ALTERNATIVE DISPUTE RESOLUTION METHODS AND THE MANAGEMENT OF HUMAN-WILDLIFE CONFLICT: THE CASE OF ARABUKOSOKOKE FOREST KENYA

By

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DECLARATION

This Thesis is my original work and has not been submitted for an award of a degree in any other university.

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DEDICATION

I dedicate this thesis to my parents: Mzee Jesse Lewa Kashero and Sophia Anzazi Lewa, who despite having acquired limited education, ensured that their siblings received good education. They will always remain a great source of inspiration for my writing and life endeavours.

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ABBREVIATIONS AND ACRONYMS

AIDs	Acquired immunodeficiency syndrome
AoA	Antioxidant Activity
ASF	Arabuko – Sokoke Forest
ASFADA	Arabuko – Sokoke Forest Adjacent Dwellers Association
ASFMT	Arabuko Sokoke Forest Management Team
Askari	Swahili Word for Human Guard
ASSFMP	Arabuko – Sokoke Strategic forestry Management Plan
AU	African Union
AWF	African Wildlife Foundation
CAFO's	Confinement Animal Feeding Operations
CBNRM	Community Based Natural Resources Management Mechanisms
CCT	Conservation Conflict Transformation
CFA 's	Community Forest Associations
CoK	Constitution of Kenya
CS	Cabinet Secretary
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
CWCC	County Wildlife Conservation Committees
EAC	East African Community
EANHS	East Africa Natural History Society
EIA	Environmental Impact Assessment

EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FGD	Focused Group Discussion
GDP	Gross Domestic Product
GEF	Global Environment Facility
GICT	Global Information Communication Technology
HIV	Human Immune Deficiency Virus
HWC	Human Wildlife Conflict
IBAs	Important Bird Areas
ICIPE	International Centre of Insect Physiology and Ecology
ICM	Interactive Conflict Management
IFAD	International Fund for Agriculture and Development
IGAs	Income Generating Activities
IMF	International Monetary Fund
IUCN	International union for Conservation of Nature
KBAs	Key Bird Areas
KCDP	Kenya Coast Development Project
KIFCON	Kenya Indigenous Forest Conservation Network
KNBS	Kenya National Bureau of Statistics
Mbwa Kali	A Swahili Word for Guard Harsh Dog
MCCC	Mida Creek Conservation Community
MOCC	Memorandum of Consultative Collaboration
MoU	Memorandum of Understanding

Mzungi	A Swahili Word for Moringa Oleifera
NGO's	Non- Governmental organizations
NMK	National Museums of Kenya
ODA	Overseas Development Administration
PAC	Problem Animal Control
PES	Payment for Ecosystem Services
PFM	Participatory Forest Management
SID	Society for International Development
SMC	Senior Management Committee
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
TCA	Tsavo Conservation Area
UK	United Kingdom
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNESCO	United Nations Education Scientific and Cultural Organization
WB	World Bank
WCMA	Wildlife Conservation and Management Act
WID	Women in Development

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ABSTRACT

The study dealt with alternative dispute resolution methods in managing Human Wildlife Conflicts: The case of Arabuko Sokoke Forest Kenya.The area has had frequent human-wildlife conflicts which have led to destruction of property, infrastructure, crops, livestock and death for both humans and wildlife. The overall objective of the study was to investigate alternative dispute resolution methods in managing human-wildlife conflicts.The specific objectives were to examine the root causes of human wildlife conflicts, to examine the impact created by the resolution methods of managing human wildlife conflicts and to explore the actors in the management of human wildlife conflicts. Globally, most sovereign states have not documented policies on human – wildlife conflict resolution methods. Most studies on conflict resolution; Transformation, management and reconciliation have been based on human-human basis. No much research has been carried out on the impact of alternative dispute resolution methods in managing human –wildlife conflict for sustainable development. Since attaining independence, Kenya had not documented its policy on the said thematic area until 2005 when it promulgated its Kenya forest services Act. The same was followed up by the Wildlife Conservation and Management Act (2013) and the National Environmental Act (2013). However, these enactments are general and do not postulate specific policies on human – wildlife conflict resolution aspects. The matter has been left to legal mechanisms which include litigation involving courts. Such mechanisms have not helped resolving conflicts between humans and wildlife as cases continue to accelerate resulting into loss of humans, wildlife and property.The study was envisaged to answer the following research questions: What are the root causes of Human-Wildlife conflicts?What are the impacts resulting from the resolution methods? Who are the actors in the management of human-wildlife Conflicts? The study adopts Natural Law and environmental democracy theory as promulgated by Finnis (2002) and Hazen (2009). The study postulated litigation methods were most suitable for the resolution of Human-wildlife conflicts: That inadequate Human- wildlife resolution methods are responsible for escalation of the conflicts and that Community Based Natural Resource Management Mechanisms (CBNRM) offer the most suitable ADR method for human- wildlife conflict resolution.The study employed the mixed method approach. Both primary and secondary data was collected and analyzed. Multistage sampling was used in the study. Data was collected based on 400 households, through questionnaires, Key informants, interviews, Focus Group Discussions (FDGs) and researcher field observations. The study disagreed with the postulation that litigation offers the most suitable method for managing human wildlife conflicts. The study concluded the presence of Human-wildlife conflict in the area and that baboons are the most notorious in this regard. It also established that the main cause of human wildlife conflict is hunger from both humans and wildlife. On the theme and main objective of the study it concluded that community based natural resources management mechanisms (CBNRM) offers the most suitable method for managing the human wildlife conflict menace but needs to be synchronized with other methods and finally the study concluded that a collaborative management will boost local communities livelihood and reduce the menace to spur sustainable development. The study recommends intensive local residents'participation in human-wildlife conflict management. It further recommends use of non-destructive methods in managing the forest resource and equitable benefit sharing and compensation schemes to the local populations in a bid to enlist their support for conservation efforts.

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Background to the Study

The world has experienced rampant wars and conflicts which emanate from environmental amenities and services such as land, water and water related resources, oil discoveries, mining of precious minerals such as Gold, coal and titanium amongst others. Forests and forestry services have also been a source of conflict as people encroach forests for economic benefits while the government on the other hand tries to militate against such activities in a bid to conserve and protect the natural ecosystem. Kenya is not an exemption to these challenges.

The study looks into the root causes of human-wildlife conflicts, the resolution methods with their associated impact and also interrogates peace building strategies that non-state actors, through Track II Diplomatic methods like community based natural resources management mechanisms (CBNRM), can put in place to ensure environmental peace, conservation and sustainable development. According to Mark Fowler (2004), Environmental peace may be defined as the whole spectrum of peace initiatives covering political, economical, social, technological, educational and cultural aspects which touch on both living and non-living ecosystem in the biosphere. Whereas in Kenya, the Constitution (CoK 2010)Articles 59 (2)(d) and 66(2) provides for Community-Based Natural Resource Management Mechanisms (CBNRM), Policy and legal provisions remain inadequate since they are based on Track I State-Centric **"**Top- down**"** approaches.

A number of policies such as the Forest Conservation and Management Act 2016, Forest policy (2007),the Water policy (1999) and the Wildlife Conservation and Management Act (2013) acknowledge the need for Community involvement in resources management. However, none of these policies currently outlines the principles and practice for using community based natural resources management mechanisms (CBNRM) in Human – Wildlife conflicts resolution. The Arabuko- Sokoke Forest Reserve forms the focus of the study.

Arabuko-Sokoke Forest Reserve, which covers a total area of 420 Square Kilometers, is the largest natural forest with in the East African coast with a wide range of rare and unique species of mammals, birds, butterflies and plants. The forest ecosystem is home to 20% of Kenya's bird species, 30 % butterfly species and a minimum of 24 endemic bird, mammal and butterfly species. It has since been designated as a UNESCO Important Bird Area (IBA). www.kenyaforestservice.org accessed on 20th July, 2015 (Ongugo *et al*, 2008). The Forest Conservation and Management Act 2016 provides for participatory forest management aimed at sustainable development and improvement of the living standards of the adjacent forest communities in line with the Rio Declaration of 1992.(FCMA 2005, Rio Declaration,1992).

Although the Wildlife Conservation and Management Act (2013) advocates for community participation and confers user rights for those in registered Community Forest Associations, human-wildlife conflicts have continued in the said area. Fencing of the forests' perimeter among other non-lethal control measures have not been able to fully militate against the Human-Wildlife conflict (Mungai *et al*, 2011). Rather, the conflict has been exacerbated, resulting into loss of both human species and wildlife including ecosystem biodiversity loss. Litigation settlement legal methods have not been able to offer sustainable outcomes to the menace.

There is, therefore, an urgent need to investigate the Resolution Methods used in the management of human-wildlife Conflict in the area under study in a bid to foster sustainable development. The study is also expected to promote forest management policies and laws that benefit rural populations in affording economic sustainability without unduly degrading forest ecosystem and biodiversity. It is expected to inform global, regional, sub-regional, National, county and local governance cadre on sustainable resolution methods of managing human-wildlife conflict for peaceful coexistence and sustainable development

1.2 Statement of the Research Problem

The Arabuko-Sokoke forest area has had frequent human-wildlife conflicts. Chronic poverty levels and quest for quick economic gains by the affluent have forced both the local population and outsiders to encroach into the Arabuko- Sokoke forest in search for food, (animal proteins), timber and firewood. This has resulted into deforestation of the remnant coastal tropical forest. The human encroachment into the forest has not only led to deforestation but human-wildlife conflicts. The fencing (Mungai *et al*., 2011) of the forest has limited access of humans into the forest. However, they sneak through informal inlets in search of livelihood. Wildlife, especially elephants and baboons inhabiting the forest, sometimes also escape through informal corridors and invade farms in the area, hence sparking human-wildlife conflict. Kenya Wildlife Service (KWS), Kenya Forest Service (KFS) and Kenya Forestry Research Institute (KEFRI) personnel manning the forest resource have not managed to squash the human-wildlife conflicts.

Idle unemployed Kenyans have found solace in invading the forest to fend for their livelihood. Deforestation is their immediate economic activity since they lack basic education to acquire professional employment. The Kenya government's legal mechanisms through conventional

courts litigation have not adequately addressed these human-wildlife conflicts. Both humans and animals continue to engage in violent conflicts with loss of life from both ends.The said conflicts sandwitched in chronic poverty levels among the poor and economic greed from the affluent few forms a vicious cycle in the area which necessitates urgent attention. The study, therefore, seeks to investigate alternativedispute resolution methods in managing human–wildlife conflicts and whether these methods would impact positively for peaceful co-existence of humans and wildlife in the said area to ensure sustainable development. The question which begs to be answered is "will alternative dispute resolution methods (ADR) bring a solution in managing human wildlife conflicts?"

1.3Overall Objective

To investigate Alternative Dispute Resolution (ADR) methods used in the management of Human- Wildlife Conflicts.

1.3.1 Specific Objectives

i. To assess the efficancy of Alternative Dispute Resolution (ADR) Methods such as CBNRM in the management of human-wildlife conflict.
ii. To analyse the causes of human-wildlife conflict.
iii. To examine the actors in the management of the Human-Wildlife Conflict.

1.4 Research Questions

i. Which Alternative Dispute Resolution (ADR) Method offers optimum results in managing human-wildlife conflicts?

ii. What are the causes of human-wildlife conflicts?

iii. Who are the actors in the management of human-wildlife Conflicts?

1.5 Justification of the Study

This study implores both academic and policy justification, which mutually reinforce each other.

1.5.1 Academic Justification

In the world, most subsistence farmers reside next to forest protected areas. This is in a bid to access forest resources such as game meat, mushrooms, timber and building materials. These human activities overlap and interfere with wildlife in the forest. Conversely, wild animals also escape from forests and invade crops and livestock outside the protected areas. Such interactions become incompatible and trigger conflict between the human and wildlife species.

In Kenya, studies on alternative dispute, resolution methods in managing human wildlife conflicts have not been carried out in detail. Studies have majored on management of environmental conflicts (Kariuki, 2011). Other studies have majored on issues of climate change, global warming, pollution and issues of waste management. These thematic areas have not come out clearly to enlighten the academic world on issues of human-wildlife conflict management. Further, those that have endeavored to do so have not looked at the impact of alternative dispute resolution method in managing human-wildlife conflicts. Most studies on human-wildlife conflict management have been based on conventional methods such as litigation involving law courts. Such conventional methods stand out dated since you cannot take an elephant or baboon to a court of law. Additionally, most subsistence communities cannot afford litigation fees which are exorbitant.

Studies carried out on abating the human-wildlife conflict menace at Arabuko-Sokoke forest embarked on fencing the perimeter of the tropical forest (Mungai *et al* 2008). While fencing the forest reduced invasion to crops by elephants, it has not abated the problem because baboons still brave the fencing and other barriers and play havoc on the crops, livestock and property of the adjacent local communities (Knight 2003). Local communities in retaliation kill the wild animals and use the meat for relish. In the process injury and death for both humans and wildlife is the outcome.

The study will enrich the academic world through research on alternative dispute resolution methods in managing the human-wildlife conflict. Literature, observations and experience adduced from this study will benefit faculty, human-wildlife conflict management experts, conservation students and government agencies such as Kenya Wildlife service (KWS), Kenya Forest Service (KFS), and the tourism industry. Recommendations of the study will enrich the education fraternity through knowledge dissemination and adoption in schools, colleges and universities.

Additionally, few studies have been undertaken on the plight of poor subsistence farmers who border forest protected areas. Local communities at Arabuko-Sokoke Forest buffer zone have continued to suffer loss of livelihood due to wildlife invasions, environmental stress, poor governance policies offering scarce peace building and conflict mitigation (Onyango, 2010). In this regard, the relationship on conflict, environmental security and environmental governance is poorly understood which demands a deeper assessment of these issues. Also studies on alternative crops such as hot pepper, sisal and Moringa oleifera which elephants and baboons

find unpalatable have not been exhaustively researched on and this study envisions to avail knowledge on the same.

Academically, there has been confusion about conflict management approaches and human-wildlife conflict resolution approaches. There has been a further confusion on resolution of environmental conflicts which is a general approach rather than a resolution method which specifically looks for alternatives to the conventional methods. This study strives to bridge the knowledge gap between resolution of environmental conflicts and resolution of human-wildlife conflicts. The interface between the two is in the alternative dispute resolution methods such as community based natural resources management mechanisms (CBNRM).

1.5.2 Policy Justification

The study introduces three policy justifications. First is the frequent ethnic conflict between the Kauma and Chonyi who reside at the Arabuko-Sokoke buffer zone of Ngamani, Dzitsoni, Ng'ombeni, Mbudzi and Chivara. These neighbours, who displaced the Sanya from Arabuko-sokoke, have been fighting over Ngamani agricultural land for decades. This has culminated into the formation of Vyambani sub-location and Mwakambi Sub-location, all of which are in Chonyi Division but are also being claimed by the Kauma. Such endemic conflicts among the said neighbours points to the fact that the contemporary administrative and management frameworks are not effective in addressing such ethnic conflicts at the forest buffer zone. The study will advocate for, and invoke, more peace building initiatives for human as well as human-wildlife co-existence. Secondly, the prolonged degradation of the forest and emerging loss of carbon sequestration which, in turn propels climate change and global warming, calls for a re-

engineering of the policies that govern the Arabuko-Sokoke forest with specific focus on the livelihoods of the local communities. The study will mainstream incentives and benefit sharing policies so that the local communities benefit from the forest resource and thereby enlist their support for conservation initiatives.

Thirdly, humans have exploited the forest ecosystem and the environment and have been able to recover due to events occasioned by nature. However, with increasing population, effects of industrialization and global warming, it has evidently emerged that the natural system of environmental recovery cannot measure with natural disasters and destructive human activities. By and large, the study will be a source of reference for academic and policy makers.

1.6 Literature Review

1.6.1 Introduction

Literature review in this section is thematic and makes reference of the Natural law theory by J M Finnis (2002) and environmental democracy theory by Susan Hazen (2009). The twin theories postulate the right and freedom of access to exploit and use of natural resources by mankind. This section includes literature review on causes of environmental conflicts, conservation conflict transformation (CCT), conservation approaches and conflict transformation (CT).

1.6.2 Causes of Environmental Conflicts

An environmental conflict may be described as a conflict brought about by environmental scarcity on a resource occasioned by a man-made disturbance of a resource regeneration rate. According to Blitt and Homer– Dixon, the impacts of environmental scarcity such as constrained

agricultural output, migration social fragmentation, weak institutions and economic production can, either singly or as a whole trigger conflict among groups or communities. For example, the post-election violence of 2007/08 in Kenya was by and large caused by environmental factors. They only manifested in political form but the root causes were environmental (Burton,1990 ; Marker,2003; Satterfield,2002). Issues of unequal distribution of resources such as land, unresolved squatter problems, ethnic and regional marginalization informed identity grievances which triggered the violence. Overuse of renewable and non-renewable resources or pollution also leads to environmental resource scarcity. According to Homer-Dixon *et al*.,(1998), these scarcities have conflict generating potential. These are scarcities based on agricultural land, forests, fresh water and fish or fishing spots. Degradation and depletion of renewable resources can generate conflicts through resource capture by more powerful and "politically right groups."

Buckles and Rusnak analyzed the causes of environmental conflicts and have attempted to narrow them down to scarcity, interconnectedness of nature, unequal relations and different uses of the environmental resources by different people (Buckles *et al.,* 1999). The two scholars argue that environmental squabbles catalyzed by overexploitation of natural resources to ensure food security for the fast developing world, highlight the relationship between natural resources and conflict. According to the duo, conflicts are directly linked to contests over natural resources and access to them and are tied into the forces that intensify competition. Natural resources are portrayed as causes of competition and tension that can result in clashes when triggered by other factors. They argue that essentially, the environment is the cause of all social conflicts (Buckles and Rusnak,1999).

Other different scholars such as Gleick, *et al.,* (2000) have espoused the view that in the current world, human pressure on environmental resources is increasing while most the sources of resources are deteriorating. This creates an upward propensity for conflict and competition between nations or between different ethnic groups within nations. Gleick *et al.,(*2000) cite resources that have been drivers of contention and thereby leading to conflict as being fresh water, fisheries, productive land, fossil fuels and mineral deposits. Poverty and marginalization have been identified as factors that act as catalysts as they interact with other problems of degradation and other contests over environmental resources to further escalate conflicts (Gleick *et al*., 2000).

Kahl (2006) advanced theoretical mechanisms explaining the links between population growth, environmental degradation, natural resource scarcity and violence within countries. By way of various ecological, economic and social effects, population and environmental pressures reverberate into politics and produce two potential pathways to civil strife; state failure and exploitation. Kahl further argues that state failure conflicts occur when demographic and environmental stress factually weakens state authority, hence reducing the ability of the government to maintain order and enhancing the fertile ground for inter-group violence premised on the security dilemma. State exploitation conflicts, on the other hand, occur when threatened top leadership individuals seize natural resource scarcities and related social grievances to advance their parochial quest and instigate conflicts. (Kahl, 2006)

Kahl also discusses ethnic clashes in Kenya and contends that demographic and environmental stress provided both incentives and opportunities for the instigation of large scale organized ethnic violence. He thus concludes that land scarcity, as a result of demographic and

environmental stress, was one of the fundamental causes of the ethnic clashes that plagued Kenya in the 1990s. Mwagiru (2010), espouses that Kenya went through an embarrasing post–election violence in 2007/8, thereby resulting into the death of 1,333 Kenyans besides destruction of property. Economic marginalization, rooted in land scarcity, generated a number of grievances that political elites used to pit ethnic groups against each other in a bid to stay in power.

Buckles and Rusnak (1999) have brought to the fore the following explanations for the proliferation and escalation of conflicts related to the use of environmental resources. First, it relates to the fact that environmental resources transverse physical and spatial boundaries where actions of one group or individual may generate far reaching effects. For instance, using water for irrigation by communities in the upper stream of a river may cause conflict with their counterparts downstream who may also need the water for their routine activities (Buckles *et al*., 1999).

According to Peet and Natts (1996), environmental resources are constituted in a shared social domain where unequal and social relations are enshrined among various social actions, for example agricultural exporters and producers, subsistence farmers, marginalized ethnic groups and the state executive. Just as it happens within the political arena, those actors with the greatest political muscle and endowed with much power are also in a better position to control natural resource decisions and hence to swing them in their favor (Peet *et al*., 1996). Thirdly, environmental resources are bound to become scarce because of climate change, increase in demand and assymetric modes of distribution (Hamer-Dixon *et al*., 1998).

Environmental and climate change may involve land and water degradation, overexploitation of wildlife and aquatic resources, and extensive land clearing, and drainage. Increase in demand for goods and services has multiple social and economic bearings which include population growth, change in consumption patterns, trade liberalization, rural enterprise development, changes in technology as well as land cover change and use. Scarcity of natural resources could occur because of unequal distribution of resources among social groups or unclear policies in defining rights to common goods and property (Kariuki, 2011).

According to (Chevalier and Buckles 1995), people use and define environmental resources symbolically. For example, land, waterways and forests are not just material resources which people compete over, but also become lifestyle. These environmental resources touch on the life style of the farmers, ranchers, fishermen and loggers. They also point to ethnic identity, and a set of gender and age responsibilities. These natural resources' aspects offer themselves social, political and ideological conflict management related issues (Chavalier *et al*., 1995).

LeBaron (2006) finally introduces the concept of culture in conflicts. She argues that the cultural aspect is an important part of conflict and its resolution. Cultural messages, through gestures and other forms of communication, shape the understanding of relationships and best ways of dealing with conflict. She argues that whenever different individuals interact, there is bound to be either conflict or harmony. LeBaron further connects conflicts and culture by arguing that culture is part and parcel of every conflict in that conflict is an association between humans. Culture affects every sphere of our daily lives. She concludes by saying that there is no best approach to conflict resolutions, given that culture is always a factor. Fluency in culture is thus a main deciding factor for those who participate in conflict resolution. Cultural fluency entails

recognizing being loyal to the understanding that ways of naming, communication, taming and framing conflicts and identities vary from one culture to another (Leberon *et al*., 2006). In this regard, Chew (2004) states that individuals of different races, ethnic groups, religions and socio economic classes have distinct cultures and cultural profiles (Chew, 2004).

1.6.3 Conservation Conflict Transformation (CCT)

According to Le Baron and Pillay (2006) conflict "is a difference within a person or between two or more individuals or between groups of individuals that touches them in a significant way."

Paterson *et al*., (2013) states that "conflict always manifests itself in expressed disagreements among people who see incompatible goals and potential interference in achieving these goals". Indeed the perceived incompatibility and defined disagreements as a result of deep-rooted social conflict that could have little impact on the expressed disagreement (Jeong, 2008; Coleman, 2011). In the prevalence of such a conflict, the decision making processes and dialogue need to be accounted for the parties to come up with sustainable mutually acceptable solutions (Lederach, 2003). The processes adopted or the organizations and individuals used during the process, fail to reconcile or recognize the conflicts among the stakeholders which affects the conservation goals (Clark *et al*., 2011; Balint *et al;* 2011; Doucey, 2011; Peterson *et al* … 2013; Dickman, 2010). This is brought about by presenting potential interests and disputes. This does not take into account those entangled in disputes.

Lack of a deeper insight into these social conflicts, stakeholder involvement processes often even exacerbate or overlook, this unexplained conflict dimension that creates solutions if accounted to create more sustainable long-term solutions (Jeong, 2008; Levinger, 2013.). Secondly, short-term negotiations are often undertaken, to solve these complex conflicts. Indeed,

poor management of human- wildlife conflicts presents a big challenge to the effective conservation and management of many wildlife species worldwide. (Madden, 2004; Peterson *et al*; 2013, Michalski *et al*; 2006; Redpath *et al*, 2013). In most instances, such conflicts are brought about by deeper differences between groups, they are acturely not conflicts between individuals and wildlife. They manifest as social conflicts (Dickman, 2010). The epicenter of conservation conflict transformation is that it goes beyond approaches and techniques and also invokes a reflection, understanding and a means of how to relate to conflict.

1.6.4 Conservation Approaches

According to Michalski *et al*., (2006), conservation studies have their roots in biological sciences. Practicing professionals in conservation basically join the profession so as to understand, protect or to manage wildlife issues and not the human species (Michalski *et al*., 2006). As Treves *et al* (2003) further posits, as the field evolves, conservation efforts focus more on spatial and physical measures, for example, using fences, bee-hives, economic strategies such as incentives for compensating farmers who sustain losses because of wildlife destruction. Redpath *et al*., (2013) sees alternative livelihoods, technical strategies such as invoking changes in domestic animal husbandry and farming practices as the solution. Other measures are legal actions like severe punitive strategies and enforcing laws which prohibit harm to wildlife. Of equal significance are biological methods for example how use of lethal control impacts wildlife population (Breitenmoser andWoodroff, 2005; Parker,2013).

In as much as the said tenets are important for successful conservation, another school of thought according to Peterson *et al*., (2013) and Leong *et al*., 2013 opine that they are not sufficient when

considered in isolation with no regard to psychological values and needs responsible for driving social conflict.The logic behind this school of thought is that for successful conservation and management of human-wildlife conflicts an integrated approach is necessary. Conflicts related to conservation always serve as proxies for conflicts over more fundamentals such as non-material, social as well as psychological unmet needs. These include the need to be recognized, respect to individual dignity, status in society, freedom, societal empowerment, control, voice, identity, personal fulfillment, connectedness and belonging. Others include emotional, social, spiritual and cultural security (Burton, 1990; Satterfield, 2002; Marker, 2003). These issues are not addressed by the approaches or technical fixes described above. Factually, conservation endeavors falter many times since they do not account for the diversity, history and the various levels of social conflict that affect conservation actions (Rothman, 1997; Marker and Laderach, 2003;Madden, 2004).

Even though effective stakeholder participation is invoked as in Barlow *et al*., 2010, Redpath *et al*.,(2013) and Treves *et al*., 2009, conservation professionals may not have the requisite skills and capacity to design and lead effective processes which translate destructive conflict to a productive one (Manolis *et al*.,2009; Leong *et al.,* 2011, 2009). Although the intention to carry out such strategies is good, poorly crafted endeavors only look into casual issues of the conflicts which hinders stakeholders'acceptance to change and commitment to participate in conservation goals (Reed,2008 ; Leong, *et al.,* 2009).

Paying attention to the history of how earlier decisions were made and implemented is of paramount importance. Failure to take due regard to the influence of deep rooted psychological

as well as social factors may also lead to futile results even if interventions to address immediate and material issues of the conflict are invoked (Deutsch and Coleman, 2010; Coleman, 2011; Lederach, 2003).

1.6.5Conflict Transformation (CT)

The big question posed by many research scholars is on what is conflict transformation? Conflict transformation entails the capacity to foresee and react to the conflict in a positive manner so as to create a potential for reasonable growth. Change can be described both at the immediate level of conflict resolution and that of future issues and broader pattern. Conflict transformation reviews the complex aspects of social conflict resolution. Whereas conflict might be viewed as an opportunity, transformational approach combines both relational context and promotion of creative change (Lederach, 2003).

Burton, (1987) describes conflict as the outcome of various human interactions. It is the consequences or effects of conflict that dictate whether it is injurious or constructive (Lederach, 2003). Conflict transformation,which provides a proper approach to conflict was brought about by re-conceptualization of traditional approaches in so as to make them more applicable in modern conflicts (Miall, 2004). Contemporary conflicts are often protracted, interconnected and deep rooted macro and micro scales and characterized by power differences (Miall, 2004).

Most conservation conflicts entail deep-rooted conflict. Such conflicts include deeply held values, high stakes, power imbalances, complexity and a feeling of moral superiority that may entice the parties to continue with the fight, even when they cannot win in the short term (Clark, 2002; Burgess, 2004; Pearce and Little John, 1997).

Psychological and non-negotiable needs are deeply enshrined within conflicts that may appear negotiable on the surface (Burton,1990 &,1993). Serious conflicts are often those occurring among groups (intragroup) and between groups (intergroup). In this case , the internal conflict results in external conflict, since the leaders are urged to uphold the conflict so as to promote group cohesiveness (Deutsch *et al*., 2012).

Another special tenet of Conflict Transformation (CT) is that it begins with focusing on the relationships and how people relate to one another (Lederach, 2003). Through the design and sustenance of processes whose objective is to reconcile negative associations, conflict transformation strategies try to come up with ultimatums where the actors can humanize their views and correlations with the other. This creates a conducive environment and change of attitude from an "us" verses "them" mentality to a more genuine and inclusive "we"(Lederach, 2010).Through an all inclusive approach in diversified empowerment, participation of marginalized minorities and actors, asymmetric agenda setting and decision making are replaced by a collaborative environment. Such a strategy addresses many of the power inequalities associated with social conflicts. It also provides the environment and opportunities for enterprise and innovation (GCCT, 2014; Ramsbotham, *et al.*,2011).

Conflict is part and parcel of the continual progression of a society. It does not work in isolation (GCCT,2014,).Deep-rooted and complex conflicts are many times described and reinforced by the interface between micro-conflicts, local levels, to macro-level conflicts at the systemic regional and global community level (Henrick, 2009). The outcome is that conflict transformation (CT) embraces the unique complexity of each context of conflict thereby relying

on an applicable set of principles, theories, skills, and processes rather than a progressive formula for stakeholder involvement. It is hereby argued that such conditions are important if human–wildlife conflict managers will adapt and innovate changes in the ecological and socio-political systems in which they operate.

