEN PROTECTED AREAS AND ECO-TOURISM PERFORMANCE IN KARURA FOREST, KENYA

BY

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DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented for a degree in any other University. No part of this thesis may be reproduced without the prior written permission of the author and/ or University of Eldoret.

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DEDICATION

This work is dedicated to my beloved wife Everlyne Atieno Ogilo, children Melyn Caroline Awino Ogilo, Mildred Cecilia Akoth Ogilo and Mitchelle Claudia Achieng Ogilo who accorded me love, courage, inspiration and moral support throughout this journey leading to Master of Science Degree study and academic excellence.

ABSTRACT

Eco-tourism performance with socio-economic impact by local community in peri-urban Protected areas (PAs) presents policy challenges on management and administration. Presently PAs are affected by demographic pressure emanating from extraction leading to degradation of fauna, flora and favourable attraction sites which are vital for eco-tourism. The main objective of this study was to assess socio-economic linkages between PAs and eco-tourism performance in Karura forest, Kenya. The specific objectives identified factors that determine the eco-tourism performance within specific sites; determined biodiversity components that influence high tourism attraction; examined socio-economic characteristics that affects the sustainable eco-tourism development and documented policies and legislations that guided PAs management plans to enhance eco-tourism performance. Transected 1000 meters in five administrative beats of the forest and along transect demarcated sampled areas of 50m by 500m of plot size 25m by 25m. Questionnaire was administered to Karura forest staffs and CFAs members whereby 10%-20% threshold sampling intensity for primary data collection was applied. The data were analyzed using Excel Spread Sheet, SPSS, two way ANOVA model and econometric function. Chi-square statistics was used to tests goodness of fit of the study. Species diversity for F distribution of 5% with 1.726 and critical value of 2.52 indicated that the biodiversity component influenced high tourism potential. Whereas ceteris paribus in econometric analysis showed that one variable had a causal effect on another variable, the findings confirmed the critical impacts of local communities' dependence on forest resources with socio-economic characteristics variables critical values of χ^2 distribution of P ($\chi^2 \geq 5.99$) = 0.05 and P ($\chi^2 \geq 3.841$) = 0.05 of $0.025 < P < 0.05$. PAs was found to be compatible with eco-tourism as a result of positive correlationship between tourist attraction and variability of species diversity and important sites visited. However there existed significant positive and strong linear relationship between the foot paths R^2 (0.265) and most of the major disturbances recorded R^2 (0.184). This inferred that adjacent local communities participated in illegal activities and contributed to deterioration of natural resources in the forest potential for eco-tourism. The study therefore recommended improvement of forest landscape, Security and infrastructures to enhance eco-tourism performance within specific sites in Karura Forest; embrace PFM to ensure ownership and suitability in forest conservation and management and improve socio-economic characteristics benefits to sustain eco-tourism development and to sensitize local community on policies and legislations that guide development of PAs management plan and addresses factors that favour eco-tourism performance. The study further recommended research to determine eco-tourism cost-benefit analysis of forest for development of an effective strategy of preservation of natural and cultural resources that will promote economic benefits to local communities.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

OPERATIONAL DEFINITION OF TERMS

Assessment: To evaluate the quality of the study and decide or fix the value of phenomenon by identifying and analyzing problems and giving solutions which then form the basis of a project, a programme or an activity.

Biodiversity: Variability among living organisms from all sources, including the ecological complexes of which they are a part and the diversity within and among species, and ecosystems.

Causal effect: A ceteris paribus change in one variable having an effect on another variable.

Chi-square (χ^2): An analysis of the descriptive data measuring discrepancy between expected and obtained frequencies of performance given by equation $\chi^2 = [(f_o - f_e)^2]^{-fe}$ where χ^2 = Chi-square statistics, f_e =expected frequency and f_o = observed frequency. When χ^2 value = 0 it is said to be significant, but when $\chi^2 > 1$ it is said to be insignificant.

Community: A group of people who live in the same area, and often share common goals, social rules and / or family ties.

Ceteris paribus: Assumption of holding constant a variety of outside influences so that the particular relationship being studied can be explored in a simplified setting.

Demography: Study of statistics of age, sex, marital status, household, gender and physical disability in order to show the state of a community.

Disturbance (Error term): The variable that contains unobserved factors that affect the dependent variable and may also include measurement in the observed dependent or independent variable.

Forest: A constitutes of land area with trees more than 0.1 ha, crown cover of at least 30% and where trees have a height of more than 2 m.

Goodness-of-Fit measure: A statistic that summarizes how well a set of independent or explanatory variables explains a dependent or response variable.

Economics: Science or principles of the production, distribution and consumption of goods and services. It deals with how decisions are made under varied conditions and situations and the evaluation or implications of alternative decision for a given situation.

Economic model: A relationship derived from economic theory or less formal economic reasoning.

Ecosystem: Ecological unit consisting of plants and living creatures interacting with each other and with their surroundings.

Econometrics: A social science subject which makes use of economic theory, mathematics and statistical theory in the analysis of economic relationships with threefold Objective:

testing hypotheses in economic theory; making of policy recommendations and finally forecasting.

Eco-tourism: A form of tourism which focuses on contributing to the preservation of natural and cultural resources while promoting economic contribution to the local communities.

Eco-tourism performance: An outstanding action or achievement in preservation of natural and cultural resources while promoting economic benefits to the local communities.

Inventory: Detailed list of fauna and flora observed in a protected area of forest. The inventory herein will refer to the fauna and flora found in Karura forest.

Local Community: Persons and households living in close proximity to a forest and identified by common residence and from time to time may, include all the residents of a village which share a boundary with a forest.

Management plan: A systematic programme showing all activities to be undertaken in a forest or part thereof during a period of at least five years, and includes conservation, utilization, silvicultural operations and infrastructural development.

Performance: An outstanding action or achievement.

Population: A well defined group (of people, forest area and so on) focused for a statistical or econometric analysis.

Protected areas: Areas dedicated primarily to the protection and enjoyment of natural or cultural heritage, to maintenance of biodiversity, and/or to maintenance of ecological life-support services. The protected areas herein will refer to Karura forest.

Socio-economic: System whereby people have a social way of living together in organized communities and produce, distribute and are consumer of goods and services and face the problem of making choices in a world of scarce resources.

Socio-economic linkages: Social way of living by the local communities and produce, distribute and consume goods and services in Protected areas and its impact on performance of eco-tourism.

Stakeholder: A functional category of actors with a direct dependency on forest resources, in terms of their use and management for specific goals. The primary actor herein refers to local community.

Sustainable Development: A process of change in which the exploitation of resources, the direction of investments, and the orientation of technological development and institutional changes are in harmony, and enhance both current and future potential to meet human needs and aspirations.

LIST OF ACRONYMS

ANOVA	Analysis of variance
BIOTA	Biodiversity Transect Analysis
CBD	Convention on Biological Diversity
CFAs	Community Forest Associations
CID	Criminal Investigation Department
FAO	Food and Agriculture Organization of the United Nations
FSK	Forest Society of Kenya
FKF	Friends of Karura Forest
FKF CFA	Friends of Karura Forest Community Forest Association
GDP	Gross Domestic Product
Ha	Hectare, measure of an area in the metric system
KFS	Kenya Forest Service
KFWG	Kenya Forest Working Group
IUCN	World Conservation Union

KFSMP	Karura Forest Strategic Management Plan
KIFCON	Kenya Indigenous Forest Conservation Programme
KNPS	Korea National Park Service
MTP II	Vision 2030 Medium Term Plan II
NSIS	National Security Intelligence Service
NTFPs	None Timber Forest Products
PAs	Protected Areas
PFM	Participatory Forest Management
PRSP	Poverty Reduction Strategy Paper
R^2	Multiple correlation coefficient of determination
SFM	Sustainable Forest Management
SPSS	Statistical Package for Social Science
SS	Sum of Square

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CHAPTER ONE

INTRODUCTION

1.0 Background information

Eco-tourism is a form of tourism which focuses on contributing to the preservation of natural and cultural resources while promoting economic benefits to the local communities. It is a low impact tourism that conserves forest ecosystems and improves the well being of forest adjacent communities. According to Faulkner et al. (2003) tourism is considered one of the world's biggest and fastest growing sectors with the potential to generate major economic benefits for the country. Eco-tourism practice in PAs is dedicated primarily to the protection and enjoyment of natural or cultural heritage, to maintenance of biodiversity, and/or to maintenance of ecological life support services. Its performance with socio-economic impact by local community in peri-urban PAs currently presents policy challenges on management and administration. PAs are affected by demographic pressure emanating from extraction leading to degradation of fauna, flora and favourable attraction sites which are vital for eco-tourism outstanding achievement. Social way of living by the local communities who produce, distribute and consume goods and services in PAs affects the performance of eco-tourism. However the Forest Act, 2005 (GoK, 2005) has been credited with making forest adjacent communities partners in Participatory Forest Management (PFM) for a continued Sustainable Forest Management (SFM). This landmark inclusion has seen a rise in partnership between the KFS and her various partners in the form of Community Forest Associations (CFAs). PAs conservation and management is an

entity of some international conventions and agreements on development and environment which has been enforced by Vision 2030 (GoK, 2007). Currently creation of new PAs in Kenya is becoming impossible due to declining land space, increasing human populations, alienation of local people and lack of socio-economic incentives for conservation (Wishitemi, 2008). This has been necessitated by rapid population growth, limited arable land and shortage of employment opportunities in the industrial and services sectors resulting into high pressure on the forest and its resources. While increased settlement and exploitation of forest resources provide a basis for the livelihood to forest adjacent communities, there has been an increase in the deterioration of PAs resources due to over exploitation. This has provided challenges to SFM. Hence a need to incorporate eco-tourism management as an incentive to local communities through provision of employment and other benefits to enhance SFM and document policies and legislations that will guide development of PAs.

Eco-tourism practiced in PAs offers opportunities for investing and employment that increases national stake in protecting biodiversity resources, within forest ecosystem environment and landscape. However the economic growth of this venture will solely depend on performance on tourists' visitation derived from good policies and legislations in management. Section 35 of the Forest Act 2005 stipulates that all state, local authority and provisional forest must be managed according to a management plan, GoK (2005). Karura forest being a state forest is not exempted from the clause in this act.

Forest management plan involves the application of business methods and technical forestry principles to the operation of a forest property. The Act refers to a systematic programme showing all activities to be undertaken in a forest or part during a period of at least five years, and includes conservation, utilization, silvicultural operations, eco-tourism and infrastructural development. The Forest Act, 2005 introduced a new approach to forest management where community participation is seen as an integral part of forest management (GoK, 2005). Since then various steps have been taken towards making this new dispensation a reality. The tourism industry in general is a predator of PAs sustainability that depends largely on the unique forest composition and structure (Mamimine, 2011).

Studies have shown that elimination of conduce tranquil and serene atmosphere, in its broadest sense, automatically leads to the curtailment of the desire to tour (Mamimine, 2011). Linking a PAs with eco-tourism performance provides forests with economic safety net potential for tourist visitation. Therefore PAs plays an important role as an income and resource gap-filler to forest adjacent communities. Forest policy and legislation are often driven by concerns on forest degradation that needs to take on board the potential impact on eco-tourism performance in forest planning and management. It therefore strikes a balance between forest extraction by local community and the level of eco-tourism performance.

1.1 Problem Statement and Justification

Karura forest being located in Nairobi county capital city of Kenya provides a vital refuge from the city life. Tourists flock into the forest to appreciate fauna and flora (KIFCON,

1994) and other popular attractive sites. The number of tourists visiting Karura forest has been increasing despite lack of institution documentation on the impact of the PAs conservation status. PFM is practiced at Karura and that the forest adjacent communities are exploiting the forests and get livelihood. However social economic interactions from their activities have not been documented in order to determine the sustainability of managing Karura forest efficiently. While exploitation of natural resources provide a basis for the livelihood to forest local communities, such actions have negative impacts on eco-tourism potential in the PAs and thus pose serious challenges to SFM. The Forest Act No. 7 of 2005 provides for involving forest adjacent communities' partners in conservation. The adjacent communities' inclusion in forest management and decisions making has increased the number of partnership between KFS and various CFAs.

Hence this study aimed at identifying the factors that determine the eco-tourism performance within specific sites, determining biodiversity components that influence high tourism destination, examining socio-economic characteristics that affects the Sustainable eco-tourism development and to document policies and legislations that guide development of PAs management plans and addresses factors that favour eco-tourism performance in Karura forest.

1.2 Research Objectives

1.2.1 Main Objective

The main objective of this study was to assess the socio- economic linkages between PAs and eco-tourism performance in Karura forest, Kenya.

1.2.2 Specific Objectives

Specific objectives were:

i. To determine the factors that influence the eco-tourism performance within specific sites in Karura forest,

ii. To determine biodiversity components that influence high tourism attraction in Karura forest.

iii. To examine socio-economic characteristics that affects the sustainable eco-tourism development.

iv. To document policies and legislations that guide development of PAs management plans which address factors that favour eco-tourism performance.

1.3 Research Hypotheses

- **Ho_1:** All sites in Karura forest have same eco-tourism performance.
- **Ho_2**: Biodiversity components in Karura forest do not influence high tourism attraction.

- **Ho_3**: Socio-economic characteristics of forest adjacent communities do not affect sustainable eco-tourism development in the forest.
- **Ho_4**: Current policies and legislations on PAs and management plans do not address factors that favour eco-tourism performance.

1.4 Assumptions of the Study

The study was based on the assumption that the forest adjacent community was supportive of the eco-tourism which focused on contribution to the preservation of natural and cultural resources and promoted social-economic benefits to them. It also assumed that the local community was willing to participate in PFM in the protected areas of Karura forest potential for tourism attraction in order to reap the benefits that may accrue from the eco-tourism activities. In addition the study also assumed that the protected areas of the forest were potential areas for tourists' attraction and the local communities were aware about the provisions of the policies and legislations pertaining to the management of PAs and eco-tourism development. Assumption of holding constant a variety of outside influences so that the relationship being studied can be explored in a simplified setting was also applied in the notion of ceteris paribus.

1.5 Limitation of the Study

Due to limitation in terms of time and budget, a sample of the population was taken as opposed to carrying out a complete enumeration which would have been the most ideal method of carrying out the study. The study also covered only one forest station due to time and financial constraints. More convincing results would have been obtained by taking

samples from several stations where there were PAs of forest and eco-tourism is practiced. Also the study employed the use of a structured questionnaire for socio-economic characteristics assessment and inventory of species diversity as the only data collection tool due to limitation of time and budget. Triangulation by use of several instruments to collect the data would have yielded richer data.

1.6 Delimitation of the Study

The study focused on socio-economic linkages between PAs in the forests and eco-tourism performance which contributed to innovation of the SFM while promoting economic benefits to the local communities. The study was carried out in Karura forest station where the eco-tourism has been in practice for four years since its inception. The study was delimited to the socio-economic activities from forest adjacent communities who were considered as primary stakeholders and were members of Friends of Karura Forest Community Forest Association (FKF) and live in close proximity to Karura forest and identified by common residence.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents literature on socio-economic linkages between PAs and eco-tourism in other countries and its impacts on the economies of countries. It looks at the evolution of eco-tourism and the enactment of policies and legislations to mitigate development of forestry as a business enterprise. Perceptions from key stakeholders are also discussed. Finally theoretical conceptual framework for socio-economic linkage between PAs and eco-tourism that guides this study is presented.

2.1 Evolution of Protected areas and their policies

Protected areas conservation and management has its origin in international conventions and agreements on conservation environmental development. In Egypt a policy strategy has been developed for eco-tourism to enhance protected areas conservation and management (Government of Egypt, 2006) whereas in South Africa there is national protected areas expansion strategy (Government of South Africa, 2011). In Kenya, this has been documented in Vision 2030 (GoK, 2007) and the Medium Term Plan II (GoK, 2013) as areas of interests for conservation and management. However, creation of new PAs in Kenya is becoming impossible due to declining available land space, increasing human populations, alienation of local people and lack of socio-economic incentives for conservation (Wishitemi, 2008). All these have been necessitated by rapid population

growth, limited arable land and shortage of employment opportunities in the industrial and services sectors resulting in high pressure on forests and land resources in Kenya. While increased settlement and exploitation of natural resources provides a basis for the livelihoods to forest adjacent communities, there has however been an increase in the deterioration of resources through over exploitation which poses challenges to current policies and legislations on SFM.

2.2 Evolution of eco-tourism

Eco-tourism is a form of tourism which contributes to the conservation/preservation of natural and cultural resources while promoting economic contribution to local communities. Eastern Central Europe regards it as a form of tourism in which the main motivation of the tourist is the observation and appreciation of nature (Diamantis, 2004). According to Faulkner et al. (2003) tourism is considered one of the world's biggest and fastest growing sectors with the potential to generate major economic benefits for the country. In the study of a self-assessment system for the eco-tourism group in Curuca in Brazil, accounting for tourist opinions while maintaining initial goals, community-based eco-tourism can be a potential tool for conservation of the local environment (Karina, 2008). One of the main goals of community-based eco-tourism is to ensure that participating communities take an active role in the sustainable development and management of eco-tourism activities. Consequently, a measure of eco-tourism goals is met through a system of assessment through which the eco-tourism community will be able to account for the opinions of the tourist and guide operators (Karina, 2008).

2.3 Evolution of eco-tourism and policies governing the industry in Kenya and other parts of the world.

Although the origins of nature travel are truly remote, Herodotus was however one of the first nature tourist (Ceballos, 1989). His extensive travels included visits to the Black Sea, Egypt, southern Italy, Athens and the Aegean Sea. Inferences drawn from his remarks showed that he was deeply interested not only in history, but also in geography, the natural environment and ancient monuments such as the pyramids of Egypt. Aristotle also practiced nature tourism. After he failed to become master of the Academy following Plato's death in 347 BC, he went to the island of Lesbos in the Aegean Sea where he spent his time studying marine animals. Other notable precursors of eco-tourism included Pytheas, Strabo and Pliny the Elder, all of whom travelled, moved by a desire to see the natural and cultural environments of the world in which they lived (Ceballos, 1989).

Nature travel as a popular pastime cannot be considered to have truly developed until the late 19th Century, following advances in mass travel (Ceballos, 1989). It was essentially a quest for spectacular and unique scenery. During this time, the national park concept was created; and while the founders of national parks wanted to protect the environment rather than provide resorts, it was the tourist who provided the economic and political rationale needed to translate philosophy into accomplishment (Butler, 1992). Not until the mid-20th century did worldwide travel become possible for more than just for the elite. The technological revolution in communication and transport now permits an ever-growing

number of tourists from different parts of the world to undertake trips to remote destinations previously inaccessible to the common traveler.

The first tours organized around some special interest began to appear in the twenties, especially in Europe. Castles, cathedrals, museums, gardens, mountainous areas, and gastronomy became popular sites for such tours, (Butler, 1992). After World War II, the tourism industry exploded worldwide. But as the numbers increased, the image of tourism deteriorated. In the Fifties and Sixties, Americans were ridiculed for their insensitive and boorish behavior when touring in foreign countries and were referred to as "Ugly tourist". For some time it was thought that this was just a result of particular American traits. However, in the Seventies it was the turn of the Germans to be seen as the ugly tourist in Europe and East Africa and in the Nineties, the Japanese. According to Butler (1992) the ugly tourist phenomenon was not based on actual personality traits, but rather was as a result of the feeling of invasion by people who were different from the host community.

As mass tourism exploded in the 20th Century, another type of tourists emerged in a smaller way but with a different reputation. During the 1960's, public concern about the environment increased. Conservation organizations were formed to lobby governments to set aside land not just for tourists or for certain animals, but to preserve the natural integrity of whole ecosystems. The whale-watching industry in the United States of America developed at this time in response to a concern about the worldwide depletion in whale populations. By 1966, publicity from these activities and from scientists created enough public pressure that the Humpback whale was made a wholly protected species, followed

by protection of the Blue whale in 1967. This period thus marked the birth of eco-tourism (Butler, 1992).

Support for conservation activities was of course stronger if people had experienced an area or endangered species at first hand. A PAs for example, needed a constituency of supporters who appreciated and understood it if its long-term survival was to be assured. Ironically the increased interest in nature and nature travel led to problems of overuse and disruption. Indeed, overuse, resulting in degradation of the environment, loss of economic benefits due to damage to the resource by the local communities was often cited as drawbacks to eco-tourism. But if tourism was damaging to a natural resource in a PAs, then it was not eco-tourism. Butler (1992) emphasized that true eco-tourism can in fact be one of the most powerful tools for protecting the environment.

2.4 Economic importance of eco-tourism

Eco-tourism in PAs offers opportunities for conservation, management and employment which in turn increases national stake in protecting biodiversity resources, a broader forest ecosystem environment and landscape. However the economic growth of this venture will solely depend on performance of tourists' visitation derived from good policies and legislations in management. Section 35 of the Forest Act 2005 stipulates that all state, local authority and provisional forest must be managed according to a management plan (GoK, 2005).