1.6.6 Empirical Literature on Human-Wildlife Conflict

Empirical literature entails an overview of where human-wildlife conflicts occur globally. In this regard, a selection of a few cases has been included in this study. This provides knowledge of human-wildlife conflict worldwide and highlights prevalent problems across global, national and local environment. Isolated case studies relate to the Americas, European countries, the Middle East, China, Asia, India and Africa. These cases adduce the severity of occurrence of the menace and how it has been managed.

1.6.7 Human-wildlife conflict in North America and Canada

In Western North America, conflict between the humans and wolves over the ungulates is a historical struggle associated with hunter societies in North America (Musiani *et al*., 2003). In recent times it has become more intense for zones that keep domestic animals for subsistence and commercial purposes. As Musiani *et al.*, (2003) posits, wolves caused death of 286 livestock. The animals killed were mainly cattle, horses, sheep, dogs, goats, geese, chicken and ducks in Alberta, Canada. This devastation occurred in a period of 14 years between 1982 and 1996.

In Idaho, Montana and Wyoming, United States of America (USA), between 1997 and 2001 wolves killed 788 cattle and sheep. In both the US and Canada, the trend shows that such

conflicts occur in border zones of protected areas (PAS) where different animals co-exist with high population densities of the humans (Ogada *et al.,* 2003).

1.6.7.1 South America, (Peru and Brazil)

Sekhar (1998) posits that there exists a direct positive association between the distance from a protected area and the level of damage caused by wildlife (Sekhar, 1998). In the sovereign state of Peru and in Brazil, in the Amazon province of Tambopata, about 3200 humans live inside the Northern border of the one and half million hectare protected area of Tambopata- Candamo Reserve (Treves *et al*., 2003). Local natives engage in various activities like peasant farming, fishing and logging. Within the course of their activities they encounter conflict with wild animals. Chief among forest animals mentioned as culprits in this regard are Brazilian tapir and Capybara. Other predators include, acelot (Leopardus Pardalis) hawks, jaguars and pumas (puma concolor) which have caused most depredation (Naughton-Treves *et al.,* 2003).

1.6.7.2 Europe: Wolf conflict in Italy

Human –wildlife conflict in Europe has been reported in Rome. Killing of household animals by the wolves (canis lupus) is prominent in areas such as Abaaruzo area, Italy, where rural economy is associated with subsistence farming and keeping of cattle, goats, sheep and horses which constitute the major animal husbandry activities. Even though both wolves and wild bears are present in this zone, wolves are more notorious killers of livestock than wild bears (Cozza *et al.,* 1996).

1.6.7.3 The Middle East: Golden Jackal Conflict in Israel

This is an example of a scenario that demonstrates how increased availability of food from agricultural activities and prevention of unaccepted dump of refuse can disrupt ecological equilibrium. This happens through keeping of a large predator populations beyond the natural carrying capability of the habitat.

Here, 33% of the Golan plateau is managed as grazing land for cattle. The main dwellers are the farmers who produce turkeys, fruits, chicken, cereals and dairy products. At the Golan plateau, cattle farmers lose close to 2% of new born calves every year to golden jackal predation (Yom-Tom, 1995). These losses were valued to a total estimate of over US $42000 as Yom-Tom, 1995 posits.

Increased killing of cattle is indirectly driven by the farmers through unacceptable dumping of domestic animal carcasses which constitute the main source of food for the jackals. This has led to increased jackal population and exacerbated the conflict. People should anticipate more intense human-jackal conflict if they do not control illegal waste dumping (Yom-Tom, 1995).

1.6.7.4 India

The tolerance of individuals towards wildlife is determined by their traditions, religious attitudes, and beliefs towards wildlife even though they continue to damage crops and household animals. For example, Hindus regard monkeys to be sacred animals. As a result, they revere and protect them. Such traditions, religious beliefs and attachment to monkeys really influence Indian local communities' perceptions of conflict (Imam and Malik, 2002). There is a general reverence for animals and plants in some Indian regions. This has always prevented people from persecuting

large carnivores and improved their perception towards nature parks and wild animals (Vijayan and Pati, 2002;Madhusudan *et al*., 2003,).

1.6.7.5 Lions and Leopards Conflict In India

The Gujarat state, close to Gir National Park, is endowed with Asian Lions and Leopards which use tracts of mango and sugarcane tree plantations to find water and shelter. Eventually, they hunt prey like pigs, buffaloes, cattle and domestic dogs. Many lions stray out of the park border into farms where they attack domestic animals. Leopards, on the other hand, have made these plantations as their permanent habitat (Vijayan and Pati, 2002). The co-existence and overlapping of forest animal domains with human settlements has culminated into attacks on farmers and cattle depredation. The lives of local communities are insecure, livestock depredation is the order of the day and mechanisms of addressing the conflict are miserably weak.

1.6.7.6 China: Asian Elephant Conflict

The conflict emanates from the fragmentation and degradation of the elephants' habitat. The elephants rely on the evergreen forest for food despite having the large exploitation of the forest. The natural food shortages force the elephants to forage on food crops including rice, wheat, bamboo and banana (Zang and Wang, 2003). As Zang and Wang (2003) report, in the year 2000, rural inhabitants claimed that elephant damage accounted for about 48% of the community annual losses which stood at US $ 314,600 in 1999.

The implementation of elephant habitat conservation and local residents' development project by the International Fund for Animal Welfare (IFAW) is a welcome idea. The project purposed to

enhance co-existence between local communities and wild animals. It provided small loans, environmental education, education on alternative farming techniques, habitat conservation, as well as knowlegde awareness on human safety. By the time the initial stage was complete, the debts were fully repaid, local residents had adopted alternative farming strategies and reduced pressure on forests and at the same time tolerating elephants' damage (Zang and Wang, 2003).

1.6.7.7 Human- Wildlife Conflicts in Africa

Human-wildlife conflict has been rampant in most African countries. Most local natives in the African continent are faced with the challenge of co-existing with wild animals without getting any tangible benefits while often the costs are very high in comparison to their standard of living (O'Connell- Rodwell *et al*., 2000). Many African rural populations' livelihoods are vulnerable to wild animals' predation which worsens the chronic poverty levels.

1.6.8 Lion and Leopard Conflict in Zimbabwe

Zimbabwe has experienced numerous human-wildlife conflicts. Specifically, Gokwe communal land, near Sangwa rural communities face adverse experiences because of their nearness to the national park. Wild animals such as leopards and lions attack domestic livestock which culminates into severe conflicts. As Butler (2000) posits, ranging from January 1993 and June 1996, in an area covering 33 square kilometers, 241household animals were killed by lions, leopards and baboons. These predators have different techniques of attacking their prey. Baboons attack during the day, mainly killing small animals like sheep and goats. In the converse, leopards and lions attack at night, with lions killing larger animals like cattle and donkeys. It is

important to note that even though baboons kill more livestock, lions cause more monetary loss due to the superioreconomic value of cattle which they kill at night (Butler, 2000).

1.6.8.1 Monkey Conflict in Zanzibar

The red colobus, which is categorized among the endangered species, is top on the list of human wildlife conflict drivers in Zanzibar. In Zanzibar, large mammals are considered by farmers as a threat to crops. Farmers in the Island have cited the red colobus as the third most notorious wild animal. Of particular mention is that the said monkey stands as one of the most endangered primates within the African continent. In Zanzibar there are only approximately 2000 individuals residing in the Island of Unguja (Siex *et al*., 1999). On the other hand Siex (1999) posits that the red colobus may not be detrimental to the Zanzibar Island communities after all. He posits that they help in pruning small and immature coconuts and at the same time they are a boost to tourism industry (Siex *et al*., 1999).

1.6.8.2 Human – Wildlife Conflict in Uganda

Human-wildlife conflict occurs around Kabale National Park where fifty four per cent of the land within the range of 1km from the National park's boundary is cultivated. Crop farmers reported losing about seventy five per cent of their yearly season's crop to wild animals mainly elephants (Loxodonta africana) which is among the endangered species (Naughton-Treves, 1997). Here, women are basically peasant farmers. They were more concerned about cassava damages. Men, on the other hand, concentrate on cash crop agriculture and pin pointed banana as one of the most vulnerable crop to wildlife damage. Further, farmers singled out olive baboons, bush pig and elephants as the most damaging animals. Here, the red tail monkey also poses as one of the

most frequent invader in agricultural fields (Naughton-Treves, 1997). Weladji and Tchamba, (2003) posit that conflicts can be triggered by local peoples' inaccessibility to natural resources. They highlight co-management as a way of attaining sustainable wildlife conservation (Weladji and Tchamba, 2003). The human wildlife conflict management strategies used here are essentially guarding and, to a lesser extent, fencing and trenches (Mungai *et al*., 2008).

1.6.8.3 Human- wildlife Conflict in Cameroon

Elephant (Loxodonta africana), one of the endangered species is also a major source of conflict in Cameroon. In North Cameroon, the creation of the Benoue National Park in 1968 brought about many regulations concerning land previously used as a hunting wildlife reserve. The land belonged to the local natives and fell under the control of community elders. Presently, projects like subsistence farming, animal husbandry, hunting, fisheries and gold mining are carried out within a small piece of land near the boundary of the park. Local natives have prohibitive rights to access land and its resources which has led to an estimated annual crop income loss of over thirty per cent and annual livestock income loss of over twenty per cent per household (Weladji and Tehamba, 2003). Farmers in cameroon who suffer animal invasion calamity are those that cultivate millet, maize, yam and cotton. The animals causing major losses were reported as elephants, baboons, parrots as well as warthogs. It needs to be mentioned that the wild animals not only devastate staple food crops but also domestic animals. Bush meat constitutes about 20% of animal protein consumption by the local communities. In order to ensure livelihood security, the local natives take to poaching and unlawfully encroach parks. It is evident that excluding local populations from access to land and its resources such as firewood, bushmeat, fish and grazing land could lead to adverse long-term outcomes on the conservation agenda. Excluding

the local communities from the conservation agenda only escalates human wildlife conflicts. Weladji and Tchamba (2003) posit that involvement in wildlife management and provision of incentives to the local communities is the best strategy to human-wildlife conflict resolution.

1.6.8.4 Human-Wildlife Conflict in Namibia

Human- wildlife conflict occurs in the Caprivi region of Namibia. This is because the area is highly densely populated with human and elephant populations. Both species rely on and compete for the same land resources and water. Wildlife conflict with humans here is so much intense because the region accommodates over 5000 elephants. This is the biggest free ranging elephant colony in the entire African continent. The conflict is further made worse because the elephants are not restricted to the 2 East Caprivi National Parks. They frequently escape through informal corridors onto areas outside the Park (O'Connell – Rodwell *et al*., 2000). A bigger percentage of the conflict in this region occurs in villages that border the reserves. Elephants are twice as much aggressive as compared to lions and attack a much more large area. This not-withstanding, lions cause greater negative monetary havoc than elephants. For example, by 1995 losses caused by elephant damage to crops stood at US $ 39200 while lion depredation amounted to US $ 70,570 (O'Connell-Rodwell *et al*., 2000).

1.6.8.5 Human- Wildlife Conflict In Kenya

Kenya, like other developing countries in the world, experiences human-wildlife conflicts. Lion and other carnivores such as leopard, cheetah and spotted hyenas are examples of such conflict causing wildlife. Further, elephants and baboons are on record as causing crop and property havoc in Arabuko Sokoke forest zone (Mungai *et al*., 2008).

Human –wildlife conflict affects both rural vulnerable local natives as well as livestock traders. Patterson (2004) carried out a study to evaluate impact of 2 livestock farms annex to the border of Tsavo East National Park in Kenya. Here, lions, cheetah and spotted hyenas were responsible for attacking household animals like cattle, goats, chicken as well as sheep. At Arabuko Sokoke forest zone, elephants and baboons are notorious in crop, livestock and property damage (Patterson *et al*., 2004). The elephant menace has been reduced due to electric fencing (Mungai *et al*., 2008) but baboons still continue to play havoc on crops and small domestic animals such as sheep and goats.

1.6.9Study Gap

The literature gap in this study is on the interface between conventional and non-conventional methods of human wildlife resolution. Conventional methods are track 1 diplomatic methods while non-conventional methods are track 2 diplomatic methods. KWS litigation based on court decisions is track I diplomacy which uses force, coercion and punishment based on State-Centric approaches which is a"Top-down**"**approach. Non-conventional methods are Track 2 diplomatic methods of human wildlife conflict resolution such as (CBNRM). These are based on Rio Declaration (1992), and are more humane and "Bottom-up.**"**

There also exists a governance gap in that the government has not been able to successfully implement compensation schemes. This is due to red tape inadequacies, cheating, corruption, time and costs involved and fraudulent claims. Further, the said schemes are associated with practical barriers and moral hazards that illiterate farmers have to overcome in the process of submitting compensation claims. (Kenya Wildlife Service, 1996; Muruthi, 2005).

Studies carried out on resolution of environmental conflicts (Kariuki, 2011) among others are too general and do not touch on specific tenets of human wildlife conflicts resolution methods. The literature reviewed stresses the fact that there is a body of knowledge on the various sources and triggers of conflicts over natural resources. It also shows that CBNRM among other peaceful mechanisms of conflict resolution have been considered as possible solutions for the endemic human-wildlife conflicts in European countries, Brazil, India and the United States of America. It is also clear from the literature reviewed that there is no authoritative discussion on alternative dispute resolution methods in managing human wildlife conflict and that contemporary litigation mechanisms in Kenya may not be exhaustive in resolving the menace. There is, therefore, a missing link (Gap) between resolution of environmental conflicts and human-wildlife conflicts. This research will navigate towards filling the said gaps.

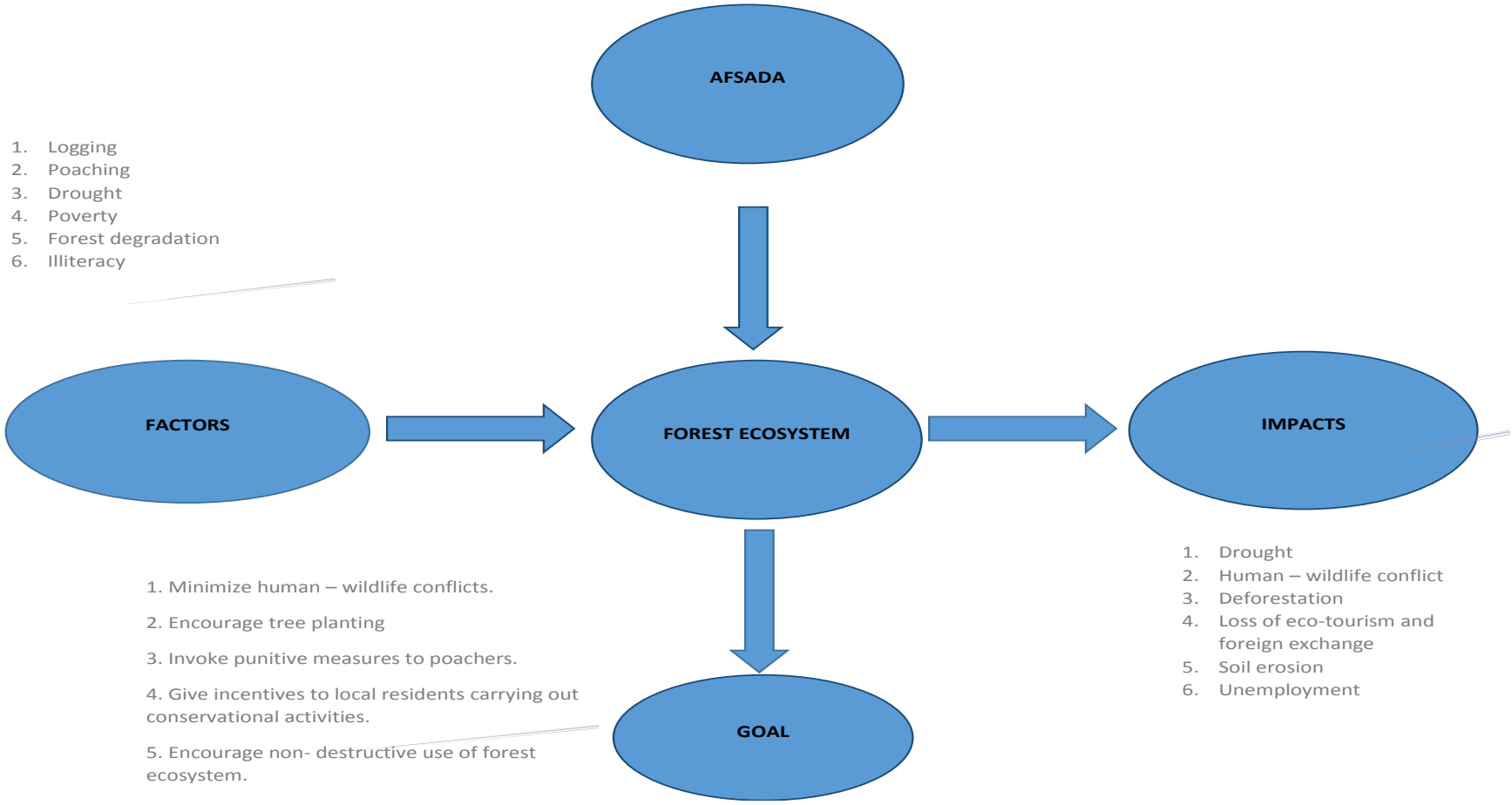
1.7 Theoretical Framework

The study adopts the environmental democracy approaches to conflict resolution. Environmental democracy is used to connote the right of an individual in taking part in the governance of the environment (Hazen, 2009). The study also borrows from the Deep Rooted Conflict Theory by Vern Redekop (2002) which analyses conflict into three levels with their corresponding processes used to address them as disputes, addressed through Settlement, Underlying Conflicts addressed through Resolution and Identity-Based Deep Rooted Conflicts which are addressed through Reconciliation. This is in tandem with the principle of equal rights for each individual. It includes public entities, community workers, lawyers, industrialists, trade unions, academia, government leaders and other cadre of experts involved in environmental governance. Environmental democracy gives an opportunity to every individual whose life is affected by the

quality of the environment to participate in environmental decision-making as freely as they do in other public interest matters like health care, education, finance and government. This offers a chance for the local communities to have a stake and ownership of the Natural Resource and to benefit from the proceeds as per the Rio Declaration (1992). The alternative dispute resolution methods in managing human wildlife conflicts provide an interface and strong linkages between natural law, environmental democracy and the conceptual model on a casual and effect basis.

Figure 1.1 Conceptual model

MANAGEMENT OF HUMAN-WILDLIFE CONFLICTS USING LOCALIZED GOVERNANCE STRUCTERS: CASE OF ARABUKO SOKOKE FOREST KENYA



Source: Field Research 2016

Fig.1.1 Conceptual Model

1.8 Research Methodology

1.8.1 Introduction

This section is concerned with methods and instruments used to do this research. The methods which were used to collect data are explained. Sampling methods and study areas are also explained. This section demonstrates the research design, the study population, sample size, sampling techniques, data sources and the data collection instruments.

1.8.2 Research Design

Research design is a plan or road map for carrying out a research. The study adopts descriptive design which uses words, sentences and explanations. Descriptive survey is mainly concerned with description of present conditions in details. The survey gathers data at a particular instance with a view of identifying the standards against which existing conditions may be compared with past conditions as well as determining the relationship that exist between specific events. The method helps the researcher to gather both quantitative data and qualitative data.

1.8.3The Study Area

The study area is within the coastal zone of the Republic of Kenya. Arabuko-Sokoke Forest is the largest coastal dry forest remaining in Eastern Africa. It is number two in Africa in birdlife conservation after Congo forest. Its ecosystem is composed of three forest types namely, mixed forest, branchy stegia woodland and cynometra. Each of these contains different rare species of birds, mammals, butterflies and plants.

The forest boasts of being habitat to over 160 elephants which continue to reproduce and enrich ecotourism of the area. It was first protected as a crown forest in 1943 and was gazetted in the 1960s. Arabuko – Sokoke forest is a natural resource base to several tribes among the Mijikenda such as the Giriama, Kauma and Chonyi who forcefully displaced the Sanya who originally occupied the forest ecosystem. Other ethnic groups that live within its environs are the Arabs, Bajuni, Gala and a few Indians and Europeans who have migrated to the area and settled. The area has both red sand soil as well as white sand soil in some isolated places. The topography is mainly flat isolated hilops rocky limestone. Arabuko-Sokoke Forest is located 110km North of Mombasa. It traverses three Sub-Counties of Ganze, Kilifi North and Malindi at a latitude of 3^0 20'S and longitude of 39^0 E. Its buffer zone and periphery is surrounded by 50 villages with a population of 104, 000 while Mida the specific area of research has a population of 6535 with 850 households (KNBS). It is 45 km from Kilifi town and 20 km south of its nearest town of Malindi. The forest covers an area of 420Km^2. One of its periphery areas which offer historical and environmental interest is Gede Ruins and the Mida Creek which are famous for their rich mangroove plantation. Due to elephants' invasion of farm plantations in its environs, the forest has since been fenced as a mitigation effort against Human-Elephant Conflicts (HEC). However, baboons continue to play havoc on the crops of the adjacent communities.

1.8.4 Target Population

The target population was based in Kilifi County in the Republic of Kenya and to be precise, Arabuko-Sokoke forest reserve. Whereas there are many adjacent villages to the forest the researcher zeroed down on Mida which is in Mida sub-location, Gede location, Malindi sub-county within the periphery of the forest with a population of 6535 comprising of 850

households (KNBS,2010). The households were then randomly selected using the following scientific formula : Booth *et al*., (2008), to determine the sample size.

$$n = \frac{(z^2 \; x \; p \; x \; q x \; N)}{e^2 \; (N-1) + (z^2 \; X \; p \; X \; q);}$$

$$n = \frac{(1.96)^2 \, x 0.05(1-0.05) \, x 850}{(0.05)^2 (850-1) + (1.96)^2 \; x \, 0.05 x \, (1-0.05)}$$

$$n = \frac{850}{0.0025 \; (849)} \; n = \frac{850}{2.1225} \; n = 400$$

where: n = Sample size (being determined), N= Population size (Number of households which is known), p=Sample proportion (assumed to be 0.05, if not given), q= 1 – p, e= 0.05 (since the acceptable error level of significance) should be 5%) and z=Standard deviation at a given CI(z = 1.96 at 95% Cl). Cl connotes confidence level.

The formula stated yields a sample size of 400 within margin of error of 5 %. 400 households heads were interviewed by use of questionnaires because of their maturity and long experience in residing in the buffer zone.

The Arabuko-Sokoke forest adjacent Dwellers Association (ASFADA) officials, village Development Forest Conservation Committee officials (VDFCC), the County Wildlife Conservation Compensation Committee (CWCCC) were interviewed on Focus Group Discussion (FGD) bases. Primary data was collected through a survey among 400 households specifically targeting the human-wildlife hot- spots and the three mentioned associations above.

1.8.5 Data Collection Methods

The study set off with a review of the existing literature on causes of environmental conflicts in Sub-Saharan Africa, Kenya, and Kilifi County (Arabuko- Sokoke Forest Reserve). Questionnaire and interviews with key informants were used to collect data. Questionnaires contained both structured and un-structured questions with open ended questions to allow well thought out responses from interviewees. Such questionnaires are suitable for research because the responses given are anonymous and chances of getting true answers are high.

The study also employed use of focus group discussions (FGDS) especially where it was deemed appropriate to interview resourceful individuals likely to give detailed information. In this case the researcher will interview the County Director of Environment, Chief Forest Warden at Arabuko-Sokoke forest reserve, the Arabuko-Sokoke Forest adjacent Dwellers Association (ASFADA) officials, Village Development Forest Conservation Committee officials (VDFCC). Others interviewed included Community Forest Association officials based at Sokoke, Gede, Mida, Kenya Medical Research Institute (KEMRI) and representatives of the non-organized people living adjacent to the forest.Representatives from National Museum of Kenya (NMK) officials managing the Butterfly (Kipepeo) Farm at Arabuko forest, Birdlife International officials working under UNESCO important Bird area (IBA) sight where 20% of the Kenyan birds are found KWS, KFS, KEFRI, CWCCC and the County Environmental Chief Officer were interviewed.

Secondary sources of data included text books, journals, the internet and on-line e-libraries, the Forest Conservation and Management Act 2016, the Wildlife Conservation and Management Act (WCMA 2013), conference papers, Newspapers and other media reports. The importance of

secondary sources of data is anchored on the fact that they give insight into efficiency, challenges and opportunities in resolution of human-wildlife conflicts internationally and emerging issues in environmental conflict management.

1.8.6 Validity of the Research Instruments

Validity is the confidence that an instrument measures what it is intended to measure in a given situation. The questionnaire and checklist was first pre-tested with few respondents outside the target population. Errors detected were corrected to reaffirm validity of research instruments.

1.8.7 Reliability of the Research Instruments

This is the extent to which a research instrument yields consistent results at different times. Reliability can be determined by retesting the same experiment at different times and consistent responses thereby determined. Reliability of the research instruments was duly carried out.

1.8.8 Data Analysis and Presentation Methods

Data was collected, coded, cleaned and analyzed using a statistical package. Descriptive statistics was used to analyze the data. Tables of frequency distribution percentages, pie charts, graphs and pictograms were used to represent the data. The impact of the alternative dispute resolution methods in managing human wildlife conflicts was measured through pictorial and graphical presentation of data. Relevant interpretation, discussion and recommendations were inferred from the analyzed data after which results were published in thesis and scientific journals.

1.9 Chapter Outline

Chapter one constitutes the introduction to the thesis. It constitutes the background to the study, statement of the research problem, the objectives of the study, research questions, and justification of the study, literature review, study gap, theoretical framework, conceptual framework and research methodology.

Chapter Two explores an overview of approaches to human wildlife conflict management. It delves into human wildlife conflict as a global challenge in a dynamic world, preventive approaches for human wildlife conflict management such as barriers and fences, physical repellents and mitigation approaches such as agricultural strategies, sustainable animal husbandry strategies, compensation schemes, insurance policies and reasons for human-wildlife conflict management failure.

Chapter Three examines the root cause of human-wildlife conflict at Arabuko-Sokoke Forest which include, commodities sought by local communities in the forest, proximity to boundary, perceptions and beliefs of local residents among other causesand chapter summery.

Chapter Four examines the management of human wildlife conflict in Arabuko-Sokoke Forest. It explores participatory planning, monitoring, collaborative human wildlife conflict management, nature of wildlife verses local communities perceptions,the effect of human wildlife conflict management interventions and chapter summary.

Chapter Five explores theactors in the human wildlife conflictmanagement at Arabuko Sokoke Forest. It looks at legal status, biodiversity, human population adjacent to the forest, policy and institutional background, legislation, governance and administrative framework, the Arabuko-Sokoke Forest Management Team (ASFMT), partnerships withNature Kenya, Kenya Wildlife Service (KWS), National Museums of Kenya (NMK), Kenya Forestry Research Institute (KEFRI), Kipepeo butterfly farm and the Mida Creek Conservation Community.

Chapter Six explores a critical analysis of alternative dispute resolution methods employed in the management of human-wildlife conflicts at Arabuko Sokoke Forest. It pictorially shows the impact of alternative dispute resolution methods based on tables and figures and chapter summary.

Chapter Seven outlines the summary, conclusions based on the study's findings and recommendations. It finally gives proposals for further study and research.

CHAPTER TWO

APPROACHES TO HUMAN WILDLIFE CONFLICT MANAGEMENT:AN OVERVIEW

2.0 Introduction

Chapter one explored the problem, justification, theoretical and empirical literature review, research methodology, design, data collection process, data analysis and interpretation,validity and reliability of data collection instruments. This chapter explores a general overview of the approaches pursued in human –wildlife conflict management. The chapter strives to bring out the various strategies employed in managing the said menace. Conflict between the humans and wild animals is one of the most widespread and intractable issues bothering conservation scientists, environmentalists, sustainability scientists, top government officials and other policy makers. The conflict poses crucial threats to many wildlife species in the 21st century, drawing the attention of the global community due to threats of climate change and global warming amongst others (Earth Summit, 2002).

Damage orchestrated by wild animals serves as the sole driver of human wildlife conflicts.There are many approaches available to reduce it. It is of much concern that conflict often continues long after damage reduction. This is pointer to the fact that conflict requires diligent, integrated and elaborate approaches to resolve it sustainably. It is imperative to note that local communities' attitudes towards wildlife are usually complex, with social factors as diverse as religious affiliation, ethnicity, cultural norms and beliefs, all of which shape conflict intensity.

It is further imperative to note that these conflicts are manifestations of underlying human – human conflicts. For example, conflict involving people of different cultural backgrounds or between government authorities and local communities. Although there is empirical evidence in literature regarding the importance of social factors in causing conflict than damage driven by wildlife, the said social factors are not taken seriously by human-wildlife conflict managers. Crafting a broad-based awareness of conflicts drivers enhances knowledge of patterns and underlying processes of the conservation problem at hand. This chapter intends to navigate and interrogate therole played by social factors in influencing perceptions of human-wildlife conflicts. It will further highlight how mitigation methods must become aggressively innovative and interdisciplinary so as to allow local communities migrate from conflict to co-existence for sustainable development. Before reviewing different approaches of human wildlife conflict management, a review of challenges posed by human wildlife conflict is necessary.

2.1 Human – Wildlife Conflict: A Global Challenge in a Dynamic World

As earlier explained conflict between humans and wildlife has become a global conservation thorny issue. The menace involves an immense diversity of circumstances and animal species which span from grain eating rodents such as mice and rats to man – eating tigers (Pimental *et al*.,2005; Barlow, 2009). Living in the same ecosystem with such species normally imposes heavy costs on the local communities which may include depredation on domestic animals or wildlife (Thirgood *et al*., 2005), property destruction, stored food destruction (Perez and Pacheco, 2006), attacks on human beings (Packer *et al*., 2005), transmission of diseases to livestock, humans and other opportunity costs, thereby forcing local communities to forgo

economic or lifestyle choices because of co-existing with wild animals in the same conservation areas (Woodroffe *et al*., 2005).

Lethal control is the immediate response in case of invasion by wild animals. In this regard, a variety of species such as crowned eagles, lions, elephants, buffaloes, leopards, monkeys and baboons, among others are in danger of extinction (Frank *et al*. 2006; Sarasola and Maceda, 2006; Kumar *et al*., 2008). Some sections of the globe like the Americas, Europe, China, India as well as Kenya have experienced increasing cases of human wildlife conflicts. This has been occasioned by huge human populations which move and occupy forest zones which had not been previously inhabited. On the other hand animal species migrate seasonally and reoccupy some of their rangeland (Skogen *et al.,* 2008). These challenges and matched responses have elicited a lot of interest from conservation biologists and world nations in regard to the human – wildlife conflict menace.

2.2 Technical Approaches for Human – Wildlife Conflict Management

Technical approaches for human–wildlife conflict management only contribute towards lessening conflict. They do not eliminate it. Technical strategies work to the reduction of the magnitude of wildlife damage suffered. This is according to Breitenmoser *et al*., 2005, Marker, Dickman and Macdonald, 2008 and Woodroffe *et al*., 2007. Premafacie, conflict resolution looks like a very simple endeavour where expectations are that once appropriate approaches are invoked to curb conflict, animosity towards the species causing havoc will stop. Contrary to this notion, there is adequate evidence which attests to the fact that complete, long term conflict resolution is very hard to achieve, even in circumstances where approaches have been carried out

(Marker, 2002; Webber *et al*., 2007). Despite the fact that conservation scientists cite wildlife damage as the main reason for conflict between humans and wildlife, (Sillero – Zubiri, *et al*., 2001), causes of conflict are very complex and deep- rooted, hence an all-inclusive strategy must be employed so as to abate the conflict totally in the long term.

2.2.1 Physical Separation of Conflicting Species and Resources

The approach here involves fencing, enclosing resources, use of repellents, deterrents and scaring devices. It also involves fencing of protected areas with electric fence. Digging trenches, netting and other defence structures around the resources is characteristic of this approach. Further, use of visual repellents, chemical repellents, rubber bullets and radio activated guard boxes is part of this approach (Hill *et al* 2002, Kalpers *et al* 2010).

2.2.2 Guarding Assets

This approach involves guarding and use of animals which sound warning to intruders. Here, special animals such as trained dogs (Mbwa Kali), animals like donkeys and domestic dogs are used to raise an alarm on predator presence(Patterson *et al*.,2004) The technique also involves human guardian resources (Askari), to keep vigil in farms to chaseinvading animals, pastoral thieves and also to guard and scare away any carnivores. In the same vein, physical devices such as protection collars, king collars and cyanide collars are put on livestock to identify them and make noise as a gimmick to scare away any intruders (Sekhar, 1998) According to Treves and Karanth (2003),the utilization of domestic guard dogs has found successfully managed the predation risk from black bears and cheetahs.However, it is less effective with wolves and grizzly bears(Treves and Karanth,2003b).By the same token, North American dogs are often left

alone to protect domestic animals and are not as effective as in Europe or North Asia where shepards and ranchers deal directly with their dogs (Musiani *et al.*,2003).

2.2.3 Habitat Use and Modification

This technique involves manipulating the habitatas a meansof reducing conflicts. For example, airport authorities implore mowing of vegetation for reduction of bird strikes. Some forest authorities alsoinvoke burning of vegetation to cover for problematic wildlife. Habitat zoning is part of this approach. Under this strategy, habitat is demarcated into different land use zones to prioritize human or wildlife use (Kagombe and Mwendwa,2000). For example, Arabuko forest has been divided into forest management zones such as non-extractive zone, subsistence zone, commercial zone and intervention zone. The essence of zonation is to bring about specialization on how different zones in the forest can be sustainably managed to ensure sustainable conservation of the biodiversity of the forest ecosystem (Mwendwa, K.A.2000).

2.2.4 Behaviour Modification of Conflict- Causing Animals

Here, conditioned taste aversion is implored. For example, poisonous salts such as Lithium chloride as well as other toxic compounds are applied to the resources to cause discomfort to the culprits. After consumption, the animals are naturally compelled to change behavior or direction altogether (Shivik *et al.*, 2003). Prudent livestock management is part of this approach. It entails scientificmodes of breeding, more conscientious herding, guarding, raring livestock under enclosures (walled and gated bomas), scientific methods of carcass disposal and avoiding conflict hotspots. This method has not been very successful at Arabuko-Sokoke Forest because it

denies the wildlife of their freedom of movement as advocated by the environmental democracy approaches advocated by Susan Hazen (2009).

2.2.5 Behaviour Modification of People Responsible for Forest Resources

This involves relocating people. The local communities are advised to migrate from animal dominated zones.Requisite capacity building and education is imparted to the local people. They are taught on risk reducing factors such as reduction of driving speed to avoid deer- vehicle collision and best techniques of reducing conflict (Madhusudan, 2003).

2.2.6 Use of Buffer Resources

This technique uses buffer plants and vegetation, availing of alternative sources of food and maintaining the alternative sources of food. For example people in Kirepwe Island across Mida Creek Plant Moringa Oleifera (Mzungi) to supplement relish while it gives ten other nutritional ingredients to the human body. Moringa Oleifera has been scientifically proven to provide calcium, iron, Antioxide Activity (AOA) with vitamin A, B and E and also fiber and body immunity. Consumption of Moringa Oleifera products also increases milk production to breast feeding mothers. Since Baboons do not eat this crop, this helps in averting the human wildlife conflicts in the said area (Mwalimu, A.(2017) Game tour guide KFS. Interview held at Arabuko-Sokoke Forest regional offices, Gede on 22 March 2017).

It is further imperativeto maintain wild prey for carnivores such as lions and wild crops for herbivores.This ensures that the animals do not consume commodities meant for humans.

Diversionary feeding of conflictcausing animals also helps in mitigating the human – wildlife conflict.

2.2.7 Lethal Control of Conflict – Causing Species

This method is about animal population control. It involves ruthless killing of conflict causing animals as a strategy of averting conflict. It also involves selective culling of animals to suppress growth in animal population. Another strategy is retaliatory killing.This involves killing the conflict causing animals in response to ongoing conflict in the locality. Under this approach also comes problem animal control. This strategy targets to invoke lethal control of all problems animals.

2.2.8 Non-Lethal Control of Conflict-Causing Animals

This method involves sterilization and removal or translocation of problem animals. Use of contraceptives, physical sterilization, putting into captivity of conflict causing animals is invoked.

Another non-lethal control approach is reducing costs of conflict approach. This involves the alleviation of economic costs associated with conflict. It advocates for compensation for wildlife losses and insuring the resources. Another technique is giving economic incentives to contain the species that exacerbate conflict. Local communities are paid directly for conserving conflict causing wildlife. For example, the people of Arabuko Sokoke Forest Buffer Zone would be given monetary compensation for living alongside with elephants and baboons.

2.2.9 Alternative Income Generation Projects

Alternative income generation is yet another community based approach. This entails diversification of income sources to divert human dependence on the forest ecosystem under human – wildlife conflict. For example locals of Arabuko Sokoke Forest diversify income through the KIPEPEO farm at Gede ruins which is under Arabuko-Sokoke-Forest (ASF) and National Museum of Kenya (NMK). Another income generation enterprises is beekeeping for honey production which is also being done at the Mida Creek Mangrove ecosystem honey projects.

2.2.9.1 Increasing benefits of Wildlife Conservation to Local Communities

Increasing benefits of wildlife conservation to local communities is another non-lethal control approach. For instance through ecotourism, profit sharing schemes, wildlife based employment such as wood carving, increasing lifestyle benefits such as providing recreational aesthetic benefits through activities like wild animal viewing, hunting or providing meat from wild animals' hunting. It is strongly anticipated that invoking a culture of environmental entrepreneurship to the local communities will go a long way in curbing the human–wildlife conflict (Mishra *et al.*,2003).

2.2.9.2 Agricultural Strategies

Agricultural strategies offer some of the best methods to manage human wildlife conflicts. Practices like changing the crop planting time or harvesting time could help in decreasing crop raidsby wild animals.

To accomplish this, use of special breed of maize seeds like the hybrid 1 (Katumani) which mature early and can hence be harvested earlier than other food crops is imperative. As a result of their early maturity time, such maize species are less vulnerable to damage by wildlife which occurs later in the crop growing period.

Through intensive farming, mechanization, application of organic fertilizer and irrigation, farmers canget optimal returns from smaller tracts of land thereby making it easier for them to guard against crop invading elephants, monkeys and baboons. Intensification can be achieved through introducing practical, environmentally sound techniques like the use of organic fertilizer and mulching (Timber Producers' Federation, 2006).

Small patches of crops scattered over a large forest inhabited by wild animals canbe easily destroyed than those that are clustered together. By this token, a landscape strategytowards reduction of human-wildlife conflict should entail crop plantations in large communal fields with straight fences or edges. This may entail clearing the nearby bush and habitat to guard against wildlife crossing. This is because baboons and bush babies do not like crossing open areas.

2.2.9.3 Sustainable Animal Husbandry Strategies

Livestock raids by wild animals can be lessened by sustainable animal husbandry practices like grazing during daylight, securing livestock in predator proof enclosures at night and keeping off predators' zone of influence.

Adding to this, herders should desist from driving domestic animals to rivers inhabited by crocodiles or other water born species. Prudent animal husbandry also needs vigilance and

willingness on the livestock farmer to confront and chase away livestock predators as the need arises.

2.2.9.4 Compensation Schemes

Direct compensation is done through payment when a person dies, injury or domestic animals killed by carnivorous predators or elephants. Such schemes usually get funding from conservation organizations like the Global Environment Facility (GEF) or by the National Government through KWS. These schemes are carried out to boost damage tolerance among the local communities affected and hence prevent them from hunting and killing the animal culprits like lions, elephants and baboons (Treves et al, 2003).

There exist some compensation schemes to cater for the losses brought about by wildlife within sub – Saharan Africa. However, majority of African nations do not compensatefarmers for damages caused by wild animals. They argue that these schemes cannot do much in reducing human wildlife conflicts. They further argue that these schemes have been associated with much red tape, are less accountable, less transparent and hence redundant (KWS, 1996).

Majority of compensation strategies have failed because of challenges occasioned by obscure bureaucracy, cheating, fraudulent claims, corruption, long procedures, high costs involved, moral hazards and the fact that most illiterate farmers find problems in filling and submitting the compensation claims. Coupled with this, there is also the problem of competent personnel to move, verify and quantity damage involved over large areas. These bottlenecks lead to delays in decision making on the part of KWS officials, low monetary amounts, inadequate payments,

irregular payments, or worse still, rejection of the compensation claims altogether (Muruthi, 2005).

2.2.9.5 Indirect Compensation Scheme

This is an alternative compensation scheme which dwells on giving out licenses to local community dwellers to exploit and use natural resources. In this regard, locals are dully licensed to carry out ecotourism, hunting, collecting mushrooms fodder or timber from the forest.

This type of compensation is more preferred than monetary payment. According to Sekhar, (1998) it is a proven fact that local communities' perceptions and attitudes are motivated and influenced by the right of access and legitimate use of forest resources.

2.2.9.6 Insurance Policy

This is an innovationto compensate farmers who make premium payments to cover themselves against some defined riskslike livestock depredation among others. Such premiumsare normally set at the prevailing market rate or subsidized as per the provisions of the conservation organizations such as United Nations Environmental Programme (UNEP) and Global Environment Fund (GEF). The insurance policy scheme needs accurate assessments of the causes of the crop damage, livestock depredation, humanswho have died or injured. Since it is operated locally, reports can easily be verified. The method calls for participation by farmers to mitigate against human wildlife conflict but according to Muruthi, (2005) it is more viable.

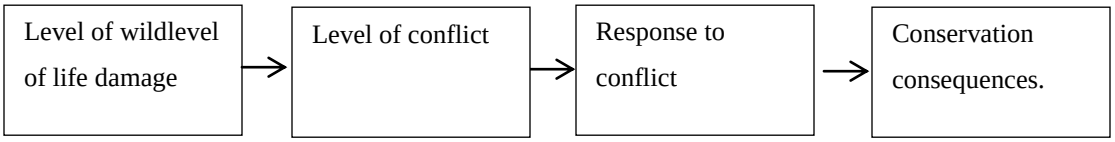
2.3 Navigating the Reasons for Human Wildlife Conflict Management Failure

The approaches enumerated above stand out to be the most appropriate strategies to mitigate against the human wildlife menace. However, the question that begs an answer is what is the impact created by these resolution methods? An overview of possible reasons for continued human – wildlife conflicts despite application of the approaches mentioned in this study are hereby explained.

2.3.1 Complexities of Human – Wildlife Conflict

There exist numerous reasons as to why conflict managementinitiatives might fail to achieve envisioned sustainable outcomes.Issues of human wildlife conflicts pretty much depend on local conditions. Scientists and conservation professionals many times make important assumptions regardingbehaviorand human attitudes when managing conflict.However, many times the variance between assumed and actual behavior is amazing. Figure 2.1 below shows an example of an ideal situation of the human wildlife conflict process which most conflict managers assume.

Figure 2.1 : Rational Conceptualization of the Human – Wildlife Conflict Process

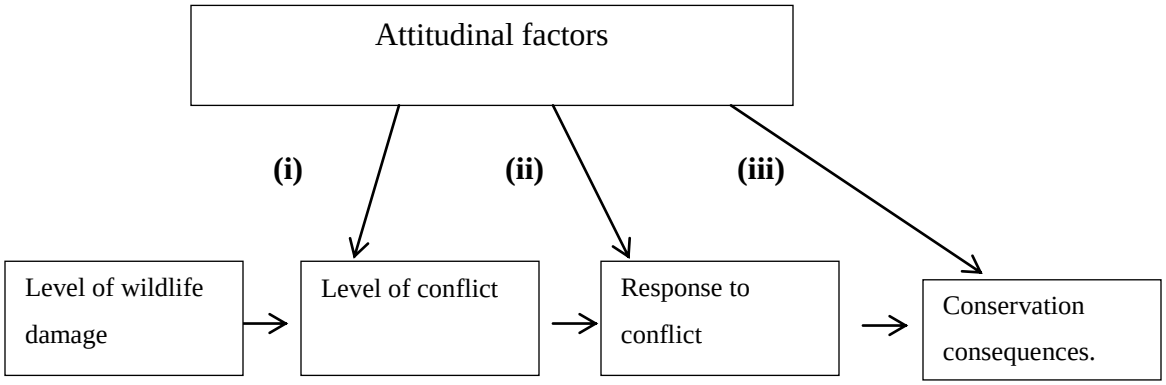


Source: Author, 2017

This narrative adduces three assumptions which are: That the level of wildlife damage is directly linked to the level of conflict generated or generated, that the level of conflict brings about a proportionate response and that altering conflict response will have proportionate conservation effects.

However, in practice, there are vital attitudinal factors that affect the relationship between all these components as depicted by figure 2.2 bellow.

Figure 2.2: Impact of Attitudinal Factors on the Perceptions and Consequences of Conflict



Source: Author, 2017

It needs to be known that differences in attitudinal factors mayresult to significant departures from the anticipated human – wildlife conflict management model. Failure in considering such departure cans criticallyimpact the direction of a conflict management assignment.

Cognizance has to be taken in that different people respond differently under different conflict circumstances. Hence severalfactors have to be considered. This are the accuracyin level of damage assessment and severity thereof. These factors affect the perceived level of conflict, whether the management of the species is directly linked to the reported conflict and the intensity

of an individual or groups' response to the conflict. There are, therefore, the three major factors affecting the variance between the commonly held assumptions and actual behaviour.

These are perception of risk, disproportionate response to conflict and social influences. It is imperative that human – wildlife conflict managers examine their local conditions critically so as to know which factor influences conflict prior totaking a decisionon methods believed to yield optimum outcomes under given circumstances. For a deep understanding, these factors are hereunder discussed.

2.3.2 Perceptions of Risk

Social factors, culture, values, ideology and historical patterns greatly influence concept, understanding and reactions to risk. This is particularly so regarding ideas of what or how the world be (Boholm. 1998, Sjoberg, Moen and Rundmo, 2004).

For example, a scholarly study by Starr (1969), on how people perceive, tolerate and accept risks, showed how people generally more willing to take risks voluntarily contrary to the risks imposed by external forces. Such revelation is very important.Buffer zone communitieseasily blame external organizations for imposing wild animals with their attendant risks upon them. For example, in Norway and France, many farmers suspected that special breed of wolves were secretly reintroduced into their farms (Skogen, et al; 2008). Further, scholarly research at Kabale Forest in Uganda, indicated that even though domestic animals caused two times crop damage compared to wild animals, the indigenous people resented the wild animals much more because

they perceived the wild animals to belongto the government and imposed on them by external organizationsinstead of being tolerated voluntarily (Naughton – Treves and Treves, 2005).

Individuals who dependon a single livelihood avenue tend to be antagonistic towards dangerous animals. Thereasoning is thatchances and consequences of resources destruction are aggravated by absence of alternative assets or income avenues. It should be noted that there is a difference between being at risk vulnerability to risk. It is a proven fact that predator attacks are more likely in areas close to forests, as exemplified by Arabuko Sokoke forest.By the same token, puma and jaguar attacks have been prevalent in parts of Brazil (Palmeira et al; 2008).It, therefore, follows that a person grazing livestock near a forest is more at risk than the one far from the forest boundary. Regardless to this, if that individual hasmore wealth, alternative income sources and is sociallyesteemed by the community, such a person is deemed less vulnerable to the predators' attacks than others (Naughton- Treves and Treves, 2005).

Being endowed with extra sources of wealthand coping mechanisms, therefore, is very important in the reduction of vulnerability. Such mechanisms are part and parcel of what befalls most indigenousfarmers who face environmentally induced hazards more regularly (Butt et al, 2009).

2.3.3 Social Influences

Besides proven facts and personal experiences, other factors like culture norms, expectations, beliefs and societal experiences equally affect people's perceptions.Although the said factors play a very important role in aggravating human wildlife conflict, they are rarely taken into account.When it comes to folk- lore, animals play central positions in influencing culture and attitudes for certain categories. For example, people in North Eastern Madagascar, believe in the

myth that the aye-aye *Daubentonia Madagascarensis* is a harbinger of doom.Based on this myth, people kill the aye aye every time it is seen and they believe that a whole village should be burned down and abandoned if an aye-aye is sightedin the village periphery (Glaw, et al; 2008).

Further, in Tanzania, spotted hyenas spur violent conflict becauseof the belief that some ethnic categories bewitch and coach them on killing other people's household animals. Therefore, tensions over hyena depredation are aggravated by such intergroup suspicions (Dickman, 2008). Further, it is believed in Mozambique that individuals are able to invoke witchcraft powers to change dimika tree branches into invisible lion spirits which they use to attack their adversaries (West, 2001). As a result of these perceptions of people changing themselves into animals form sorcery powers, animals such as elephants, bearded pigs, lions and chimpanzees have found themselves as victims of human-wildlife conflict.

It is interesting to know that in developed nations where concepts of evil spirits and sorcery are neither here nor there, human–wildlife conflict can be significantly affected by intergroup hostility. For instance a pigeon Columba livia shootingextravaganza was held every year in Pennsylvania (USA).The excuse for these festivals was pest control (Hoon Song, 2000). The truth is that pigeons did not cause any damage locally but they had to be shot because of their association with urban moral decay.They particularly abhorred them because of issues related to homosexuality, HIV and drug taking. Hence the authorities advocated for shooting pigeons instead of dealing with the problem of drug barons.

2.3.4 Environmentally Induced Risk Factors

Environmental risk factors affect human wildlife conflict due to intensity of havocdriven by wild animals. For example, farms nextto forest boundaries are most likely to suffer raiding by wildlife like wild Bear, Elephant and Baboon (Linkie et al; 2007). It is imperative to note that damage by wild animals often increases with scarcity in alternative food reserves (Tweheyo et al; 2005). Likewise, land use methods and its management can equallygreatlychange the likelihood and direction of conflict. For example, changing from maize to chili farming (Hot Pepper) which is not edible to crop invading animals like elephants and Baboons can improve local livelihood security and reduce conflict with wild animals (Osborn and Parker, 2006). This method has been practiced to a great success in Zimbabwe.

2.3.5 Social Risk Factors

Antipathy over perceived power imbalancesgreatly triggers the occurrence of conflict. For example, rural communities are always aggrieved by the wildlife damages which they perceive as being protected by more influential urban elites (Skogen, et al; 2008).

Such issues are provoked by distrust or antagonism between groups as happens in Sierra Leone where people felt that Chimpanzee attacks on local people were exuberated by powerful external trading elites, who they suspected shape shifted into Chimpanzees and killed local youths for their body parts (Richards, 2000). Further, it is important to note that vulnerability can play an important role in intensifying human – wildlife conflicts.

Likewise povertyequally aggravates vulnerability and hence level of hostility to costs imposed bywildlife.Eventually, it is the belief and value system of anygroup or individual that will of essence determinethe perception of damage by wildlife.Beliefs based on religion and spiritual issues have important bearings on human wildlife conflict. For example, Evangelical alliance movement beliefs are hostile to wildlife as Hazzah (2006) posits. Further, Christian Pentecostal Ministries International biblically believes that snakes should be killed as and when spotted. This follows God's decree that the seed of the woman shall crash the head of the snake while the snake on the other hand shall bite the leg of the woman's seed. Even though this is may not be environmentally sound, the enmity between human beings and snakes is perpetual (Genesis Chapter 3).On the other hand Buddhist in Nepal believes that the snow leopard *panther uncia* should be preserved and that if it should die, it must be caused by thepunitive hand of their god instead of blaming the predators (Ale, 1998). The multiplicity and matrix gridofinteracting cultural, social and personal factors eventually determine how conflict- causing species are perceived, theof co-existing with them, and hence the degree of hostility applied to them. Such hostility can have important consequences.The said consequences can be either directly, by persecuting the culprit animals or indirectly by altering wildlife habitats to make them less comfortable for such animals.

2.4 Chapter Summary

This chapter explored an overview of approaches to human-wildlife conflict management. It established that there are many strategies and approaches to managing human wildlife conflict.

Some of the approaches that this chapter dealt with include preventive approaches such as physical separation of conflicting species, guarding assets and habitat use modification among

others. The study also explored mitigation approaches which include local communities' attitudes towards wildlife, social factors such as religious affliation, ethnicity, cultural norms and beliefs, all of which shape conflict intensity.

Community- Based Natural Resources management mechanisms were broadly explored. It emerged that the local communities prefer this approach. This approach calls for integrating other stakeholders ranging from local, national to global stakeholders. It works on a democratic, collaborative participatory management style which is all inclusive in planning and decision making processes. The resolution of human-wildlife conflict, therefore, calls for a multiple approach that takes into account not only local internal dynamics but also regional and international ones. In this regard, social influences, environmental risk factors social risk factors and perceptions of risk have to be taken into consideration before exploring the optimum model of approaches into managing human wildlife conflicts. Chapter three will explore the root causes of human-wildlife conflicts at Arabuko- Sokoke Forest.

CHAPTER THREE

THE ROOT CAUSES OF HUMAN-WILDLIFE CONFLICT IN ARABUKO SOSOKE FOREST- KENYA

3.1 Introduction

The root causes of human-wildlife conflict within the Arabuko Sosoke buffer zone are here under discussed.It is imperative to note that there exists a set of global trends which contributes to the exacerbation of human-wildlife conflict. These are categorized as human population growth, distance from households to forest boundary, land use and cover transformation, species' habitat loss, habitat degradation, forest fragmentation, road networks, infrastructure development, increasing interest in access to nature reserves and ecotourism. Other trends include competitive exclusion of wild herbivores, increasing livestock numbers,increasing wildlife population as a result of conservation programmes, abundance and distribution of wild prey,stochastic events and climatic factors as a result of traditional human practices. Additionaldriversof conflict include unemployment, poverty, influx of people, ignorance, inequality, illiteracy, cultural beliefs, lack of professionalism and high propensity to unskilled jobs.

The study posits that these drivers of human-wildlife conflict have a higher velocity when the Natural Law Theory propounded by J.M.Finnis (2002) is not adhered to. Further when environmental democracy as advocated by Susan Hazen (2009) is violated the said drivers move at a higher velocity resulting into escalation of human-wildlife conflicts.

3.2 Human Population Growth

Direct interaction between humans and wildlife is inevitable because of demographic and social changes. As human population grows, human settlements stretch into and near protected areas (IUCN, World Park Congress 2003). This trend is not only experienced in rural areas but also in cities and other cosmopolitan areas.In Africa, growth in human population has resulted in encroachment by human beings into wildlife habitats, confining wildlife species into marginal forest patches thereby escalating direct competition with local communities (siex*et al.*,1999).In Columbia,Canada,conflicts do not take placein nature reserves and rural setup but is often experienced in urban conglomerates as well.Contemporarily,human population density is positively correlated with encounters with cougar,grizzly bears and black bearsand has becomea daily occurrence (Ministry of land, water and air population, British Columbia,2003).

According to the Kenya National Bureau of statistics (KNBS 2013) the population of Arabuko Sosoke Forest buffer zone stood at 48,720 while the total population in Kilifi County stood at 456,297 with a population density of 116 persons in every square kilometre. This high population density leads to more frequent interactions between the human beings and the wildlife, resulting into a ripe environment for conflict.

3.3 Proximity to Forest Boundary

The mean distance from the local communities' households to the forest boundary has a bearing on driving human wildlife conflicts. With reference to table 3.1 the main distance from the Arabuko Sosoke forest boundary to the residents' housesstood at 6.49 km.The closest homestead to Arabuko forest boundary stood at 0.1 km while the furthest was 25 km.Most

homesteadsrangedbetween one and three kilometres from the Arabuko Sosoke boundary, while 20% of the homesteads were built less than one kilometer from the boundary. This close proximity of the adjacent communities' households to the boundary has posed as a major cause of conflict.

Table 3.1 : Mean Distance from Homesteads to the ASF Boundary

Distance in KM	**Mild point x**	**Frequency**	**Fx**	**Percentage %**
$0 \leq 3$	1.5	80	120	20
$3 \leq 5$	4	100	400	25
$5 \leq 7$	6	90	540	22.5
$7 \leq 9$	8	40	320	10.0
$9 \leq 11$	10	50	500	12.5
$11 \leq 13$	12	4	48	1.0
$13 \leq 15$	14	4	56	1.0
$15 \leq 17$	16	2	32	0.5
$17 \leq 19$	18	10	180	2.5
19 and above	20	20	400	5.0
Total		$\Sigma f = N = 400$	$\Sigma fx = 2596$	**100.0**

$$\bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$\frac{2596}{400}$$

Mean $= 6.49 km$

3.4 Land use Transformation

This root core driver of human wildlife conflict is a closerelative of human population growth. High population densities have escalated human activities. The said human activities have led to transformingsavannah, forests and other ecosystems to urban cities or agrarian areas.This is a direct consequence of increase in demand for food production, land raw materials and energy. For instance, in Gujarat India, on the edge of Gir National sanctuary, exuberating conflicts with leopards and lions (Panthera pardus) are as a result of rapid extensive change in land use related to the conversion of millet and groundnut fields into mango and sugarcane plantation cultivation.The said crops create conduciveenvironment for predators'survival thereby playing a leading role in influencing natural distribution and abundance of animal colonies (Vijayan and Pati, 2002).

In the Kenyan front, a number of counties endowed with much wildlife like Trans-Mara, Samburu, Taita, Kwale and Kilifi County, conflict is aggravated by small scale agricultural developments and land use fragmentation. As a matter of truth, state farms like the Agricultural Development Corporation (ADC) have been subdivided and corruptly sold on small holdings with cultivationbased on commercial horticultural crops (Kenya Wildlife Service, 1996).The Arabuko Sokoke buffer zone has witnessed a major transformation of the land in terms of illegal logging for timber for sale and building materials, pasture and quest for mining.

3.5Commodities Sought for by Local Communitiesin the Forest

Quest for access to natural resources from the Arabuko Sosoke forest by the local residents is a cause of the human-wildlife conflict. According to Natural Law Theory propounded by

J.M.Finnis(2002) and Environmental democracy by Susan Hazen(2009) local communities have a right to access natural and participate in management and decision making policies affecting their livelihood. In this regard, the Arabuko Sosoke forest community dwellers seek to access and harvest some natural resources from the forest.