Forest management plans involve the application of business methods and best forest practice to the operation of a forest property. It outlines systematic programmes showing all activities to be undertaken in a forest or part during a period of at least five years, and includes conservation, utilization, silvicultural operations, eco-tourism and infrastructural development. The Forest Act, 2005 provides for a new approach to forest management where community participation is seen as an integral part of forest management (GoK, 2005). Since then various steps have been taken towards making this new dispensation a reality.

An elimination of conduce tranquil and serene atmosphere in tourism, in its broadest sense, automatically leads to the curtailment of the desire to tour, (Mamimine, 2011). In the commerce and tourism manifesto of the Jubilee Coalition (2013) emphasis is laid to promoting Kenya as an end destination by doubling the number of tourists to three million per year and to provide incentives to encourage investment in tourist accommodation. This is because tourism contributes about two percent of the Country's GDP while Kenya's economic fate is inextricably intertwined with that of her neighbours. Eastern Central Europe has emerged over years as an important tourism region (Diamantis, 2004). These regions include Hungary, Poland and Czech and Slovak Republics. Despite the role of economic importance of eco-tourism in restructuring the economies of Eastern Central Europe, there are few explanatory models for its development in the region.

2.5 Socio-economic linkages between PAs and eco-tourism

Linking a PAs with eco-tourism performance indicates that it is an economic safety net for any tourist visiting the forest area. Therefore it plays an important role as an income and resource gap-filler to a forest adjacent community. Policies and legislations are often driven by concerns about forest degradation, from both government and conservationists, and a definite need to take on board the potential of eco-tourism performance. The policies and legislations therefore strike a balance between degradation due to forest extraction by local community and the level of visitation by tourists.

In Ghana, the goal of the Tourism Sector Medium Term Development Plan (2010-2013) was to develop the country as an internationally competitive and high quality destination where the tourism industry explicitly contributed to poverty reduction and conservation of the country's cultural, historical and environmental heritage (Government of Ghana,2010). The Ministry attached immense importance to biodiversity and coastal forest ecosystem conservation given that they themselves were major ecological attractions visited by both domestic and international eco-tourists. The Ministry of Tourism collaborated with relevant Ministries and Agencies such as the Ministry of Lands and Natural Resources, the Forestry Commission and the Wildlife Division of the Forestry Commission to promote eco-tourism in the National Parks and Nature reserves as part of its policy to use tourism as a tool to support the conservation of the environment.

Government of Poland (2007) had a National Strategy for the conservation and sustainable use of biological diversity with an Action Plan for the period 2007-2013 implemented by the Steering Committee which included representative of the Ministry of Sports and

Tourism. The Publications of the Council of Europe on the tourist industry inform on the breakthrough in the attitudes and mentality of today's tourists, manifested mainly in their increased ecological awareness and high expectations of quality services, as well as environmentally attractive and unpolluted surroundings for their travels or leisure. This represented opportunities for tourism development in areas of high nature value in Poland.

Tourism in areas of high nature value such as small-scale agriculture, processing activity, artistic and practical handicraft as well as additional forms of sustainable tourism may be an important factor stimulating the development of regions whose greatest capital lies in nature, culture and tradition. Protected areas cover around 10% of Poland's territory and feature exceptional nature values as well as outstanding cultural, landscape and tourist resources (Government of Poland, 2007). The diversified forms of currently available tourist traffic in PAs significantly affected the natural environment. However, for many local communities tourism also meant an opportunity for economic development. To promote development of tourism in PAs three objectives needed to be achieved: ecological, social and economic. How the PAs was made available to tourists depended on a given area and it was important to assist various types of tourist exploration and plan the necessary infrastructure tailored to the individual conditions of a given Protected areas.

For the South African government, activities related to tourism development were covered in numerous provisions of the legislation (Government of South Africa, 2008). The Biodiversity Act also made provision for the declaration and publication of bioregional plans. A guideline to this effect was published in 2009 and a National PAs Expansion

Strategy published in 2008. Other mechanisms developed included the People, Parks, Kids, Parks Program, Stewardship Programme, and Boundless Southern Africa Brand. These mechanisms had direct implications for Tourism and responded adequately to the provisions made in the CBD Guidelines on Biodiversity and Tourism.

The Department of Tourism facilitated the development of a National Minimum Standards for Responsible Tourism which was published by the South African Bureau of Standards in March 2011 and catered for, among others, local biodiversity conservation including supporting PAs of high biodiversity value, avoidance of adverse effects on ecosystems, reduction of the tourism impact on nature and natural resources and encouragement of the benefits of tourism accruing to local communities (Government of South Africa, 2011).

Israel applied principles for sustainable development of tourism that included reference to biodiversity such as territorial contiguity; integration in the landscape and environment; planning and building law (environmental impact assessment in sensitive areas); plans for national parks, reservation areas and PAs; strategic plan for sustainable tourism (Government of Israel, 2008).

The Peruvian tourism law aimed to promote, encourage, and regulate the sustainable development of tourism (Government of Peruvian, 2008). In the national tourism strategic plan (2008-2018), the Minister of foreign trade and tourism developed programs such as rural community tourism program, and actions for the promotion and dissemination of sustainable tourism culture which were aligned with the guidelines on biodiversity and tourism development.

Considering that major tourist destinations in Peru fall into the PAs, the Ministry of Tourism and the National Service of PAs were implementing joint actions to offer tools such as field equipment for monitoring and control to assist in the safety and security of tourists in its PAs. In the process of updating the National Tourism Strategic Plan, the ministry was aware of the importance of increase coordination with the Ministry of Foreign Trade and Tourism and the Ministry of Environment to incorporate more specific initiatives and coordinated with the guidelines on biological diversity.

Since the tourism industry was one of the main pillars of the Mauritian economy which generated MUR 40 billion annually, the Ministry of Tourism was laying much emphasis on guided principles of sustainable tourism development and tourism related activities (Government of Mauritius, 2002). Tourist arrivals in Mauritius were considerably increasing from 656,453 in 2000 to forecasted 1,010,000 in 2012. The tourism industry had created above 100,000 employments with 27,000 direct jobs and around 73,000 indirect ones. The continuous tourists' growth was putting stress on the limited natural and manmade resources on the island especially around the 300 kilometres of costal line. The Ministry of Tourism and Leisure of Mauritius stands guided by both the Tourism Development Plan (Government of Mauritius, 2002) and the Mauritius Sector Strategy Plan on Tourism (Government of Mauritius (2009) recommended coastal and environmental conservation and management. The Mauritius Tourism Authority Act 2006 made provision for the regulation of the tourism industry with a view to promoting its development in a sustainable manner (Government of Mauritius, 2006).

Egypt benefited from the CBD Guidelines on Biodiversity and Tourism Development to prepare its Eco-tourism Strategy for PAs which were visited annually by about 4 million tourists (Government of Egypt, 2006). Many of the recent consultant studies identified sustainable tourism as the most appropriate direction for tourism development, which was understandable given the wealth of natural and cultural resources, importance of environmental protection to the livelihood of the population and the opportunity to distribute revenues to local communities. A sustainable tourism approach cannot only meet these objectives but also expand the tourism mandate to ensure that all tourism development contributes to the interest of stakeholders.

Republic of Korea adopted eco-tourism as a part of the national policy for Green Growth and had developed policy and financial mechanism for sustainable tourism (Republic of Korea, 2008). Approximately 40 million people visited Koreans' park per year. Korea National Park Service (KNPS) had three objectives for eco-tourism: Environmental education to enhance visitors' awareness on the values of park resources, satisfying visitors by offering a range of experiences in the parks, and to activate local communities' economy. Republic of Korea had a financing mechanism between National park and private enterprise and some large companies had supported voucher program for students' travel to national park. This Voucher was a free coupon for handicapped, multi-cultural, low income, and Island and isolated area family.

The Ministry of Environment had supported KNPS and local government for sustainable design of resort development since 2010 and had eco-tourism as an option to activate local

economy. One example was Gwanmae-do Island which had 126 households in 5.73 Km^2. By marketing the park villages through its eco-trails and local products, the number of visitors increased considerably from 634 in 2010 to 51,956 in 2011. In addition, numerous mobile applications for travel such as “25 eco tour lists” and Dulre-gil storytelling (an audio-visual service with GPS traffic information) were developed. The effort of development of eco-trails and putting up local products enhanced growth of eco-tourism in these countries.

2.6 Conceptual framework

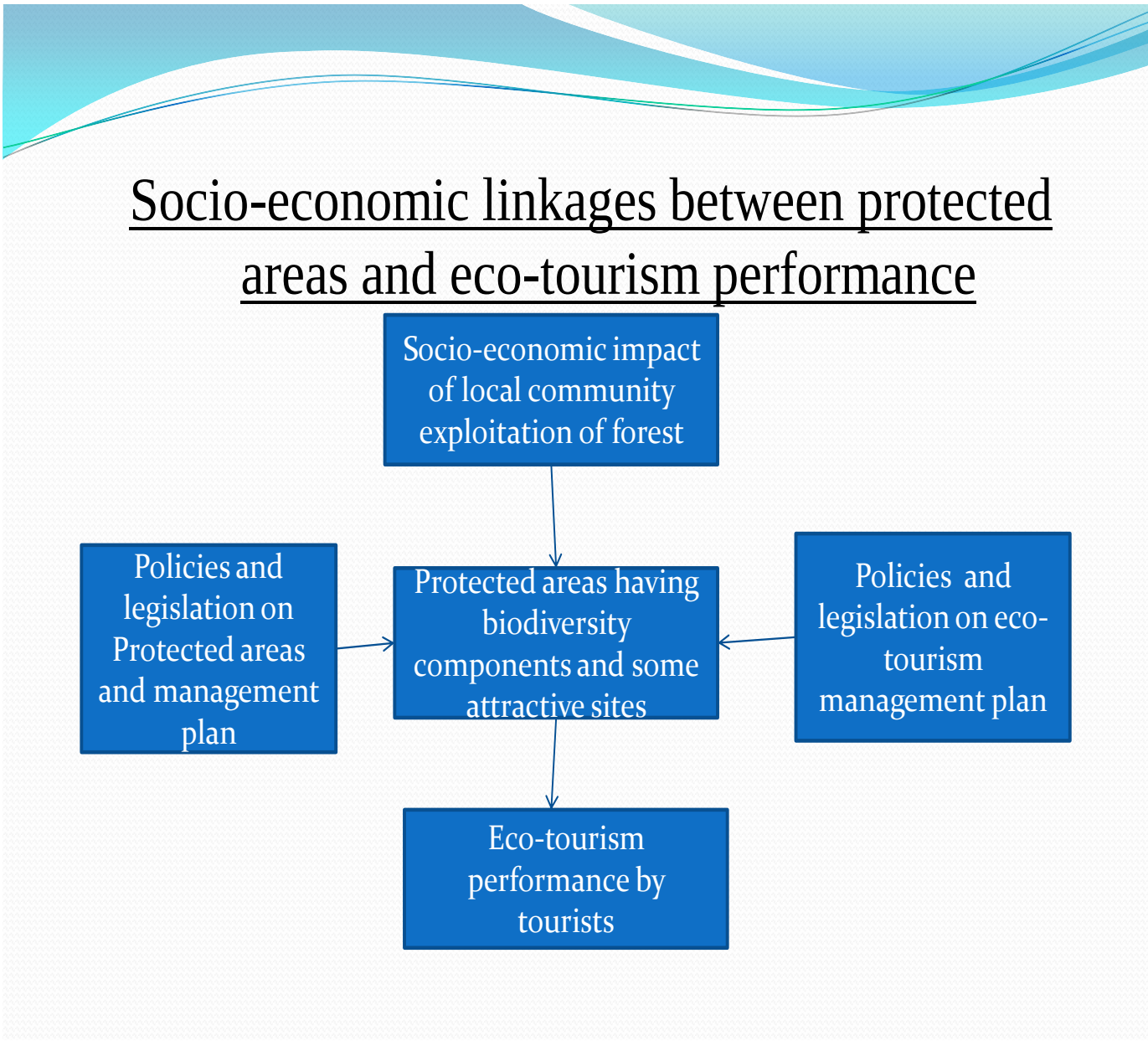

Figure 2.6: Conceptual framework

(Source: Author, 2015)

CHAPTER THREE

MATERIALS AND METHODS

3.0 Introduction

This chapter looks at the research design, target population, sample size and sampling techniques used in the study. It gives a brief description of the instruments used in data collection as well as its validity and reliability. Finally the chapter gives an insight of data collection procedures and data analysis and presentation techniques.

3.1 Study area

The study was carried out in Karura forest located in the Northern part of Nairobi City County and straddles Limuru, Kiambu and Thika Roads. The forest has an area of 1,041 Ha making it one of the largest urban forests in the world gazetted in 1929. The forest has three distinct blocks the Sigiria to the north that borders Muthaiga, Westlands and Canadian Embassy to the east and the Karura block that houses Kenya Forest Service (KFS) headquarter bordering Limuru Road to the west and Kiambu Road to its east. The last and smallest block, Ridgeway that houses Criminal Investigation Department (CID) and the National Security Intelligence Service (NSIS) stretches east of Kiambu Road all the way to the Survey of Kenya offices in Thika Road (Moss, 1988). The three blocks have further been subdivided into five administrative boundary beats for ease of management namely Sigiria, Huruma, Karura, Dark Farm and Mazingira beats.

Karura forest ecosystem is relatively rich in biodiversity and has some popular sites important for tourism attraction. The forest is neighboured by local communities who benefits from existing various products sourced from the forest namely Huruma, Mathare, Githogoro and Deep sea slum. The forest area has a plantation of 632 Ha, natural forest of 260 Ha and other area of 149 Ha consisting of bush lands, glades, and streams. The mean annual precipitation amounts to 930 mm. Soils of the forest are categorized as friable clay, loam and red soil, (Dale and Greenway, 1961).

Figure 3.1 is a Map of Karura forest ecosystem showing adjacent settlements

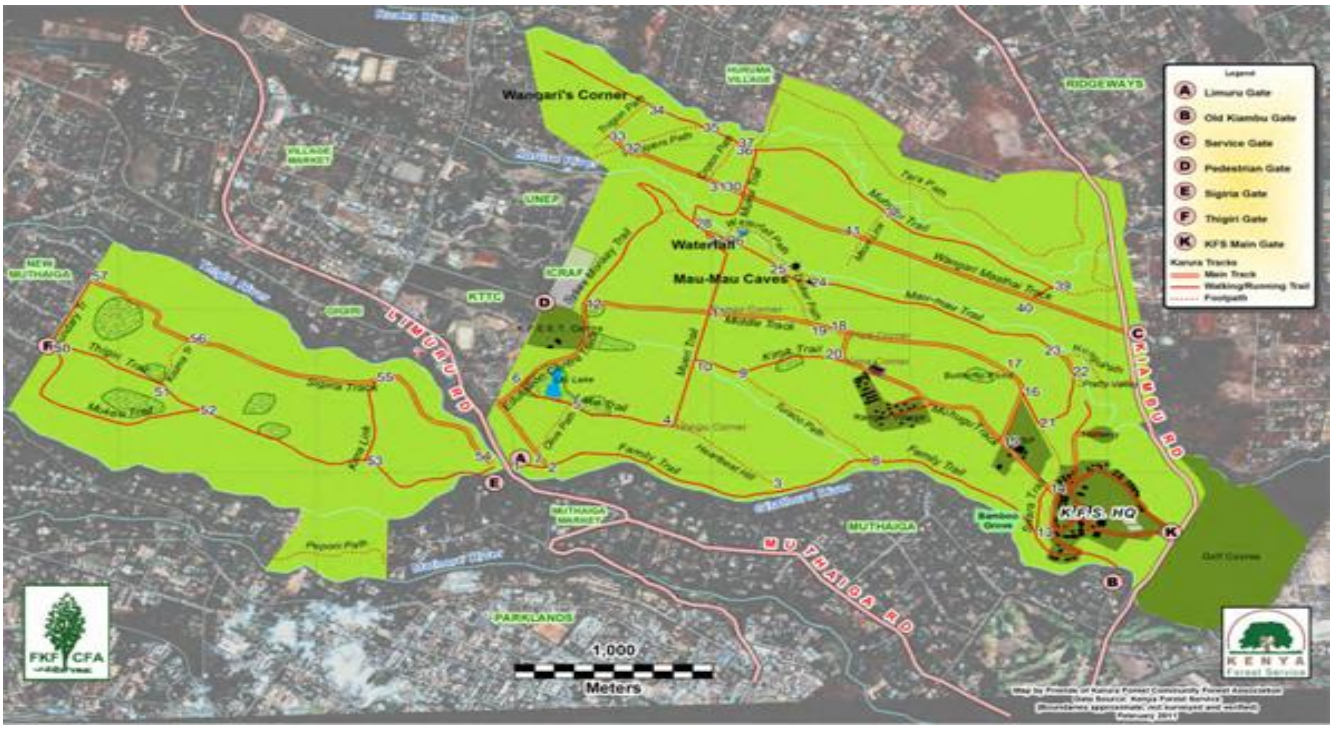

Figure 3.1: **Map of Karura forest ecosystem and adjacent settlement**

(Source: Kenya Forest Service, 2010)

3.2 Research Design

Transects were laid across the highly and least visited areas of the forest applied and spaced at 1000 meters, based on what is documented in BIOTA (2006) and areas 50m X 500m (2.5ha) demarcated in the forest. The sampling intensity and plot size used 10%-20% threshold and 25m X 25m (0.0625) respectively (Veldhoen, 1969). The sampling intensity was adopted as an accessible population according to Quantitative and Qualitative Statistical Approaches by Mugenda and Mugenda, 2003. The units sampled were identified using simple random numbers. The topographic map of Karura forest of scale 1:10,000 square grid was imposed and the grid line at the intersection of random numbers picked to establish points of reservoir sites highly and least visited by tourists along roads, paths, rivers and streams such that the points could also be located on the actual ground. These points were marked as starting points for transects drawn on the topographic map cutting across the forest specified beats one, two, three, four and five namely Mazingira, Karura, Dark Farm, Huruma and Sigiria respectively (Figure 3.2)

Species diversity was examined and their importance values, similarity and diversity indices were determined and used to describe and compare the tree species composition and dominance in the forest (Wass, 1995). Deterioration of natural resource was assessed by recording indications of disturbance (Error term) which included tree stumps from illegal logging, debarking of trees by humans and wildlife, forms of traps or snares laid, charcoal burning, debranching of trees for fuelwood, foliage destruction, grassing and observation of foot paths indicating the presence of human activities in the area.

Eco-tourism potential based on visitation to the reservoir sites and socio-economic impact was determined through descriptive design by administering questionnaires to Karura KFS forest staff and CFAs members while secondary data were sourced from various records. Human disturbance were expressed in terms of the percentage frequencies of occurrence of various kinds.