Table 3.2: Commodities Sought for by Local Communities in the ASF Buffer Zone

Commodity	**Frequency**	**Percentage %**
Pasture	280	70
Water	100	25
Minerals	20	5
Total	**400**	**100**

As depicted by table 3.2, major items needed by the local residentsfound in Arabuko Sosoke forest encompass pasture, water and minerals. Pasture accounted for 70% of the items sought by 25% of the respondents while minerals were sought by 5% of the respondents.The local residents identified fifteen other items they seek from the forest. These include grazing grass, water, charcoal, housing materials,game meat, herbal inputs for pharmaceutical ingredients, forest vegetables, fruit, wood for carving, game trophies, mining resources, sand, honey, mushrooms and farmland for growing Moringa Oleifera(Mzungi).100% of the respondents confirmed that wild animals, particularly baboons trespass into their farms and homesteads to destroy crops and stored food respectively. This interaction breeds into conflict as humans keep vigil to ensure their crops, livestock and food stores are not invaded by wild animals. Conversely,as the humans access the forest in a bid to acquire the natural resources mentioned above, conflict ensues as the

wild animals in the forest plus the wildlife agents such as Kenya wildlife service patrol personnel see the humans as intruders in the forest ecosystem.

3.6Growing Interest in Ecotourism and Access to Nature Reserves

Aesthetic and recreational activities such as Game walk, photography, video shooting followed by an interest in the "big five" wild species such as lion, buffalo,elephant, rhino and leopard which are endangered species is chiefamongamongst other causes of the human-wildlife conflict menace. The said interest has increased human –wildlife interactionsaround protected areas and aroused concern onability to manage and control human access to the forest and macro utilization thereof. For example, as tourists take their game walk at Arabuko Sosoke forest Mida Ecocamp, wildlife get scared due to noise pollution and disturbance. This catalyzes conflicts and has led to human injury and deaths (Lynn,Graduate research assistant,Arabuko Sosoke Foerst,2016).

3.7 Species Habitat Loss, Degradation and Fragmentation

Another cause of human-wildlife conflict is species habitat loss, fragmentation and degradation. For example, alteration offorest areas into agriculture and grazing land has restricted the Sumatran tigers home range to small patches of forest. Presently, a minimal five hundred tigers are available on the entire island (Nyphus and Tilson, 2004b).

In Kenya, Arabuko Sosoke forest respondents' said that there is rampant human-wildlife conflict. Unlike the case in Sumatra Island, the most notorious culprit is baboon. Previously the elephant played much havoc on crops but this has been mitigated through the electrical fencing of the Arabuko Sosoke forest boundary perimeter (Mungai et al: 2008).

3.8Increasing Livestock Populations and Competitive Exclusion of Wild Herbivores

Large numbers in domesticanimal populations can culminateinto overlaps of diet and forage competition with herbivores such as elephants, zebra and girrafes.This leads to overgrazing and decliningnumbers in wild herbivore populations (Mishra et al:2003).For instance, in India, livestock are more than wild animals within protected areas. It has come to the fore that household animals graze in seventy three per cent of forest sanctuaries and thirty nine per cent of protected areas (Mishra,1997). This scenario creates a favourable environment for livestock to fall prey for predators. The situation at Arabuko Sosoke forest buffer zone is more or less similar to that in India. In this instance, the Giriama and Sanya natives keep livestock like cows, goats and sheep. These are normally left roaming on their own or with the vigilance of a little shepherd boy. Due to the enormous numbers of the livestock, predators find easy time invading them since the little Shepard flees for his life upon the appearance of the carnivores.

3.9 Human Activities on Wild Habitat

The drivers of conflict mainly relate to human activity in wild animal habitat. For instance in ape zones such as Arabuko Sosoke forest where baboons and monkeys have their habitation, habitat destruction and fragmentation means that the said primates continue to come into more frequent contact with poor people living subsistence lifestyle. Extractive and agricultural activities resulting from human population growth further exacerbate the level of human wildlife conflict. Research by Hockings and Humle 2009 posits that by 2030 not less than ninety nine per cent of African great ape habitats and not less than ninety nine per cent of orangutan habitats shall suffer because of adverse consequences arising from human activities (Hockings and Humle,2009).The primates at Arabuko Sosoke forest, particularly baboons and monkeys have become difficult to

tame. This is because of their high intelligence capacity, almost similar to humans. They quickly adapt to traps and scarecrows and easily brave human barriers and deterrents' (Knight, 2003).

3.9.1 Traditional Human Practices

Traditional human practices such as bushfires, gathering of water from natural resources such as rivers and boreholes, gathering deadwood to make charcoal, harvesting natural resources such as medicine,honey and dye are other causes of human wildlife conflicts. Further, use of snares, hunting with guns, bows and arrows leads to proliferation of small arms and weapons and catalyzes the human wildlife menace in the area under study (Hockings and Humle,2009).The Giriama and Sanya of Arabuko Sosoke forest buffer zone still exhibit traditional practices like igniting bushfires and slashing and burningshrubs. Such practices, apart from being backward oriented, cause conflict because they threaten dangerous wild animals such as bears, lions, leopards and tigers (Nyphus and Tilson,2004).In the course of fleeing for safety these wild animals adversely interact with livestock and humans and either injure or kill their prey(Hockings and Humle,2009,Nyphus and Tilson,2004b).

3.9.2 Logging

Of late, there has been rampant logging at Arabuko Sososke Forest.Here,logging is done both on small and large scale basis. Small scale logging is done by the local communities who access the forest to acquire building materials for their houses. Reference to table 6.10 from field data confirms that local communities use timber(100%) for building their houses.

Table 3.3: Materials used for Building Houses

Responses	Frequency (f)	Percentage%
Timber	400	100
Iron Sheets	0	0
Coral Bricks	0	0
Other	0	0
Total	**400**	**100**

Source: Field Data, 2016

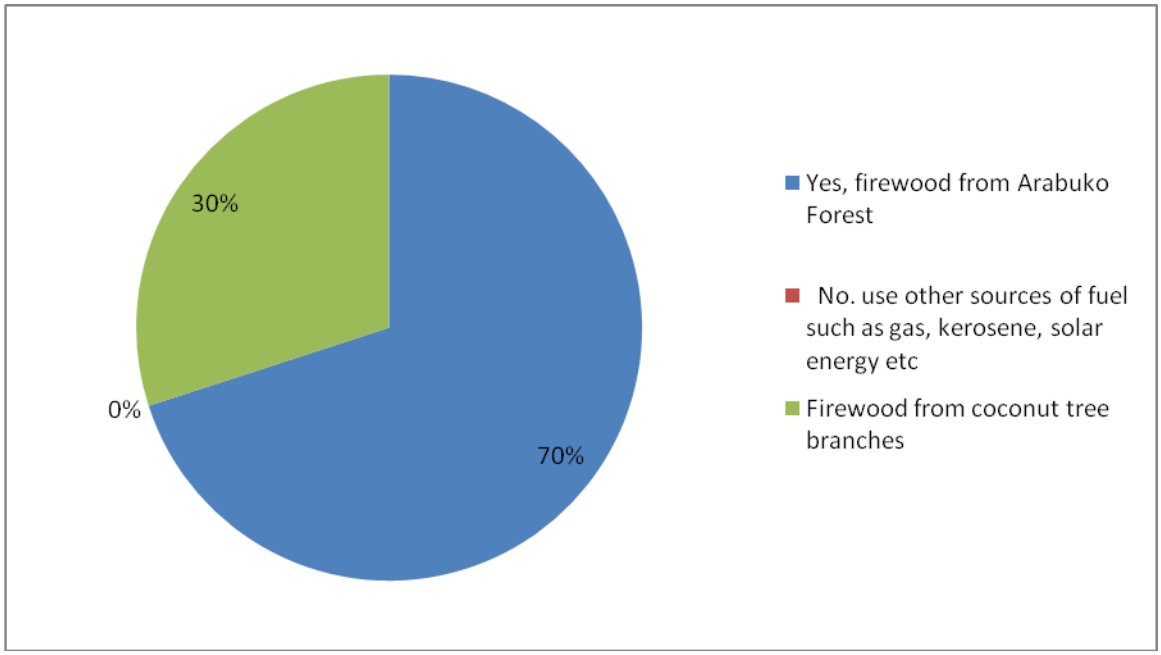


Figure 3.1: Charcoal as a Source of Cooking Fuel

Source: Field Data, 2016

Further, statistics generated from field data figure 3.1 depicts that 70% of respondents interviewed answered "Yes" to using firewood from Arabuko Sososke Forest.It is evident from

the field data that logging has been rampant given that local communities use timber for building materials, use firewood for cooking, use logs for charcoal and also for wood carvings. This is pointer to the fact that there is deforestation which threatens forest degradation. This further threatens lack of carbon sequestration which leads to climate change phenomena. This further points to global warming which is a major concern for the global community in the 21st century.

3.9.3 Road Network and Infrastructure Development

Road network is another cause of human wildlife conflict. For example the road which cuts across Arabuko Sokoke forest from Pwani University through Kakanjuni through Dida to Kangamboni has been a source of conflict as wildlife cross through the road to enter the other side of the forest (Otieno, O., 2001) .Further, the Mombasa-Malindi highway which stretches along the Arabuko Sokoke forest has been a source of injury through accidents both to humans and wildlife. A more contemporary example is the human-wildlife conflict which recently ensued due to the construction of the Standard Gauge Railway (SGR) from Mombasa to Nairobi.It cut through Tsavo National Park and Nairobi National Park which culminated into destroying and displacing wildlife from their natural habitat. (Environmental Tribunal stops phase 2 of standard Gauge Railway (Ogemba,p.2017).

Further, migrating birds to and from Mida creek have been associated with threatening aeroplane flights from the nearby Malindi Airport due to their danger of colliding with planes in motion. Bird, bat or butterfly in motion can cause a plane crush if it enters a plane and either confuses the pilot or enters the engine system (Marville, 2005).

3.10 Cultural Beliefs and Perceptions

Cultural beliefs and value systems are major drivers of human-wildlife conflict not only in Arabuko Sosoke forest but globally. Every society or cultural group has its own beliefs and perceptions regarding certain wild animals. For instance, as already seen in chapter two, in Norway and France, many farmers suspected that special breed of wolves were reared in secret places and brought into their farms(Skogen et al:2008). At Kibale National Park in Uganda empirical literature indicated that even though domestic animals caused double crop damage compared to wild animals, the local people resented the wild animals much more because they perceived the wild animals to be owned by the state and imposed upon them by outsiders rather than voluntarily co-existing with them on voluntary bases (Naugton-Treves and Treves,2005).

Further, cultural attitudes towards certain animals can cause human-wildlife conflict. For example, in North Eastern Madagascar, the mythology that the aye aye Daubentonia Madagascarensis is a harbinger of doom compels people to kill it whenever they see it. They actually believe that if it is seen moving around a village the whole village must be burnt down and left desolate as a matter of cleansing it with its dwellers (Glaw et al:2008).

For instance, in China, Rhinos are quite endangered because of the belief that rhino horns are medicinal and increase libido on men. This belief has made the rhino trade in China to blossom such that a kilo of rhino horns costs U$ 6250.This revelation has intensified poaching for the rhino species thereby threatening their extinction. This myth may not have been scientifically proven but because the people believe in it, the wild animal is endangered (Namasyo, G ,2015).

At Arabuko Sosoke forest, there has been the cultural belief that baboons are most notorious in destroying crops and small livestock such as goats, sheep and chicken. As a result of this belief baboons are naturally hated by the local communities who endeavor to kill them and use the meat as relish as depicted on figure 3.2.

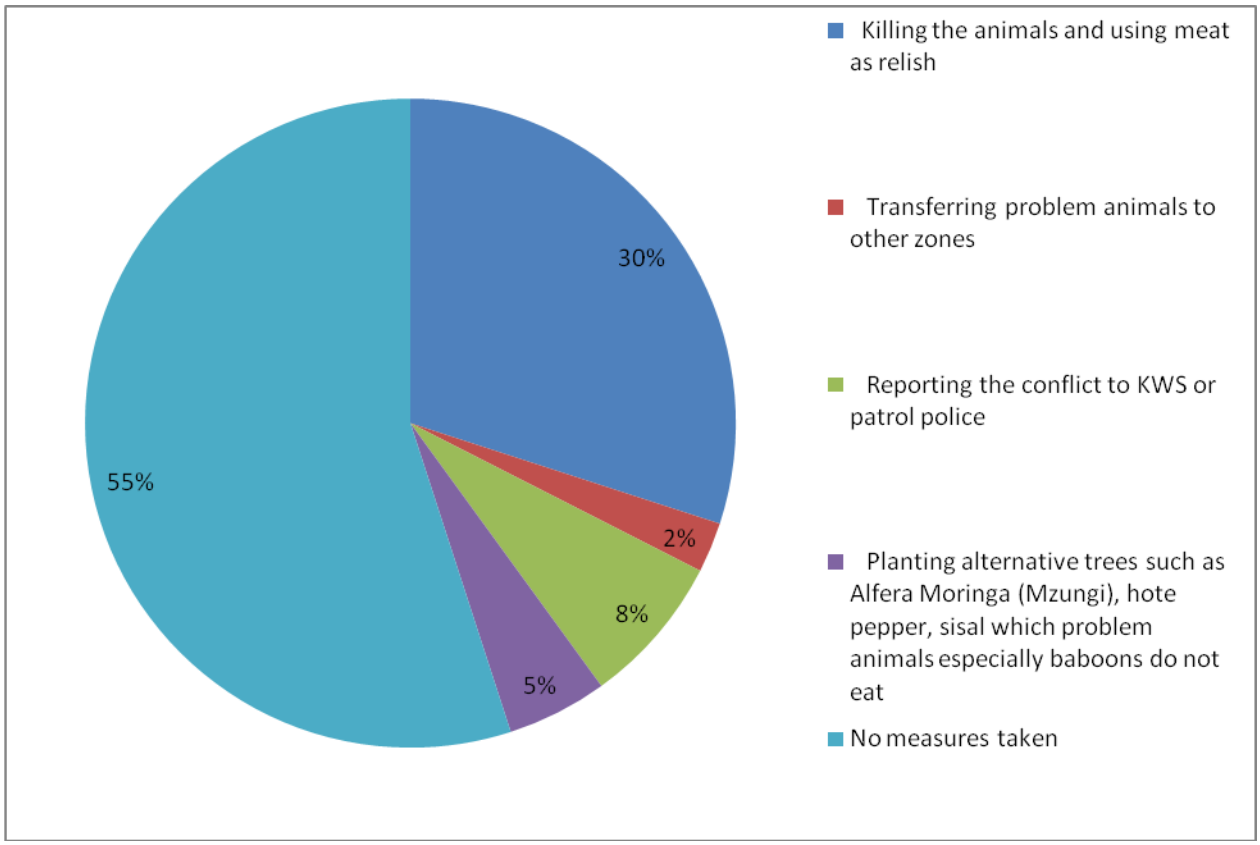


Figure 3.2: Measures taken by the Local Community to Curb Human Wildlife Conflicts

Source: Field Data, 2016

At Arabuko Sosoke forest buffer zone the local communities interviewed vouched for killing animals and using their meat as relish. Since 55% of the locals did not know what to do regarding the baboons crop and livestock menace, it follows that majority (30%) wanted the baboons killed because of their natural hatred towards them.

3.11 Religion and Spiritual Beliefs

Religious beliefs cause human wildlife conflicts. For example, Evangelicals such as Christian Pentecostal ministries International are known to be hostile to wildlife(Hazzah,2006).Conversely, Nepal Buddhists believe that the snow leopard,Panter Uncia should be preserved and that if it must die, it must only be due to a punishment from their mountain god. Even if the said snow leopard dies in the hands of predators they do not blame the predators since they know that can only happen in accordance to the will of their mountain god (Ale, 1998).At the Arabuko Sosoke buffer zone of Chonyi, Dzitsoni, Mbudzi Kauma and Mida villages, cows and goats die in large numbers during deaths remembrance rituals (Mabulu) when the local natives offer sacrifices to the spirits of the dead as they remember their departed loved ones.

3.12 Poverty

Poverty plays a very big role in driving human wildlife conflict at Arabuko Sosoke forest buffer zone. Poverty has cause and effect preposition in that it causes malnutrition, disease and despondency. Such despondency leads to deforestation which further causes soil erosion which culminates into land degradation and drought. Drought causes wild animals to migrate in search of pasture and water and in the process carnivores such as lions, leopards and tigers predate on livestock.in the process human wildlife conflict ensue whose result is injury or death from both ends.

Poverty increases vulnerability of local residents' crops and livestock destruction by wildlife. Local residents that depend on a single livelihood source are more antagonistic to invading

dangerous animals.This is because the latent consequences in destruction of resources are aggravated by absence of alternative income sources.An individualendowed withmuch wealth, alternative income sources and in good social standing in the community will be less vulnerable to the predators' attacks than people who are poor (Naughton-Treves and Treves, 2005).

An analysis of research interview responses revealed that there were a number of key causes of human wildlife conflict at Arabuko Sokoke buffer zone. Respondents mentioned some of these causes as poverty from humans and wildlife, energy issues such as quest for cooking firewood from the forest, building materials, economic reasons such as greed from rich elite and unemployment among other causes.

Research data and Focused Group Discussion (FGD) revealed that among the other causes were perceptions, cultural norms, beliefs and close proximity to the forest boundary. According to the responses adduced from the respondents, the chief driver of human wildlife conflict in the buffer zone under study is poverty. This poverty is in the form of hunger evident from both humans and wildlife at 75%.this is followed by human settlement and activities at 12.5% .Economic reasons follow at greed and unemployment at 5%.the study can deduce from this statistics that poverty id rampant at the area under study and is a case which needs to be looked into without eradicating poverty human wildlife conflict will continue. The result will be chaos, anarchy wholesome destruction of property and infrastructure.

3.13 Colonial Rule and Scramble for Africa

When the European colonialists came to Africa, they discovered a continent which was very rich in all kinds of natural resources such as natural forest ecosystems, rivers and water sheds minerals such as gold, silver, copper and titanium. With this awareness they congregated at the Berlin Conference at 1884/5 to strategize on how to divide Africa into boundaries for their ease of ruling and manipulation (Berlin Conference of 1885-5).

The Berlin Conference was attended by representatives from 14 countries namely: Belgium, Denmark, GreatBritain, Germany, Italy, the Portugal, Netherlands, Spain, Russia, Sweden, Turkey and the USA. Out of the 14 countries, France, Germany, GreatBritain and Portugal played chief roles in the Conference and controlled majority of colonized African countriesthen.When they congregated at the Berlin conference European powers had only managed to colonize the coastal zones of the African continent.

During the said conference, European powers scrambled to acquire control ofthe interior parts of Africa. The conference lasted for three months upto February 26 1885 where colonial power haggled over geographical boundaries in Africa's interior partsin total disregard to cultural and linguistic boundaries which had already been established by native African people themselves. This resulted into the birth of fifty irregular countries in Africa.

A newly founded map was superimposed over the one thousand indigenous cultures and regions of African continent. It should be noted further that the newlyfounded countries had neither rhyme nor reason.It rather divided coherent groups of people and merged together disparate groups whose socialfabrics could not hold together.

After this exercise the European powers cleared the natural forest ecosystem and began to export the all-important timber and building materials to Europe besides practising agriculture and

developing cities and conglomerates. These selfish actions led to deforestation and degradation of the natural forests which were habitat to wildlife. Oncethese habitats were cleared for the said human activities, the wild animals begun to migrate in search for pasture, water and convenient habitable ecosystems. This migratory process was the genesis of human-wildlife conflict in Africa.

The same scenario occurred at Arabuko Sosokeforest which then covered parts of Southern Somalia through the Kenyan Coast to Northern Mozambique (www.africafederation.net/Berlin-1885.htm accessed on 22 June 2017).

3.14 Influx of the People

Before the 20th Century, Arabuko Sokoke forest was far much bigger than it currentlyis.Within its ecosystem biodiversitywere many local forest products for trading.Examples of the said pool of important forest products included timber, gum, and copal and for musk from civets. Further, the forest ecosystem offered various traditional subsistence uses which included hunting and gathering of other forest foods.Main beneficiaries of theforest biodiversity were the Sanya (Waryangulo/Gala) who dweltin the forest and depended on hunting and forest food gathering for their livelihood (Blackett 1994, Muchiri et al 2001).

After the Berlin Conference of 1884-5, in early20th century, timber merchants arrived from Sweden and Europe. They startedcutting down timberdeemed to be good for trading purposesmainly Afzeliaquanzensis and Branchylaenabuillensis.The timber tradecreated employment and job opportunities which became the genesis of people flocking to the forest ecosystemin search of livelihood openings (Muchiri, .F.2001).

Increased population influx put pressure on the land, as areas were cleared for agricultural settlements as well as cashewnut and sisal plantations. Sisal quarrying trade also started to flourish while increasing population growthin Malindi and Mombasa provided a ready market for timber, building poles and firewood, thereby exacerbating the pressure on land. Further, increase in the demand for building materials for hotel and tourism industry increased the logging velocity and pressure on the forest (Bliss, T.2000, Muchiri, and F.2001).

3.15 Lack of Professionalism and Unemployment

Lack of professionalism resulting from illiteracy and low levels of education has led to the local residents' unemployment. Due to lack of professional education, locals have a high propensity to unskilled jobs,. Extreme poverty levels have made most indigenous people feel that initiatives to conservethe forest ecosystemwould restrict their lives even more.

Rampant unemployment levels among the youths at Arabuko Sosoke forest enhances illegal access and harvesting of forest ecosystem resources and wildlife. This has a twin consequential effect. One, the humans encounter fierce predators in the forest which results in human wildlife conflict culminating into injury and sometimes death(Kangwana,1993,Comover 2002,Okello et al 2003).Secondly, Kenya wildlife patrol police apprehend and arrest the poachers and sometimes shoot escaping culprits. Such acts scare wild animals and create a situation that discourages ecotourism in the area. This retards tourism and economic development. This is the bear truth that happens at the study area on daily basis. This state of affairs plays conformity with the Natural Law Theory J.J.DFinnis, 2002) which advocates for free access of people into natural ecosystem habitats to tend for livelihood opportunities. Conversely, it contravenes environmental

democracy (Susan Hazzen 2009) when it comes to Kenya Wildlife Service (KWS) patrol police shooting local residents trying to make a living from the forest resources (Kagombe et al 2001).

3.16 Climatic Factors

Climatic factors and trends constitute important causes of human-wild life conflict even though rarely mentioned.The probablereasonis that they areuncontrollable in nature.Coupled with the type of soil, rainfall constitutes the most important climatic factor which determines the type of vegetation found at Arabuko Sokokeforest. The rainfall here is bimodal mainlyaround June.Phasetwo of rains come in November and December.The months of January and February are very dry.Average annual rainfall varies from less than 600mm in the North West part of the forest to over 1000 mm at Gede in the East. Animal predation in Kenya correlates directly with seasonal changes in rainfall. For example, Peterson et al (2004) observeda positive correlation between monthly rainfall and predator attacks, which demonstrates thelikelihoodof domestic livestock being attacked by lions and other predators during seasonal rains. When it is dry, ungulates migrate and stayclose to migre water resources.Herethey are easily discovered by carnivores and killed. Where river water fills the 26 water boreholes inside Arabuko sokoke Forest, carnivores such as lions and leopards retreat back to their ranges, change diet and prey on easier targets (Patterson et al 2004).

Contrary to the Kenyan scenario experienced at Arabuko Sokooke Forest,Tsavo and Nairobi National Park among others, the case is different in Zimbabwe.Close to the Sagwa Wildlife Research Centre in Zimbabwe, thereis a strong positive correlation between seasonal changes and intensity of livestock depredation.The difference is that predators willprobably attract attention and attack livestock during months of droughtwhen vegetation cover restricts hunting

strategies of lions and leopards.The said carnivoresstrategize on surprise huntingmethods (Butler,2000).These harsh climatic conditions are, therefore, drivers of human wildlife conflict in the area under study.

3.17 Chapter Summary

This chapter explored the root causes of human-wildlife conflict at Arabuko-Sokoke Forest such as species habitat loss,degradation and fragmentation,human population growth,proximity to forest boundary,land use transformation, commodities sought by local communities from the forest,cultural beliefs and perceptions, growing interest in ecotourism, increasing livestock populations, human activities on wild habitat, religion and spiritual beliefs, climatic factors, lack of professionalism, employment and poverty. Chapter four will explore the methods of human wildlife conflict management at Arabuko-Sokoke Forest.

CHAPTER FOUR

THE MANAGEMENT OF HUMAN WILDLIFE CONFLICT IN ARABUKO-SOKOKE FOREST

4.1 Introduction

Chapter three explored the root causes of human-wildlife conflict. This chapter explores management of human wildlife conflicts at Arabuko-Sokoke forest.It will essentially zero down on the various methods of conflict management applied the world over and see their applicability at the area under study. There exists quite a large spectrum of different management methods developed all over the worldfor addressing human-wildlife conflict yeta good number of them are strongly site and species specific (IUCN, World Park Congress, 2003). Although this chapter will borrow from other specific areas, the specific area of relevance and study is on management of human-wildlife menace at Arabuko –Sokoke Forest.

For optimum management of human-wildlife conflict at Arabuko-Sokoke Forest, several thematic issues have to be addressed. Among others, these are biodiversity conservation, subsistence use, eco-tourism and environmental education, problem animal management, forest protection, forest commercial use, infrastructure development and research and monitoring. Management of the wildlife menace at the Forest revolves around these tenets. Hence this study looks into how to strategically manage the human-wildlife conflict through optimum management of the said issues.

4.2 Biodiversity Conservation

Arabuko-Sokoke forest is so important as a special ecosystem endowed with numerous rare and endangered mammals , birds, trees and other wildlife species (Ayiemba, 1998).The population surrounding Arabuko Sokoke Forest is growing very rapidly and it really depends on it for subsistence and commercial survival (Kagombe 2001). The degree ofunsustainable use of the forest has gone up, with the increase in human population.This culminates into higher levels of forest resources degradation.

An interview with Magangha Blesisngtone, Director Kenya Forest Service on 20th March, 2016 at Gede Kenya Forest Service regional office revealed that regeneration of certain tree species has been of late the main problem. For example, Branchylaena Huillensis (Muhuhu),having been targeted for harvesting for many years is now in danger of extinction (Omenda, 2005). A change in forest configuration and structureof thiskind adversely affects the already threatened bird and mammal species which have already adapted to unique habitats existing in the ecosystem (Collar and Stuart, 1988).

At Arabuko-Sokoke Forest, for instance,birds are so dependent on habitat of a certain structure. Therefore changes occasioned by forest degradation through logging, fuel and wood harvesting adversely affect the adapted birds. Harvesting fuel wood erodes invertebrate abundance of beetles and termites and brings about loss of nest sites for hole and ground birds. Quest for proteins is an obvious threat to endangered mammal species and constitutesone of chief drivers of human-wildlife conflict (Fitzgibbon *et al*, 1995).

The forest contemporarily risks further degradation through increasing external economic pressures. This is due to the discovery and possibility of mining of titanium deposits in mambrui and within Arabuko- Sokoke Forest.

Further, pressure is also mounting for forest excisions to avail more agricultural land for the local subsistence farmers. The forest is under such threats because most local residents underestimate the many values of its biodiversity and the importance it has for their livelihoods through the goods, services and ethical aesthetic attributes (ASFMT Strategic forest management plan 2002-2027) P 14.

In a bid to mitigate human wildlife conflict and to foster sustainable development, a number of management strategies and actions are necessary as discussed hereunder.

4.2.1 Boosting understanding and Knowledge of the Forest Ecosystem

It is of profound importance to inculcate a culture of improved information and understanding of the forest ecosystem infrastructure. This is foundational to sustainable conservation of bioderversity and goes a long way to mitigate against the war between humans and animals. In this regard the study implores on Kenya forest research institute (KEFRI), National Museums of Kenya (NMK) and Arabuko- Sokoke Forest Adjacent Dwellers Association (ASFADA) to boost research activities that document and utilize the indigenous knowledge of Forest adjacent local communities. This is because local people constitute a repository of knowledge about the forest which needs to be tapped. Local communities'involvement, participatory initiativesand support strengthens the knowledge base. To ensure local support for biodiversity and conservation

success, measures to increase benefits packages flowing to indigenous people must be implemented.This gesture boosts the morale of indigenous communities as they reap tangible benefits from research outcomes emanating from their continuous involvement. Research and monitoring initiatives shouldcontinually try to address the needs of the indigenous residents as well as those of biodiversity conservation (Kagombe *et al*; 2001).

4.2.2 Improving awareness of biodiversity values

This management approach seeks greater participation and involvement of local residents in research and other biodiversity initiatives like ecotourism (Mbuvi *et al*; 2000).

The outcome of this is that biodiversity values will become more directly relevant to them. This management approach strengthens local residents' awareness onhow importantthe forest is to them and promotes their support to ensure it is managed in a sustainable manner.

Kenya forest service (KFS), Kenya wildlife service (KWS), Kenya Forestry Research Institute (KEFRI) have equal responsibilities to ensure that they promote local participation and benefits from eco-tourism as a means of creating better awareness of biodiversity. Further, it is profoundly important need to involve local residents in biodiversity research. This creates employment for the locals and also raises their awareness and research expertise. To ensure accountability and transparency (Susan Hazen-theory on Environmental democracy, 2009) research findings have to be disseminated to the local communities through extension and communication centres. This makes the local people own the forest biodiversity and shun from killing wildlife or destrorying other forest ecosystem species (Kagombe and Mwavita, 2001 a).