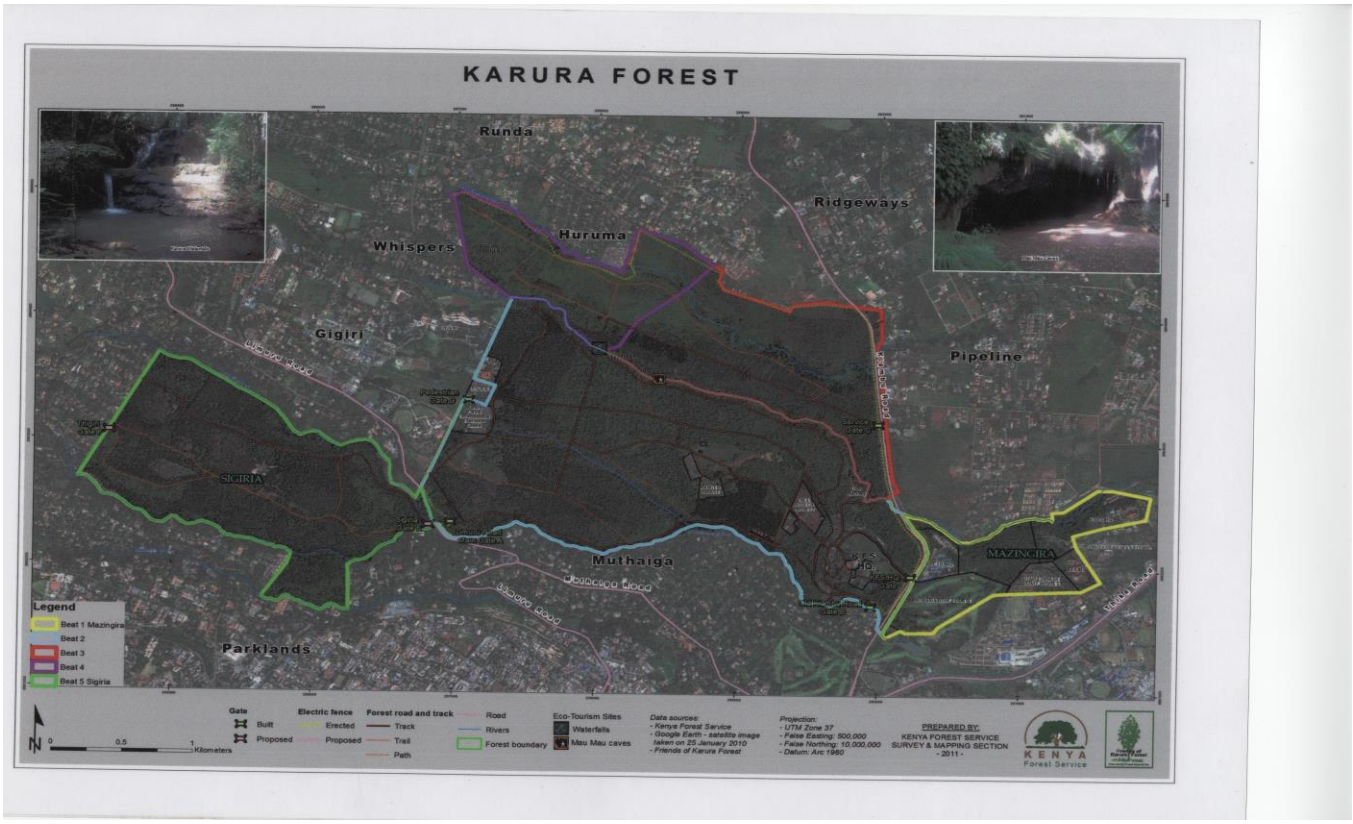

Figure 3.2: **Map of Karura forest showing the five administrative boundary beats.**

(Source: Karura Forest Service, 2010)

3.3 Target population

The targeted populations of Karura KFS staffs were twenty (20) while CFAs members were one hundred and twenty (120) (Mugenda and Mugenda, 2003). The CFAs members were

considered as the forest user group as per the KFS and KFWG (2007) manual on PFM management plans. According to the KFS and KFWG (2007) manual forest user group comprised of members of a local community involved in a particular user activity in a forest or part of a forest areas. The responses from the Karura KFS staff and the user groups were organized and presented according to the categories derived from thematic issues of high eco-tourism performance and socio-economic sustainability of PAs. The forest resource management in practice was the application of business methods and the technical forestry principles to the operation of a forestry property. It involved the task of building up, putting in order, and keeping in order a forest business on eco-tourism management and at the same time protect the forest areas to enhance improvement and high performance of the venture.

3.4 Sampling techniques

Methods for measuring biodiversity component consisted of carrying out inventory of species diversity. The biodiversity component measured included recording the number of trees and animals observed in a transected area and examined separately.

All the Karura KFS staffs were administered with a questionnaire while CFAs 24 members out of 120 were administered with questionnaire. The members from Huruma who were majority in membership in association received 12 questionnaires while only two members from Mathare were administered with questionnaire due to their small number in membership in association.

3.5 Data collection

The forester in-charge of Karura forest station guided on how to reach the respondents whom the questionnaire were to be administered and also guided to identify areas where plots were to be established. A research assistant and an enumerator were recruited to assist in data collection. The training of the research assistant and enumerator took two days which was followed by pre-testing of the data collection instrument applying sampling intensity of 10% according to Mugenda and Mugenda (2003). Various issues arising in the process of data collection in the pre-testing were incorporated into the tool used for final data collection.

The number of CFAs members given questionnaire was based on sampling intensity of 10-20% threshold (Veldhoen, 1969 and Mugenda and Mugenda, 2003). Karura KFS staffs with capacity of 20 employees with different responsibilities (table 3.1) were all administered with questionnaire because they were accessible according to Mugenda and Mugenda (2003). Also transect and plots were established in the sampling area and the data collection exercise carried out. The entire collection of both primary and secondary data exercise lasted for six months.

Table 3.1 Questionnaire Administration

Respondent	**Total No. of members**	**No. of members who selected**	**Distribution of the sampled population**
Karura KFS Staff			Forester (1), Assistant forester (2), Plant operator (1), Senior clerical officer (1),

	20	20	Subordinate staff (2) , and Rangers(13)
CFAs (Friends of Karura Forest)			
Huruma slum	120	12	24 CFAs represented 20% of the total CFAs memberships
Mathare slum		2	
Githogoro slum		6	
Deep sea slum		4	
Total		**24**	

Karura forest with a distribution of sampled area had two blocks (table 3.2) for assessment of species diversity.

Table 3.2: Distribution of sampled area of Karura forest

Block	**Area (Ha)**	**Remarks**
Karura and Ridgeway	765.9	The largest block which houses KFS Hqs., CID Hqs., Muthaiga Golf Course, Utalii staff quarters, NSIS offices, KEFRI and KFS residential quarters.
Sigiria	275.4	The block has a large marshland which is a site that is ideal for a camp site. The block is well protected by the adjacent high class residential areas.
Total	**1,041.3**	

(Source: KFSMP 2010-2014)

The following were detailed activities on which data was collected as per objective:

3.5.1 Factors that determine eco-tourism performance within specific sites in Karura forest.

Various records were sourced to identify the factors that determine eco-tourism performance within specific sites in Karura forest and questionnaires administered to Karura KFS staff and CFAs members. The following factors were assessed: Landscapes, proximity to town, biodiversity, security, infrastructure (Roads), drinking water accessibility and eco-tourism site (Figure 4.1 and Appendix A).

3.5.2 Biodiversity components that influence high tourism potential in Karura forest.

The PAs with natural forest had an area of 260 Ha. With 10-20% sampling intensity threshold:

$$100\% = 260 \text{ Ha, Therefore } 20\% = (20 \text{ X } 260)^{-100} = 52 \text{ Ha (Area sampled)}$$

Length of transect was 1000 Meters with four sample area of 50m X 500m (*2*.5Ha) totaling 10 Ha in one transect. There was establishment of sampling plots of size 25m X 25m (0.0625 Ha).

$$10 \text{ Ha} = 1\text{transect, Therefore } 52 \text{ Ha} = (52 \text{ X } 1)^{-10},$$

$$= 5 \text{ transects (no. of transects established in PAs)}$$

Highly visited areas = 3 transects and least visited areas = 2 transects (Figure: 3.2)

What was observed in transects included: species diversity of flora and fauna and deterioration of natural resources (disturbance). The following disturbances were studied: Number of tree stumps, debarking of trees by human and wildlife, form of traps and snares

laid, charcoal burning, illegal logging, foliage destruction, debranching of trees for fuel wood collection and foot paths as other indication of human activities in the location.

Total number of sampling units in a sampling area = 40 units

100% = 40 units. Therefore 10% intensity = $(10 \text{ X } 40)^{-100}$ = 4 sampling units

Considering each transect had 4 quadrants of sampling area, the total sampling units in the whole length of transect (1000m) was (4 X 4) = 16 units. The four (4) sampling units in the sampling area were identified through generation of simple random numbers and picked out of forty (40) units (table 3.2.1).

Table 3.2.1: Sampling units showing the 40 random numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Secondary data were also sourced from existing inventory records of avifauna (Figure 4.8 and 4.9).

3.5.3 Socio-economic characteristics that affects the sustainable eco-tourism development

A survey of the following variables of socio-economic characteristics was done by administering semi structured questionnaire: Occupation, Level of education (literacy), Size

of land, Residential infrastructure, Period of residing on the farm, Land title deed and ownership, Farming (livestock and farm produce), CFAs membership period, Reason of joining CFA, Community view about PFM and its satisfaction, Participation in eco-tourism activities, Income generation, Eco-tourism activities, Demographic pressure on natural resources (population) and other non monetary benefits (Table 4.30 and Appendix II).

3.5.4 Policies and Legislations that guide development of PAs management plans which address factors that favour eco-tourism performance

Various records on prerequisite policies and legislations that guide development of PAs management plans and addresses factors that favour eco-tourism performance were studied and documented. These factors included landscapes, proximity to town, biodiversity, security, road infrastructure, drinking water availability and attractive eco-tourism sites.

3.6 Data Analysis and Presentation

Data were prepared and checked for accuracy then entered into the computer. Raw data were appropriately put in readiness for analysis and organized to provide a means to introduce the interpretations into quantitative and qualitative methods.

3.6.1 Factors that determine eco-tourism performance within specific sites in Karura forest

Descriptive data analysis was done at three levels. At first level, data were collected through semi-structured questionnaires and entered into Excel spread sheet and Statistical

Package for Social Science (SPSS) version 17 computer software. The second level involved production of a correlation coefficient of variables obtained from the first level. Third level assessed the independent variables among them X: Landscapes, proximity to town, biodiversity, security, infrastructure (Roads), drinking water accessibility, eco-tourism site and dependent variables Y: Tourist response toward specific sites in the PAs. The objective of estimating these parameters was to test whether the relationship between independent and dependent variables were significantly linked. The presentation of results was done using tables and figures.

3.6.2 Biodiversity components that influence high tourism potential in Karura forest

Data was analyzed using an application of two way ANOVA model to determine the variability of the species diversity and deterioration of natural resources (disturbance) in the PAs. The presentation of the results was done using tables and figures.

3.6.3 Socio-economic characteristics that affects the sustainable eco-tourism development

A CFAs survey was carried out using semi-structured questionnaires on members from Huruma, Mathare, Githogoro and Deep sea slum. Household members were stratified according to four house wall-types of stone, wood, iron sheet and mud house as a proxy measure for wealth. Data were analyzed using descriptive statistics (Maua and Ogweno, 2004). An econometric multi-equation model was used to describe the forest adjacent community interest towards PAs to determine whether there were direct factors influencing

their readiness to support eco-tourism. Chi-square (χ^2) statistics of goodness of fit was applied to test the socio-economic linkages.

3.6.4 Documentation of Policies and legislations that guide development of PAs management plans which address factors that favour eco-tourism performance

Descriptive statistics of means and standard deviation were used to analyze the principal determinants of the eco-tourism performance of some popular sites in PAs and then documented policies and legislations on PAs management plans and on eco-tourism that enhance high performance.

CHAPTER FOUR

RESULTS

4.0 Socio-demographic characteristics of respondents

4.1.1 Karura KFS staff

Karura KFS staffs were 20 in number and had different responsibilities as shown in table 3.1. The members (65%) were forest rangers aged between 18-35 years, with good health. They were manning the forest thereby providing security to forest area with no case of disability amongst the staff.

4.1.2 Community Forest Association (CFAs)

The 24 respondents of CFAs represented 20% of the total population of 120 memberships from Huruma, Mathare, Githogoro and Deep sea slum. Socio-demographic characteristics of respondents drawn from table 4.1 indicated the following results:

The majority of CFAs members (79%) were aged between 18-35 years and only a small numbers of members were aged above 36 years.

The sex of the respondents differed between male (33.3%) and female (66.6%).

The majority of the CFAs members were married (75%) while only 25% stated that they were still single (table 4.1).

The CFAs members interviewed were mostly household heads (66.7%) and were individuals having their own houses (table 4.1).

Result in table 4.1 shows that most of the respondents (66.6%) were females while 33.3% were male indicating that majority of CFAs members were females.

On disability status results (table 4.1) shows that all the CFAs members interviewed did not have physical disability.

Table 4.1 Demographic characteristics of members of CFAs

Demography	**characteristics**	**Frequency**	**Percentage (%)**
Age	18-35 years	19	79.2
	36-50 years	2	8.3
	51-60 years	3	12.5
Sex	Male	8	33.3
	Female	16	66.6
Marital status	Married	18	75.0
	Single	6	25.0
Household	Household head	16	66.7
	Parent	1	4.2
	Employee	7	29.2
Gender	Male	8	33.3
	Female	16	66.6
Physical disability	No	24	100
	Yes	0	0

4.2 Factors that determine the eco-tourism performance within specific sites in Karura forest

Karura forest offers eco-friendly opportunities for Kenyans and visitors from abroad to enjoy a leafy green respite from the bustle of the city, to walk, jog, or just sit quietly and enjoy nature in all its diversity. The following factors were identified as affecting eco-tourism performance within specific sites in the forest (see table 4.2 and 4.3): Accessibility to the specific sites in terms of infrastructure (roads), security of the forest area, landscape, proximity to town, biodiversity richness, drinking water accessibility and quality eco-tourism sites.

Table 4.2 Eco-tourism sites in Karura forest and surroundings

No.	Site	Performance	Remarks
1	Scenic 20 meter waterfalls and rivers	Frequently visited	Provide aesthetic scenery
2	Marked walking trails of 50 Kilometers	Frequently used by tourists	Provide excellent physical exercise
3	Small wetlands that are habitats for birds	Frequently visited	Provide aesthetic scenery
4	The incinerator formerly used by Central Bank of Kenya to burn old currency notes	Frequently visited	Provides fascinating resting point
5	The area at which the late Professor Wangari Maathai carried out a campaign against illegal acquisition of forest land	Frequently visited by Environmentalists	Provides a historical scene
6	Landscape	Frequently visited	Provide aesthetic scenery
7	Biodiversity hotspots	Frequently visited	Provide aesthetic scenery
8	Edaphic marshlands and grassy glades	Frequently visited	Provide aesthetic scenery

9	Old quarry lake covered with water lilies	Frequently visited	Provide aesthetic scenery
10	Distributaries of Nairobi river passing through the forest running roughly west to east cutting through the gently undulating landscape	Frequently visited	Provide aesthetic scenery
11	Mau-Mau caves used during battles for independence	Frequently visited	Also served as venues for spiritual nourishment
12	Sacred trees (*Mugumo*)/grooves/shrines	Frequently visited by Environmentalists	Provide a historical scene
13	Centenary of freemasonry in East Africa 1904-2004	Frequently visited	Provide a historical scene

Table 4.3 Eco-tourism activities undertaken in Karura forest

No.	**Activities**	**Performance**	**Remarks**
1	Forest walks	High	Recommended
2	Forest drives	High	Recommended
3	Bird watching	High	Recommended
4	Butterfly watching	High	Recommended
5	Cycling	High	Recommended
6	Running	High	Recommended
7	Picnicking	High	Recommended

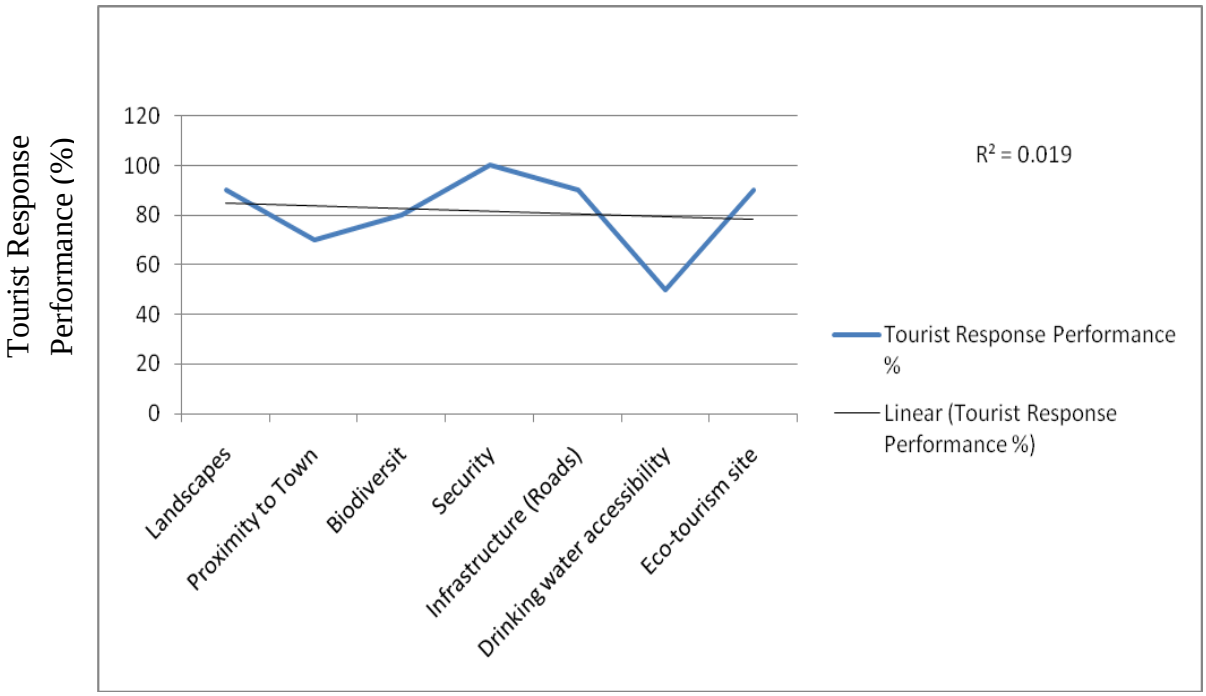

Figure 4.1 Tourist response performance on various factors

The multiple correlation coefficient of determination (R^2) analysis for qualitative data generated from the questionnaire assessed the independent variables X: Landscapes, proximity to town, biodiversity richness, security, infrastructure, drinking water accessibility and quality of eco-tourism sites against single dependent variables Y: Tourist response toward specific sites in the PAs. The result value of R^2 (0.019) and linear tourist response (81%) showed a significant strength of independent variables against dependent variable. Thus the Ho_1: There is no factor that determines the eco-tourism performance within specific sites in Karura forest is rejected.

Findings of a semi-structured questionnaire administered (Appendix I) to Karura forest KFS staff also showed that security, forest landscape, existing infrastructure and cultural values were factors that determined eco-tourism performance within specific sites in Karura forest as shown in the following results in subsequent sections.

1) Karura KFS staff

Results showed that 40% of the respondents had been in the station for between 5 – 10 years, 35% above 10 years, 20 % between 1 -3 years and 5% have been in the station between 3 – 5 years (table 4.4). 90% of the respondent stated that they were in both Karura and Sigiria blocks, 5% were in charge of Sigiria and the other 5% are in charge of Karura (table 4.5).

Table 4.4: Length of time respondent has been at the station

Response	Frequency	Percent
1 - 3 years	4	20.0
3 - 5 years	1	5.0
5 - 10 years	8	40.0
above 10 years	7	35.0
Total	**20**	**100.0**

Table 4.5: Block of Karura under respondent's jurisdiction

Response	Frequency	Percent
Karura block	1	5.0
Sigiria	1	5.0
All the above	18	90.0
Total	**20**	**100.0**

2) Respondents views on tourists performance

Results showed that 80% of the respondents confirmed that there was high performance of eco-tourism in the PAs, 15% indicated it is moderate and the rest 5% reported it is very high. The features most attractive to tourists were identified as Mau Mau caves, scenic waterfalls and rivers and marked walking trails (85%), Mau Mau caves (5%), scenic waterfalls (5%) as well as marked walking trails (5%) (table 4.7). This implies that tourists were not attracted by a particular thing in the PAs but a combination of many things.

Table 4.6: Tourists performance to the eco-tourism in the PAs

Tourist performance	Frequency	Percent
Very high	1	5.0
High	16	80.0
Moderate	3	15.0
Total	**20**	**100.0**

Table 4.7: Protected areas most attractive to tourists

PA	Frequency	Percent
Mau Mau caves	1	5.0
Scenic waterfalls and rivers	1	5.0
Marked walking trails	1	5.0
All the above	17	85.0
Total	**20**	**100.0**

3) Constraints to eco-tourism development

Asked whether there were any constraints in coping with eco-tourism in the PAs, 60% of the respondents stated they experienced no constraints, 35% felt there is demographic pressure on natural resources and 5% felt that there is deteriorating socio-economic conditions and policy challenges (table 4.8).

Table 4.8: Major constraint in coping with eco-tourist

Constraints	Frequency	Percent
Deteriorating socio-economic conditions and policy challenges	1	5.0
Demographic pressure on natural resources	7	35.0
None	12	60.0
Total	**20**	**100.0**

4) Records on visitation

When the respondents were asked the year with the highest number of tourists who visited in Karura, 70% stated 2011, while 30% indicated the year as 2012 (table 4.9). 2011 is also the year when eco-tourism generated higher revenue compared to 2012 (table 4.10). 2008 and 2009 Karura forest did not have record of tourists' visitation.

Table 4.9: Year with the highest number of tourist visitation in Karura

Year	Frequency	Percent
2008	0	0
2009	0	0
2011	14	70.0
2012	6	30.0
Total	**20**	**100.0**

Table 4.10: Year when eco-tourism generated higher income

Year	Frequency	Percent
2011	14	70.0
2012	6	30.0
Total	**20**	**100.0**

5) Benefits of investing in eco-tourism in Karura forest

When respondents were asked the benefits of investing in eco-tourism in the PAs of the forest, they listed several benefits. A majority (75%) reported investing in eco-tourism provides protection for natural resources, 20% reported it generates revenue, and the rest (5%) indicated investing in eco-tourism is a source of recreation and leisure activities(figure 4.2).

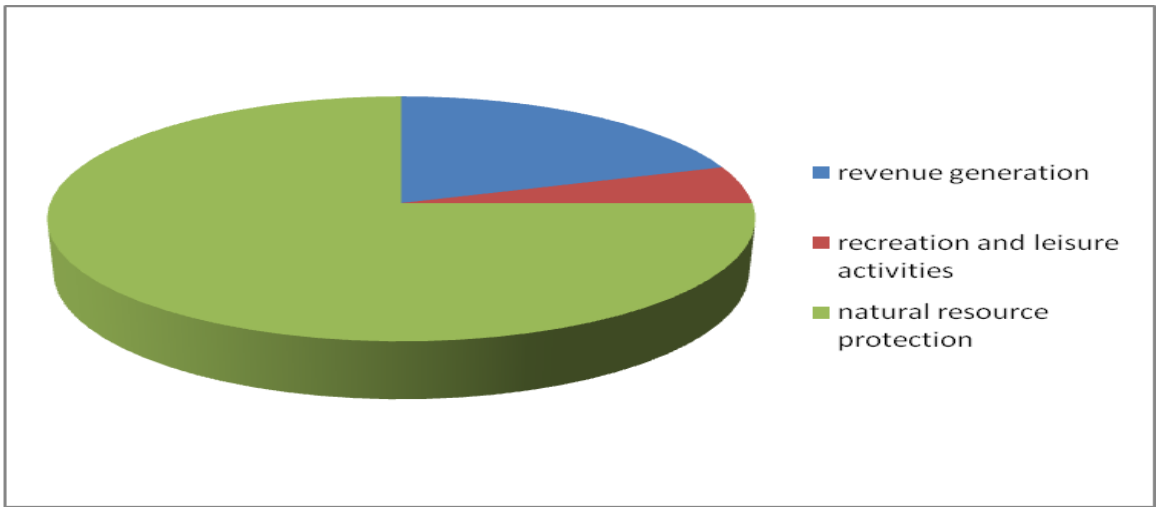

Figure 4.2: Benefits of investing in eco-tourism in Karura forest

Apart from the benefits derived from investing in eco-tourism in Karura forest majority of the respondents benefited through exploitation of NTFPs, aesthetic value of biodiversity, employment opportunities and income generation from the PAs of the forest. However, 10% felt that they particularly benefited from the PAs of the forest from NTFPs.

Even as they benefit from the PAs of the forests through eco-tourism, respondents sighted some limitations that were imposed on tourist visits. Some of these limitations included:

controlling the number of tourist visitation, introduction of entrance rates and subscription fees, disciplinary procedures in case of a visitor committing an offence and inspection of performance. These were cited by 80% of those who responded. However, 20% of the respondents felt that disciplinary procedures on tourists who commit offences were the greatest limitation.

6) Policies and Legislations on promoting forest management and eco-tourism

As far as awareness on policies and legislations that link management of PAs and eco-tourism is concerned; all the respondents confirmed they were aware that they do exist. However they differed as to which policy and legislation content strongly applied to the management of the PAs and eco-tourism development. Result in figure 4.3 shows that majority of the respondents (85%) felt that the policy that strongly applied to PAs indicated that all reserved forest areas will be managed on the basis of approved management plans, guided by sound forest management principles. The rest of the respondents (15%) were divided among the three policies; that all existing PAs forest reserves on public areas remain reserve (5%); PFM approaches to be to ensure the participation of communities and other stake holders in the management of PAs areas (5%) and users of benefits derived from PAs contribute to their conservation and management through the user pay principle (5%) (figure 4.3).

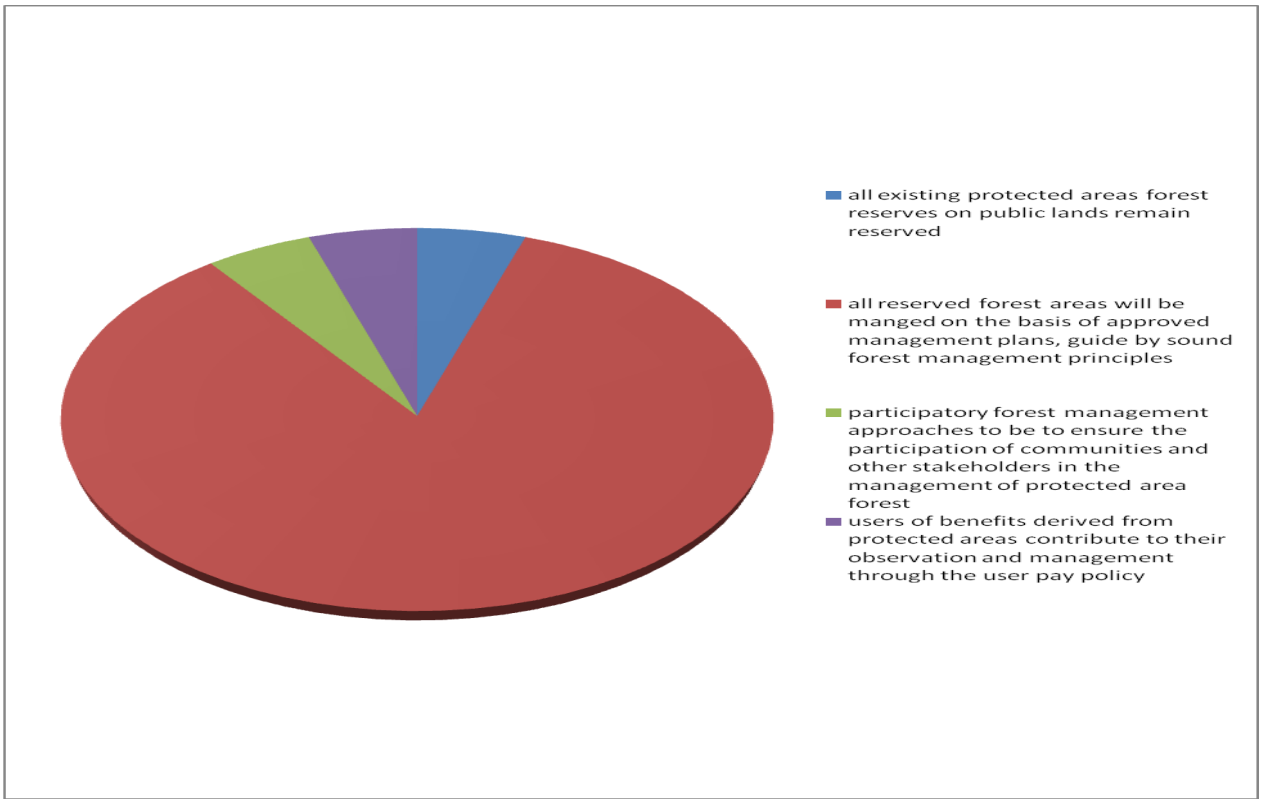

Figure 4.3: Content of policies that strongly applies to eco-tourism management in a PAs

7) Growth of the Economy

The researcher was also interested in finding out whether eco-tourism enterprise contributed to the growth of the economy. The participants in the study area all affirmed that indeed eco-tourism contributes to the growth of the economy. The derived contributions however differed amongst the different participants, with 35% stating it contributed in revenue generation, 30% indicated it contributed to income generation, 25% reported it reduced pressure from exploitation of forest products, 5% contended that it

upgraded to the literacy of the local community and the rest (5%) felt that the contributions mentioned above all led to the growth of the economy (figure 4.4).

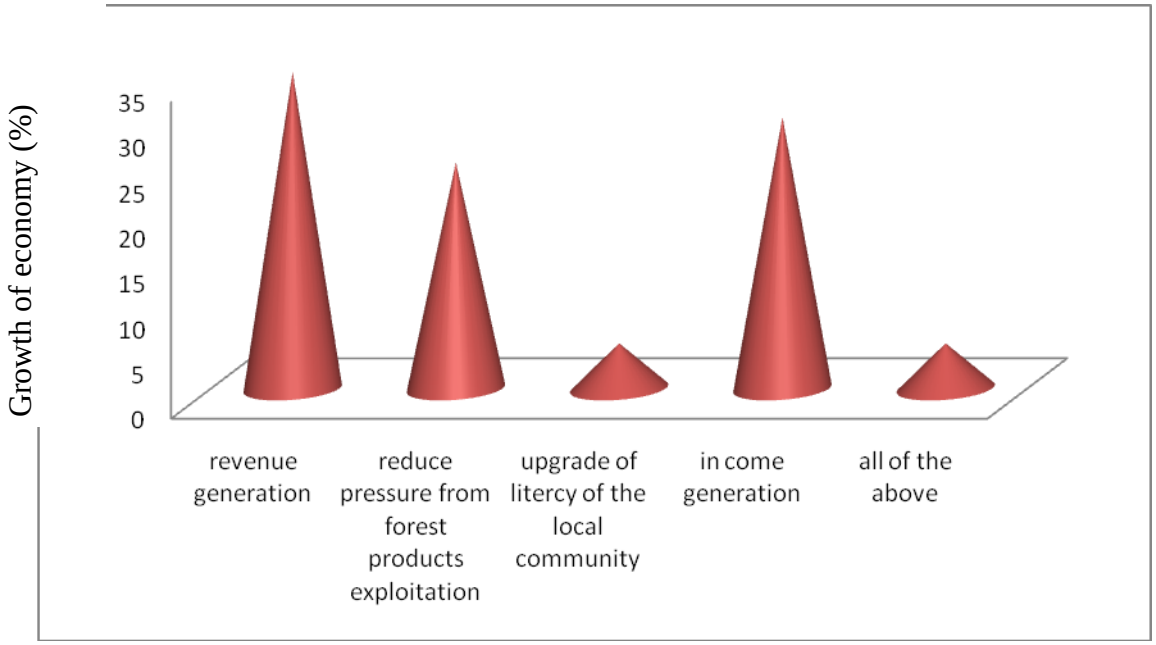

Figure 4.4: Contributions of eco-tourism to the growth of the economy

8) Infrastructure

In trying to find out on the accessibility to specific sites of the PAs visited by the tourists, the researcher wanted to know the quality of the access roads to the specific sites of the PAs visited by the tourists. Responses to this particular item differed as 90% of the respondents described the roads as all weather, 5% viewed them as seasonal and 5% indicated there were other types of roads besides those specified by the researcher (table 4.11).

Table 4.11: Quality of roads to the specific sites of the PAs visited by tourists

Quality of road	Frequency	Percent
All weather roads	18	90.0
Seasonal roads	1	5.0
Other	1	5.0
Total	**20**	**100.0**

The proximity to services such as hospitals and hotels showed that these services were available and the distance ranges between 2-5 miles as reported by 30% of the respondents and between

6-10 miles as indicated by 70% of the respondents (table 4.12).

Table 4.12: Proximity of services such as hospitals and hotels

Proximity	Frequency	Percent
2 - 5 miles	6	30.0
6 - 10 miles	14	70.0
Total	**20**	**100.0**

On the quality of eco-tourism sites 90% of the respondents reported that the sites were good while the rest (10%) assured they were exceptionally good (table 4.13).

Table 4.13: Eco-tourism site quality

Site quality	Frequency	Percent
Exceptionally good	2	10.0
Good	18	90.0
Total	**20**	**100.0**

9) Recreation facilities

Asked for distance between existing recreation facilities in the forest and other surrounding areas outside the forest visited by tourist 75% of the respondents indicated that the facilities are between 6 -10 miles, 10% said the facilities are between 11-20 miles and the rest 5% said these facilities are between 1 -5 miles (figure 4.5).

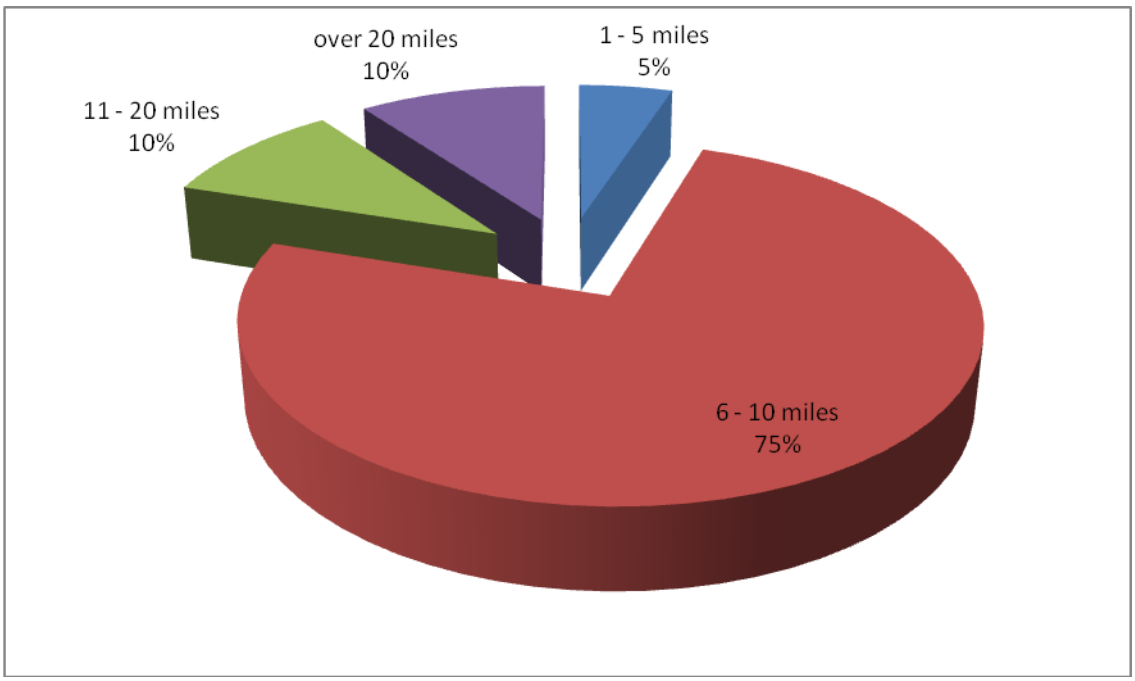

Figure 4.5: Distance between existing recreations facilities in the forest and other surrounding areas outside the forest

The type of water accessible to tourists was reported as spring water (50%), tap water (25%) and bottled water by the (25%) (table 4.14).

Table 4.14: Type of water accessible to tourists

Type of water	Frequency	Percent
Spring water	10	50.0
Tap water	5	25.0
Bottled water	5	25.0
Total	**20**	**100.0**

Respondents were also asked whether they recommended investing in eco-tourism and all recommended investing in eco-tourism. However, reasons why investing in eco-tourism was recommended varied from one respondent to another. Among those who responded, 85% said that investing in eco-tourism provides an opportunity to bring attention to the interconnectivity between forests and the people while 15% indicated that investing in eco-tourism enhances infrastructure (table 4.15).

Table 4.15: Reasons for investing in eco-tourism

Reasons	Frequency	Percent
Enhances infrastructure development	3	15.0
Provides an opportunity to bring attention to the interconnectivity between forests and the people	17	85.0
Total	**20**	**100.0**

4.3 Biodiversity components that influence high tourism potential in Karura forest

The biodiversity components considered were high plants and animals. These components were found to influence high destination in Karura forest either directly or indirectly. Results showed varied diversity of different trees and animals' species and the impact of deterioration of the natural resources (table 4.17, 4.18, 4.19, 4.20 and 4.21). Deterioration of natural resource index is indicated in table 4.16.

Table 4.16 Deterioration of natural resource index

Index No	Deterioration of natural resource	Indication
1	Trees stumps from illegal logging	Visible old stumps
2	Debarking of trees by human and wildlife	Human debarking for medicinal
3	Laying of traps or snares	Traps and Snares
4	Charcoal burning	Kiln
5	Debranching of trees for fuelwood	Debranched trees
6	Foliage destruction	Destruction of leaves
7	Grassing	Presence of heard
8	Foot paths inside the forest area	Foot paths

Table 4.17 shows that the beat had relative high abundance of different species with no deteriorating of the natural resource by the adjacent local communities.

Table 4.17: Beat 1 (Mazingira) plots 1 - 16

Species: Flora/ Fauna		Frequency of observation (F)	Plot species is observed	Deterioration of the natural resource index and frequency(F)
11	*Lantana camara*	High	1,2,3,5,7,10,12,15	1 - 0 2 - 0 3 - 0 4 - 0 5 – 0 6 – 0 7 – 0 8 - 0
22	*Teclea nobilis*	19	1,7,11,13,15,16	
33	*Croton megalocarpus*	101	1,2,3,4,5,6,7,8,9,10,11,12,14,15, 16	
4	*Newtonia buchananii*	7	1,4,6,14	
5	*Ficus thonningii*	6	1,2,5,13,15	
6	*Dombeya goetzenii*	48	1,2,3,4,7,9,11,14,15,16	
7	*Spathothodea campanulata*	1	2	
8	*Teclea simplicifolia*	103	2,3,5,7,8,9,10,11,12,14,15,16	
9	*Croton alienus*	High	2,5,6,8,9,10,11	

10	*Warburgia ugandensis*	7	3,8,12	
11	*Calondendrum capense*	5	4,11,13	
12	*Brachyleana huillensis*	23	4,5,7,11,14,15	
13	*Chaetacme aristata*	34	4,5,6,8,11,12,14	
14	*Uvaridenndron anisatum*	21	4,13,16	
15	*Solanum incanum*	14	5,12,16	
16	*Diospyros abyssinica*	4	6,13	
17	*Salvadora persica*	3	6	
18	*Trichilia emetica*	2	6	
19	*Chrysophyllum viridifolium*	2	6	
20	*Schebera alata*	3	7,9	
21	*Strychnos henningsii*	20	7,12	
22	*Caesalpinia volkensii*	6	8	
23	*Rhus natalensis*	24	8,10,16	
24	*Craibia brownii*	2	9	
25	*Erythrococca bongensis*	2	9	
26	*Drypetes gerrardi*	2	10	
27	*Elaeodendron buchananii*	8	10	
28	*Olea europeae*	2	14	
29	*Other spp*	145	1,2,3,4,5,6,7,8,9,10,11,12,13,14, 15,16	
30	*Birds*	High	1,2,3,4,5,6,7,8,9,10,11,12,13,14, 15,16	
31	*Butterfly*	High	1,2,3,4,5,6,7,8,9,10,11,12,13,14, 15,16	
32	*Syke's monkeys*	3	11,12,13,14	

Table 4.18 shows that the beat had relative high abundance of different species with varied deterioration levels of the natural resource by adjacent local communities dominated by illegal logging as evidenced from visible old trees stumps followed by debarking of trees for medicinal purposes and debranching of trees for fuel wood. The existence of 16 foot paths in the sampled area was an indication of human activities in the area.

Table 4.18: Beat 2 (Karura) plots 17 – 32

Species: Flora/ Fauna		Frequency of observation	Plot species is observed	Deterioration of the natural resource index and frequency(F)
11	*Lantana camara*	High	19,21	1 - 39
22	*Teclea nobilis*	12	17,20,22,24	2 - 10
33	*Croton megalocarpus*	57	18,19,20,21,22,23,24, 25, 26,	3 - 1
4	*Newtonia buchananii*	2	25	4 - 0
5	*Ficus thonningii*	1	18,21	5 - 10
6	*Dombeya goetzenii*	28	18,22,23	6 - 2
7	*Teclea simplicifolia*	64	18,19,21,22,23,24	7 - 0
8	*Croton alienus*	35	17,18,19,21,23,24,25, 26	8 - 16
9	*Brachyleana huillensis*	13	18,20,21	
10	*Chaetacme aristata*	24	20,21,24,25,26	
11	*Solanum incanum*	2	19,21	
12	*Diospyros abyssinica*	6	19,20,26	
13	*Salvadora persica*	2	25	
14	*Chrysophyllum viridifolium*	16	17,23	
15	*Schebera alata*	5	20,22,23	
16	*Rhus natalensis*	6	26	
17	*Craibia brownii*	5	22,23	
18	*Drypetes gerrardi*	7	17,20,25	
19	*Elaeodendron buchananii*	3	20	
20	*Markhamia lutea*	2	18	
21	*Vangueria madagascariensis*	3	26	
22	*Other spp*	100	17,18,19,21,22,23,24,25,26,28,29,30,32	
23	*Birds*	High	17,18,19,20,21,22,23,24,25,26,27,28,29,30,32	
24	*Butterfly*	High	17,18,19,20,21,22,23,24,25,26,27,28,29,30,32	
25	*Ground squirrel*	6	17,18	
26	*Syke's monkey*	5	18	
27	*Bush babies*	5	19,26	
28	*Grimm's Duiker*	1	23	
29	*Porcupines*	1	29	

Table 4.19 shows that the beat had relative high abundance of different species with minimal deterioration of the natural resource by the adjacent local communities. Observed deterioration ranged from illegal logging as evidenced by visible old tree stumps and by debarking of trees for medicinal value. The small number of foot paths (7) existing in the sampled area suggested indication of minimal human activities in the area.