4.2.3 Countering External Threats and Forest Interference

The existence of Arabuko- Sokoke Forest attracts enormous external economic pressure from a few greedy rich elites. The likelihood of mining titanium deposits that were discovered recently at Arabuko- Sokoke is bound to cause an influx of people (IUCN, World Park congress, 2003).As both local and international investors explore the possibility of mining the rare titanium deposits, economic activities will intensify in the environs of the forest which will lead to an influx of people to the area. This is likely to cause a further degradation of the forest resulting into exacerbation of human-wildlife conflict. To counter external pressure and threats, a number of management strategies are necessary. There is need to strengthen the working partnership between Kenya wildlife service (KWS), Kenya Forest Service (KFS), Forest Adjacent Dwellers Association and NGOs such as Nature Kenya. The idea is to include a wider representation of stakeholders particularly at the local level to ensure more coordinated action and response to external threats. There is need to enhance the process of settlement of rights to the forest resources, particularly those of forest adjacent communities (Sekhar, 1998). Further, there is need to strengthen lobbying and publicity of the forest and its biodiversity and importance both nationally and internationally. This lobbying must include funding since most of the human-wildlife conflict management interventions cannot move without funding (Dickman *et al*; 2011, Morrison *et al*; 2009).

4.2.4 Restoration of Degraded Habitats

Huge chunks of the forest stand degraded if not utilized sustainably. Some of these degraded areas may still be accommodating populations of the important birdsand mammal species. Strategic interventions need to be carried out so as to restore some of these degraded habitats.

Some of the management strategies that Kenya Forestry Research Institute (KEFRI), Kenya Forest Service (KFS) and the Arabuko- Sokoke Forest Adjacent Dwellers Association (ASFADA) need to put into place are: to seek substitutes for forest products through agro forestry, tree planting and other silviculture technologies in a bid to alleviate some of the human induced pressures on the forest.

Another managerial strategy is to undertake site-specific interventions aimed at restoring degraded forest habitats such as promotion of natural regeneration (Omenda, 2000) and enrichment of tree planting (reforestation).

As the forest gets resorted wild animals will find enough food nutrients within the forest ecosystem. This helps in reducing their interactions with humans and reduces human- wildlife conflicts. It also foresters the Environmental democracy theory propounded by Hazen (2009). Which postulate, environmental resources enjoyment for all (Susan Hazen, 2009).

4.3 Managing Forest Subsistence Use

Local communities' subsistence use of the forest poses the biggest threat to its existence and peculiar biodiversity (Kagombe *et al*; 2001). Localsaccess the forest for a range of their livelihood needs such as bush meat, fodder, fruits, medicinal plants, poles and fuelwood.

In this regard, research information adduced from respondents brought the following revelations. On the question of materials used for building houses and source of cooking fuel there was 100 percent positive response on timber usage and 70% fuelwood usage. The significance of these statistics is that the local residents' access the forest either legally or illegally to cut down poles and logs for building their timber based houses. From this analysis, it is evident that such

interactions lead to degradation of the forest and culminates into human-wildlife conflict. Although respondents interviewed revealed that materials used for building range from timber, iron sheets, coral bricks among others, there is significant evidence that local residents prefer using timber and fuel wood which they acquire from the forest. It can further be deduced that they act in rhythm with the environmental democracy theory (Hazen 2009) and Natural law (J.M Finnis, 2002) which advocate for rights and freedom in accessing and enjoyment of environmental resources.

It is imperative to note that forest dependency which leads to unsustainable utilization is an indicator of poverty and that the local communities are aware about the negative impacts of degradation but they continue with the same acts since they have no alternative of livelihood. In this regard, drivers of poverty must be addressed since the poorer the people, the more dependent they are on forest resources. However, the status quo can change through improvement of livelihoods.

Conserted efforts by Kenya wildlife service (KWS) and Kenya Forest Service (KFS) to control subsistence use have not yielded success due to limited resources and patrol personnel. It is of profound importance to know thatforests are productive and renewable resources. It must, therefore, be understood that sustainable management on a range of forest products is viable provided they are utilized systematically and optimally controlled (Sekhar, 1998).

Additionally, otheruses like bee-keeping and butterfly farming do not destroy forest diversities and can provide livelihood benefits on end without jeopardising forest ecosystem. An example to

this effect pointsto the success story of Kipepeo butterfly farming and beekeeping at Gede (Gordon and Ayiemba, 1998).

Additional to subsistence users, there are other secondary users equally dependent on forest products for their livelihoods. Indeed, Akamba wood carvers in nearby trading centers depend on the forest for supplies of good quality timber for their handicraft business. The study revealed that recently, harvesting of high value timber such as branchylaena huillensis (Muhuhu) has been a major cause of forest degradation. Even though this subsistence cutting is a illegal, it has not stopped (Kagombe and Muchiri, 2001).

To sustainably manage these challengesfor enhancing sustainable livelihoods of the forest adjacent communities, a number of management strategies such as mitigating the causes of poverty, developing partnerships between government agencies and forest adjacent communities and developing a systemic approach to local communities' utilisation of forest resources are hereunder discussed.

4.3.1 Mitigating the causes of Poverty of Forest Adjacent Communities

This method includes interventions that seek to support sustainable livelihoods, focusing mainly on poorer families in the buffer zone with a propensity to forest dependency. Under this strategy, particular attention is given to supporting and promotion of income generation initiativesthat either utilize the forest in non-destructive ways, those that provide alternative sources of income or those which inject forest products from outside the forest resources (Ayiemba, 1998). These approaches are meant to reduce pressure on the forest through unsustainable use.

In this regard the KFS, KWS, Kenya Forest Research Institute (KEFRI) and the National museums of Kenya (NMK) have equal responsibility to promote non-consumptive and non-destructive use of the forest as a means of sustaining local livelihoods through income generation, for example, bee-keeping and butterfly farming (Maundu *et al*; 1997).

Further, there is need to reduce forest dependency by promoting diversification of activities, essentially on farm activities such as agroforestry and establishment of wood-lots in a bid to create alternative sources for forest products. There is also the advent need to involve the local communities in other forest oriented activities such as eco-tourism (Kagombe and Mwarita, 2001a) and research with a view to increasing local benefits from the forest.

4.3.2 Developing Partnerships between Government Agencies and Forest Adjacent Communities

The forest Act (2005) advocates for participatory forest management (Forest Act, 2005). This advocacy was implemented at Dida Sub-location in the western side of Arabuko- Sokoke forest (Ongugo *et al*; 2008). This involves harmonizing working relationships between the local residents and the government, particularly Kenya Forest service (KFS). The particular forest management project at Dida has since attracted a lot of optimism and success leading to its formal registration.

Even through requisite strategiestoimplement participatory forestry at the local level are in public domain, legal and institutional frameworks required to support this approach arenot yet strong. There is, therefore, need to expand this phenomenon to other priority areas and villages. There is need for Kenya Forest services (KFS) to provide information and experiences to the government

which will stimulate support for a stronger legal and policy frameworks for participatory forest management. The idea here is to involve local communities in participatory forestry management planning so that they own the presence of the forest resources and stop destroying its biodiversity. This alleviates human-wildlife conflicts.

4.3.3 Developing a Systemic Approachto Local Utilization of Forest Resources.

Success of participatory forest is conditional to allowinglocal communities themselves to take responsibility for regulation of their use of the forest ecosystem and its products (sekhar, 1998). Earlier efforts by the Kenya Forest Service (KFS) to regulate forest use were directed to producing timber while managerialmethods for a wide range of home borne essential products like poles were not given much attention. Further, low attention wasgiven for the conservation of fuel wood and wildlife. A better method of boosting sustainable usage levels of Arabuko sokoke Forest should zero down to two approaches. First, efforts should be directed towards sensitization and education of local residents on the forests' production capability.The second one is that alternative sources of forest products should be sought concurrently (Mbuvi *et al*; 2000).

For optimum management of the human wildlife menace at Arabuko forest buffer zone, Kenya Forest Service (KFS) in collaboration with Kenya Forestry Research Institute (KEFRI) should identify and champion on-farm activities to reduce forest dependency. They should provide training and support at local levels by promoting sustainable harvesting practices such as procurement of harvesting license (Sekhar, 1998). Further, they should encourage the use of alternative tree species by the wood carving fraternity and promote their establishment on private

farm land (Omollo, 1991). There is an urgent need to carry out research for domestication of some of the important forest tree species.

4.4 Forest Protection for Managing Human Wildlife Conflicts

As mentioned earlier, the chief driver of forest degradation at Arabuko Sokoke Forest is human pressure and activities. Local residents exert a lot of pressure to the forest ecosystem through their quest to unlawfully harvest and utilize the forest resources. This is yet another foundational root cause ofhuman wildlife conflict (Nyphus and Tilson, 2004 B, Siex *et al*; 1999).

Protection of forestsconstitutes a very essential function within the perview of Kenya Forest Service (KFS) (Kagombe and Mbuvi, 2001 a) This function is normally carried out through joint patrols with Kenya Wildlife Service (KWS) personnel.Kenya Forest service(KFS)relies on patrolling as the key protectionstrategy. However, controlling the level of unregulated forest resources use has not been possible. Debateon lawful and unlawful use of forests has been in the conservation domain and still stands as one of the contemporary unresolved issues globally (Mbuvi and Mathenge, 2001).

Local residents have often found themselves in problems because of inappropriate forest policies and legislation.Such inadequate policieshave created forest protection demands which are not practically enforceable. The forest Act (2005) and the Kenya constitution (CoK 2010) advocate thatforest adjacent communities should participate as partners in managing theforest (CoK 2010, Article 59 and 66). Attempts have hence been made to ensure thatbenefits of sustainable levels of forest use flow to the local communities. Conversely, poorer families are denied access to a

number of commodities they desire to obtain from the forest because of the impaired licensing mechanismsput in place. These poor locals continue to use the forest illegally resulting in antagonistic encounters with wildlife and the Kenya Forest Service Patrol personnel. The study emphasizes the fact that most unlawfulacquisition and use of Arabuko-Sokoke Forest is for household purposes (Mogaka, 1991). It is further argued that even where commercial extraction occurs, those who carry out such activities do so in a bid to earn a living.The outright reasonfor theiractions is that sources of livelihood are limited (Kagombe and Muchiri, 2001). Despite the possibility of adopting approaches such as participatory forest management for addressing problems associated with subsistence use, patrolling still stands out as an essential methodof management to counterthe commercial poaching menace. However, theresources to accomplish this mission are limited.Consequently; both the effectiveness and efficiency of forestry patrols are reduced.

In order to bring down levels of unlawful extraction of forest products, there are managerial strategies and actions which are necessary as discussed hereunder.

4.4.1 Involving Forest Adjacent Communities in Forest Protection

Adequate level of forest protection may not be accomplished by rampant confrontations between forest managers and adjacent communities. Best practices involve the local residents and government agents to work together for mutual benefit. This ensures a sustainable way of conserving the forest and utilizing the forest products. Consequently, the most optimum approach entails working together with the local residents to initiate collaborative protection mechanisms.The advantage of this practice is that it generates an environment for agreement on

levels of utilization and sharing of benefits within the capacity of the forest to meet subsistence needs to the local communities.

In this regard, Kenya Forest Service (KFS) has to directly involve local people in forest protection by appointing them as community guards. Further, Kenya forest Service (KFS), Kenya Wildlife Service (KWS) and the Arabuko- Sokoke Forest Adjacent dwellers association need to build teams in order to strengthen communication between Kenya Forest Service Staff and the local community. Further, they must create partnerships between local people and Kenya Forest Service to benefit the local communities from forest products in a legal and systematic manner. Additionally, Kenya forest Service needs to foster local incentives for reporting or catching poachers.

4.4.2 Improving the Effectiveness of Patrolling

Patrolling is a strategy to scare away poachers and other illegal stress passers. For this to be effective it has to be done continuously. At Arabuko- sokoke forest patrolling mainly targets commercial users of the forest (Kagombe and Muchiri; 2001).

For patrolling to be more effective at Arabuko Sokoke Forest there is necessity to conduct joint patrols between the Kenya Forest Service (KFS) Kenya Wildlife Service (KWS) and the local communities. Further, there is need to increase the frequency of foot patrols with vehicle track-ups.

Kenya Forest Service (KFS) and Kenya Wildlife have to jointly improve patrolling plans and have systematic reporting of patrolling findings. They also need to secure adequate financial

resources to keep roads in good condition. Further they have to rationalize the road network fore easier patrolling and to reduce access for poachers (Otieno, 2001).

Last but not least, the Kenya Forest Service (KFS) will need to beef up the training of staff and community members on skills needed for effective forest protection (Kagombe and Mburi 20001 a). Finally, Kenya Forest service in collaboration with Kenya wildlife service have to promote a remuneration and rewards system as an incentive (Mishra eta al; 2003) for the most effective guards.

4.4.3 Influencing Formulation of Relevant Legislation and Licensing Systems

.There has been a very high demand for wood carving which consequently put so much pressure on the forest. Particularconcern is on the fate of branchylaena huillensis (muhuhu) whose extinction is looming yet it has been difficult to craft measuresfor its continued survival. There is need to institute a complementary mechanism to target markets for unlawful products.The same should be beefed up with efforts to seek alternative tree species to be grown outside the Arabuko Forest. Since the local natives are in continuous interaction with the forest, they are in a better position to know the kind of illegal activities that take place at the forest periphery. In this regard, they should be given preferential treatment in utilization of any available resources (Mogaka, 1991) through legally instituted licensing mechanisms.

On whether local communities visited the forest to access animal protein (Game Meat), building materials or fruits among other reasons, respondents availed the following responses, as inferred from table4.1 and figure 4.1 below.

Table 4.1: Visiting Forest based on License or on Illegal Basis

Responses	Frequency (f)	Percentage%
Yes. With license	330	82.5
Yes. With no License	70	17.5
No. Never	0	0
Visited for Ecotourism	0	0
Total	**400**	**100**

Source: Field Data, 2016

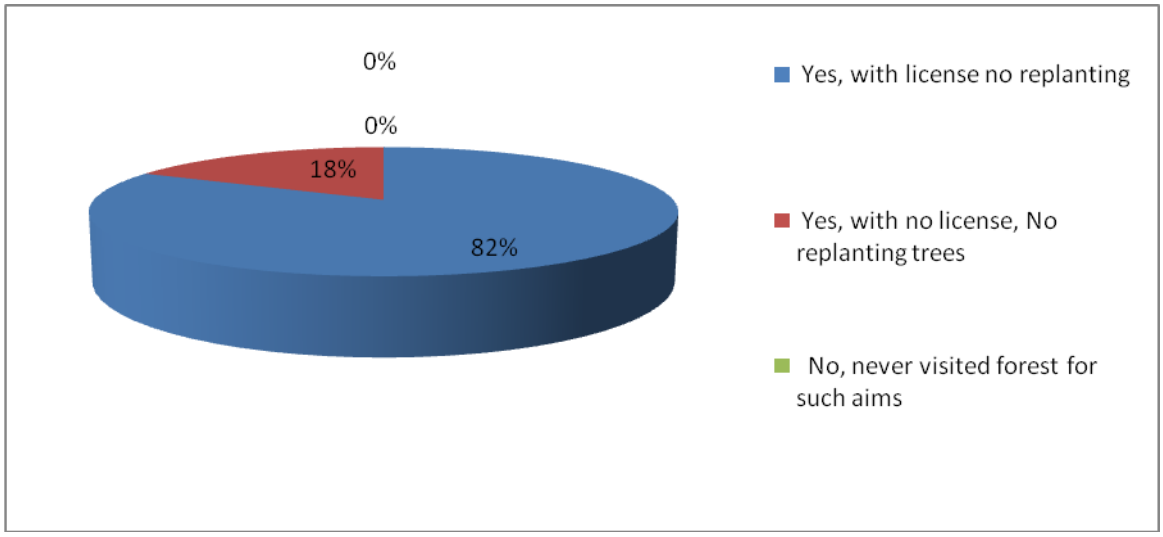


Figure 4.1: Visiting Forest based on License or on Illegal Basis

Source: Field Data, 2016

Of the households interviewed.82.5% households agreed to have visited the forest to get animal protein, to acquire building materials or o access wild fruits. They further conceded that they do this with license from KWS but agree that they do not replant or replace the trees. 17.5% conceded that they visit the forest with no license and they do not replant the trees. None of the

people interviewed disputed visiting the forest for such aims. Further, none of these interviewed agreed to have visited the forest for ecotourism, aesthetic purposes and having made any payment for Ecosystem Services (PES).

To curb the human-wildlife conflict through illegal access of the local communities (Mburi and Mathenge, 2001) the study advocates for the follow8ing management strategies in this regard. The Kenya forest service (KFS) and community based organizations such as A Rocha Kenya should support and assist wood carvers operatives to sue good wood. They need to promote transparency hand publicity for licensing procedures which give priority to the local communities (Omollo, 1991).

Further, Kenya forest Service (KFS) and Kenya Forestry Research Institute (KEFRI) have to intensify silvicultural initiatives and forest regeneration efforts to ensure proper certification for good wood for carving. Finally,Kenya Forest Service (KFS) bears sole responsibility to raise public awareness on policy and legislation and the impact of illegal activities on forest resources especially amongst the adjacent urban communities of Gede, Malindi, Kilifi, Mombasa and the tourism industry (Omollo, 1991).

4.5 Problem Animal Management

Amongst other drivers of human wildlife conflict at Arabuko Sokoke Foreast, crop raiding by forest elephants and baboons is most pronounced. This causes a lot of damage and occasionally loss of human life has been experienced (Lynn, Graduate Research assistant Arabuko- sokoke forest (Interviewed on 18/3/2016 on Field research visit). Crop raiding, loss of livestock and

human life spurs, and escalates, antagonisticactionsfrom forest adjacent communities against forest conservation efforts. When livelihoods of local communities are under threat form wild animals, it becomes extremely difficult to enlist their support for forest protection. The wildlife management and conservation Act (2013) has been very negative about culling animals (Kagombe and Mwavita, 2001). Options for animal barriers such as electric fencing (Mungai *et al*; 2008) have provedprohibitively expensive when compared with the value of the crops damaged. Although the boundary has since been fenced, baboons still jump over the cause havoc on adjacent forms and on livestock (Knight, 2003).

Having confirmed that indeed human-wildlife conflict is prevalently present at Arabuko-sokoke Forest, the study looks into managerial problem strategies on how to manage the animals at the said forest.

4.5.1 Controlling Animal Movement

Key methods for addressing damage to crops by problem animals is through using barriers like fences for diverting elephants and other problem animals from entering sensitive areas and to also control their movements (Mungai *et al,*2008). For example, arrangements can be made to provide access corridors which can facilitate animal movements to drink water outside the forest resource.Effectiveness of this approach can be easily securedthrough understanding elephant movementsand carrying capacity of the forest to support huge elephant population. Baboons are normally managed through licensed trapping on private farms outside the forest. This has not succeeded so much due to high intelligence capacity of baboons (Knight, 2003).

Kenya Wildlife Service (KWS), Kenya Forest Service (KFS),National Museums of Kenya (NMK) and Arabuko –Sokoke Forest adjacent Dwellers Association (ASFADA) can use the following management strategies to combat human-wildlife conflict. Obtain a better understanding of forest carrying capacity through research and take appropriate management action such as transferring some animals, reducing animal species population among other methods. Permit trapping of smaller problem animals such as baboons and monkeys on private land adjacent to the forest: Further, investigate the applicability of animal control methods being used elsewhere and test them for effectiveness at Arabuko-sokoke forest.

4.5.2 Improving Communication Strategies

Mitigation to crop raiding animals can successfully be carried out through patrolling. Effective patrolling can be secured through improvementof communication network between Kenya Wildlife service (KWS) and the local residents.It should be ensured that both KWS and local communities have adequate infrastructure and patrolling gear. Patrolling must be continuous and should be a collaborative initiative enjoining close participation of local residents affected most by invadingwildlife.

Management actions to effect this from government agencies such as Kenya Wildlife Service (KWS) and the local communities' representative Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) are as follows: Work with forest- adjacent communities to establish good communication and response to elephants raids. Involve local communities directly in patrolling through the recruitment of community rangers, and provision of equipment with training on how to use the equipment.

Provide adequate infrastructure and equipment for patrolling operations by Kenya Wildlife Service (KWS) and local communities. Finally, record, quantity and publish records of animal damage and make these widely available, especially to policy makers.

4.5.3 Reducing the Impact of Animal Damage through Compensation

Some damages by animals cannot be avoided. When this happens, it can be mitigated throughavailing adequate compensation. This can easily work through village committees like the ones registered for participatory forest management. Such committees should be regularly appraised, closely involved in loss and damage assessment, as well as payment of compensation.

In this regard, the Kenya Wildlife Service (KWS), in collaboration with Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) have to effect the following management strategies to reduce animal damage impact: Develop a robust system of compensation payments for losses arising from animal damage (Mishra *et al* 2003). Support promotion of other local benefits from the forest to offset losses due to animal damage. Further, support diversification of local agriculture and livelihood strategies and practices that are less susceptible to animal raiding. For example practice the Moringa Oleiforra, hot chilli and sisal farming which crop invaderslike elephants and baboons do not eat. Initiate research into the effectiveness of local protection measures such as planting of live plant barriers and finally build consensus and influence the development of practices and policies addressing problem animal management through annual problem animal control policy meetings (Kagombe and Mwanta, 2001).

4.5.4 Eco-tourism and Environmental Education

Eco-tourism is one other alternative strategy of managing human wildlife conflict at the forest. Ecotourism offers great potential for generating income without destroying forest ecosystem. It also offers value addition advantages to the forest resource. Further,it broadens forest awareness, its importance and the essential need to conserve it. It is imperative to note that eco-tourism cannot be carried out everywhere in the forest. Hence it is important to identify specific forestzones where its activities can be carried out without any negative impact on either humans or wildlife (Kagombe and Mwavita, 2001).

Although eco tourism activities have been going on at Arabuko-sokoke forest, the potential has not yet been fully exploited. One major challenge which hinders eco-tourism development at the forest is poor infrastructure development. The road network is poor, which is a recipe for human-wildlife conflicts (Kagombe and Kivyatu, 2001).

Contemporarily, there is no elaborate strategy on how ecotourism incomecan directly contribute to sustainable forest management and conservation. Presently,quite a big percentage of the revenue from tourism activities goes to local hotels and tour business. The implication is thatminimal amounts go towards benefiting the communities. Up to now, only Arabuko Sokoke forest guides benefits from the fund which it generates through charging fees for taking tourists around the forest.

The long-term sustainability of eco-tourism depends on environmental education about Arabuko-Sokoke forest. For example, if the local communities appreciate and understand the importance

of the forest, there will be little pressure for excisions and resistance to destructive developments such as logging and unauthorized harvesting of wild animals (Bliss, 2000). The study argues that once locals enjoy benefits from eco-tourism, they will appreciate the importance of having to live with the opportunity costs of its presence and they will not kill the wildlife.

4.5.4.1 Enhancing Community Benefits from Eco-tourism

Local communities must receive assurance that they shall be given the opportunity to benefit more through ecotourism initiatives (Kagombe and Mwavita, 2001). Such benefit include getting employment as tour guides, provision for local communities' opportunities of working more closely with Kenya wildlife service (KWS) and the Kenya Forest Service (KFS) as community rangers. Further visitor countries can be used to market local products abroad. For example, handicrafts and wood curving, can be marketed overseas both for cultural and also for educational purposes.

4.5.4.2 Increasing Long-term Benefits of Environmental Education

Environmental education will in the long run lead to better understanding of the importance of conserving the forest. Environmental education method targets a wide scope of groups in society. This involves different actions which include school children, national and international forest visitors (Bliss, 2000).Such groups receive capacity building lessons on importance of forest conservation and eventually become trainers of trainers.

In this regard, organizations such as Kenya wildlife service (KWS) Kenya Forest Service (KFS), Arbuko – Sokoke Forest Adjacent Dwellers Association wildlife clubs of Kenya and A Rocha

Kenya have t o work towards strengthening school environmental education programmes. Additionally, they must encourage the involvement of local clubs and schools to use the forest as an educational resource base (Kagombe and Mwavita, 2001).

4.6 Infrastructure Development

Sustainable management of human-wildlife conflicts cannot be optimally achieved without requisite infrastructure. Road networks, buildings and vehicles are all important to sustainable management of Arabuko-sokoke forest and its ecosystem. However, these infrastructural amenities cannot be constructed, purchased or maintained without an input of heavy financial capital expenditure. Given that the forest yields very little revenue, maintenance of a sound infrastructure base is wanting. This is a big challenge in that the study revealed occurrence of unlawful activities increases as road network quality worsens (Kivyatu, 2000, Otieno, 2001).

Likewise, to maintain optimum and happy personnel, the provision of proper excellent accommodation services cannot be over-emphasized. Insufficient funding for these amenities reduces expenditure on such items and leads to poor work morale and high labour turnover.

Equipment for communication is also required to ensure improved effectiveness of forest management operations, particularly problem animal control and patrolling.This helps to control poaching activities. For this to happen, radio telephones, vehicles and poaching monitoring gear (Paulsteyn, 2017) are necessary.

Further, on matters administration, provision of requisite equipment office space and computer networks is necessary. Since lack of financial resources constitutes the chief constraint for acquisition of infrastructure assets, there is need to seek for ways of funding and how to prioritize expenditure options once funding is availed.

To achieve optimum infrastructure necessary to achieve objectives of managing human –wildlife conflict at Arabuko- Sokoke forest the study advocates for the following.

4.6.1 Maintaining a Good Road Network

For effective functioning of entities involved in managing forest ecosystems, a good road network is the master key. The idea is to strategically prioritize road maintenance activities over others that require infrastructure support (Otieno, 2001). For this to happen, the Kenya Forest Service (KFS) must secure financial resources needed to maintain existing roads and further rationalize road network. In this regard, the said organization must initiate or system for planning the maintenance of roads, most of which are currently dilapidated.

Further, Kenya Forest Service (KFS) must carry out annual surveys of road conditions to ensure that maintenance efforts are properly targeted and prioritized and finally to investigate and promote local community participation in road maintenance operations such as “food for work” (Otieno, 2001)

4.6.2 Maintaining Staff Buildings, Services and Equipment

Maintenance of staff equipment, buildings and welfare services is is an important innovation just like it is in roads (Otieno, 2001).Regular servicing of equipment and buildings is very key to

achieve multiple management goals of Arabuko-Sokoke Forest. The study established that resources toextend existing infrastructure and maintenance thereof are in limited supply. Hence the strategy should be to allocate available resources according to management priorities. Further, focus should be directed towards maintaining existing assets rather than acquiring new ones (Kagombe, 2001).

4.6.3 Developing Institutional Partnerships to Maximize Impact of Infrastructure

It is important to note that Kenya Forest Service (KFS) controls a big percentage of direct expenditure on infrastructure development attheforest in question.

This notwithstanding, there exists multiple other stakeholders who benefit directly or indirectly. For example, government agencies, tour operators and local residents use this facility with no contribution towards maintaining it. The strategy the study advocates is to strengthen institutional partnerships in infrastructure development. For example, Kenya wildlife service (KWS) must always seek and bring non-governmental partners into the forest fraternity for development of facilities for eco-tourism and recreation. Kenya forest service (KFS) must develop new partnerships with a view to reducing direct implementation of maintenance programmes (Kivyatu, 2001).

4.7 Chapter Summary

This chapter discussed various ways of managing human-wildlife conflict and it noted that managing human wildlife conflicts with no destructive effects to either wildlife or human welfare demands a delicate balance of agricultural extension and wildlife conservation. As such, social scientists and the methods they develop for participatory planning, measuring human

attitudes and perceptions as well as understanding socio economic practices are deemed important for designing and implementing politically viable human wildlife management projects. Theimportance of this approach not only has relevance at local community but also for the broader politicalforces that appraise and validate such projects.

Human Wildlife Conflictsare not only confined to local actors but commonly attract and encompass wider groups as will be seen in next chapter. For example US department for agriculture USDA in April 2014, announced $20 million effort to reduce crop damage caused by Feral Swine. Further, U.S farmers used lethal methods and traps on their own properties to bring down agricultural losses (Newby *et al*; 1958). Indeed the 21st century has witnessed a consistent paradigm shift to agricultural producers and hunters.The said farmers and hunters have demanded that U.S. government mustbring down predator populations proactively through bounties, trapping and widespread media campaigns.

Intersecting the work of social scientists with that of ecologists is of paramount importance and needs to be nurtured if wildlife will be managed sustainably.Precisely, the chapter brought to lightthe importanceof understanding how perceptions influence complaints about human wildlife conflict. It further showed how important it is to accept research findings and on the acceptability of management actions and long term sustainability of interventions in line with Agenda 21 of the Rio declaration of 1992.

Circumstances which increase tolerance for human wildlife conflict also reduce resistance to conservation efforts processes.Through such interventions, humans choose to change the type of

livestock or crop husbandry to reduce conflicts.Sometimes it may include relocation of human activities to ensure peaceful co-existence.