Table 4.19: Beat 3 (Dark Farm) plots 33-48

Species: Flora/ Fauna		**Frequency of observation(F)**	**Plot species is observed**	**Deterioration of the natural resource index and frequency(F)**
11	*Lantana camara*	>108	33,34,35,36,37,41,42,43,43,44,46	1 - 10 2 - 6 3 - 1 4 - 0 5 - 0 6 - 0 7 - 0 8 - 7
22	*Teclea nobilis*	3	40	
33	*Croton megalocarpus*	108	33,34,35,36,37,38,40,41,42,43,44,45,46,47	
4	*Newtonia buchananii*	3	37,45,46	
5	*Ficus thonningii*	13	33,34,42,43,44,45	
6	*Dombeya goetzenii*	17	34,38,41,43,46	
7	*Spathothodea campanulata*	2	33,42	
8	*Teclea simplicifolia*	84	34,35,36,37,39,40,44,45,47	
9	*Warburgia ugandensis*	11	35,38,40,41,44,47	
10	*Calondendrum capense*	3	38	
11	*Brachyleana huillensis*	27	34,36,38,39,40,41,47	
12	*Chaetacme aristata*	4	37,45	
13	*Uvaridenndron anisatum*	8	36	
14	*Solanum incanum*	11	34,39,43	
15	*Diospyros abyssinica*	2	44	
16	*Salvadora persica*	1	39	
17	*Trichilia emetica*	3	39	
18	*Schebera alata*	2	46	
19	*Strychnos henningsii*	6	41	
20	*Caesalpinia volkensii*	11	42	
21	*Rhus natalensis*	14	42,46	
22	*Craibia brownii*	3	37	

23	*Erythrococca bongensis*	3	40	
24	*Drypetes gerrardi*	2	34,44	
25	*Olea europeae*	16	40,41,43,44,47	
26	*Vangueria madagascariensis*	6	47	
27	*Acacia spp*	3	33,39	
28	*Rhamnus prinoides*	6	45	
29	*Other spp*	98	33,35,36,37,40,41,42,43,45,46,47	
30	*Birds*	>108	33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48	
31	*Butterfly*	>108	33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48	
32	*Hares*	2	34,48	
33	*Syke's Monkeys*	20	36,39,40,43,47	
34	*Antelope*	3	38,40,48	

Table 4.20 shows that the beat had relative high abundance of different species with minimal deteriorating of the natural resource by the adjacent local communities. Observed deterioration was from illegal logging as noticed from visible old trees stumps and by debarking of trees for medicinal value. There were also cases of debranching of trees for fuel wood. The existence of the 10 foot paths in the sampled area suggested indication of human activities in the area.

Table 4.20: Beat 4 (Huruma) plots 49-64

Species: Flora/ Fauna		**Frequency of observation (F)**	**Plot species is observed**	**Deterioration of the natural resource index and frequency(F)**
11	*Lantana camara*	>108	49,50,51,52,53,54,55,56,57,58,59,60,63,64	1 - 11 2 - 5 3 - 1 4 - 0 5 - 4 6 - 0 7 - 0 8 - 10
32	*Croton megalocarpus*	75	49,50,51,52,53,54,55,56,57,58,59,60,62,63,64	
3	*Newtonia buchananii*	3	54,61,64	
4	*Dombeya goetzenii*	13	49,51,56	
5	*Spathothodea campanulata*	3	52,53,54	

6	*Croton alienus*	12	53	
7	*Warburgia ugandensis*	15	49,50,51,52,55,56,57,62,64	
8	*Brachyleana huillensis*	11	50,52,53,56	
9	*Uvaridenndron anisatum*	6	61	
10	*Solanum incanum*	5	57	
11	*Salvadora persica*	6	55	
12	*Strychnos henningsii*	6	62	
13	*Caesalpinia volkensii*	6	50	
14	*Rhus natalensis*	7	50	
15	*Craibia brownii*	2	52	
16	*Elaeodendron buchananii*	6	63	
17	*Markhamia lutea*	23	50,51,53,54,55,56,58,59,61,63	
18	*Podocarpus falcatus*	3	49	
19	*Croton macrostachyus*	32	49,53,54,57,58,60,61,62,63	
20	*Cordia abyssinica*	5	54,58,59	
21	*Polyscias kikuyensis*	5	55,56,57	
22	*Rhamnus prinoides*	8	56	
23	*Vitex keniensis*	1	58	
24	*Juniperus procera*	25	58,59,60,62,63	
25	*Other spp*	67	49,50,51,52,54,57,59,60,61,62,63	
26	*Birds*	>108	49,50,51,52,53,54,55,56,57,58,59,60,61,62,63	
27	*Butterfly*	>108	49,50,51,52,53,54,55,56,57,58,59,60,61,62,63	
28	*Syke's Monkey*	21	51,52,55,61,62	
29	*Antelope*	1	60	

Results in table 4.21 showed that the beat had relative high abundance of different species with varied deteriorating of the natural resource by the adjacent local communities. The high observed deterioration was from illegal logging as noticed from visible old trees stumps and by debarking of trees for medicinal value with both having twenty two frequencies. There were also cases of debranching of trees for fuel wood collection with 11 frequencies. Minimal deterioration was experienced from other type of disturbance which included foliage destruction and foot path within the forest indicating human activities. The

13 foot paths existence in the sampled area suggests indication of human activities in the area.

Table 4.21: Beat 5 (Sigiria) plots 65-80

Species: Flora/ Fauna		**Frequency of observation (F)**	**Plot species is observed**	**Deterioration of the natural resource index and frequency(F)**
11	*Lantana camara*	>108	65,66,67,68,69,70,71,72,73,74.75,76,77,78,79	1 - 22 2 - 22 3 - 0 4 - 0 5 - 11 6 - 2 7 - 0 8 - 13
22	*Teclea nobilis*	3	65	
33	*Croton megalocarpus*	118	65,66,67,68,69,70,72,73,74,75,76,77,78,79,80	
4	*Newtonia buchananii*	4	71,74,76,80	
5	*Ficus thonningii*	8	65,69,70,73,74	
6	*Dombeya goetzenii*	36	66(abundant),71,72,73,75,77	
7	*Rhamnus prinoides*	3	79	
8	*Teclea simplicifolia*	99	65,66,67,69,70,71,74,76,77	
9	*Croton alienus*	>108	69	
10	*Warburgia ugandensis*	18	65,66,70,72,75,76,77,78,80	
11	*Calondendrum capense*	3	66,68,78	
12	*Brachyleana huillensis*	26	68,71,72,75,76,77	
13	*Chaetacme aristata*	3	67,74	
14	*Uvaridenndron anisatum*	7	77	
15	*Solanum incanum*	26	65,68,73,78,80	
16	*Diospyros abyssinica*	8	69,75,76	
17	*Salvadora persica*	2	78	
18	*Trichilia emetica*	1	66	
19	*Schebera alata*	2	80	
20	*Caesalpinia volkensii*	11	71	
21	*Craibia brownii*	3	68	
22	*Erythrococca bongensis*	13	72,79	
23	*Drypetes gerrardi*	3	80	
24	*Olea europeae*	7	72,73,74	
25	*Markhamia lutea*	2	80	
26	*Juniperus procera*	12	78,79,80	
27	*Other spp*	115	65,66,67,68,69,71,72,73,74,75,76,77,78,79,80	
28	*Birds*	>108	65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80	

29	*Butterfly*	>108	65,66,67,68,69,70,71, 72,73,74,75,76,77,78, 79,80	
30	*Syke's Monkeys*	7	67,70,74	
31	*Harvey's Duiker*	1	72	
32	*Ground Squirrel*	2	77	

Thus the results in tables 4.17, 4.18, 4.19, 4.20 and 4.21 suggest a correlation between disturbance types and foot paths observed in sampled areas in the PAs which does have an impact on deterioration of the natural resource in the area. The Mazingira beat had no deterioration of natural resources while Karura beat had the highest (62) occurrences of disturbances with (16) foot paths observed.

Table 4.22 highlights the impact of deterioration of natural resource frequency found in the sampled sites $S_{1, 2, 3, 4 \text{ and } 5}$. The result in the table 4.22 further shows that there was no deterioration effect in S_1, and a minimum deterioration effect in $S_{3.}$ It also shows that there was no charcoal burning and animal grassing activities observed in the all sites of the PAs in Karura forest.

Table 4.22: The impact of deterioration of the natural resource

Index No.	S_1	S_2	S_3	S_4	S_5	Total
1	0%	48%	12%	13%	27%	100%
2	0%	23%	14%	12%	51%	100%
3	0%	33%	33%	33%	0%	99%
4	0%	0%	0%	0%	0%	0%
5	0%	40%	0%	16%	44%	100%
6	0%	50%	0%	0%	50%	100%
7	0%	0%	0%	0%	0%	0%
8	0%	35%	15%	22%	28%	100%

Figure 4.6 shows the results of linear frequency of impacts of foot paths on various disturbance (Error term) types indicating significant linear relationship between the foot paths (0.265) and most of the major disturbance recorded (0.184) as a result from various disturbance types frequency indicated in tables 4.17, 4.18, 4.19, 4.20 and 4.21.

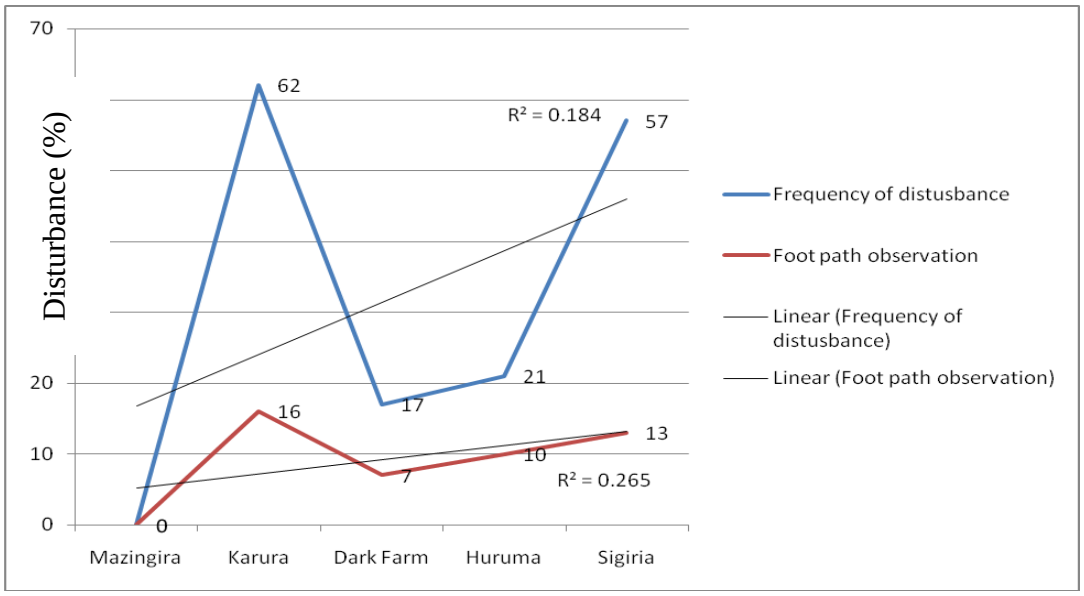

Figure 4.6 Correlation coefficient determinants of foot paths versus disturbance type levels in the PAs

From table 4.23 on the biophysical flora observation the following rows comprising of PAs transects 1, 2, 3, 4 and 5 and columns comprising of sampled plots 1-16 two way ANOVA model application for species richness was tabulated as shown in table 4.24.

Table 4.23 Flora Biophysical Observation data

Species	Frequency	% Proportion	Species	Frequency	% Proportion
Olea europeae	23	1.14	*Chrysophyllum viridifolium*	16	0.79
Croton megalocarpus	358	17.76	*Drypetes gerrardi*	12	0.60
Warburgia ugandensis	44	2.18	*Chaetacme aristata*	31	1.54
Brachyleana huillensis	77	3.82	*Croton macrostachyus*	32	1.59
Uvaridenndron anisatum	21	1.04	*Vitex keniensis*	1	0.050
Markhamia lutea	27	1.34	*Podocarpus falcatus*	3	0.15
Teclea nobilis	18	0.89	*Spathodea campanulata*	5	0.25
Juniperus procera	25	1.24	*Cordia abyssinica*	5	0.25
Craibia brownii	13	0.64	*Polyscias kikuyensis*	5	0.25
Newtonia buchananii	12	0.60	*Strychnos henningsii*	8	0.40
Salvadora persica	11	0.55	*Erythrococca bongensis*	16	0.79
Ficus thonningii	22	1.09	*Vangueria madagascariensis*	9	0.45
Trichilia emetica	4	0.20	*Rhamnus prinoides*	17	0.84
Calondendrum capense	6	0.30	*Caesalpinia volkensii*	28	1.39
Dombeya goetzenii	94	4.66	*Solanum incanum*	44	2.18
Teclea simplicifolia	247	12.25	*Elaeodendron buchananii*	9	0.45
Acacia spp	3	0.15	*Rhus natalensis*	27	1.34
Diospyros abyssinica	16	0.79	*Lantana camara*	358	17.76
Schebera alata	11	0.55	*Croton alienus*	358	17.76

Table 4.24 Two way ANOVA model application for species diversity

Transect	**Plots**																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**Mean X_i**
1	41	30	27	28	32	31	43	47	32	33	30	57	35	44	45	53	38.00
2	47	58	35	31	31	40	31	28	21	25	29	40	49	36	51	37	36.81
3	15	21	28	39	34	30	28	47	41	39	33	42	45	30	59	47	36.13
4	26	27	31	21	24	23	22	28	21	21	34	23	30	28	23	29	25.69
5	31	27	33	32	34	41	44	37	30	44	23	30	46	22	34	32	33.75
Mean X_j	29.8	32.6	30.8	30.2	31	33	33.6	37.4	29	32.4	29.8	38.4	41	32	42.5	39.5	34

Results in two way ANOVA model application for species diversity (table 4.24) gives the number of units of species diversity in sampled plots 1-16 within transects 1, 2, 3, 4 and 5 in PAs of the Karura forest. A PAs site is sampled to quantify the species composition and the same method replicated to other PAs sites. The numerators sum of squares (SS) is computed directly from the mean of rows and grand mean; however, the denominator SS is obtained indirectly by calculating the other SS and then solving for that SS.

Calculations yielded the following results values: $X_{1,}$ = 38, X_2 = 36.81, X_3 = 36.13, X_4 = 25.69 and X_5 = 33.75

X_1=29.8, X_2 =32.6, X_3=30.18, X_4 =30.2, X_5 =31, X_6=33, X_7 =33.6, X_8 =37.4, X_9 =29,

X_{10} =32.4, X_{11}=29.8, X_{12} =38.4, X_{13}=41, X_{14}=32, X_{15} =42.5 and X_{16}=39.5

$$\sum_{i=1}^{4} (X_i - X)^2 = 36.81$$

$$\text{And } \sum^{16}_{j=1}(X_i-X)^2 = 286.06$$

$$\text{Hence, } \sum^{4}_{i=1}\sum^{16}_{j=1}(X_i-X)^2 = 16(36.81) = 588.96$$

$$\text{And } \sum^{4}_{i=1}\sum^{16}_{j=1}(X_j-X)^2 = 5(286.81) = 1{,}434.05$$

Additional calculations based on the table 4.24 values where X=34.0 yielded:

$$\sum^{4}_{i=1}\sum^{16}_{j=1}(X_{ij}-X)^2 = 7{,}141$$

$$\text{Hence, } \sum^{4}_{i=1}\sum^{16}_{j=1}(X_{ij}-X_i-X_j+X)^2 = 7{,}141 - 588.96 - 1{,}434.05 = 5{,}117.99$$

As a result the F value becomes:

$$F = 15(588.96)^{-5,117.99} = 1.726 \text{ and } V_1 = 4 \text{ and } V_2 = 60$$

From Percentage points of the F Distribution of 5% table critical value is 2.52. Therefore Ho_2 hypothesis that biodiversity components do not influence high tourism destination in Karura forest is rejected. The analysis of variance is shown in table 4.25.

Table 4.25 Two way ANOVA of species diversity

Source of variation	**Sum of Squares (SS)**	**Degree of Freedom (d.f)**	**Mean square**	**F- Value**
Rows	588.96	4	147.24	1.726
Columns	1,434.05	15	95.60	1.120
Error	5,117.99	60	85.30	
Totals	7,141	79		

Figure 4.7 showed fauna Birds, Butterflies and Syke's monkeys had high frequency of observation with over 50 times the abundance of observation. Other animals with minimal observation included Harvey's Duiker, Ground squirrel, Antelope, Hares, Porcupines, Grimm's Duiker and Bush babies with less than 10 times the abundance of observation. However secondary data recorded existence of equivalent high proportions of these other fauna despite their minimal encounter during the time of biophysical observation which was carried out in the sampled area of the PAs.

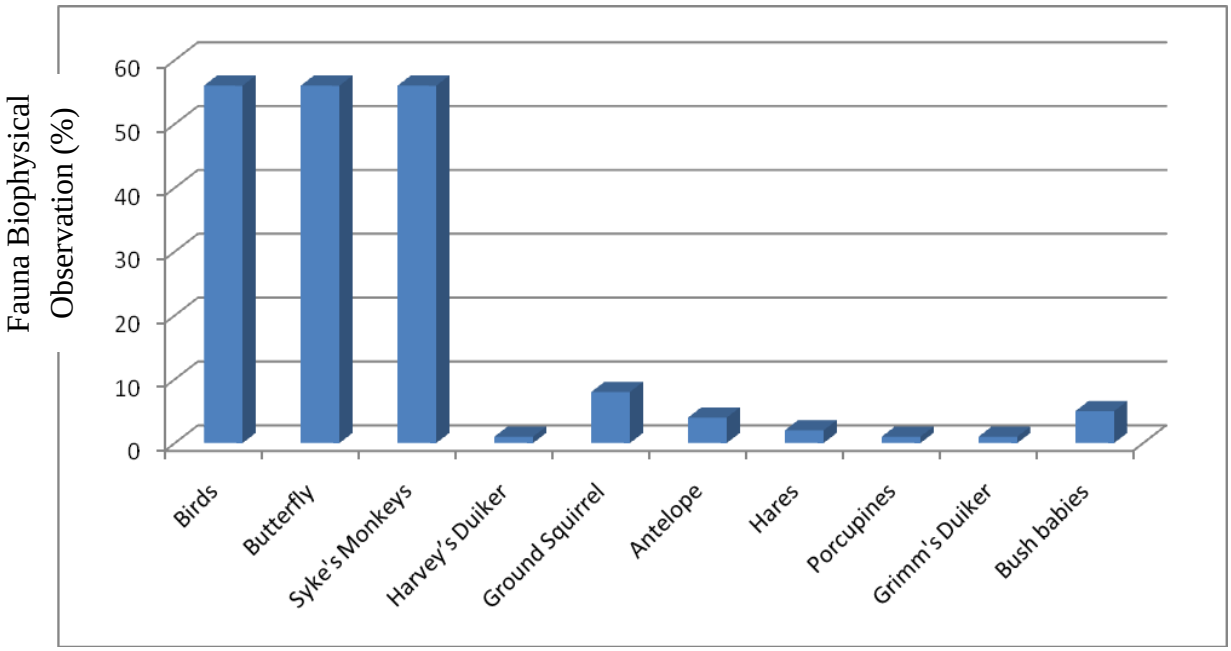

Figure 4.7 Fauna Biophysical Observation

Flora Biophysical expected results

From secondary data records the flora comprised of forest plantations of exotic trees covering 632 Ha and indigenous trees covering 260 Ha. The PAs of forest with indigenous

trees and shrubs which covered 260 Ha comprising of various tree species of varied utilization as listed in table 4.26.

Table 4.26: Indigenous trees found in the study area

No.	Botanical name	Local name (Kikuyu)/Common Name	Species richness (H-High, A-Average and L-Low)	Remarks
1	*Olea europeae*	*Mutamaiyo*	H	Fuelwood
2	*Croton megalocarpus*	*Mukinduri/Musinendet*	H	Fuelwood
3	*Warburgia ugandensis*	*Muthiga*	A	Medicinal, Timber, Fruits edible
4	*Brachyleana huillensis*	*Muhugu*	H	Carving
5	*Uvaridenndron anisatum*	*Mutonga*	H	Walking stick and ax handle timber
6	*Markhamia lutea*	*Siala*	L	Timber
7	*Teclea nobilis*	*Munderendu*	H	Carving
8	*Juniperus procera*	*Mutarakwa*	L	Timber
9	*Craibia brownii*	*Mukumbu*	A	Timber
10	*Newtonia buchananii*	*Mukui*	L	Timber
11	*Salvadora persica*	*Mukayau,Mswaki*	L	Edible fruit, branches for used for toothbrushes
12	*Ficus thonningii*	*Mugumo*	H	Sacred tree
13	*Trichilia emetica*	*Mururi, Munyama*	A	Timber
14	*Calondendrum capense*	*Murarachi (Cape Chestnut)*	L	Timber
15	*Dombeya goetzenii*	*Mukeu*	H	Timber
16	*Teclea simplicifolia*	*Munderendu*	H	Fuelwood, Timber
17	*Acacia spp*	*Mugaa*	L	Fuelwood

18	*Diospyros abyssinica*	*Muiruthi*	A	Timber
19	*Schebera alata*	*Mutoma*	A	Timber
20	*Chrysophyllum viridifolium*	*Murundu*	L	Timber
21	*Drypetes gerrardi*	*Munyenye*	A	Timber
22	*Chaetacme aristata*	*Muyuyu*	L	Timber
23	*Croton macrostachyus*	*Mutundu*	A	Timber
24	*Vitex keniensis*	*Muuru (Meru Oak)*	L	Timber
25	*Podocarpus falcatus*	*Muthengera*	L	Timber
26	*Spathodea campanulata*	*Mutsulia (Nandi Flame)*	L	Timber
27	*Cordia abyssinica*	*Muringa*	L	Timber
28	*Polyscias kikuyensis*	*Mutati*	L	Timber

(Source: KFSMP 2010-2014)

Table 4.27: Shrubs found in the study area

No.	**Botanical name**	**Local name (Kikuyu), Common Name**	**Species richness (H-High, A-Average and L-Low)**	**Remarks**
1	*Strychnos henningsii*	*Mutata*	H	Medicinal
2	*Erythrococca bongensis*	*Muharangware*	H	Medicinal
3	*Vangueria madagascariensis*	*Mubiro*	H	Medicinal
4	*Rhamnus prinoides*	*Mukarakinga*	H	Medicinal
5	*Caesalpinia volkensii*	*Mubuthi*	H	Medicinal
6	*Solanum incanum*	*Mutongu ,Ochok, (Sodom apple)*	H	Medicinal
7	*Elaeodendron buchananii*	*Mutanga*	H	Medicinal, Timber

8	*Rhus natalensis*	*Muthigio*	H	Medicinal
9	*Lantana camara*	*Mukenia*	H	Invasive weeds
10	*Croton alienus*	*Muthenia*	H	Firewood

(Source: KFSMP 2010-2014)

Results on Fauna found in the study area secondary data indicated that Karura forest host a variety of mammals as listed in table 4.28 and reptiles in table 4.29.

Table 4.28: Mammals found in the study area

No.	Mammal	Species diversity	Remarks
1	Duikers	High	Okay for tourists attraction
2	Bush bucks	High	Okay for tourists attraction
3	Bush pigs	High	Okay for tourists attraction
4	Genets	High	Okay for tourists attraction
5	Civets	High	Okay for tourists attraction
6	Bush babies	High	Okay for tourists attraction
7	Porcupines	High	Okay for tourists attraction
8	Sykes monkeys	High	Okay for tourists attraction
9	Squirrels	High	Okay for tourists attraction
10	Hares	High	Okay for tourists attraction
11	Epauletted-bat	High	Okay for tourists attraction

(Source: KFSMP 2010-2014)

Table 4.29: Reptiles found in the study area

No.	Reptile	Species diversity	Remarks
1	Cobras	Available	Okay for tourists attraction but dangerous to be watched at close quarter. Highly poisonous venom
2	Pythons	Available	Okay for tourists attraction but dangerous to be watched at close quarter.
3	Green snakes	Available	OK for tourists attraction. None poisonous venom
4	Monitor lizards	Available	OK for tourists attraction

(Source: KFSMP 2010-2014)

4.3.1 Avifauna found in the study area

From secondary data records 113 bird species have been observed. These birds were mainly found in wetlands and the forest edge and while were others found in the forest itself. Figures 4.8 and 4.9 are the inventory of birds Amedeo (2011). Names of birds documented are listed in Appendix III.

Figure 4.8: Birds found in wetlands and forest edge

(Source: Amedeo, 2011)

Figure 4.9: Birds found in Karura forest

(Source: Amedeo, 2011)

Beside's mammals, reptiles and birds, a number of butterflies are found. These include the African Queen and Desmond's Green Banded Swallowtail which are found in large number.

4.4 Socio-economic characteristics affecting sustainable eco-tourism development

Forest survey was carried out using semi-structured questionnaire on twenty four (24) CFAs members and analyzed using descriptive statistics. Socio-economic characteristics (table 4.30) were identified to be affecting sustainable eco-tourism development in Karura. Result showed that the CFAs members interviewed were literate having attained primary (4.2%) and secondary (95.8%) level of education. Majority of the CFAs were fully employed since they were engaged in diverse forest activities.

The number of years the member had lived on the farm adjacent to the forest varied greatly with some members having lived adjacent to the forest for between 1-5 years (37.5%) while others had lived above 15 years (33.3%).

When asked what size of land they owned in the area adjacent to the forest, majority of the respondents (70.8%) stated that they did not own any land. None of the respondents was in possession of title deed the land and this is a challenge members encounter in livestock production because of land tenure.

Respondent's house infrastructure was stratified according to four house wall-types namely stone, wood, iron sheet and mud as a proxy measure for wealth. Results in table 4.30 showed that more than half of CFAs member (58.3%) who are living adjacent to forest live

in iron sheet roofed houses. None was found to occupy a mud house suggesting improvement in the living standard of CFAs members.

On membership in CFAs only 8.3% members had joined the association when it was established by the law 5 year ago. However results showed that membership increased tremendously thereafter. Most members gave reasons of getting opportunities of reaping benefits from the forests and also they wanted to get employment (table 4.30) as reasons of joining CFAs.

The researcher inquired the view of the members about PFM as an approach aimed at improving the livelihoods of the forest adjacent communities as well as improving the PAs. Half of members (50%) agreed that PFM has improved their living standard through generation of income. When members were asked to rate the status of the forest in terms of its protection since joining CFAs, all of them (100%) unanimously viewed the PAs as improving very much. Table 4.30 confirmed their satisfaction as very satisfied (58.3%) and satisfied (41.7%).

Almost all the members participated in eco-tourism activities in the PAs (95.8%) as shown in table 4.30 and often spend above 20 days in undertaking forest activities (79.2%) which included offering security to tourists (62.5%), tour guiding (29.2%) and a minimal engagement in technical activities (8.3%). In one day guiding results showed that most individuals were earning an average of Ksh 200-500 (62.5%) with few individuals (25%) earning Ksh 500-1000 and Ksh 1000-above (12.5%).

When a member was asked to mention on other income NTFPs generating activities he or she benefited from apart from the income from eco-tourism activities, most of them unanimously listed bee keeping (66.7%) as shown in table 4.30. The other activities were butterfly farming (16.7), herbal medicine extraction (8.3%) and fish farming (8.3%)

The members accrued other non-monetary benefits as a result of participating in eco-tourism activities which included mostly involvement in decision making about forest conservation and management (41.7%), better environment (33.3%) and better relation with forestry authorities (20.8%) as shown in table 4.30 above.

Table 4.30 Socio-economic characteristics affecting sustainable eco-tourism development

Socio-economic Characteristics	Item	Frequency	Percentage (%)
Occupation	Partially employed	5	20.8
	Fully employed	19	79.2
Level of education	Primary	1	4.2
	Secondary	23	95.8
Size of land	Less than 1 acre	1	4.2
	Above 1 acre	6	25.0
	None	17	70.8
Period of residing on the farm	1-5 years	9	37.5
	5-10 years	6	25.0
	10-15 years	1	4.2
	Above 15 years	8	33.3
	Yes	3	12.5

Land title deed ownership	No	18	75.0
	No response	3	12.0
Farming (Livestock production)	Small size of farm	1	4.2
	Lack of funds	7	29.2
	Land tenure	16	66.7
Residential infrastructure	Stone house	9	37.5
	Wood house	1	4.2
	Iron sheet	14	58.3
	Mud	None	0
CFAs membership period	Less than 1 year	1	4.2
	1-3 years	8	33.3
	3-4 years	7	29.2
	Above 4 years	2	8.3
	No response	6	25.0
Reason of joining CFAs	Wanted to take part in conservation of the forest	1	4.2
	Wanted to reap benefits from the forests	2	8.3
	Both 1 and 2	18	75.0
	Wanted to get employment	3	12.0
Respondent view about PFM	It offers employment	7	29.2
	It improves living standards through income generation	12	50.0
	Offers alternative livelihood	1	4.2
	Reduces poverty levels	3	12.5
	All of the above	1	4.2

PFM satisfaction	Very satisfied	14	58.3
	Satisfied	10	41.7
Participation in eco-tourism activities	Yes	23	95.8
	No	1	4.2
Eco-tourism activities	Tour guide	7	29.2
	Technical	2	8.3
	Security	15	62.5
Income generation	Ksh 200-500	15	62.5
	Ksh 500-1000	6	25.0
	Ksh 1000 and above	3	12.5
NTFPs Generating activities	Fish farming	2	8.3
	Bee keeping	16	66.7
	Butterfly farming	4	16.7
	Herbal medicine	2	8.3
Other non-monetary benefits	Forest conservation and management	10	41.7
	Better environment	8	33.3
	Better relation with forestry authorities	6	28.8

The researcher was also interested to know the plans a member had in place to help him/her exploit the opportunities available in investment of eco-tourism industry as provided by management plan of the PAs. The result showed that (45.8%) will stick to activities stipulated for the CFAs and (25%) stated that they will organize and facilitate transparency and fair elections for CFAs membership to improve work environment (table 4.31).

Table 4.31: Plans to exploit opportunities available in eco-tourism

Plans	Frequency	Percent
Follow CFAs rules and regulations	1	4.2
Stick to activities stipulated for the CFAs	11	45.8
Identify and negotiate benefit sharing	3	12.5
All the above	1	4.2
Missing response	2	8.3
Organize and facilitate transparent and fair election for CFAs membership	6	25.0
Total	**24**	**100.0**

When a member was asked to compare his/her living standard today and when he/she was not involved in forest activities (70.8%) reported it had improved greatly (25%) indicated some improvement and only (4.2%) stated there was no change (table 4.32).

Table 4.32: Comparison between living standards today and when member was not involved in forest activities

Comparison	Frequency	Percent
Improved greatly	17	70.8
Improved	6	25.0
No change	1	4.2
Total	**24**	**100.0**

Tables 4.33 indicate the challenges members still face while engaged in eco-tourism as opportunity for employment. The results showed limited benefits compared to other employment opportunities (45.8%), continued destruction of the forest by outsiders (45.8%), interference by politicians (4.2%) and other members (4.2%) stated that there was lack of collaboration from forest authorities.

Table 4.33: Challenges of engaging in eco-tourism as employment

Challenges	Frequency	Percent
Limited benefits compared to other employment opportunities	11	45.8
Continued destruction of the forest by outsiders	11	45.8
Interference by politicians	1	4.2
Lack of collaboration from forest authorities	1	4.2
Total	**24**	**100.0**

Members were asked to suggest what should be done in order to improve eco-tourism so that it can accrue more benefits to the government and forest adjacent communities. Majority of them unanimously (75%) stated there was need to educate local communities about the importance of protecting the forest.

Causality and the notion of ceteris paribus in econometric analysis evaluated policies and legislations on PAs management plans and on eco-tourism management in line with the conceptual framework of the research (see table 4.1 and 4.30). The results revealed that one variable had a causal effect on another variable. For example there was an influence of the CFAs members to support eco-tourism as dependent variable and factors that enhances the influence as independent variables. The association between the two variables was suggestive and suggested a causal effect. According to Wooldridge (2012) dependent variable Y function is represented as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11} \text{------} X_j)$$

Where Y is the dependent variable, X_1, X_2 -----X_j are the independent variables and f is the causal effect constant.

The results of the analysis are as follows:

X_1 – Youthful age---------- 79.2%

X_2 – Household head ----------66.7%

X_3 – Sex ---------- 54.2%

X_4 – Marital status ---------- 75%

X_5 – Occupation ---------- 79.2%

X_6 – Level of education ---------- 95.8%

X_7 – Lack of land ---------- 70.8%

X_8 – Forest conservation and other benefits from the forest --------- 75%

X_9 – Income generation ---------- 62.5%

X_{10} – Non-monetary benefits ---------- 41.7%

X_{11} – NTFPs---------- 66.7%

The average response rating from the factors influencing the CFAs members' readiness to support eco-tourism is given as 70% which is a suggestive that one variable has a causal effect on another variable.

Socio-economic characteristics that affect the sustainable eco-tourism development (table 4.30) a Chi-square goodness of fit with data consisting of 24 CFAs members to a response ratio were applied and the following results revealed:

1. Satisfaction of a member with PFM as an approach to forest management with a response ratio of 58.8:41.7 implying 58.8% for very satisfied and 41.7% for satisfied.

The data recorded are 24 observed frequencies (f_o) in each of the two response categories, with expected frequencies (f_e) gave the following results:

Frequency	**Category of response**		**n**
	Very satisfied	**satisfied**	
f_o	14	10	24
f_e	58.8	41.7	100

Degrees of freedom = v = k – 1 = 2 – 1 = 1

The statistic is given by equation $\chi^2 = [(f_o – f_e)^2]^{-fe}$ where χ^2 = Chi-square statistic,

f_e =expected frequency and f_o = observed frequency.

Thus $\chi^2 = [(14 – 58.8)^2]^{-58.8} + [(10 – 41.7)^2]^{-41.7}$

= 34.13+24.10 = 58.2 ------- (i)

From Appendix F: Critical values of the Chi-square distribution $P (\chi^2 \geq 3.841) = 0.05$

$0.025 < P < 0.05$, Therefore, we reject Ho_3

2. Whether a member participates in eco-tourism activities in the PAs with a response ratio of 95.8:4.2 which showed 95.8% for a yes response and 4.2% for a no response.

The data recorded are 24 observed frequencies (f_o) in each of the two response categories, with expected frequencies (f_e) gave the following results:

Frequency	Category of response		n
	Yes	No	
f_o	23	1	24
f_e	95.8	4.2	100

Degrees of freedom = v = k – 1 = 2 – 1 = 1

The statistic is given by equation $\chi^2 = [(f_o – f_e)^2]^{-fe}$ where χ^2 = Chi-square statistic,

f_e =expected frequency and f_o = observed frequency.

Thus $\chi^2 = [(23 – 95.8)^2]^{-95.8} + [(1 – 4.2)^2]^{-4.2}$

$= 55.3 + 2.4 = 57.7$ --------- (ii)

From the Appendix F: Critical values of the Chi-square distribution $P (\chi^2 \geq 3.841) = 0.05$

$0.025 < P < 0.05$, Therefore we reject Ho_3

3. How often in a month a member participates in eco-tourism activities with a response ratio of 12.5:8.3:79.2

The data recorded are 24 observed frequencies (f_o) in each of the two response categories, with the frequencies expected under null hypothesis (f_e) gave the following results:

Frequency	Category of response			n
	5-10 days	10-15 days	Above 20 days	
f_o	3	2	19	24
f_e	12.5	8.3	79.2	100

Degrees of freedom = v = k – 1 = 3 – 1 = 2

The statistic is given by equation $\chi^2 = [(f_o – f_e)^2]^{-fe}$ where χ^2 = Chi-square statistic,

f_e =expected frequency and f_o = observed frequency.

Thus $\chi^2 = [(3 – 12.5)^2]^{-12.5} + [(2 – 8.3)^2]^{-8.3} + [(19– 79.2)^2]^{-79}$

= 7.5 + 4.8 + 45.9 = 58.2 -------- (iii)

From the Appendix F: Critical values of the Chi-square distribution $P (\chi^2 \geq 5.99) = 0.05$

$0.025 < P < 0.05$, Therefore we reject Ho_3

4. Average income of a member from eco-tourism with a response ratio of 62:25:12.5. The data recorded are 24 observed frequencies (f_o) in each of the two response categories, with the frequencies expected under null hypothesis (f_e) gave the following results:.

Frequency	**Category of response**			**n**
	Ksh 200-500	**Ksh 500-1000**	**Ksh 1000-1500**	
f_o	15	6	3	24
f_e	62	25	12.5	100

Degrees of freedom = v = k – 1 = 3– 1 = 2

The statistic is given by equation $\chi^2 = [(f_o – f_e)^2]^{-fe}$ where χ^2 = Chi-square statistic,

f_e =expected frequency and f_o = observed frequency.

Thus $\chi^2 = [(15 – 62)^2]^{-62} + [(6 – 25)^2]^{-25} + [(3 – 12.5)^2]^{-12.5}$

= 35.63 + 14.44 + 7.22 = 57.3 --------- (iv)

From the Appendix F: Critical values of the Chi-square distribution $P (\chi2 \geq 5.99) = 0.05$

$0.025 < P < 0.05$, Therefore we reject Ho_3

Thus the Chi-square calculated statistics results (i), (ii), (iii) and (iv) above 58.2, 57.7, 58.2 and 57.3 with critical values of the χ^2 distribution of 3.84, 3.84, 5.99 and 5.99 respectively having probabilities of occurrences results rejected the Ho_3 hypothesis.

4.5 Documentation of policies and legislations that guide development of PAs and management plans which address factors that favour eco-tourism performance

4.5.1 Policies that guide development of PAs management plans and eco-tourism performance

a) Forest Draft Policy 2007

This policy expanded the mandate in the management of all types of forests as key element and guided in the design of Karura Forest Strategic Management Plan 2010-2014. The forest has been divided into two blocks, one of which is mainly comprised of plantations. The other block has plantations of both exotic and indigenous species and an area under natural forests which is the PAs. The objective of the zonation is to help in sustainable use and development of the forest. The forest reserve has been zoned using the multiple-use classification criteria; this considers the application of primary use alongside secondary uses of the zoned areas. The main zones identified include the nature reserve, indigenous forest area, wetlands and riparian areas, productive forest (exotic plantations) and developed areas. The documented policies and legislations that guide the development of PAs management plans addresses the factors that favour eco-tourism performance of some popular sites as illustrated in the zonation criteria of forests and their management (table 4.34).

Table 4.34: Zonation criteria of the forest and their management

Zone	Criteria	Management Objectives	Management Options
Nature Reserve	High biodiversity natural forest	Total biodiversity conservation	- No extractive use - No disturbance
Indigenous forest area	Water catchment, Wildlife habitat, Protection of biodiversity, and Rehabilitated areas	-Conservation of biodiversity, Wildlife habitat - Low disturbance	- Conservation area -Minimum impact eco-tourism (walking, bird watching) - Enrichment planting of degraded areas
Wetlands	Swamps/ marshlands/ riparian areas	Total preservation of the wetlands	-Preservation of the area -Research and bird watching
Productive forest (exotic plantations)	Area under plantation of exotic species	-Generation of revenue - Adventure sports	-Harvesting of plantations to be converted into indigenous forest -Areas to be identified for plantation development mainly for Christmas trees and other wood products
Developed areas	Areas under residential and non residential buildings, tree Nurseries	-Areas to continue serving the same purpose -Gen. revenue (rent)	Status quo to remain

(Source: **KFSMP 2010-2014)**

The results of Policies and Legislations (table 4.35) documents applicable in management of PAs to enhance eco-tourism performance in Kenya showed that the documents were enacted within 1999-2014 (table 4.35).

Table 4.35: Policies and Legislations applicable in management of PAs to enhance eco-tourism performance

No.	Policy	Legislation	Agency
1	Forest Draft Policy 2007	Forest Act No. 7 of 2005	Kenya Forest Service
2	Forest Draft Policy 2014	Forest Act No. 7 of 2005	Kenya Forest Service
3	National Tourism Policy 2006	The Tourism Act No.28 of 2011	Kenya Tourism
4	-	EMCA Act No.8 of 1999	Environment

b) Forest Draft Policy 2014

This forest policy was a review of Forest Draft Policy 2007 it also expanded the mandate in the management of all types of forests as key element.

c) National Tourism Policy 2006

This policy encourages communities to appreciate the value of natural and cultural resources for tourism development, and to conserve, develop and promote Kenya's cultural heritage as an integral part of the tourism product; and facilitate the provision of financial incentives and technical assistance for community-based tourism projects. The policy is relevant to management of Karura forest and its adjacent areas since it appreciate the value of natural and cultural resources for tourism development vital for eco-tourism applied in the PAs of Karura forest.

4.5.2 Legislations on PAs management plans and eco-tourism development to enhance performance

a) Forest Act No. 7 of 2005:

This act paved the way for FKF (CFAs) to be registered according to the Forest Act 2005. FKF (CFAs) comprises of the following entities: Local communities, Green Belt Movement, Oswal Education and Relief Board, Community Development Foundation, UNEP, Shell Kenya Ltd, East African Breweries Ltd and Safaricom and Barclays Bank.