In conclusion, the ability for managing wildlife related threats to human security and property effectively without compromising wildlife population or human life and livelihoods is viable. To accomplish this, it is believed that collaborative managers must combine technical expertise with indigenous knowledge and embrace transparent and democratic process of participatory planning in tandem with the natural law theory promulgated by J M Finnis (2002) and environmental democracy approaches advocated by Susan Hazen (2009).

CHAPTER FIVE

ACTORS IN THE MANAGEMENT OF HUMAN-WILDLIFE CONFLICT

5.1 Introduction

Chapter four discussed various methods of managing human-wildlife conflict and highlighted the need to maintain a balance between agricultural extension and wildlife conservation. This chapter builds on our earlier discussion and examines the actors that engage in actual management of the conflct.

Actors in the management of human wildlife conflict are many depending on where the humans and wildlife interact. These may be categorized as global, regional national and local actors. They can also be grouped as formal and informal actors. This chapter looks into these actors with a view to their influence in the management of human wildlife conflict at Arabuko Sokoke Forest, Kenya.

On the global front, actors or stakeholders involved in the management of ASF as revealed from field research responses are, the European Union (EU), the IMF and World Bank ., USAID, Birdlife International, the Global Environment Facility (GeF), Donor agencies and foreign embassies.

The global actors' role in this regard revolves around funding and technological knowledge exchange. The global actors further look into the needs of locals such as poverty and unemployment. They encourage locals to form sustainable projects such as seedling – tree nurseries and help marketing them abroad. For example the JAMII Villas at Mida was funded by

the European Union at an initial amount of U$50,000 in 1996. It is now fully operational and helps poverty reduction through employment derived from ecotourism.

Another example of global partnership at ASF is the Kipepeo butterfly farm. This was started in 1993 but took good shape in 1995. Kipepeo butterfly project was funded by USAID, Nature Kenya, ICIPE and the Government of Kenya through Kenya's National Museums. The project was implementedthrough a grant of US$ 50,000 from the United Nations Development programme UNDP's Global Environment Facility NGO Small Grants Program in June 1993. Arabuko Sokoke Forest (ASF) attracts international recognitionand importance, ranked number two in Africa for birds, accommodating six main birds' species and three main mammal species. The six birds' species at ASF are: Sokoke scopes Owl, East Coast Akalat, Clarke's Weaver, spotted ground thrush, Sokoke pipit and Amani Sunbird (See Figure 5.2:The birds of MidaCreek).

The three main mammals at ASF are bushy-tailed mongoose, Golden Rumped elephant Shrew and other rare and endangered animals such as Aders Duiker and the African elephant.

Regionally, the East African Community (EAC) member states have not shown much presence at ASF. This could be due to the fact that the East African member countries of Kenya, Tanzania, Rwanda, Uganda, South Sudan and Burundi have their own sovereign policies on tackling the human wildlife conflict menace. As such, there has not been much collaborative effort in this regard.

Nationally, the main actor is the government of Kenya. The GoK has set up agencies which manage ASF on its behalf. Focused group discussion at ASF coupled with an interview with Mr. Blessingtone Maghanga, Senior Forester/Station Manager, Kenya Forest Services (KFS) revealed that ASF is mannedby government agenciesin conjunction withthe local communitiesandNGO's.The GoK agencies are Kenya Forest Services(KFS), Kenya Wildlife Service (KWS) Kenya Forest Research Institute (KEFRI), the National Museums of Kenya (NMK) NGO's and the local communities. For an elaborative understanding, the historical background of ASF, Location, topography and latitude, status, vegetation types, biodiversity and human population are hereby reviewed before delving into the actors in the management spectrum.

5.2 Kenya Forest Service (KFS)

It is important to know that KFS is the main government of Kenya agency in managing Arubuko Sokoke Forest.Kenya Forest Service (KFS) is mandated under the Forest Act (2005) to undertake the promulgation of policies for managing and conserving forests, preparing and implementing management plans,managing and protecting Kenya's gazetted forests,establishing forest plantations, promoting on-farm forestry and environmental awareness. Kenya Forest Service currently gives much focus to afforestation on small scale farms and conservation of natural forests. Arabuko-Sokoke Forest has three forest stations namely, Sokoke,Gede and Jilore . At each station, there is a forester whose responsibility is to administer and manage the forest.

5.3 Legal Status of Arabuko-Sokoke Forest(ASF)

The area was declared as a forest in 1932 and gazetted in 1943. Additional land amounting to 2,675 ha at Kararacha was included 1968. In the forest periphery, 4,300 ha were earmarked for nature reserve purposes in 1977. Another addition of 1635 ha was effected in 1979 as depicted in table 5.1 hereunder.

Table 5.1: Legal Status of Arabuko – Sokoke Forest

Details	**Year**	**Boundary plan**	**Legal notice**	**Area/ha**
Original gazettement	1932	75/12	44	39,089
Revocation of proclamation 44 and re-gazettement with new boundaries	1943	175/4	48	39,089
Declared central forest	1964		174	39,089
Kraracha extension	1968	175/88	149	2,675
Declaration of nature reserve (within forest reserve)	1977	175/194	100	2,699
Declaration of nature reserve extension (within forest reserve)	1979	175/215	180	1,635
Declaration of national park (external to forest reserve)	1990		426	600

Source: Field Research Data, 2016

5.4 Biodiversity

Arabuko – Sokoke forest is rich in biodiversity. This includes concentrations of endangered and endemic flora and fauna. The forest is considered as the second most vital forest for conservation of endangered bird species in the African continent.

Not lessthan two hundred thirty bird species inhibit this forest ecosystem, including six globally threatened species. These are: Clarke's Weaver, spotted ground thrush (a rare migrant), Sokoke scops Owl, Amani sunbird, Sokoke pipit, and East Coast Akalat.These rare species are mainly constituted in the East African Coastal forests.

5.4.1 Mammal Species, Butterfly, Reptiles and Plant Species

There are 52 mammal species recorded in ASF. These includethree taxa which threatenedworldwide and this include: the Sokoke bushy – tailed Mongoose, the Golden–rumped elephant– shrew of which 90% of its total population lives in the ASF (Fitzgibbon, 1994), and Aders Duiker, which is only found in Zanzibar. ArabukoForest also accommodates some of Kenya's uncommon mammals and supports approximately seventy elephants. A big population of reptiles, including large snakes likes pythons and invertebrates such as butterflies are also present. There are over 250 recorded butterfly species recorded at the Kipepeo butterfly farm at Gede, four of which are endemic. ASF records plant species which includes 50 that are globally and nationally rare.

5.5 Human Population Adjacent to the Forest

Arabuko–Sokoke forest buffer zone is at the center of about fifty villages, with a total population of about one hundred and four thousand people(104,000) KNBS, 2010). The major ethnic group in the region is mainly composed of the Giriama who have chased away the former Sanya communities (Gala, Waryangulo) who initiallydwelt in the forest as hunters. Currently, most forest buffer zone communitiesare peasantagriculturists who utilize the Arabuko Forest for their livelihood requirements. The main subsistence crops grown are cassava, maize, green peas and beans. Major cash crop plantations in the areainclude coconut, mango and cashewnut trees.Local farmers have consistentlypracticed dairy farming even though such practice still remains small. The shamba system (Kurombeka) was hitherto used to establish exotic plantations in the area but this did not quite succeed because of crop raids from wildlifeespecially elephants and baboons. There are no squatters inside the forest. Squatters are found outside the forest boundaries.

5.6 Policy, Legal and Institutional Background

5.6.1 Policy

The Kenyan forest policy is stipulated in session paper no. 1 of 1968. The policy was a component of the Kenya Forestry master plan project and was initiated by the Ministry of environment Finlands' Development Assistance. The master plan covered topics like : The ability of the forests to fulfill the local demands for wood and other forest products, protecting biodiversity,ensuring that sustainable benefits from the forest which support agriculture, mitigation of global warming continuity ,meeting the demand for industrial wood products,, promoting ecotourism and conserving the forest. The master plan is intended to be implemented in the next 25 years which culminates to vision 2025 (Finnida,1994).

Generally, the policy states that “the rationale of forest management depends on local conditions set by climate, soil and tree species and the actual forest related needs of the people, which incorporate both social and cultural aspects.

In all circumstances, the forest resources shall be managed in a sustainable manner with due regard to environmental conservation in accordance to intergenerational equity as prescribed by agenda 21 of the Rio Declaration of 1992. Further, reliable information on forest resources and their utilization needs to be ensured. Such information should include forest health monitoring” (ASSFMP, 2002 p.6).

5.6.2 Legislation

The forest department, which became the Forest Act (2005) is governed by the forest Act Cap 385 of the Kenyan laws. The Forest Act (2005) is more detailed and covers aspects such as multiple stakeholders and community participation in forest development and conservation. The Kenya Forest Service (KFS) is a body corporate whose mandate is;policy formulation, for Board approval, which is related to management, conservation of all forms of forests in Kenya, management of all private forests in consultation with the private owners, management of all indigenous forest for conservation purposes and protection of all forests as per the provisions of the said Forest Act (FA, 2005).

5.6.3 Statutes

According to FA (2005), there are more than seventy seven statutes concerned with environmental legislation. A proper framework for environmental legislation was formulated in 1999. The environmental Management and Coordination Bill was passed by the parliament on

15th December, 1999 and enacted on 14th January 2000. The legislation provides coherence to good environmental management, guidance for ideal environmental conservation and the national environmental principles. It is also concerned with cross sectional issues such as environmental planning, overall environmental policy formulation, protection and conservation of the environment, environmental quality standards, Environmental Impact Assessment (EIA), environmental audit and monitoring, institutional coordination, conflict resolution and environmental protection orders. It has an impact on forestry legislation, land use legislation and land tenure. The Act establishes an operation framework under the NEMA.

Under the Forest Act (2005), the local communities actively participate in forest management. The first participatory Forest Management (PFM) project was started in the Dida Village within the Arabuko-Sokoke Forest buffer zone in 1997(Ongugo *et al*., 2008). Under this arrangement, the forest adjacent communities become co–managers with the KFS by forming community Forest Associations (CFAs). Eligibility for participation in Community Forest Association membership is by subscription fees (Ongngo *et al*., 2007). User rights for CFA members are provided for in part IV, section 46 (2) of the Forest Act 2005 (Gok, 2005).

Some of the rights enlisted include, harvesting of timber, firewood, medicinal herbs, and income from communitybased industries, recreation activities (aesthetic), ecotourism, scientific research and educational activities. It needs to be noted that gaining user rights may not necessarily mean fair access to the forest resources because such access could be shaped by a number of factors beyond formal laws and statutes such as access to power and social relationships. Currently, there are well over 40 PFM sites (Thenya *et al*., 2008) and more than 100 CFAs in the major

water towers such as Mau Forest, Mt. Elgon, Aberdares, Mt. Kenya amongst others (Koech *et al*; 2009; Mogoi *et al*; 2012).

5.7 Governance and Administrative Framework

Governance entails the manner through which the organization responsible for formulating management decisions and conducting management activities in a manner that meets the objectives of the stakeholders. The management of Arubuko- Sokoke Forest is based on partnership arrangement among several stakeholders and groups.

Among all the stakeholders, the Kenya Forest Service (KFS) has the legal obligation to protect the forest resources. KFS has since entered into different partnerships with KWS, KEFRI and NMK, the government entities being the main management agencies at ASF. The government organizational structure, thus outlines those whoseresponsibility is to undertake monitoring. The ASF is currently operating under the following forest structure.

5.7.1 Arabuko – Sokoke Forest Management Team (ASFMT)

Thepartnership and working arrangements to manageArabuko Sokoke Forest are formalized in form of Memorandum of understanding between the four organizations mentioned above. The Memorandum of Understanding between the said institutions lacks a legal structure, but is structured based on the mandates of the concerned institutions. Further, there is need for them to work closely to ensure optimum outcomes and avoid unnecessary duplications. The current memorandum of understanding is between the Kenya KFSand KWSwith National Museums of Kenya (NMK) being enjoined in the partnership. A memorandum of consultative collaboration,

particularly on scientific and research matters (MOCC), has also been developed between KFS and Kenya Forestry Research Institute (KEFRI). Strengthening this partnership will ensure that the Arabuko Sokoke Forest Management Team (ASFMT)has more capability to resist the external pressures on forests arising from conflicting interests which might have more decentralized decision – making powers in line with the Kenya Forest Act,(FA, 2005).

The main role of ASFMT is to manage the day to day operations within the forest. It constitutes representatives from the four major government institutions namely: Kenya Wildlife Service (KWS), Kenya Forest Service (KFS), National Museums of Kenya (NMK) and Kenya Forestry Research Institute (KEFRI).

The management team has been expounded to entail local community representatives and local non-governmental organizations (NGO's) concerned with aspects of the forest. By using a series of working groups which specifically focuses on Natural law (J M Finnis,2002) and environmental democracy approaches (Susan Hazen,2009) theories, the four partners are widely involved in the achievement of management goals of the forest ecosystem. The theories advocate for freedom in access and use of environment and environmental resources. They also advocate for local participation in planning, management policy making and benefit sharing of proceeds of environmental ecosystem.

The local community represented by Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) has been incorporated in the Arabuko-Sokoke Forest Management Team (ASFMT). Other players working at Arabuko-Sokoke Forest (ASF) have been split into specific working which meet their interests such as the employees of the four partner institutions.

The routine activities are coordinated in four working groups with the help of a Senior Management Committee (SMC). The four working groups' joint membership and the SMC, forms ASFMT. The Rural development working group, Forest management working group, Research and monitoring working group and Tourism and education working group constitute the working groups.

The four concerned government agencies have since been enacted into parastatals and are coordinated at the national level through a majority of memoranda of understanding under the leadership of the Ministry of Environment and Natural resources. Currently, the ASFMT has made a lot of progress through the goodwill and cooperation of team members.

5.8 Global Friends and Non-governmental Organizations (NGO's)

According to research interview responses (Maghanga Blessingtone and FGD), Birdlife international, which is a global partnership that is concerned with the conservation NGOs whose coordinating secretariat is situated in the United Kingdom (UK) is major among the international partners. Since 1983, the Bird life international has worked in collaboration with the forest management team, during this period, the natural resource surveys took place. The KWS and KFS have worked closely with birdlife international since 1991.

The Kenya Indigenous Forest Conservation Project (KIFCON) was funded by the UK Oversees Development Administration (ODA) between 1990 and 1992 .This body proposed pilot projects for the conservation of indigenous forests and undertook investigative work in Mau, Kakamegaand Arabuko – Sokoke forest. In was proposed in their joint plan that a pilot

programme in Arabuko – Sokoke will be implemented by the forest department and Kenya Wildlife Service (KWS), and partly funded by birdlife international and Overseas Development Agency (ODA). However, this envision was prevented by the withdrawal of the Overseas Development Agency (ODA).

The British Development Division in East Africa took the place of the Overseas Development Agency to fund all its activities. These funds steered the activities of the Arabuko Sokoke Forest Management Team (ASFMT) and critical in reshaping and allowing for the project design before the Arabuko Sokoke Forest management and Conservation Project (ASFMCP) commenced in 1996, and this was funded using grants from the European Union Tropical Forest budget line to the secretariat of birdlife international. In the due course of this project , Kenya's designated partner birdlife international, nature Kenya, became increasingly involved. Currently, Nature Kenya, rather than birdlife international plays a leading role at Arabuko–Sokoke Forest. The joint participation in forest management in Arabuko – Sokoke forest can be used to demonstrate how the joint involvement of various stakeholders can promote forest management. The Forest Adjacent Dwellers Association (ASFADA) established in 1999 has also allowed the local community participates in forest management.

Other international partners are the International Union for Conservation of Nature (IUCN) FAO of the United Nations, World Bank, Global Environment Facility (GeF), UNEP, UNDP, USAID and A Rocha Kenya all of which have been actively involved in funding arrangement of ASF (Arabuko – Sokoke Strategic Forest Management plan, 2002) pp. 1-7. Interview with Blessington Maghanga, Senior Forester and Station Manager KFS on 15th March, 2016).

5.9 Nature Kenya

While birdlife international has been, and still is, one of the international partners involved in the management of Arabuko Sokoke Forest (ASF), closer management of the said non-governmental organization (NGO) rests in Nature Kenya. Since Nature Kenya shoulders responsibility over Important Bird Areas (IBAS) and Key Bird Areas (KBAs) (Bennun *et al*; 1999) in the world and has taken root in National Museums of Kenya (NNK) issues, it is deemed prudent to highlight its work which is hereunder explained.

5.9.1 History and Initial Work

Nature Kenya – East Africa Natural history society (EANHS) is the oldest environmental society in Kenya. It was formulated in 1909 to allow for the study and conservation of nature in eastern Africa. These aims are implemented through the mission "connecting nature and people to participate in biodiversity conservation". Nature Kenya strives to: promote conservation of Kenya species,encourage community participation in conservation through promotion of sustainable benefits,enhance knowledge of Kenya biodiversity,sites and habitats, enhancing knowledge of Kenya biodiversity and advocate policies favorable to biodiversity conservation.

The specimens collected by the founders of the East Africa Natural History Society led to the construction of a museum to store the collected samples and educate the public. Later the museum was moved to Kenya which is currently the Famous National Museums of Kenya (NMK). In 1910, a scientific journal was written by the members of East Africa Natural History

Society. This journal published journal is available to date, in conjunction with the NMK, as a East African Natural History journal and the both the hard and soft copies are available.

Nature Kenya members have continued with their active participation of collaborating with other working groups including the bird committee. They participate in undertaking surveys and coming up with a list of plants, birds, insects and other living creatures. They have published books, an ornithological journal, articles, photographs and dvds. They share information and lead outings.

5.9.2 Staff and Management

The staff of Nature Kenya also actively participates in environmental conservation. To utilize the limited resources to the maximum, nature Kenya has drawn more attention to vital bird areas (IBAS). IBAs form an ideal environments birds conservation. IBAs are also concerned with the protection of other living things as their scope entails the conservation of plants, mammals among others.They are also referred to as Key Biodiversity Areas (KBAs) that promote the conservation of key species, habitats and sites.

5.9.3 Corporate Social Responsibility (CSR) to Local Communities

To attain the objective of protecting sites of critical biodiversity value, Nature Kenya seeks to: promote sustainable incentives and benefits through nature – based activities such as butterfly farming,bee keeping, ecotourism, mushroom and aloevera farming, tree seedlings for business, bird guiding, energy saving technologies like food warmers better known as micro-waves and

solar cooker and forest restoration(Maghanga Blessing. Interview held on26 March 2016 at Gede Kenya Forest Service offices).

More than 4000 beehives have been distributed across the sites and the Kenyan locals can earn Ksh shillings 24 million per year. Arabuko Sokoke Forest (ASF)has generated shillings 8 million shillings to be shared among the 400 households involved, increasing their household income by 40-50%. Individuals have planted trees in their farms which they sale after four years, the communities living in Arabuko–Sokoke forest anticipate to earn Kshs. 90 million (Maghanga, Blessing. Interview held in Kenya Forest Service offices, Gede, on 26 March,2016)

5.9.4 Monitoring and Reporting

Nature Kenya and the National Museums of Kenya should be actively involved in the monitoring and reporting of the state, response and pressure in fundamental bird areas based on routine monitoring and evaluation. Majority of the activities that have been undertaken indicate positive outcomes with findings on monitoring according to research responses and observation, indicating deteriorating state of biodiversity and increasing pressures despite the various initiatives to protect biodiversity. The result show that more needs to be done to revert the current downwards trend in loss of biodiversity.

5.9.5 Advocacy

Advocacy stands for the protection of key biodiversity areas and important bird areas. The objectives of advocacy include; formulation and implementation of appropriate policies, expansion of the protected areas network, nationwide recognition of KBAs and IBAs, promoting

their joint management and development considers both biodiversity and natural resources and mitigating sound climate management at the same time.

Collaborate with the private sectors, government and local communities to build capacity of local environmental groups, inform and educate the public,publish all the relevant print and electronic materials and strive to meet the international reporting standards in the protection of biological biodiversity and among other global concensus.

5.9.6 Kenya Wildlife Service (KWS)

As already stated in the previous section of this chapter, KWS is one of the Government of Kenya (GoK) agencies that manage the Arabuko – Sokoke forest. Research interview with Maghanga B. C. Mwalimu, A., and other officials at ASF revealed how the KWS is involved in the management of human wildlife conflict. It is important to note that KWS has its offices premised in the same compound together with KFS and KEFRI in Gede within Malindi Sub County in Kilifi County.

The Kenya Wildlife Service (KWS) is a state corporate stipulated under Act of Parliament Cap 376 of the Laws of Kenya. Its mandate is to conserve and manage the Kenyan wildlife and enforcement of related laws and regulations. The Kenyan wildlife is conserved and protected by the KWS both for the locals and the foreigners. It, therefore, triples up as an international actor, national actor as well as a local actor being at the centre of the three stakeholders. There are many and varied challenges faced in the conservation of wildlife and biodiversity in Kenya.

Such challenges include climate change, tourism market volatility, forest depletion,habitat degradation and loss, human wildlife conflict and wildlife crime as a result of population growth and land use activities of the communities which co-exist with wildlife.

To tackle these challenges, KWS employs a multi – pronged strategies and approach and engages different stakeholders, partners and interest groups. Kenya Wildlife Service (KWS) collaborates with the stakeholders in the management and conservation ofwildlife resources even outside the protected areas. It is the mandate of the KWS to collaborate with other stakeholders to conserve, protect and manage wildlife resources appropriately.

The KWS through the community wildlife initiative in collaboration with other stakeholders promotes conservation of biodiversity by communities living on land adjacent to wildlife such as dispersal lands and wildlife corridors at the outskirts of parks and reserves. This is premised on the ideology that "if people benefit from wildlife and other natural resources, then they will take care of these resources"

5.9.7 Importance of Wildlife to Kenya

More than 70% of the land surface in Kenya is occupied by wildlife. Kenya is famous for the "Big-Five" namely, the elephant, lion, rhino, leopard and buffalo and the great wildebeest migration . Wildlife greatly contributes to the growth of the Kenyan economy. It is the major tourist attraction contributing to over 12% of the total GDP in the country. It creates more than 300,000 job opportunities in Kenya (A guide to the Wildlife Act of Kenya WCMA, 2013).

Despite all this factors, the Kenyan economy is facing challenges due to habitat fragmentation, poaching, bush fires, habitat degradation, illegal trade in flora and fauna,illegal logging, pollution, climate change culminating into global warming and human-wildlife conflict.

5.9.8 Legislation on Wildlife

The Wildlife Conservation and Management Act (WCMA, 2013) governs wildlife management in Kenya. The Act seeks to create a fair association between people and wildlife by opening avenues for individuals to benefit from wildlife without affecting habitats and ecosystems. The law clearly states the consequences of violations, offences related to wildlife. It is imperative to note that the Wildlife Conservation and Management Act (2013) do not work in isolation. Rather it amplifies other natural resource management legislations which include; The Water Act (Cap 372), The Forest Act (Cap 385 of 2005). The Environmental Management and Conservation Act EMCA, 1999 (Cap 387). The Wetland Regulations of 2009, The Mining Act (Cap 383), The Firearms Act (Cap 114) and The Fisheries Act (Cap 378).

All these laws seek to ensure that there is sustainable development in Kenya as provided for in the Constitution (Cok, 2010) and globally by the Rio Declaration of 1992, Agenda 21. It is also imperative to note the multiplicity of the nature of human-wildlife conflict parties and actors involved. As such, it is common sense that a single legislation may not suffice. It, therefore, calls for an interactive conflict management strategy (ICM).

5.9.9 Requirements of Wildlife Conservation and Management Act (WCMA, 2013)

The Wildlife Conservation and Management Act (2013) govern wildlife conservation and management in Kenya. This law is basically enforced by the KWS with help from the various government agencies and the police.

This therefore begs an answer to the question “what does KWS do?” In managing wildlife and conservation issues in Kenya KWS work is categorized into three major roles which are protection/law enforcement roles, management laws and Socio-Economic roles.

5.9.9.1 Management Roles

KWS is tasked with management of national parks, conservation areas and sanctuaries such as the Lewa Conservancy Wildlife Sanctuary in Eldoret among others. It prepares and implements the national park management plan, advises the Cabinet Secretary andthe land commissionon the establishment of new national parks, develops and implements recovery plans for endangered species, wildlife conservancies and sanctuaries, advises the cabinet department on wildlife policy, strategy and legislation. Apart from offering stewardship role on national parks, KWS also oversees Wildlife management and conservation beyond the protected areas, including those under community and private sanctuaries and the local authorities. It also ensures security for visitors and animals within and outside protected areas. It offers conservation education and training wildlife research monitoring and input into national wild-life related law and policy. It ensures adapting and carrying out international protocols and conventions relating wildlife issues.

5.9.9.2 Protection/ Law Enforcement Roles

Provides Security for Wildlife Visitors in national parks and conservation areas, conducts, coordinates wildlife monitoring, ensures that no development in a national park, reserve, marine sanctuary, wildlife sanctuary or conservancy will be allowed without an approved management plan in place and to identify user rights, grant permits and to ensure compliance of terms and conditions of the Act.

5.9.9.3 Socio-Economic Roles

Responsibility to set up County Wildlife Conservation Committees (CWCC), collect revenue, develop mechanisms for benefit-sharing with communities living in wildlife areas and to ensure share up to 5% of the benefits from national parks with local communities neighbouring a park. Having seen the managerial roles of KFS, KWS and international actors it is found prudent to look into the Kenya Forestry Research Institute.

5.9.9.4 Kenya Forestry Research Institute (KEFRI)

As mentioned earlier, Kenya Forestry Research Institute (KEFRI) is one of the Government of Kenya State Corporations having offices at ASF and from field research data and Focus Group Discussion (FGD) it is one of the stakeholders at the said Arabuko Sokoke Forest (ASF). Kenya Forest Research Institute (KEFRI) is mainly research and scientific oriented.

Until 1986, the Kenya Forestry Research Institute was under the Kenya Agricultural Research . Its main mission is to improve the economic and social welfare of Kenyans through research initiatives initiated by the users to ensure sustainable forest development (Interview with Amur Arafa, Deputy Regional Director/Kenya Coastal Development Project (KCDP) Technical Coordinator on 11th March, 2016 at KEFRI Regional Office, ASF, Kilifi County).

5.9.9.5. Mandate

The mandate of Kenya Forestry Research Institute (KEFRI) is to undertake research in forestry. To cooperate with other research organizations and non-governmental organization (NGOs)

within and outside the country conducting similar research, liaise with other institutions and organizations in offering training regarding matters of forestry research and dissemination of research findings.

Being scientifically and research oriented Kenya Forestry Research Institute (KEFRI) is endowed with high level scientists and research staff. According to the Arabuko Sokoke Strategic forest management plan (2002), Kenya Forestry Research Institute (KEFRI) has over ninety four university research scientist at PhD, Master of Science and Bachelor of Science level in allied natural resources and forestry. These are distributed within the research programmes in seventeen research centers in different ecological zones in Kenya.

5.9.9.6 Endowment and Facilities

Kenya Forestry Research Institute (KEFRI) is endowed with proper infrastructuralfacilities for training and research which include printing and communication facilities, modern scientific equipment, accommodation and catering. Kenya Forestry Research Institute (KEFRI) has since come up with methodologies for the development of indigenous and exotic tree species, and has worked well for more than a hundred species, species for matching and provenances.

5.9.9.7 Water Harvesting

Kenya Forestry Research Institute (KEFRI) has invented water harvesting techniques to increase the chances of tree survival in dry regions. This knowledge and technology is very vital in drought stricken Kenya and other parts of the world. It complements the UNDP's efforts in poverty eradication.

The Gede Regional Research Center has three research scientists who have experience in farmsilviculture, agroforestry,, forestry, soil fertility management, botany, forest resource survey, community forestry, extension and information dissemination. Kenya Forestry Research Institute (KEFRI) is not into direct human-wildlife conflict management (Interview with Muema Kevin, a KEFRI official on 11th March 2016 at KEFRI Regional Center, Gede, Kilifi County).

5.9.9.8 National Museums of Kenya (NMK)

The NMK acts as the national repository for the Kenyan prehistoric, biological and cultural specimens. It undertakes research in the zoological and botanical sciences and maintains comprehensive educational exhibits and reference collections. The NMK was administered under the East Africa Natural History Society (EANHS) until 1939 when it was handed to the government of Kenya. It remains an internationally recognized center for education and research (Britton *et al*; 1979).

5.9.9.8.1 Mandate

The mandate of the National Museums of Kenya (NMK) is to collect, document, preserve study and present Kenya's present and past natural and cultural heritage and exchange knowledge, respect, appreciation, use and management of these resources to benefit of Kenya and the world.

Having looked into the International regional and national actors in the management of human wildlife conflict at ASF it is deemed prudent to delve into the local communities' efforts in the said human wildlife conflict management (Britton, 1979).

5.9.9.8.2 Local Communities as Actors in Human Wildlife Conflict Management

Some of the local initiatives and non-governmental organizations (NGOs) working as actors and stakeholders in the management of human wildlife conflicts are: The Kipepeo butterfly project at Gede, the Gedi Reptile Recue Park both managed by National Museums of Kenya (NMK), the Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) which manages the Jamii Villas at mida and the Mida Creek Mangroves Project among others (Khamis Juma ASFADA official interviewed on 16 March 2016 at Mida village).