According to section 35 of this act, Karura forest is managed in accordance with Karura Forest Strategic Management Plan 2010-2014 and the involvement of CFAs.

b) Environmental Management and Coordination Act No.8 of 1999

This Act promote the protection, conservation and sustainable use of the various elements or components of the environment and natural resources including air, land, flora, fauna and water together with their aesthetical qualities.

The Act also advocates for environmentally friendly practices phenomenon or activity that does not cause harm or degrade natural resources.

Section 54(1) of the EMCA Act 1999 gives power to the Cabinet secretary, in consultation with the relevant lead agencies, environmentally by notice in the Gazette, declare any areas of land, sea, lake or river to be a PAs for the purpose of promoting and preserving specific ecological processes, natural environment systems, natural beauty or species of indigenous wildlife or the preservation of biological diversity in general. Section 54 (2) states that

without prejudice to subsection (1), the Authority may, in consultation with the relevant lead agencies, issue guidelines and prescribe measures for the management and protection of any of environmental significance declared to be a PAs under this section.

c) The Tourism Act No.28 of 2011

The Tourism Act 2011 interprets eco-tourism as responsible travel to natural areas to view flora and fauna without disturbance to the economical, ecological and cultural status of the areas. Tourism should be sustainable and developed to meet the needs of present visitors and hosts while protecting and enhancing opportunity for the future. According to the ninth schedule of the Tourism Act 2011 the reserved nature in the PAs is listed amongst destination of the tourists.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter presents the discussion based on results. The section starts with discussing eco-tourism performance in specific sites in the PAs and biodiversity components that influence high tourism in the study area. It goes on further to discuss socio-economic characteristics, policies and legislations issues applied to PAs and forest management plan and that applied to eco-tourism.

5.1 Eco-tourism performance in specific sites in Karura forest

Results in figure 4.1 on tourist response performances on various factors showed a significant strength of independent variables against dependent variable of tourist response performance. Thus it is a unique urban forest well endowed with natural features and scenic sites including waterfall, caves and abundant biodiversity.

Karura forest offers eco-friendly opportunities for Kenyans and visitors from abroad to enjoy a leafy green respite from the bustle of the city, to walk, jog, or just sit quietly and enjoy nature in all its diversity. Secondary data from inventory records on the forests scenic and attractive sites and activities available in Karura forest identified eco-tourism and recreation opportunities in the PAs of the forest and their performance as indicated in table 4.2 and 4.3. Thus it is a unique urban forest well endowed with natural features scenic sites including waterfall, three caves and abundant biodiversity, (KFS, 2013). The three caves in

Karura forest were used by the Mau Mau during the battles for independence and also in the past served as venues for spiritual nourishment for many people from different parts of the country. In the long term, eco-tourism depends on the quality of the PAs. Indeed, the quality of PAs, or some particular feature of it, is the primary attraction for tourists. Today, tourists of all kinds are becoming more sensitive to degraded conditions of PAs at their different destinations. The multiple correlation coefficient of determination (R^2) analysis for qualitative data generated from the questionnaire assessed the independent variables X: Landscapes, proximity to town, biodiversity, security, infrastructure (roads), drinking water accessibility and quality of eco-tourism sites against single dependent variable Y: Tourist response to specific sites in the PAs influencing factors. The R^2 (0.019) showed a significant strength of independent variables against dependent variable of percentage rate result of above 81%. The null hypothesis is rejected since sites in Karura forest do not have same eco-tourism performance.

5.2 Biodiversity components that influence high tourism visitations in Karura forest

The critical value of 2.52 of the analysis of the two way ANOVA F distribution of 5% of species diversity against calculated value of 1.726 showed that biodiversity components does influence high tourism visitation to Karura forest. According to KFS (2013) from a criminal hideout and a prime property for handing out to corrupt public servants and politicians, Karura forest is now secure, a pristine and favorite hangout for nature lovers and hikers. It also hosts corporate events and welcomes over 5000 visitors a month. However from a survey of the PAs it was found that *Lantana camara* and other invasive

weeds grow too vigorously thus endangering indigenous plants, trees and other vegetation that influence high tourism visitation thereby imparting a negative impact into the forest. There was also an element of deterioration of the natural resource due to activities undertaken by adjacent local communities thus imparting a negative effect on species diversity.

Karura forest hosts a diversity of fauna and flora species. Further protection of these species through PFM will enhance a high performance of eco-tourism management. Data collected on types of disturbance, species diversity from 1000 m wide belt transects distributed in five administrative beats in the PAs with different tourists visitations revealed that foot paths were indicators of the increasing rate of natural resource deterioration through illegal logging, debarking, animal traps and snares, foliage destruction and debranching of trees for fuelwood collection. Thus the activities of forest deterioration hinder the conservation aspects in the PAs thereby degrading its inherent biodiversity and natural habitat.

The most exploited species for medicinal value was *Warburgia ugandensis* (Table 4.19, 4.20, and 4.21). According to Beentje (1994) *Warburgia ugandensis* is good for timber for building and furniture. The bark and roots are used as remedy for chest pains, common cold, malaria and toothache. The fruit is edible and all its parts have hot peppery taste. The resin is used as glue. The species has diminished around Nairobi forests due to overexploitation by adjacent forest local communities. The other overexploited species in the PAs were found to be *Teclea simplicifolia* and *Croton megalocarpus* (Table 4.23)

which are used in house building and as firewood (Beentje, 1994). The indication of foot paths in the PAs showed participation of human activities and thus foot path's density positively correlated with levels of the rates of deterioration experienced in the natural resource as a result of illegal logging, debarking, charcoal production, animal traps, debranching and foliage destruction. The noticeable three types of disturbance indexed 1, 2, and 5 in table 4.16 correlated with foot paths and have potential negative repercussions on the PAs forest health. Thus Ho_2: that biodiversity components in Karura forest do not influence high tourism attraction is rejected.

5.3 Socio-economic characteristics that affect sustainable eco-tourism development in the forest

Karura forest is a small forest with 1,041.3 Ha surrounded by high density residential area and a 260 Ha of natural forest. The impoverished local communities living around Karura forest are diverse with different needs including fuelwood collection, medicinal plants, timber and harvesting grass. To make the forest safe and secure for the enjoyment by tourists, there is controlled access into the forest by use of designated entry points. There are also regular patrols throughout the PAs by a sufficient number of forest rangers and scouts. These factors including involvement by local communities through PFM, opportunities of employment, income generation, fuelwood collection and other benefits affect eco-tourism performance in Karura forest. Results on socio-economic characteristics therefore showed that these factors do sustainable eco-tourism development in the forest, and therefore the null hypothesis is rejected.

The degree of local community contribution to the PAs that enhances eco-tourism management achievement was highly variable. Despite similar ecological and socio-economic characteristics, local communities differed greatly in their response to eco-tourism and the protection of the forest. The local communities involved in PFM the results thereof showed these communities varied in the level of internal community cohesion, independence from neighbouring estates, natural resource endowments and economic status. Only 58% of CFAs from Huruma slum; 52% from Deep Sea slum and 40% from Githogoro slum agreed that the frequency of tourists in the scenic sites has improved their livelihood. In essence the local communities concentrate more on the exploitation of forest products like fuel wood collection and herbal medicine debarked from trees with medicinal value other than being involved in the activities of eco-tourism and forest management.

According to FAO (1997) one of the dominant factors that influences community participation in forest management and protection of forest areas is the benefit of job opportunities. From the study on the socio-economic structure of the community this seemed to greatly affect both the process of communal participation towards eco-tourism and PAs management and the distribution of its costs and benefits. Socio-economic differences within the community tended to translate into different priorities related to the management of natural resources.

Household members will maintain and sustainably utilize products from PAs if these make economic sense to do so. PAs must yield benefits of comparable or higher than alternative uses of household for eco-tourism activities. If the net benefit from sustainable use of the PAs is less than eco-tourism management, individuals' households will opt for eco-tourism

activities, which can yield higher returns. Based on the analysis of socio-economic data in the study areas, it is evident that deterioration of natural resources in the forest will continue when there is need for utilization of the forest products. One way is to make SFM as comparable in terms of returns to individual members and this can be achieved if the CFAs are given skills on the best management practices, diversification and value addition.

Results further showed that utilization of natural resources in PAs where eco-tourism is undertaken as a priority in the management plan by local communities often means greater costs for the government than from the affluent neighbours who were less dependent on access to natural resources and their utilization, but only participated in eco-tourism management and its improvement. FAO (1997) emphasized the availability of labour as another factor that affected enthusiasm for progression of forest management that enhances also protection of forest areas. Therefore the study found that the success of eco-tourism in a PAs requires considerable labour inputs. Other factors, such as shortage of local fuelwood, the promises of tangible benefits from NTFPs and familiarity with communal work in forest areas appeared to have encouraged local communities to engage in PFM.

Kiunga (2005) stated that the participation of local communities in forest management should translate into benefits that will improve their livelihood in addition to the key objective of SFM. This is mainly seen in terms of empowerment to take part in decision making and offer opinion in forest management discussions, share benefits derived from community based forest industries based on NTFPs, eco-tourism and water. In the process the living standard of the local community will have improved. According to the Kenya

Government in its Poverty Reduction Strategy Paper (2012), the three basic components that require immediate attention include: to increase the ability of the poor to raise their income, to improve the quality of the poor and to improve equity and participation in development initiatives. Section 5.1 of this paper recognizes that the poor in most circumstances will be ill-placed to take advantage of economic growth unless deliberate interventions are put in place to increase their opportunities and access to resources, skills and services required for them to rise out of the poverty trap.

With the advent of eco-tourism, employment opportunities will increase through providing services like guides, horse attendants and community scout. NTFPs sourced in the forest were found to help improve the livelihoods of local communities thereby eradicating level of poverty. At present the forest caters for the supply of small activities such as beekeeping, gathering grass from the glades, collection of herbs and other medicinal plants. The beneficiaries of the forest resource were the dwellers of the four slum villages namely Huruma, Mathare, Deep Sea in Westlands area and Githogoro slum to the North West of the forest. Results of the socio-economic survey showed a significant relationship between local community involvement in PFM and forest resource benefits sharing. The communities through PFM were engaged in many activities ranging from afforestation, visitor guiding, maintenance of tracks and installed electric fence thereby getting opportunities of eking a livelihood. The study findings confirmed the critical impacts of local communities' dependence on forest resources and a strong argument for control of exploitation to enhance high performance of eco-tourism.

Key livelihood activities in the forest that were noted include provision of goods-firewood; eco-friendly micro-projects like beekeeping; provision of water to the Huruma community; support community tree nurseries and creation of employment opportunities through development of recreational activities like horse ride, guiding, eco-tourism guides, cycling, jigging, nature trails, walking and bird watching guides. Causality and the notion of ceteris paribus in econometric analysis showed that one variable had a causal effect on another variable. Findings further confirmed the critical impacts of local communities' dependence on forest resources with socio-economic characteristics variables critical values of χ^2 distribution of P ($\chi^2 \geq 5.99$) = 0.05 and P ($\chi^2 \geq 3.841$) = 0.05 of $0.025 < P < 0.05$ and thus a need for exploitation control in order to enhance eco-tourism development. However there existed constraint to eco-tourism development in Kenya notably lack of funds for development of infrastructures necessary for eco-tourism improvement and its promotion. Allocation of these funds to the government sector implementing this programme is always inefficient.

5.4 Policies and legislations on PAs management plans and Eco-tourism management

FKF(CFAs) registered according to the Forest Act 2005 provided a platform that has facilitated the collaboration of key stakeholders as envisaged in Vision 2030 MTP 11(GoK, 2013) Collaboration Framework. Its aim is to work with KFS to sustainably manage Karura forest for the benefit of the local and wider communities and ensure Karura forest is protected for the future generations.

Karura forest hosts a diversity of fauna and flora that require protection from destruction emerging from surrounding impoverished communities. Thus policies and legislations on resource management including the charcoal rule, timber harvesting rule and medicinal plants, and policies and legislations on eco-tourism management are prerequisite towards development of a management plan for the forest that would entail a high standard of ecosystem conservation and management and at the same time generate income from eco-tourism industry.

Protected forested areas in Kenya have faced many challenges over the last three decades that have been linked to weakness in policies on conservation and management and market failure to sensitize people on the benefits of eco-tourism. According to the KFS (2010), PAs policies in the past have failed to incorporate stakeholder priorities and changing values of forest resources in management. Similarly, market distortions have culminated in the under valuation of forest resources. As a result, forest development, conservation and management in Kenya has not been responsive enough to stakeholder needs and priorities, thus further increasing the poor attitude towards forest conservation and management. Kenya's legislation has in the past focused on a "command and control" approach that has made it difficult to achieve environmental sustainability through public participation and cooperation. The broad objective of forest policy and legislation (Forest Policy 2014 and Forest Act 2005) is to provide continuous guidance to all Kenyans on sustainable management of forests. The Forest policy 2014 recognizes that there are benefits arising from the involvement of local communities and other stakeholders in forest management (GoK, 2014) while the Forest Act 2005 advocate for provision for establishment,

development and sustainable management of conservation and rational utilization of forest resources for socio-economic development of the country (GoK, 2005).

Forest Policy 2007 emphasized the importance of forests for biodiversity conservation (GoK, 2007) while the Forest Act 2005 addressed the cost and benefit sharing of resources through PFM implementation (GoK, 2005). IUCN (1996) on communities and forest management indicated that the Forest and Wildlife Policy was passed in 1994 to support local forest management initiatives outside reserves. It sought to encourage local community initiatives to protect natural resources for traditional, domestic and economic purposes, and to support with the reservation of such lands their legal protection, management and sustainable development.

According to Tourism Act 2011 it interprets eco-tourism has been interpreted as responsible travel to natural areas to view the flora and fauna without disturbance to the economical, ecological and cultural status of the areas. Thus the Tourism Act 2011 enhanced sustainable tourism towards development of PAs that meets the needs of present visitors and hosts while protecting and enhancing opportunity for the future. The activities that exist in the PAs are confirmed in the ninth schedule in the Tourism Act 2011as amongst activities destined by the tourists. According to section 54(1) of the EMCA Act 1999 it gave power to the Cabinet secretary to enforce the act and section 54 (2) without prejudice to subsection (1), the Authority may, in consultation with the relevant lead agencies, issued guidelines and prescribed measures for the management and protection of any of environmental significance declared to be a PAs under this section.

5.4.1 The Forest Policy 2014 and Forest Act 2005

The forest Act 2005 identifies critical areas to be addressed towards SFM (GoK, 2005) while the goal of the forest policy is to enhance the contribution of the forest sector in provision of economic, social and environmental goods and services (GoK, 2014).

In response to Section 41 of the Forest Act 2005, Karura forest shall be managed on a sustainable basis for the purposes of: Conservation of water, soil and biodiversity; River line protection; Cultural use and heritage; Recreation and eco-tourism; Sustainable production of wood and non-wood products; Carbon sequestration and other environmental services; Education and research purposes; and Habitat for wildlife (KFS, 2010).

In response to the Forest Act 2005, Section 46, FKF(CFAs) was established as a CFAs to protect, conserve and co-manage the Karura forest or part thereof pursuant to an approved management agreement entered into under this Act and the provisions of the management plan for the forest; Formulate and implement forest programmes consistent with the traditional user rights of the community concerned, in accordance with sustainable use criteria; Protect sacred groves and PAs; Keep KFS informed of any developments, changes and occurrences within the forest which are critical for the conservation of biodiversity and do any other function that is necessary for the efficient conservation and management of the forest.

The Karura Forest Strategic Management Plan, KFS (2010) contributes to the importance of Karura forest to the general public in its plan to PAs which has been found to contribute more to high performance of eco-tourism. The stakeholders embodied within FKF (CFAs)

have committed themselves to the goals and vision outlined in the forest management plan. By creating a management plan that is agreed upon and developed in an on-going process, an efficient and cohesive management of the forest can be achieved. Thus the forest principles entailing management of the forest for eco-tourism is seen to move in the right direction. The fencing off approach with designated entry gates has significantly reduced the local communities' access to exploitation although the restriction has caused an increase in pressure in the implementation of joint management plan with local communities to realize the benefit sharing as per the CFAs agreement. Other strategies explored for high performance of eco-tourism included reinforcement of security inside the forest and development of eco-tourism sites by engaging youthful forest rangers and scouts who does patrolling into the forest areas.

The creation of eco-tourism in PAs is now the most universally adopted means of conserving a natural ecosystem and/ or relevant cultural heritage for a broad range of human values. The development of PAs has been widely promoted because of its potential for regional development in peripheral urban area. The economic and social benefits are seen in PAs in the form of an increased tourism-related labour market. Thus there is a socio-economic linkage between PAs and performance of eco-tourism. The most positively correlated variables for change in tourism employment include population growth, proximity to town, security and specific scenic sites. The null hypothesis is rejected since the documented policies and legislations on PAs and Management address factors that favour eco-tourism performance.

CHAPTER SIX

CONCLUSIONS AND RECOMMEDATIONS

6.0 Introduction

This chapter gives conclusions and recommendations of the study guided by the objectives and results.

6.1 Conclusions

6.1.1 Factors that influence eco-tourism performance in specific sites in Karura forest

Security, landscapes, attractive eco-tourism sites, roads infrastructure and biodiversity were the main factors that influence response of tourists to visit the forest area. Other factors were proximity to town and drinking water which should be made accessible to tourists.

6.1.2 Biodiversity components that influence high tourism visitations in Karura forest

Biodiversity components of fauna and avifauna that influenced high tourists' visitation into the forest were birds, butterfly, and syke's monkeys. Others were ground squirrel, bush babies, antelopes, hares, porcupines, Grimm's duiker and Harvey's duiker. There were also reptiles that attracted tourists. These were cobras, pythons, green snakes and monitor lizards. Biodiversity components of flora also influenced tourism visitation where tourists appreciated scenic vegetation. However amongst the flora invasive species, *Lantana*

camara was most abundant (17.76%) of the population of the higher plants thereby affecting biodiversity components that influence high tourism attraction.

6.1.3 Socio-economic characteristics that affect sustainable eco-tourism development in the forest

Youthful age, occupation, level of education, income generation, residential infrastructure, NTFPs and other non-monetary benefits were positive socio-economic characteristics that affected sustainable eco-tourism development in the forest. Land owned by local community, land title deed ownership, farming production were other socio-economic characteristics which affected negatively sustainable development of eco-tourism.

6.1.4 Policies and legislations that guide development of PAs management plans

KFSMP 2010-2014 development to enhance conservation and management of PAs and improvement of eco-tourism performance within Karura forest.

Policies that guided development of PAs management plan above were Forest Draft Policy 2007, and The National Tourism Policy 2006. These policies were documented to enhance PAs and eco-tourism management. Forest Act No. 7 of 2005, The Tourism Act No.28 of 2011 and EMCA Act No. 8 of 1999 also guided the management plan and enforced the policies.

6.2 Recommendations

6.2.1 Policy and Management Recommendations

1. To improve forest landscape, Security and infrastructures to enhance eco-tourism performance within specific sites in Karura Forest.

2. To initiate controlled management of invasive species, *Lantana camara* that affects biodiversity components that influence high tourism visitations.

3. To embrace PFM to ensure ownership and suitability in forest conservation and management and improve socio-economic benefits characteristics to sustain eco-tourism development. To secure title deed so that land ownership is secure to local community.

4. To sensitize local community and create awareness campaign on policies and legislations that guide development of PAs management plan.

5. To promote local community/residents participation in the conservation of the forest and its biodiversity.

6.2.2 Recommendation for further research

6. To determine cost benefit analysis of eco-tourism in a PAs as an effective strategy for the preservation of natural and cultural resources that will promote economic benefits to local communities.

REFERENCES

Amedeo, B. (2011). *Africa Bird Image Database*: A Pictorial list of the main bird species in Karura forest, Postel and Kul Graphics Printers.

BIOTA East Africa (2006): *Scientific support for conservation and sustainable use of biodiversity*, Project Proposal for Phase III volume I. BIOTA East Africa Publication.

Beentje, H. (1994): *Kenya Trees, Shrubs and Lianas*, National Museums of Kenya Publication, 164, 113 and 369 pp.

Brandon K. and Margoluis R. (2012): *The bottom line: Getting biodiversity conservation back to eco-tourism.*

Butler J.R. (1992): *Eco-tourism: It's changing face and evolving of management*. The concept of a tourism area cycle of evolution: Implications for management of resources.

Ceballos, L. (1989): *The concept of eco-tourism, evolution and trends*. Les Roches Management School, Tourism Research Centre, Switzerland Publication.

Dale I.R. and Greenway P.J. (1961): *Kenya Tree and Shrubs, Publisher*: Buchanan's Kenya ltd 155-157pp.

Diamantis D. (2204): *Eco-tourism Management and Assessment*, Published by Thomson Learning, Zrinski d.d Printers, Croatia.

Faulkner, B., Pearce, P., Shaw R. and Weiler, B. (2003): *Aspect of Tourism*: Progressing Tourism Research for controlling the challenges of the demand and impact.

FAO (1997): *Peasant Participation in Community Reforestation*, Community Forestry Case Study Series 7.

Government of Egypt (2006): *Eco-tourism Strategy for Protected area*, Ministry of Tourism Development Publication.

Government of Ghana (2010): *Tourism Sector Medium Term Development Plan (2010-2013),* Ministry of National Tourism Publication.

Government of Kenya, GoK (1999): *Environmental Management and Coordination Act No.8 of 1999*, Government Printers, Nairobi.

Government of Kenya, GoK (2011): *The Tourism Act, No.28 of 2011*, Government Printers, Nairobi.

Government of Kenya, GoK (2006): *National Tourism Draft Policy 2006*, Government Printers, Nairobi

Government of Kenya, GoK (2005): *Forest Act No. 7 of 2005*, Government Printers, Nairobi.

Government of Kenya, GoK (2006): *Forest Draft Policy 2007*, Government Printers, Nairobi.

Government of Kenya, GoK (2014): *Forest Draft Policy 2014*, Government Printers, Nairobi.

Government of Kenya, GoK (2007): *Kenya Vision 2030*, Government Printers, Nairobi.

Government of Kenya, GoK (2013): *Medium Term Plan II (2013-2017).*Transforming Kenya: Pathway to devolution, socio-economic development, equity and national unity, Government Printers, Nairobi

Government of Mauritius (2002): *Tourism Development Plan 2002*, Ministry of Environment Publication.

Government of Mauritius (2006): *Tourism Authority Act 2006*, Ministry of Environment Publication.

Government of Mauritius (2009): *Tourism Strategic Plan 2009*, Ministry of Environment Publication.

Government of Peruvian (2008): *National Tourism Strategic Plan (2008-2018)*, Ministry of Trade and Tourism Publication.

Government of Poland (2007): *Tourism Action Plan 2007-2013*, Ministry of Environment Publication.

Government of Israel (2008): *National Tourism Strategic Plan 2008-2018*, Ministry of Environment, Heritage and Local Government Publication.

Government of South Africa (2008): *National Protected Areas Expansion Strategy*. Government Printers

Government of South Africa (2011): *National Minimum Standards for Responsible Tourism*, South African Bureau of Standards Publication.

Jubilee Coalition (2013): *Jubilee Coalition Manifesto 2013-17, issue 1 jubilee Manifesto* Publication.

IUCN (1996): *IUCN- World Conservation Union (1996), Communities and Forest Management*

Karina H.C. (2008): *Study of a self-assessment system for the eco-tourism group in Curuca*, The Accounting for tourist opinions while maintaining initial goals.

Kenya Forest Service, KFS (2010): *Karura Forest Strategic Management Plan 2010-2014*, Kenya Forest Service Publication.

Kenya Forest Service, KFS (2013): *Forester Quarterly Magazine issue No. 9 of January-March 2013*, Published by Kenya Forest Service, Wiltech Communication Printers.

KFS and KFWG (2007): *Manual on Participatory Forest Management Plans (PFMPs* Published by KFS and KFWG.

KIFCON (1994): *Kakamega Forest; The Official Guide: Kenya Indigenous Conservation Programme.*

Kiunga K.K. (2005): *Participatory Forest Management: Experiences with communities in Ukambani Region.* Integrated Natural Resources Management in Ukambani (INRMU) Project.

Mamimine P. (2011). *The impact of commercial stone carving for Tourism on Environment in Zimbabwe*: A Case study of Bepura Ward in Guruve District.

Maua, J.O. and Ogweno D. (2004): *Socio-economic factors influencing forest adjacent communities to cultivate in Kiandangoro forest, Aberdares range*, Proceedings of the 2nd KEFRI scientific conference, 2004 on Recent advances in forestry research and technology development for SFM. Kenya Forest Research Institute 216pp.

Moss, R.W. (1988): *Nairobi A to Z. Complete guides*, East African Education Kenway Publications imprint 91pp

Mugenda O.M. and Mugenda A.G (2003): *Quantitative and Qualitative Approaches*, Published by Africa Centre for Technology Studies (ACTS), Nairobi. 9-10pp

Mukras, M.S. (1993). *Elementary Econometric: Theory, Application and Policy*

Poverty Reduction Strategic Paper (2012): *International Monetary Fund Country Report No.12/10*

Republic of Korea (2008): *Eco-tourism for Green Growth*, Ministry of Culture, Sports and Tourism, Republic Printers.

UNEP (2012): *Tourism and Biodiversity: Review of the Implementation of the Guidelines on Biodiversity and Tourism Development*, CBD executive secretary note.

Veldhoen, B.J. (1969): *Technical note no. 116, specification for number of plots, silviculture section.*

Wass, P (1995). *Kenya's Indigenous Forests: Status, Management and Conservation*, IUCN and ODA, Gland, Switzerland and Cambridge, Overseas Development Administration (UK).

Wishitemi, B.E.L. (2008). *Community Based Conservation and Tourism Development Adjacent Protected Areas in Africa:* A paper presented on the 5th Inaugural Lecture on 25th September, 2008 in Chepkoilel Campus, Moi University.

Wooldridge M. Jeffrey (2012). *Introduction Econometrics: A Modern approach*.2E South-Western College Publication.

APPENDICES

APPENDIX I: QUESTIONNAIRE FOR KENYA FOREST STAFF

RESEARCH TITLE:

"An assessment of socio-economic linkages between protected areas and eco-tourism performance in Karura forest"

Questionnaire ID			

Protected area assessment by Karura KFS staff (Tick response appropriately)

1) Respondent Name(Optional)----------Designation----------

2) How long have you been in this station? a) Less than 1 year b) 1-3 years c) 3-5 years d) 5-10 e) above 10 years

3) Which block of Karura forest is under? a) Sigiria b) Karura block c) Ridgeway d) All of the above e) None

4) How has been the tourist's response to the eco- your jurisdiction tourism in the protected area of forest?

a) Very high b) High c) Moderate d) Low e) Very low

5) Which are the protected areas sites of forest is most attractive to tourists? a) Mau Mau caves

b) Scenic waterfalls and rivers c) Picnic sites d) Marked walking trails e) Small wetlands that are habitats for birds f) The incinerator formerly used by the Central Bank

of Kenya to burn old currency notes g) The area at which the late Professor Wangari Maathai carried out a campaign against illegal acquisition of forest land

h) Landscape i) Biodiversity aesthetic j) All of the above

6) Which is the major constraint facing forest stakeholders in their effort to cope with turn high up of tourist's visitation?

a) Lack of management policies on eco-tourism

b) Lack of policies on protected areas

c) Deteriorating socio-economic conditions and policy challenges

d) Demographic pressure on natural resources e) Other (specify)

7) Which year had the most number of tourist visitation in Karura forest? a) 2008

b) 2009 c) 2010 d) 2011 e) 2012

8) From question 7 above, which year did eco-tourism generate higher revenue to Karura forest? a) 2008 b) 2009 c) 2010 c) 2011 d) 2012

9) What is the most advantage of eco-tourism investment in a protected area like Karura forest? a) Revenue generation b) Security c) Employment to local adjacent communities d) Recreation and leisure activities e) Natural resource protection

10) What are the benefits that forest adjacent communities derive from the protected part of this forest? a) Exploitation of non wood forest products b) Biodiversity aesthetic value c) Employment d) Income generation from eco-tourism activities e) All of the above

11) What limitations do you impose on tourist visiting the forest protected area?

a) Control the number of tourist visitations b) The rates of entrance and subscription fee c) Disciplinary procedures in case of visitor committing an offence d) The inspection of the performance e) All of the above

12) (i) Are you aware of the policy that links management of protected forest area with eco-tourism? a) Yes b) No

(ii) If the answer to above question is yes which policy content strongly applies to eco-tourism managed in a protected forest area?

a) All existing protected areas forest reserves on public lands remain reserved

b) The status of protected areas will be determined and appropriate restoration measures taken

c) All reserved forest areas will be managed on the basis of approved management plans, guided by sound forest management principles

d) Participatory forest management approaches to be to ensure the participation of communities and other stakeholders in the management of protected area forests

e) Users of benefits derived from protected areas contribute to their conservation and management through the user pay principle

13) (i) Do eco-tourism enterprises contribute to the growth of the economy of Kenya? 1) Yes 2) No

(ii) If the answer to the above question is yes, please tick the appropriate contribution. a) Revenue generation b) Employment c) Reduce pressure from forest products exploitation d) Upgrade the literacy of the local communities e) Income generation

14) What is the quality of the access roads leading to specific sites of protected areas visited in the by tourists? a) All weather roads b) Seasonal roads c) Paved roads d) None e) Other (specify)

15) What is the proximity to services like hospitals, hotels, or any other infrastructure amenity from the protected areas? a) 0-1 miles away b) 1-5 miles away

c) 5-10 miles away d) Over 10 miles away e) None

16) From your view how do you characterize the eco-tourism scenic site quality in the forest?

a) Exceptionally good b) Good c) Average d) Distracting e) Other (specify)

17) What is the approximate distance of other competing recreational facility of the protected area visited by tourists? a) Within 1-5 miles away b) 5-10 miles away

c) 10-20 miles away d) Over 20 miles away e) None

18) What type of water sources are tourists accessible to in specific sites in the protected forested areas? a) Spring water b) Surface water c) Tap water d) Bottle water

e) Other (specify)

19) (i) Do you recommend investing in the eco-tourism industry in protected area of the forest? a)Yes b) No

(ii) If your answer to the above question is yes which are the possible reasons?

a) It encourages forest conservation

b) It generate revenue to the Government

c) It enhances infrastructure development

d) It boost security in the forest

e) It provides an opportunity to bring attention to the interconnectivity between forests and the people

APPENDIX II: QUESTIONNAIRE FOR COMMUNITY FOREST ASSOCIATION (CFAs)

Socio-economic characteristic assessment by Community Forest Association (CFA) members (Tick appropriately)

20) Respondent name (Optional) ----------

21) In what age group do you member belong?

a) Less than 18 years b) 18–35 years c) 35–50 years d) 50-60 years e) Above 60 years

22) What is your relationship to the household head? a) Household head b) Spouse

c) Son d) Daughter e) Parent f) Employee Relative

23) What is your sex? a) Male b) Female

24) What is your marital status?

a) Married b) Divorced c) Widow d) Widower e) Single

25) What is the size of household member‘s by age group? (*Indicate number of HH members in each bracket)*

a) <6 years____ b) 6 – 12 years_____ c) 12 – 17Years_____

d) 18 – 35 Years___ e) 35 – 50 Years____ f) >50 Years_____

26) What is your main occupation?

a) Farming b) Business c) Partially employed d) Fully employed e) None

27) What is the highest level of education you attained?

a) None b) Primary c) Secondary d) Tertiary e) I don't know

28) How many years have you lived on this farm adjacent to forest? a) Less than 1 year

b) 1-5 years c) 5-10 years d) 10-15 years e) Above 15 years

29) What is the size of the land you own in this area? a) Less than 1 acre

b) 1-2 acres c) 2-3 acres d) Above 3 acres e) None

30) Do you have a title deed for your land? a) Yes b) No

31) Which types of food crops, vegetables or fruits do you produce on your farm? (List the two most important productions under each category and use table below to indicate your answer.

Food crops	**Vegetables**	**Fruits**
1	1	1
2	2	2

32) What type of livestock do you keep? Name at least three types of livestock.

a)---------- b)---------- c)----------

33) What challenges do you encounter in crops, vegetables, fruits or livestock production?

a) The size of the farm is small b) Lack of fund c) Lack of professional guidance

d) Land tenure e) Other (specify)

34) What type of infrastructure do you have in your land/residence?

a) Stone house b) Wood house c) Iron Sheet house d) mud house e) Other (specify)

35) How long have you been a member of CFAs? a) Less than 1 year b) 2-3 years

c) 3-4 years d) 4-5 years e) Above 5 years

36) What is the name of your user group? a) ---------- b) ----------

37) Why did you join the named CFA above?

a) Wanted to take part in conservation of the forest b) Wanted to reap benefits from the forests c) Both (1) and (2) d) Wanted to get employment e) Other (specify) ----------

38) What is your view about PFM as an approach aimed at improving livelihoods of forest adjacent communities as well as protected areas? a) It offers employment

b) It improve living standard through income generation c) It offers alternative livelihood d) It reduces poverty level e) Others (specify) ----------

39) Since you joined a CFA, how do you rate the status of the forest in terms of its protection?

a) Improving very much b) Improving c) Declining very much d) Declining e) No change

40) How satisfied are you with PFM as an approach to forest management?

a) Very satisfied b) Satisfied c) Less satisfied d) Not satisfied e) No comment

41) (i) Do you participate in eco-tourism activities undertaken in the forest area?

a) Yes b) No

(ii) If the answer of above question is yes, in one month (on average) how many days do you spend involving yourself with activities of eco-tourism? a) 1 to 5 days b) 5 to 10 days c) 10 to 15 days d) 15 to 20 days e) Above 20 days

42) What eco-tourism activities are you involved in?

a) Tour guide b) Technical c) Security d) Professional guide e) Others (specify)

43) What is the average income you get from eco-tourism activities per day?

a) Less than Ksh 200 b) Ksh 200-500 c) Ksh 500-1000 d) Ksh 1000-1500 e) Above Ksh 1500

44) What other income generating activities do you think you can practice in the forest apart from the ones you are currently engaged in? a) Fish farming b) Bee keeping c) Sericulture d) Butterfly farming e) Harvesting of gums and resins f) Herbal medicine g) Others (specify)

45) What plans do you have in place to help you exploit the opportunities available in investment in the eco-tourism industry as provided by the management plan of the protected area of the forest? a) Follow CFAs rules and regulations b) Stick to activities stipulated for the CFAs c) Identify and negotiate benefit sharing d) Organize and facilitate transparent and fair elections for CFA membership e) Others (specify) ----------

46) What other non-monetary benefits do you enjoy as a result of participation in eco-tourism?

a) Better environment b) Reduced human wildlife conflicts c) Better relations with forestry authorities d) Involvement in decision making about forest conservation and management e) Other (Specify) ----------

47) Generally, how do you compare your living standards today and when you were not involved in forest activities? a) Improved greatly b) Improved c) No change d) Declined e) Declined greatly

48) What challenges do you face while engaged in eco-tourism as an opportunity for employment?

a) Lack of collaboration from forest authorities b) Conflicts with forest authorities c) Limited benefits compared to other employment opportunities d) Continued destruction of the forest by outsiders 5) Interference by politicians e) No sufficient visitation to the forest area

49) What do you suggest should be done in order to improve eco-tourism in the forest so that it can accrue more benefits to the government and forest adjacent communities?.....

Thank you very much for your information!!

APPENDIX III: LIST OF BIRDS FOUND IN KARURA FOREST

Birds mainly found in Karura forest itself	**Birds found in the wetlands and forest edge**
Black kite	Egyptian Goose
Harlaub's Turaco	Grey Heron
White-headed Barbet	Common Sandpiper
Common Bulbul	Dark-capped Yellow Warbler
Amethyst Sunbird	Grosbeak Weaver
African Harrier Hawk	Yellow-billed Duck
Red-chested Cuckoo	Hamercop
Lesser Honey guide	Wood Sandpiper
Cabanis Greenbul	Red-faced Cisticola
Collared Sunbird	Common Waxbill
Great Sparrow hawk	Red-billed teal
Klaus's Cuckoo	Long-tailed Cormorant
Grey Woodpecker	Emerald Spotted Wood Dove
Montane White-eye	Cape Robin Chat
Bronze Sunbird	Red-cheecked Cordon-bleu
Common Buzzard	Little Grebe
Speckled Mousebird	Black-shoulder Kite
Chin-spot Batis	Diederik Cuckoo
White-starred Robin	Variable Sunbird
Baglafecht Weaver	Bronze Mannikin

Augur Buzzard	Marabou Stork
Eurasian Bee-eater	Back Crake
Tropical Boubou	Malachite Kingfisher
Ruppel's Robin Chat	Rufous Sparrow
Spectacled Weaver	African Pied Wagtail
Long-crested Eagle	Yellow-billed Stork
Cinnamon-chested Bee-eater	Grey Crowned Crane
African Paradise Flycatcher	Red-fronted Tinkerbird
Olive Thrush	Grey-headed Sparrow
Red-billed Firefinch	Yellow-rumped Seedeater
African Crowned Eagle	Sacred Ibis
Silvery-checked Hornbill	African Jacana
Grey-backed Camaroptera	Common Fiscal
White-eyed Slaty Flycatcher	Holub's Golden Weaver
Black-and-white Mannikin	African Citril
Red-eye Dove	Haddada Ibis
Yellow-rumped tinkerbird	Green Sandpiper
Black-collared Apalis	Lesser-striped Swallow
Collared Sunbird	Village Weaver
Streaky Seedeater	Golden-breasted Bunting
Total : 40 Birds	**Total: 40 Birds**
Grand Total: 80	

APPENDIX IV: BIODIVERSITY COMPONENTS INVENTORY FORM

Protected area site _____Date of observation _____

Transect No. _____ Plot No._____ Plot size _____

Species: Flora/Fauna		**Species diversity /Frequency of observations**	**Remarks**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

APPENDIX V: DETERIORATION OF THE NATURAL RESOURCE

Protected area site _____Date of observation _____

Transect No. _____ Plot No. _____Plot size _____

Type of Disturbance		**Frequency of observations**	**Remarks**
1	Removal of trees through illegal logging		
2	Debarking of trees by humans and wildlife		
3	Laying of traps or snares		
4	Charcoal burning		
5	Debranching of trees for fuel wood		
6	Foliage destruction		
7	Grassing		
8	Creation of foot paths		

APPENDIX VI: CRITICAL VALUES OF CHI-SQUARE (χ^2) DISTRIBUTION TABLE

Degree of Freedom	Significance level			Degree of Freedom	Significance level		
	0.10	**0.05**	**0.1**		**0.10**	**0.05**	**0.1**
1	2.71	3.84	6.63	**16**	23.54	26.3	32.00
2	4.61	5.99	9.21	**17**	24.77	27.59	33.41
3	6.25	7.81	11.34	**18**	25.99	28.87	34.81
4	7.78	9.49	13.28	**19**	27.20	30.14	36.19
5	9.24	11.07	15.09	**20**	28.41	31.41	37.57
6	10.64	12.59	16.81	**21**	29.62	32.67	38.93
7	12.02	14.07	18.48	**22**	30.81	33.92	40.29
8	13.36	15.51	20.09	**23**	32.01	35.17	41.64
9	14.68	16.92	21.67	**24**	33.20	36.42	42.98
10	15.99	18.31	23.21	**25**	34.38	37.65	44.31
11	17.28	19.68	24.72	**26**	35.56	38.89	45.64
12	18.55	21.03	26.22	**27**	36.74	40.11	46.96
13	19.81	22.36	27.69	**28**	37.92	41.34	48.28
14	21.06	23.68	29.14	**29**	39.09	42.56	49.59
15	22.31	25.00	30.58	**30**	40.26	43.77	50.89

APPENDIX VII: PERCENTAGE POINTS OF THE F DISTRIBUTION TABLE: 5% POINTS

	Numerator d.f									
d.f	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	161.45	199.50	215.71	274.58	230.16	233.99	236.77	238.88	240.54	241.88
2	18.51	19.0	19.16	19.25	19.30	19.33	19.36	19.37	19.38	19.40
3	10.11	9.55	9.28	9.12	9.01	8.96	8.89	8.84	8.81	8.78
4	7.71	6.94	6.59	6.39	6.26	6.16	6.08	6.04	6.00	5.96
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.81	4.77	4.74
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.14	4.10	4.06
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.72	3.68	3.64
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
10	4.96	4.10	3.71	3.48	3.32	3.22	3.11	3.07	3.02	2.98
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85
12	4.75	3.88	3.49	3.26	3.10	3.00	2.91	2.85	2.80	2.75
13	4.67	3.80	3.41	3.18	3.02	2.92	2.83	2.76	2.71	2.67
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.69	2.66	2.60
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45
18	4.41	3.55	3.16	2.95	2.77	2.66	2.58	2.51	2.46	2.41
19	4.38	3.52	3.13	2.90	2.74	2.61	2.54	2.47	2.42	2.38
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35

21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30
23	4.28	3.42	3.03	2.80	2.64	2.53	2.46	2.37	2.32	2.27
24	4.26	3.40	3.00	2.78	2.62	2.51	2.42	2.36	2.30	2.25
25	4.24	3.38	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24
26	4.22	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.26	2.21
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.30	2.25	2.20
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19
29	4.18	3.33	3.93	2.70	2.54	2.43	2.35	2.28	2.22	2.17
30	4.17	3.33	3.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
60	4.00	3.15	2.76	2.52	2.37	2.25	2.17	2.10	2.04	1.99
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91