Figure 5.1 The Kipepeo Butterfly Farm

A visit to the farm and interview with Warah Michael, farm manager on March 22nd , 2016 revealed the following information. The butterfly farm started in 1993 but took good shape in 1995. Funding was by USAID, Nature Kenya, ICIPE and GoK through National Museums of Kenya (NMK) (Gordon *et al*.; 1996).

The Kipepeo Butterfly Project was set up with a grant of US$ 50,000 given by the UNDP Global Environment Facility (GEF) small grants programme in June 1993. There are 47 species of butterflies in Arabuko-Sokoke Forest. One of the species is the charaxes blander which is found in the coast region only. Butterflies are divided into two categories. The Pappilio which feeds on flowers nectars and the charaxes which feed on juice fruits through their proboasis. Butterflies

lay their eggs on Techlea trycocapa trees. Once the eggs are hatched, they feed on the leaves of the techlea trycocapa tree. The life cycle of a butterfly is egg→ larva→pupa and Adult.

5.9.9.8.3 Objectives of the Kipepeo Butterfly Project

The objectives of the project are to create an association between conservation and development through effective utilization of butterfly diversity in Arabuko-Sokoke Forest so as to benefit the surrounding local communities. Through such benefits, it is believed to be an incentive to win local support for forest conservations (Gordon *et al*; 1998).

Other objectivesare to illustrate that the forest can be used as a source income and that it is more beneficial when it remains un cleared forest rather than when cleared for agriculture, to help in the diversification of coastal tourism by putting in place a novel eco-tourism attraction through developing an exhibit for all the invertebrates living in the coastal forests, to offer employment ,to earn export revenue for Kenya and to support conservation education activities relating to Arabuko Sokoke Forest (Ayiemba, W. O. 1997. Through the project, they are able to secure their livelihood, fend for their families' food and education needs. This has become an incentive for them not to destroy the forest.

5.9.9.8.4 Gedi Reptile Rescue Park

Gedi Reptile Rescue Snake Park is an integrated entity of the NMK that seeks to provide education and awareness to the public and in particular the younger generation with a phobia of snakes and amphibians. The snake park started as a reptile rescue center in handling cases of reptiles that were on the verge of being killed, burnt or being trafficked to other countries.

The snake park has been instrumental to the community welfare particularly the neighbouring schools whose students had previously been affected by the snake phobia. However, with collaboration with the Museums and the school administration, students are given free lectures and visits to the snake park. This has changed the once prone hysteria experience in the schools.

The local communities are also supportive to the conservation of reptiles with a record of receiving new rescue cases of tortoises at least every two months with recent one being hitched-back tortoise species (Gedi Reptile Rescue Park wall writings accessed on 22nd March, 2016 Field Research Visit).

5.9.9.8.5 Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA)

Arabuko-Sokoke Forest Adjacent Dwellers Association (ASFADA) was established in 1999 as a local stakeholder to cater for the welfare of the local communities. This is in accordance with the Kenya Forest Act (FA 2005) which advocates for Participatory Forest Management (PFM) as a form of decentralization (World Bank, 2005) Participatory Forest Management System (PFM) is a forest management strategy that aims at inclusion of forest community and other stakeholders in decision making for improvement of livelihood and sustainable forest management (Koech et.al; 2009, Bombley, 2005, Wily, L.A. 2002).

5.9.9.8.6 Jamii Villa at Mida

The Jamii Villa, a project of Arabuko Sokoke Forest Adjacent Dwellers Association (ASFADA), was started in 1996. It was built with funding from the European Union (EU). The main objectives were to cater for education for poor children through bursaries, restoration and

replanting of the forest and to create employment for the local communities through ecotourism(Khamis Juma, ASFADA official. Interview held at JamiiVilla on 18 March,2016).

5.9.9.8.7 Jamii Villa- Facilities

Jamii Villa is built with a grant funding form the European Union on a six acre piece of land which is fenced. The land was donated by Kenya Forest Service (KFS). Jamii Villa has the following facilities; Lecture hall, Modern kitchen and dining room, single rooms and two bedroom cottages for families. Tents and chairs are also available, cottages are named based on Giriama local language as follows; Nyumba Kulu – for elder, Aroni – for girls, Mongo fisi – For boys, Mwana Ng'ombe – for first born boy with wife and children and Pala (Ndalani) prayer house for elder (Uganga).

Other facilities include; A Swahili family house, Reception and office. Arabuko house- Hostel, Sokoke house- Hostel, Conference Hall, Dhome – A relaxing and conversation place, Erected water storage tanks and one tone generator for power generation since the area has no electricity grid connection. The villa is planted with Neem trees and other natural forest trees which offer natural environment and beauty.

The whole idea is to make sure the local communities as stakeholders benefit from the project. For example the locals benefit from provision of firewood, food staff and milk. The project also rears traditional chicken (Kienyeji) and also dairy goats.

The villa has three permanent employees and also Arabuko Sokoke Forest Adjacent Dwellers Association (ASFADA) committee members work on site on rotational voluntary basis.

The facility earns its revenue through hosting meetings, weddings, honeymooners, educational tours, cultural dances, accommodation to research scientists and aesthetic programmes for tourists. The facility can easily host up to five hundred people on a day basis and at least 50 people on night accommodation basis. (Khamis Juma, an official of ASFADA with other respondents on a field research visit to Jamii Villa on 12/3/2016).

www.midaecocamp.com/conservation.html

5.9.9.8.8 Mida Creek

Mida Creek is a 32 square kilometer tidal inlet. It opens up into the Indian Ocean by about a half a kilometer wide. The Creek is made of a deep channel covered by large sand-flats, which experience flooding at high tide. Seven of the nine mangrove species are situated here and are globally recognized as the most productive mangrove forest.

Mida creek is of great ecological value and deserves high protection in the entire continent. Apart from its contribution in the lives of forest birds and the lives of the coastal people, it also acts as the breeding ground for shrimps, crabs, mollusks,fish corals, the Green Turtle and Hawksbill.

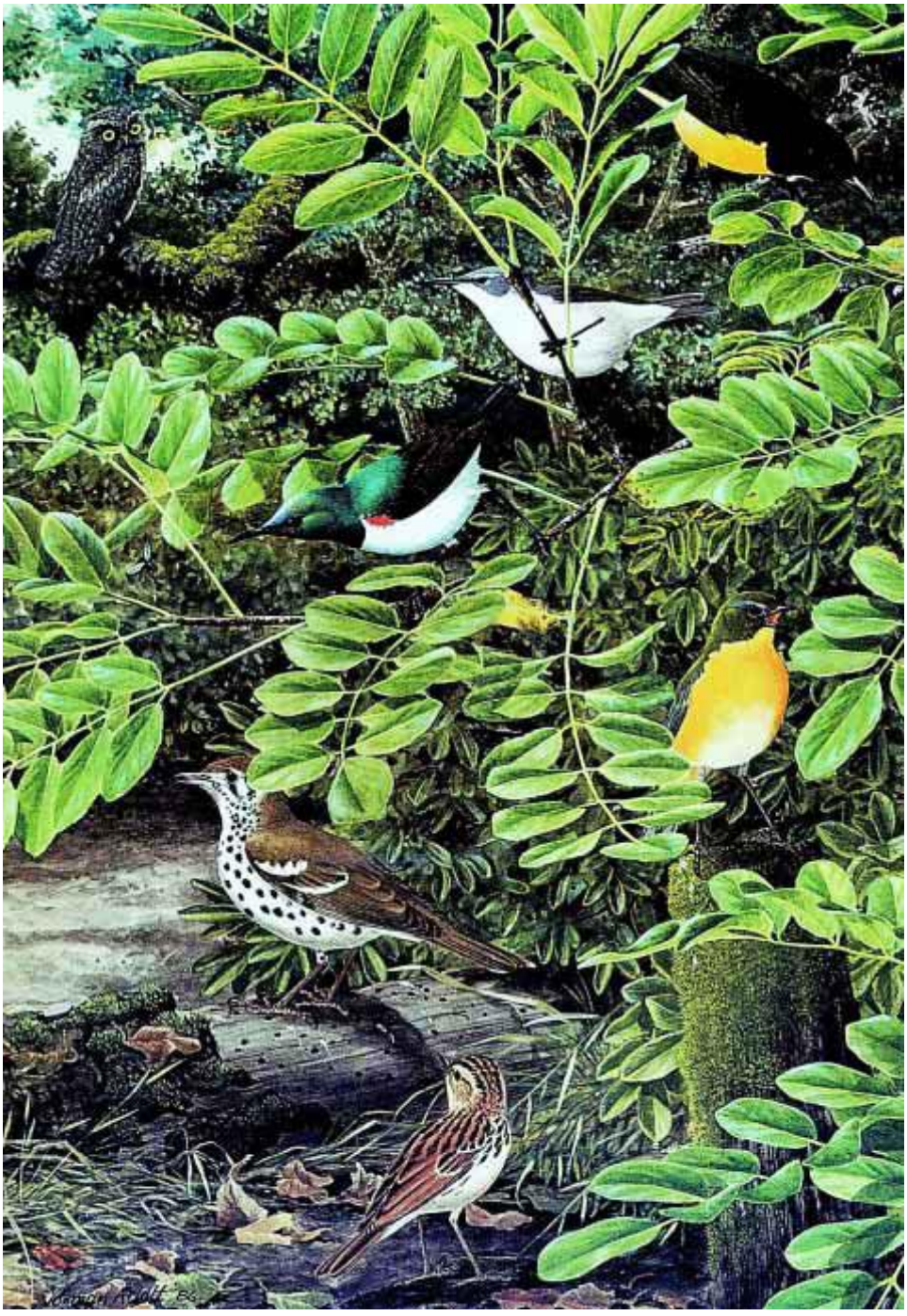
Since 1968, the Creek has been part of the Watamu National Marine Park. Mida Creek forms one of the five IBA's in Kenya (Important Bird Area). Mida's direct neighbor is the Arabuko-Sokoke forest. At one instance, it stretched from Somalia to Mozambique. Currently, Kenya's coast is the host of the greatest remnant. It is the habitat of the six globally threatened bird species such Clark's weaver bird. 90% of the world population of the Golden Rumped Elephant Shrew

cohabit the forest. It is home for more than bird 230 species, 260 butterfly species, leopard, mongoose, 100 resident elephants and the hyena. Arabuko-Sokoke forest and Mida creek were announced a UNESCO Biosphere Reserve in 1976 (Khamis Juma: ASFADA Official, Research visit to the Creek on 19.3.2016).

5.9.9.8.9 Living Standards of People Living in Mida Creek

This community lives under extremely poor conditions and majority perceive conservation as a way of making their lives more difficult. Locals are not permitted to fetch wood from the forests for their houses. Despite this, they continue harvesting wooddespite the penalties attached. Other findings confirm that majority of the people poach the forest to obtain land for agriculture and wood for construction. Most fishermen use illegal nets as they cannot afford the proper nets which cost about £100. The nets are made of small gapswhich do not provide conducive conditions for small fish to breed and grow. Hence over-fishing occurs and majority of the fishermen have nothing to capture. (www.midaecocamp.com/conservation.html) accessed on march 19, 2016

Figure 5.2:The birds of Mida Creek



As already mentioned Mida creek and Arabuko –sokoke forest were named UNESCO important Bird Area reserve in 1976. Mida creek is internationally recognised for its ecosystem biodiversity and especially in birds and mangrove forests.(Fishpool *et al*., 2001)

The open mudy sand flats make mida creek a key stop-over and wintering site on the Kenyan coast for migrant shore birds from Europe and Asia. Counts of over 5000 birds are regularly made during the Northern winter and a total of 65 wetland species have been recorded in the creek. In the area immediately around the creek a further 115 species have been recorded including the regionally threatened species little yellow flycatcher.

Large numbers of birds have been recorded roosting in the mangroves at times, the most stunning being flocks of hundreds of carmine bee-eaters, migrants from the Northern tropics. Mida holds 55% of all wetland birds in Kenyan creek systems and is internationally important for its population of crab- plovers and lesser and greater sand plovers. Other migrant shore birds at Mida creek include curlew sand piper, whimbrel and Grey plover. The creek is also a significant feeding area for Dimorphic Egrets, Yellow- billed storks and lesser Crested terns.
Some of the common birds found at the Mida creek are Greater Flamingo, Dimorphic Egrets, Sacred Ibis and Yellow billed stork.

5.9.9.8.9.1 Mida Creek Conservation Community (MCCC)

This is a a local community umbrella group made of eleven subgroups who undertake community work and conservation. The major activities are undertaken on the eastern side of

mida creek close to Dabaso. The entity involves the local community is practical conservation, sustainable management of natural resources and environmental education and awareness.

Some of the interesting eco-tourism activities that are undertaken are: a walk along the Mida creek board walk, a visit to the Mida community snake park, an education tour of the crab and fish farms, taking a canoe or motorboat tour through the mangrove or upto Kirepwe island from Dabaso landing site. Also entertainment by traditional Giriama dancers at Kirepwe is one of or the most exciting events. There is literally no place on earth quite like Mida Creek so visiting it would afford a great opportunity and adventure for world conservationists and environmental explorers (Research field visit with Khamis Juma on March 19, 2016. Also www.watamu.biz/member -list.php?acid=a accessed on 19.3.2016).

5.10 Chapter Summary

This chapter looked into the actors of human-wildlife conflict management. Research data revealed that the actors range from international, regional, national and local communities. This includes non-governmental organizations (NGOs) and civil society organisations (CSOs).

Some of the international actors involved in the management of Arabuko Sokoke Forest (ASF) are United Nations Development Programme (UNDP), the World Bank, European Union, the Global Environment facility (GeF), the USAID, United Nations Environmental Programme (UNEP), better Globe, Friends of Arabuko and Nature Kenya among others.

The regional actors have not shown much presence since the East African Community (EAC) member countries concentrate on their sovereign country's human wildlife conflict management issues and there is no block collaboration as such.

The national actors are the Kenya Forest Service (KFS), the Kenya Wildlife service (KWS), the Kenya Forestry Research Institute (KEFRI) and the National Museums of Kenya.

The said national actors combine efforts with the local communities associations such as Arabuko Sokoke Forest Adjacent Dwellers Association (ASFADA), Kipepeo butterfly project, Mida Creek Conservation Community to ensure sustainable management of the forest resource for the benefit of both wildlife and the local communities. This is done to show the local communities on the importance of them conserving the forest ecosystem for their welfare and advantage.

The chapter looked at policy and statutory postulates such as the Wildlife Conservation and Management Act (CAP 387) and the Environment Management and Conservation Act (EMCA) 1999 as well as the Kenya forest Act (FA, 2005).

It clearly emerged from the research respondents that if the livelihood aspect of the local communities is not going to be looked into, the likelihood is that they will be forced to venture into the forest to fend for their families. Cronic poverty levels are the driving force behind such deviant behaviour of the locals.

CHAPTER SIX

ALTERNATIVE DISPUTE RESOLUTION METHODS IN MANAGING HUMAN-WILDLIFE CONFLICT IN ARABUKO-SOKOKE FOREST: A CRITICAL ANALYSIS

6.1 Introduction

Chapter five looked at the actors in the management of human-wildlife conflict at Arabuko-Sokoke forest. It explored global, regional, National and Local actors in a bid to get their involvement in the management of human-wildlife conflict in the forest buffer zone.

This chapter critically analyses alternative dispute resolution methods in managing human-wildlife conflict at Arabuko-Sokoke Forest buffer zone and strives to interrogate emerging issues from the study. There are two ways of curbing human-wildlife conflicts at the forest. These are conventional approaches and non-conventional approaches. Non-conventional approaches are also known as informal methods or alternative dispute resolution methods. The alternative dispute resolution methods are also categorized as preventive and mitigation methods. The study explored a number of emerging issues at Arabuko Sokoke Forest which are variously critically analyzed as under.

6.2 Preventive Methods for Managing Human-Wildlife Conflict

These methods help to lessen conflict since they mitigate the magnitude of wildlife damage experienced (Breitenmoser *et al*; 2005, marker, Dickman and Macdonald, 2008 and Wood roffe *et al* 2007).

Premafacie, conflict resolution may seem to be a very simple exercise with expectations that once appropriate methods are applied to militate against any reported issue, animosity towards the species causing havoc will abate. To the contrary, evidence adduces, that complete, long-term conflict resolution is quite rare, even where mechanisms which appear so promising have been implemented (Webber *et al*; 2007; Marker, 2002) . In this regard, there is need to employ alternative methods to militate against the human –wildlife conflict as explored below.

6.3 Physical Separation of Conflicting Species and Resources

This method entails fencing (Mungai *et al;* 2008), enclosing resources, use of repellents, deterrents and use of scaring devices. Digging of trenches, netting and other defence structures around the resources is characteristic of this method. It also uses visual repellents, chemical repellents, rubber bullets and radio activated guard boxes (Ogada *et al*; 2003, Polisar *et al;* 2003). At Arabuko Sokoke Forest, this method has not been fully successfully. This is because while fencing has reduced crop damage by elephants, baboons still cause much damage since they jump over the fence or use informal corridors to sneak out of the protected forest area due to their high intelligence capacity (Knight, 2003). According to Knight (2003) the baboon is endowed with a very high intelligence capacity almost equal to that of the human species. The local residents of Arabuko- Sokoke Forest voiced the same opinion and the study also agrees on the same. The barriers analyzed are limited as they cannot contain each species of animal.Further, they can easily be breached by particular agile or strong target species (Treves and Karanth, 2003)

6.4 Guarding Assets

This alternative dispute resolution method involves guarding and use of warning animals. In this regard, specialized livestock such as guarding dogs, donkeys, and domestic dogs are used to raise an alarm on predator presence (Patterson *et al;* 2004) At Arabuko-Sokoke Forest, the approach involves human guards (Askari) who stays in crop fields to scare away herbivores, pastoral thieves and carnivores (Ogada *et al*; 2003). Guarding is popular at Arabuko forest as a preventive method as is also popular in parts of India such as Rajasthan (Sekhar, 1998). However, this approach has not been fully successful at the Arabuko-Sokoke Forest. This is because guarding requires additional labour especialy at night (Sekhar, 1998). Such additional labour is in short supply at Arabuko- Sokoke Forest

6.5 Habitat use Zonation

This method involves habitat manipulation so as to reduce human-wildlife conflicts. For instance this could involve the mowing of vegetation around the airports to reduce cover for problematic wild animals. Under this strategy, habitat is demarcated into different land use zones to prioritize human or wildlife use (Kagombe and Mwenda, 2000). For example Arabuko sokoke forest is divided into forest management zones such as non-extractive zone, Subsistence zone, commercial zone, and intervention zone. Zonation facilitates proper forest use planning and sustainable conservation of biodiversity (Mwendwa K..A; 2000). When the land where the wildlife or human species is used to reside is changed into another use, the only alternative is to relocate to another conducive environment (Kenya Wildlife Service, 1996, Vijayan and Pati, 2002). This approach has been a cause of human-wildlife conflict at Arabuko-forest in that migrating wildlife predate on livestock. Hence, while the approach helps in lessening the wildlife

problem in Arabuko, it intensifies conflict in other forest zones such as Tsavo conservation area (TCA). According to the Natural Law theory by J.M finnis (2002), and environmental democracy by Susan Hazen (2009) there should be democracy in habitat use by both humans and wildlife. As such if habitat in one location becomes harsh and inhabitable, there is freedom to migrate to another location.

6.6 Behaviour Modification of Conflict-Causing Animals

In this method, conditioned taste aversion is invoked. For example Lithium Chloride and other chemicals are applied to the resources which wildlife consume to cause discomfort and hence aversion after consumption. A good example of this model is exploring prudent livestock management through herding, synchronizing breeding, enclosing livestock, guarding, carcass disposal and avoidance of conflict hot sports. For example, use of hot chilli and sisal plantations drives away elephants and baboons at Arabuko sokoke Forest Buffr zone(Khamis Juma, ASFADA official interviewed on 23rd March, 2016) on a field research visit to Arabuko- Sokoke Forest.

Use of electronic training collars (EC) and movement activated guard (MAG) devices are limited by the depending on the type of stimuli used stimuli. Such gadgets are very expensive. This method disrupts a predators attack through stimuli which interferes with the normal behavior of the animal: such stimuli is gustatory, through visual, chemical infusion, light, auditory or olfactory through siren alarms which are usually exuberated by the animal going close to protected resources. In a bid to lessen the wild animal's ability to be traverse the device, it is normally equipped with many recorded sounds.

Although this method has been tried at Arabuko- Sokoke Forest, it has limited uses since over time, the animals adapt to the stimuli (Shivik *et al*: 2003, knight, 2003)

6.7 Voluntary Relocation of Human Population

This method is applicable where alternative incentives are in place. In this regard, the movement of local communities to the regions offering better access to socio-economic opportunities and natural resources mitigates human-wildlife conflict (Madhusudan, 2003). As a matter of fact, resettlement schemes whose aim is to prevent the overlap between humans and wild animals can work in the long run if some important presumptions are fulfilled. Firstly, the local communities must gain tangible benefits, for example, better access to resources in tandem with the Natural Law theory by J.M Finnis (2002) and environmental democracy theory by Susan Hazen (2009). Further, such benefits must be in tandem with the constitution of Kenya (CoK 2010).

Articles 59 and 66.. Secondly, locals should move to areas where the risk of losing life, property, crops or livestock is minimal and thirdly, they should not face may social , cultural or political opposition (Treves and Karanth, 2003). Although this method has worked in other parts of the world, it has not positively worked at Arabuko Sokoke forest. This is because the scramble for Africa occasioned by the Berlin conference of 1884-5 brought about an influx of people into the Arabuko Forest Buffer zone which forced the original Sanya natives to vacate their ancestral land. Against the Natural Law theory propunded by J.M Finnis (2002) and environmental democracy theory propounded by Susan Hazen (2009) the Sanya were undemocratically displaced and cannot access the forest for natural subsistence resources such as game meat,

timber and medicinal herbs. This has been a source of conflict between the local natives and the Kenya Wildlife Service (KWS) patrol police.

6.8 Adoption of Waste Management Systems that Restrict Wildlife Access to Garbage

Adoption of viable standards of waste management systems is neccesary to avoid attraction of wild animals to places cohabited by human beings. Such systemsrestrain the wild populations from being artificially sustained bygarbage accruing due to human activities. For example, the Golden Jackal conflict in the Golan grassland plateau in Israel is due to waste mismanagement. Since the farmers rampantly illegally dump animal carcasses which become the main source of food for Jackals, the population of Jackals has tremendously increased (Yom-Tom, 1995). At Arabuko Sokoke Forest buffer zone, waste management schemes are not coherently in place.

The presence of the hotel and tourism industry in Watamu, Gede, Malindi and Kilifi towns has seen an enormous increase of uncollected garbage. This has attracted hyenas which have been predating on small goats and sheep as they patrol the area in such of animal carcasses from butcheries dumping sites and other mismanaged farmyard and animal refuse sites.

To avoid human-hyena conflict, adoption of sound waste management systems has to be maintained. If the environment will be littered with farmyard and animal carcass refuse, hyenas and other scavengers automatically will use their democratic right to access such refuse since it is food for them in tandem with J.M Finnis (2002) Natural Law theory and Susan Hazen (2009) environmental democracy theory which advocate for the right of access and use of natural environmental resources.

6.9 Mitigative Methods

It should be realized that the alternative dispute resolution methods analyzed so far are preventive in nature. The second category of alternative dispute resolution in methods in managing human-wildlife at Arabuko-sokoke forest buffer zone is mitigative mechanisms. While preventive methods endeavour to stop the chances of a conflict from taking place altogether, mitigative methods endeavour to lessen the intensity of a conflict which has already occurred. Some of the mitigative strategies employed at Arabuko-sokoke forest buffer zone in an effort to manage human-wildlife conflict are critically analyzed as under.

6.9.1 Compensation Schemes

Direct compensation is done through payment in the event of loss of human life, injury or livestock killed by elephants or other predators. Such schemes obtain funds from conservation organizations such as the Global Environment Facility (GEF) or by the National Government through KWS. These schemes are carried out to increase the tolerance to tolerance among the local communities affected and hence prevent them from hunting and killing the animal culprits like lions, elephants and baboons (Treves *et al*, 2003).

There exist some compensation schemes for losses caused by wild animals within sub – Saharan Africa. However, most African nations compensate the damages cause by wild animals. Their argument is that compensation schemes cannot do much to mitigate the human wildlife conflicts. They further argue that these schemes have been associated with much red tape, are less accountable, less transparent and hence redundant (KWS, 1996).

Most compensation schemes have failed due to bureaucratic challenges, fraudulent claims, cheating, corruption, time wasting, moral hazards, high costs involved and the fact that most illiterate farmers find problems in filling and submitting the compensation claims. Coupled with this, there is also the problem of competent personnel to move, verify and quantity damage involved over large areas. These bottlenecks lead to delays in decision making on the part of KWS officials, low monetary amounts, inadequate payments, irregular payments, or worse still, rejection of the compensation claims altogether (Muruthi, 2005).

6.9.2Indirect Compensation Schemes

This is an alternative compensation scheme which dwells on giving out licenses to local community dwellers to exploit and use natural resources. In this regard, locals are dully licensed to carry out ecotourism, hunting, collecting mushrooms fodder or timber from the forest.

This type of compensation is more preferred than monetary payment. According to Sekhar, (1998) it is a proven fact that benefits acquired from the use of forest resources motivate and affect the perceptions and attitudes of local communities.

6.9.3Insurance Policy

This is a compensation strategy where farmers make premium payments to cover against some defined risk such as depredation of livestock among others. The premium is predetermined based on the true market rate or subsidized as per the provisions of the conservation organizations such as the UNEP and the global environment fund. The insurance policy scheme needs an accurate assessment of the cause of the crop damage, human death or injury and livestock depredation.

Since it is operated locally, reports can easily be verified. The method calls for participation by farmers to mitigate against human wildlife conflict but according to Muruthi, (2005) it is more viable.

6.9.4Agricultural Strategies

Agricultural strategies offer some of the best methods to manage human wildlife conflicts. Practices like changing the crop planting time or harvesting time could bring about a decrease in crop raiding by wild animals.

This can be effected through the use of special varieties of maize seeds like the hybrid 1 (Katumani) which mature early and can hence be harvested earlier than other food crops. As a result such maize species are less vulnerable to damage by wildlife which occurs later in the crop growing period.

Through intensive agriculture, availability of more inputs so as to increase the yields enables the farmers to attain increased outcomes from small plots which make it easier for them to guard against crop raiding moneys, baboons and elephants. Intensification can be achieved through introducing practical, environmentally sound techniques like the use of organic fertilizer and mulching (Timber Producers' Federation, 2006).

Small patches of crop scattered over a large landscape occupied by wild animals are at more risk of being encroached than the clustered ones. By this token, a landscape to mitigating human wildlife conflict should involve establishing plantations in large communal fields with straight

fences. This may entail clearing the nearby bush and habitat to guard against wildlife crossing. This is because baboons and bush babies do not like crossing open areas.

6.9.5 Use of Alternative Food Sources

This technique uses buffer crops, provision of altificial alternative food sources and maintenance of alternative food sources. For example people in Kirepwe Island across Mida Creek Plant Moringa Oleifera (Mzungi) to supplement relish while it gives ten other nutritional ingredients to the human body. Moringa Oleifera has been scientifically proven to provide calcium, iron, Antioxide Activity (AOA) with vitamin A, B and E and also fiber and body immunity. Consumption of Moringa Oleifera products also increases milk production to breast feeding mothers. Since Baboons do not eat this crop, this helps in averting the human wildlife conflicts in the said area (Mwalimu, A. (2017) Game tour guide KFS. Interview held at Arabuko-Sokoke Forest regional offices, Gede on 22 March 2017).

Further, maintenance of wild prey for carnivores such as lion, maintenance of wild crops for herbivores helps to ensure that the animals do not consume human resources. Human – wildlife conflict can also be reduced through divisionary feeding of conflict.

6.9.6 Lethal Control of Predators

This method is about animal population control. It involves mass killing of conflict – causing animals to avert conflict. It also involves selective culling of animals to limit population growth. Another approach is retaliatory killing which involves killing of the conflict causing animals in

response to ongoing conflict in the locality. Under this approach also comes problem animal control. This aims to invoke lethal control of all problems animals.

6.9.7 Non-Lethal Control of Predators

This method involves sterilization and removal or translocation of problem animals. Use of contraceptives, physical sterilization, putting into captivity of conflict causing animals is invoked.

Another non-lethal control approach is reducing the conflict approach cost. This involves eliminating the economic costs of conflict. It entails compensation schemes for wildlife losses and insuring of resources. Another technique is to give economic incentives to contain the species triggering conflicts. Local communities are given direct payments for conservation of conflict causing species. For example the people of Arabuko Sokoke Forest Buffer Zone would be given monetary compensation for living alongside with elephants and baboons.

6.9.8 Incentive Programmes

Incentive programmes constitute all strategies that use subsidies to the local communities. They are more than the conservation cost and adoption of conservation friendly practices, thus the wildlife tolerance is increased through the mutual type of relationship(Mishra *et al*; 2003). For example, through ecotourism, revenue sharing schemes, wildlife related employment like wood carving, provision of recreational opportunities through wildlife viewing, the local communities of Arabuko-Sokoke forest buffer zone have appreciated the presence of the forest resources and enthusiastically work towards its conservation.

6.9.8.1 Settlement of Rights

This is another alternative dispute resolution method employed at Arabuko-sokoke forest buffer zone. This alternative strategy fixes a quota of commodities that can be exploited by the local communities. It clearly demarcates reserve zones that are accessible to local residents and it legitimizes their rights to some specific resources.

For example, the locals at Arabuko forest have been duly licensed to access and procure game meat through hunting timber for building, collection of fuel wood, wild fruits, mushrooms and medicinal herbs. Such licensing is indeed in tandem with the Natural law theory propounded by J.M Finnis (2002) as well as the environmental democracy theory propounded by Susan Hazen (2009). As a matter of fact, the benefits derived from the legitimate collection of natural resources influence the attitudes and perceptions of rural dwellers towards wildlife and conservation. They take responsibility and own conservation initiatives as they enthusiastically promote them (Sekhar 1998).Conversely, if not handled with control, this compensation scheme can easily lead to an infiltration of poachers in the forest. Even illegal poachers can take advantage of the settlement of rights and can trespass into non-extractive zones of the forest to carry out logging or illegal hunting of forest game. Hence internal controls have to be maintained to ensure there is no abuse of this scheme.

6.9 Regulated Harvest

Globally, many local natives manage human wildlife conflict by using a low cost method which can raise public tolerance towards wildlife. Based on the settlement of rights (Sekhar, 1998) money raised from the sales of licenses is used to protect human settlements and fund

conservation activities (Karanth and Treves, 2003). It should be noted that for hunting to be seen as a genuine management practice, it should be based on scientific monitoring which guarantees sustainable harvests. Further it has to be regulated by policies that address the timing, location, hunting methods and most importantly, equity in distribution of benefits to the shareholders.

At Arabuko- sokoke forest this method has been practiced with no much success. Only 37% of the respondents interviewed vouched for killing animals for meat, with 55% are in a dilemma; not having any measures to take on depicted by figure 6.1

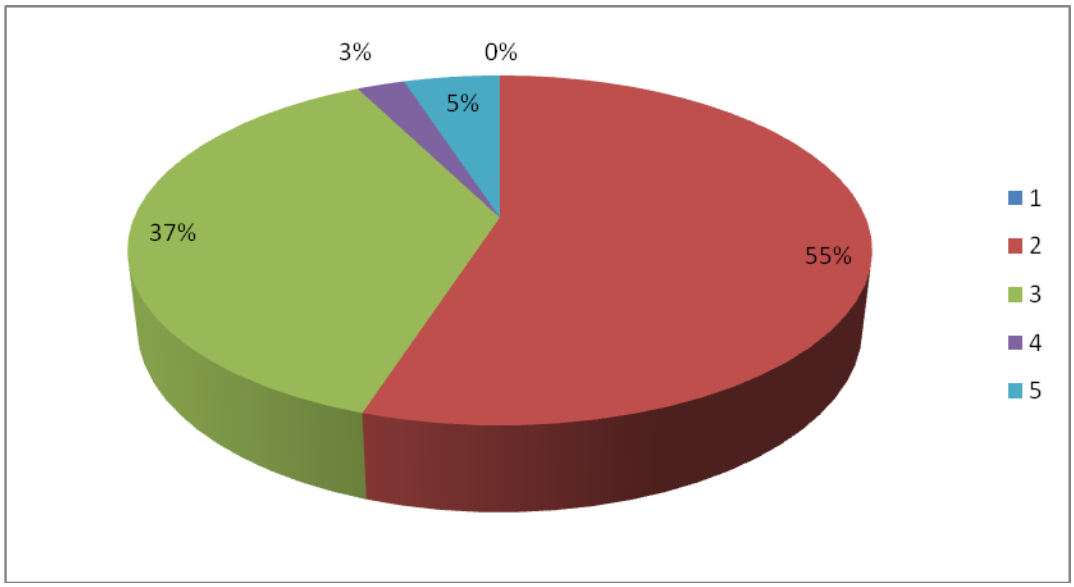


Figure 6.1 Degree of Satisfaction on Measures taken by Local Communities

Source: Field Data, 2016

Indeed, lethal control is considered an important method when it comes to satisfying the aggrieved party but suffers a drawback due to unscientific modalities of selecting the target animals to be eliminated.

This anomaly leads to killing the wrong animal; thereby leaving the culprit predator alive. This aggravates conflict because the missed out predators continue playing havoc on crops, property and livestock. In this regard, it is within the animal conservation domain that regulation of harvests is not effective in the reduction of livestock and crop losses and is even likely to result in further losses when dangerous carnivores wounded (Treves and Karanth, 2003).

6.10.1 Wildlife Translocation

This method, which is one of the best non-destructive controls, measures several animals from a difficult zone to a new zone. Even though this method may not make sense to many conservation practioners due to the risk of transferring the problem to another area, it is one of the alternative strategies that has found applicability at Arabuko-sokoke Forest. Translocation succeeds when isolated species are not able to reproduce or survivesince they are too far apart from their its species and need to be relocated to where they belong. It also works well when a high density population needs to be reduced through relocation of some animals (Treves and Karanth, 2003b).

Translocation has found succe4ss in Uttar Pradesh Vrindaban, Northern India, where high density population of rhesus monkeys was successfully translocated and the conflict they caused with local residents was revolved (Iman and Malik, 2002).

Respondents interviewed at Arabuko-Sokoke forest vouched in favour of this method, with 55% of them saying they favaoured problem animals to be transferred to other habitat as figure 6.1 depicts. The local residents overwhelmingly voted for translocation of the problem animals to other habitat as they indicated their degree of dissatisfaction on the measures put in place to curb human-wildlife conflict.

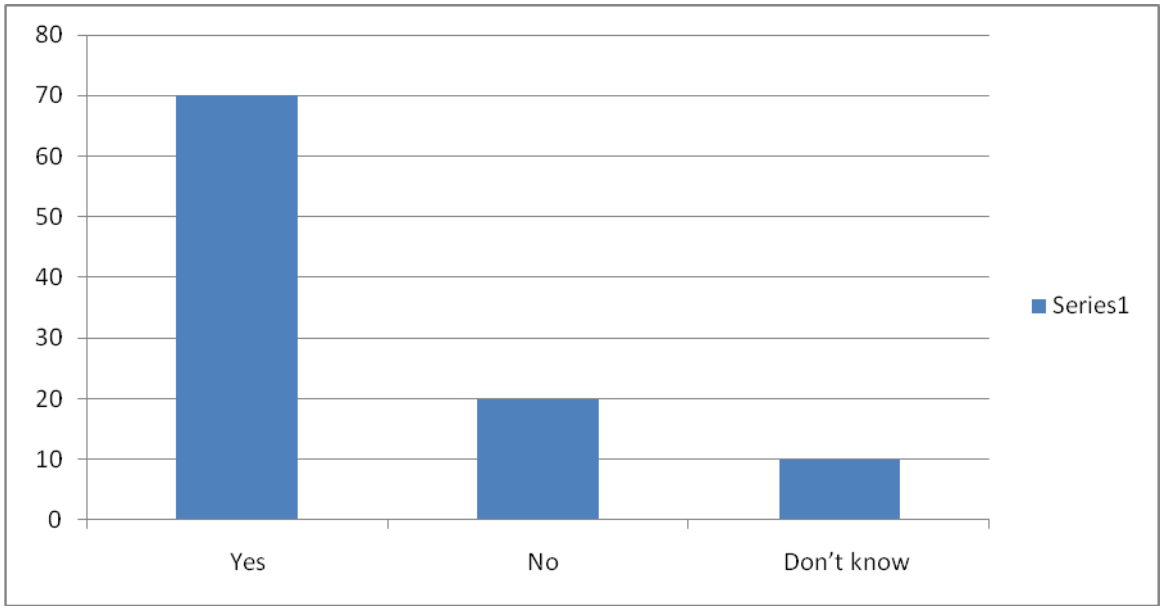


Figure 6.2: Documented National Policy in curbing Human Wildlife Conflict In Kenya

Source: Field Data, 2016

Out of those interviewed,70% said "yes" 20% said "No" while 10% of the respondents do not know whether there are such policies at all. This particular research questions unveils the fact that among the government and professional personnel within and around ASF buffer zone, there is awareness on the existence on documented policy document in in curbing Human Wildlife Conflicts. The question that may need more probing is whether such policies are exhaustive and

geared towards human wildlife conflict management and whether they are being implemented to the full.

Even though this method has been successful in the Northern Indian state of Uttar Pradesh (Vrindaban) and majority of local residents at Arabuko-Sokoke Forest (55%) advocate for it, it has its side effects. Translocation of wildlife can cause many problems particularly where carnivores are concerned. For example translocation of carnivores to areas already occupied by individuals of the same species result in aggression and infanticide due to incision and a higher mortality rates (Karanth and Treves, 2003b) . The study posits that wildlife translocation goes against the postulates of the Natural Law Theory propounded by J.M Finnis (2002) and the environmental democracy theory by Susan Hazen (2009). Translocation interferes with the democracy of the affected wildlife and may aggravate conflict in the process of implementing it.

6.10.2 Community Based Natural Resources Management Mechanisms (CBNRM)

This method constitutes a system of returning a hand to the local communities in a bid to motivate them to discourage poaching and guard wildlife outside protected areas. This strategy has been put into practice in other countries such as the Caprivi region in Namibia. Community based natural resources management mechanisms (CBNRM) are gaining popularity and have great potential in mitigation the human-wildlife conflict (O' Connell- Rodwell, *et al*; 2000).

CBNRM is another approach of dealing with conflict between the wildlife in the local communities and conservation authorities. It entails changing the affected communities' attitudes

towards wildlife and the conservation authorities. Such strategies convince the local communities to participate in day to day management decisions of the forest resources, policy making and benefits sharing scheme.

(Muruthi, 2005; Mackinnon, 2001; Hulme; 2001; Western, 1989).this is normally attained by ensuring that the individuals and communities affected are actively involved in the management of wildlife. Murphree and Helme (2001) and Coppolillo and Mulder (2005), may include consolation payments, educational programmes and equal sharing of benefits attributed to the existence of wildlife in the area.

Similarly, Muruthi (2005) further opines whether such benefit sharing programmes influence the affected communities' attitudes to live with wildlife. Further, the Kenya Wildlife Act compensates the landowners whose farms are invaded by wildlife(KWS, 2004; WCMA, 1976). This compensation may however not be obtained for loss of personal and life injuries. The amount of compensation for injury or loss of human life by the Kenyan wildlife according to Sindiga (1995) is not proportional to the loss.

Out of the 400 households interviewed at the ASF (Mida) 50 % voted for the community based natural resource management mechanism (CBNRM) as the best method in managing human – wildlife conflict as indicated in figure 6.4.This indicates the community's appreciation that community based natural resource management mechanisms (CBNRM) portrays the highest impact as an alternative methods in managing the conflict between humans and wildlife at the Arabuko Sokoke Forest buffer zone (ASF).

The study sought to explore the methods employed in managing the human-wildlife menace. Respondents interviewed revealed the following methods; litigation by going to court or reporting to KWS, killing the animals , Community Based Natural Resources Management Mechanisms (CBNRM), police involvement among others as depicted by table6.4 below

Table 6.1 Resolution Methods Employed in Managing Human Wildlife Conflicts

Responses	**Frequency (f)**	**Percentage %**
Litigation	60	15
Killing problem animals	120	30
Community Based Natural resources management mechanism (CBNRM)	200	50
Police involvement	10	2.5
Other methods	10	2.5
Total	**400**	**100**

Source: Field Data, 2016

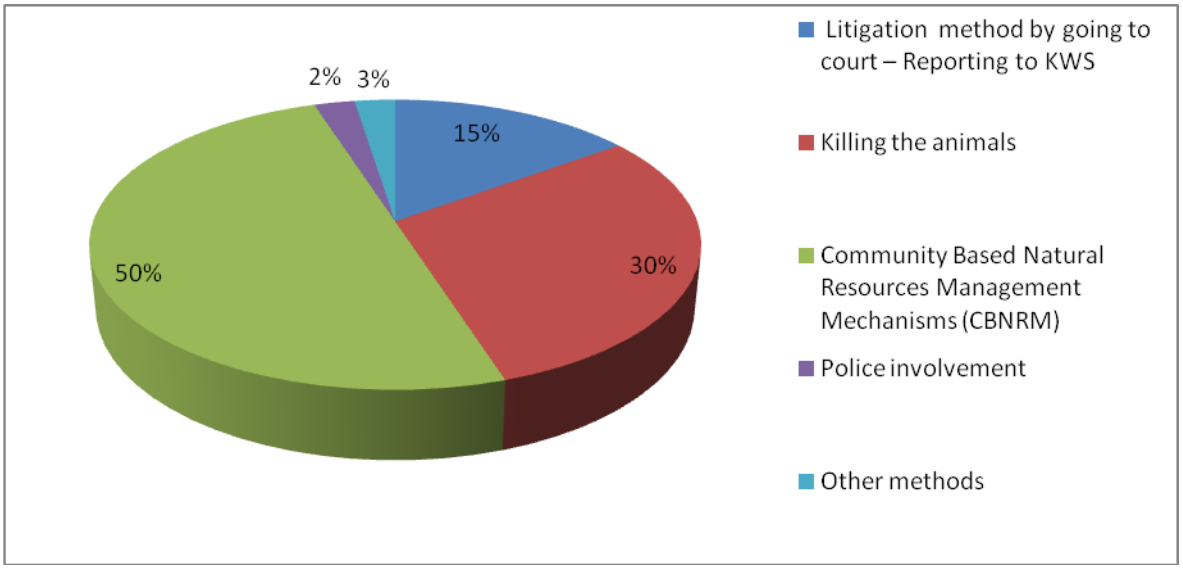


Figure 6.3: Resolution methods employed in Managing Human Wildlife Conflicts

Source: Field Data, 2016

The majority of the respondents (50%) felt that Community Based Natural Resources Management Mechanisms (CBNRM) which entails involving local communities in participating in management, policy formulation and benefit sharing of income from conservation resource is the best method for the ASF buffer zone. This was followed by killing the problem animals (problem animal control) at 30%, litigation method which involved first reporting incidences to KWS at 15%. Other control methods (5%) entailed police involvement, educating thelocal communities on wildlife conservation issues and inculcate a culture of how to control wild animals. Enlighten the communities on the economic advantages of wildlife found within the ASF. This objective can be accomplished by taking people to the parks, encouraging locals to visit other gazetted forests or through videos, photographs forming human-wildlife whatts up groups and clubs and teaching in schools.

6.10.3 Possible Global community's role in fostering community based natural resources management mechanisms for the benefit of local communities

Respondents interviewed had a number of suggestions on the possible role the global community could play to foster community based natural resources management mechanisms for the benefit of the local communities. These included promoting alternative sources of livelihood; that is income generating activities (IGAS) such as beekeeping, butterfly farming and goat rearing among others, funding (Grants) from world Bank, international monetary fund (IMF) and the International fund for Agriculture and Development (IFAD), rural electrification, clean tap water and infrastructure (Roads) development and provision for scholarships for children whose parents are engaged in forest Ecosystem and biodiversity conservation.

Table 6.2: Possible Global Community's role in fostering community Based Natural Resources Management Mechanisms (CBNRM) for the benefit of ASF buffer zone communities

Responses	Frequency (f)	Percentage%
Promoting alternative sources of livelihood (IGA's)	200	50
Funding (Grants)	120	30
Rural electrification and infrastructure development	50	12.5
Provide Scholarships	30	7.5
Total	**400**	**100**

Source: Field Data, 2016

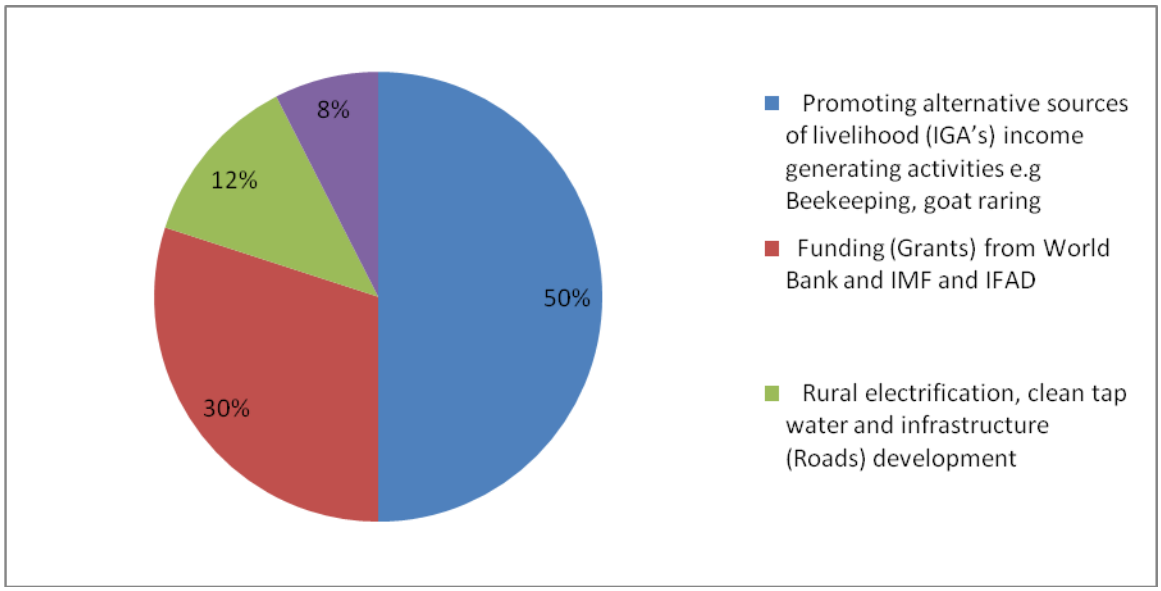


Figure 6.4: Possible Global Community's role in fostering community Based Natural Resources Management Mechanisms (CBNRM) for the benefit of ASF buffer zone communities

Source: Field Data, 2016

The analysis inferred from figure 6.2 above indicates that 50% of those interviewed preferred projects such as beekeeping, butterfly farming and goats rearing for commercial purposes. 30% of the respondents vouched for funding (Grants) from world bank and the international monetary fund (IMF), international fund for Agriculture and development (IFAD) . 12.5% vouched for rural electrification, clean tap water and infrastructure (roads) development. 7.5% of the respondents preferred the Global community to provide scholarships to children whose parents are engaged in forest ecosystem conservation.

From the analysis and interpretation, it emerges that promoting alternative sources of livelihood through income generating activities (IGA's) such as beekeeping, butterfly farming and goats rearing for commercial purposes is the dire priority quest of the ASF buffer zone dwellers and in this regard global funding is needed.

6.10.4 Chapter Summary

This chapter explored a critical analysis of alternative resolution methods in managing human wildlife conflicts at Arabuko-Sokoke Forest. Examples of emerging issues analysed in this chapter are preventive methods for managing human wildlife conflicts such as physical separation of conflicting species and resources,guarding assets, habitat use zonation, behavior modification of conflict causing animals, voluntary relocation of human populations, adoption of waste management systems that restrict wildlife access to garbage, mitigation methods such as compensation schemes, insurance policy, agricultural strategies, use of alternative food sources, lethal control of predators, non-lethal control of predators, incentive programmes, settlement of rights, regulated harvests, wildlife translocation, community based natural resources

management mechanisms and possible global community's role in fostering community based natural resources management mechanisms (CBNRM). Chapter seven will encompass summary, conclusion, recommendations and further areas for research.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

Chapter six critically analyzed alternative dispute resolution methods in managing human-wildlife conflict at Arabuko-Sokoke Forest. This chapter captures and reflects on the theme of the thesis: the impact of alternative resolution, methods in managing human-wildlife conflicts in Kenya. In this regard, the author reflects on what formal legal mechanisms such litigation have been able to achieve, what the community based Natural resources management mechanisms (CBNRN) have been able to achieve and alternative mechanisms for the present circumstances and future prospects in this thematic area. The chapter ends with an examination for prospects for the future engagement which incude recommendations and proposed areas for further study and research.

7.2 Summary and Conclusion

The research dealt with the impact of alternative resolution methods in managing human-wildlife conflicts. The study area was Arabuko-Sokoke Forest, specifically Mida village, in Kilifi County, Kenya. Human-wildlife conflicts interfere and adversely affect the livelihood of people. There is paramount need to resolve them so as to achieve sustainable development.

Natural resources based conflicts occur where humans live and thus should be resolved instead of merely being settled. A number of alternative resolution methods on environmental conflicts (ADR) are, negotiation, mediation, conciliation and community based Natural Resource management mechanisms among others. Whereas formal litigation legal mechanism are track

one state centric top-both M approaches, (ADR) CBNRN are people oriented informal track two diplomatic approaches which are participatory and bottom up approaches.

Litigation methods are legally formal approaches which use force, coercion and balance of power strategies outcomes are formally arrived based on court rulings imposed on the parties involved whether they like it or not. This arrangement does not resolve the conflict but rather settles it. When balance of power shifts, there isevery likelihood of the conflict to resurface. Further in the case of Human-Wildlife Conflict management it is not practicable to take an elephant or a baboon to a court of law incase it destroys crops or kills human beings. This complicates the use of the litigation method.

On the other hand, CBNRM involves the local communities in participating and decision making process in line with the constitution of Kenya 2010 Article 69 (1) (d) and 59 (2)(c) both of which advocate for public participation in management, protecting and conservation of the environment. Further the forest act 2005 equally advocates for adjacent forest communities participation and sharing in the benefits from forest resources as a mechanism to motivate them to conserve forest ecosystem and biodiversity.

Resolution of Human–Wildlife Conflict looks into the root of the problem and addresses the psychological dimensions of the conflict at hand it is important to note that it is impossible to achieve sustainable development in an environmental of unresolved conflicts. Unresolved conflicts negatively impact on socio-economic development as well as the biosphere.

It needs to be pointed out that there is no one “fix all” method of managing Human–Wildlife Conflict Even among the alternative methods of resolving the said conflicts, not one of them can suffice on a stand along basis. An integrated conflict management (ICM) approach would help in minimizing the human wildlife conflict menace. This entails marrying all the available approaches mentioned in chapter two and synchronizing them into “one whole” continuous research, monitoring of interventions and maintaining a robust feedback mechanism is the way to go.

7.3 Recommendations

Based on the data collected, key informant’s literature and observations; the author has the following recommendations to make.

The voice of the local communities needs to be heard. The livelihood of the local communities is at stake. Chronic poverty levels have impaired education standards since most of the local communities cannot afford even school uniform and basic primary school requirements let alone secondary and university level education.

Rampant human-wildlife conflicts have aggravated the poverty levels. Baboons continue to play havoc on crops and livestock and interfere with the subsistence farming activities of the residents. It is hereby recommended that the wildlife conservation and management Act 2013 be amended to ensure compensation is given to victims of crop, property destruction and death caused primaries such as by baboons and vervet monkeys.

The study recommends that once compensatory funds have been granted by the government priority should be given to the victims and not KWS as in the current practice under the WCMA 2013.

When it comes to compensation rewards the process of claiming should be shortened, without much bureaucracy and should be made more transparent. Internal checks should be incorporated into the process to ensure justice is given to victims of wildlife damage to either crops, property or even fatal injury and death.

Current awards of Sh 3million for permanent incapacity and Sh 5 million for death should be revised to 5 million and10 million respectively.The study, therefore, recommends that in this regard both national assembly and senate should enact amendment to the wildlife conservation and management act (WCMA 2013) to effect these amendments.

Capacity building and education to the local communities needs to be intensified. The study found out that most locals do not know their rights and how they can legally benefit from the forest resource and wildlife thereof.

For example, the act postulates that every citizen should be freely allowed to access wildlife resources. Wildlife management can be practiced as a gainful land use, as long as the wildlife remains in a healthy, natural and secure state and is carried out on suitable land that adheres to the terms and conditions of the license issued by the cabinet secretary incharge of environment and natural resources. Majority of Kenya's particularly local communities in rural Kenya have no knowledge of this. Hence more capacity building and education is required.

The study found out that infrastructure network of the study area is wanting. Apart from the Mombasa- Malindi highway which is tarmacked, all the feeder roads within the ASF buffer zone are in deplorable condition. This is worsened by the much sandy soil (Bungabunga) which makes mobility by motor cycle, bicycles, handicraft or even walking on foot very difficult. This state of affairs aggravates the conflict in that both livestock and humans fall victims of predators because mobility is checked. The government should look into construction all weather roads to facilitate transport and security in the buffer zone. Further clean tap water connectivity and electricity is lacking. It is recommended that these amenities be availed to foster accelerated development of the area. In line with the Jubilee manifesto, the primary and secondary schools in the area should be connected to electricity grid. Apart from availing convenient lighting to students' prep work and private evening study, electricity will open up the area for trade and other economic activities.

On the agricultural front, the study found out that the main cash crop grown in the area is the coconut tree. It is recommended that detailed research on the said tree be carried out in a bid to optimizing its products' benefits to the local communities and the Kenyan economy at large. Local and international marketing strategies for the said tree should be intensified to foster coconut trade which has capacity to create employment and help poverty eradication in the area.

Further, modern methods of maize production such as use of mechanization, certified seeds and application of organic fertilizer as supplementary to chemical fertilizer will need to be invoked for higher yields. In this regard local farmers should be sensitized on planting self-nitrogen fixing plants such as legumes, grivalia and carbon 3 and 4 vegetation which enrich the soil. It is,

therefore, recommended that the national and county governments collaborate to intensity agricultural extension services to the area. Also channels of distribution and marketing outlets have to be sought to improve the economy of the local residents.

The study found out that notorious wildlife especially, elephants and baboons do not consume Morigna Oleifera, sisal, and hot pepper. It is hereby recommended that local communities be advised to intensify growing the said vegetation. This will help to alleviate the human-wildlife conflict in the area. It will help to alleviate the human wildlife conflict in the area. It will also work to the advantage of the local communities since they can make exports based on these agriculturally oriented initiatives.

On water harvesting, the study found out that local communities have not embraced the culture of water harvesting for domestic and horticultural purposes. It is recommended that emphasis be put in sensitizing locals to inculcatea culture of water harvesting to be used by livestock and also for practicing smart farming through drip irrigation agriculture.

The study therefore recommends that it be enacted that water harvesting becomes law. This will mean that every Kenyan putting up a dwelling house must incorporate water harvesting mechanisms which may include installation of gutters, aerial and underground water tanks and the digging of water pans as is practiced by Bishop Titus Masika of Christian Impact Mission in Yatta plateau in machakos county. All industrial networks, schools, colleges and universities should be made to adhere to this proposed enactment. This will collect every drop of rain water which currently drains into the Indian ocean as total waste. Kenyans need to borrow a leaf from Israel in this regard.

Once there is enough water for domestic, industrial and commercial use, the tap water flowing from the five main water towers of Mau complex, Mt. Elgon, Mt Kenya, the Abaderes and Cherangani hills will be directed to the country's major cities of Nairobi, Mombasa, Kisumu and Eldoret among others which have experienced major water shortages in recent past. This approach will go a long way to reduce human wildlife conflicts because humans will be water sufficient outside the forest ecosystem. The interactions of the two species will therefore be reduced.

One morerecommendation relates tohay and grass farming. Thisis a deliberate initiative to allocate large tracts of land to grow grass. This has been practiced in the U.S , Europe and South Africa. Here in Kenya it has been practiced in parts of central Kenya and in Samburu county by Hon. Simion Lesrima in his ranch. Such grass is harvested during the rainy season and stored. It is given to livestock during the dry season when grass is scarce. It is recommended that the local communities at ASF buffer zone will tap into this innovation as an initiative to reduce the human wildlife conflicts in the area. Farmers with large tracts of land can tap into this multi-million export enterprise which uses natural rain. Major inputs are land as a factor of production, labour, warehousing, (storage) and appropriate managerial skills.

In the US grass farming has been practiced with much advantage. www.polyfaceframs. Com. Also a South African grass "Boma Rhodes" had found its way to Kenya,becoming a multi-million business in the Rift valley. Boma Rhodes grass ahs more nutritional value than alfalfa. Indeed, the opportunity for grass farming will be virtually unlimited, as people seek ways to

confront the ecological, social and economic challenges of the future. The physical health and happiness of the people, the viability of economies and the very future of humanity ultimately depend on the sustainability of Agriculture. Livestockfarming will be essential in meeting the food security needs of a growing global society in the post-industrial era of global warming, fossil energy depletion and a commitment to greater social equity. Grass farming has obvious advantages over confinement animal feeding operations (CAFO's) (Zero grazing) in meeting the ecological, social and economic challenges of the future locally, nationally and globally. (Greenspan,A. 2005) http: apha.org/advocacy/policy/policysearch/default.htm?id = 1243. Accessed on 18th may 2017.

On improving the livelihood of the local community, the study recommends that more collaborative partnerships with the government, NGO's the private sector and global financial institutions such as the world Bank and international monetary fund (IMF) , the global environment facility (GeF) and the international fund for agriculture and development (IFAD) be strengthened.

Further, global information communication technology (GICT) knowledge exchange programmes should be intensified. These should be synchronized with indigenous knowledge of the locals for a hybrid environmental partnership. Global markets should be sought for coconut, cashew nut and mango products which grow in large quantities in the area.

The study found out that the level of education in the ASF in very low due to poverty. Schools are very few and unequipped, some schools have no adequate classrooms and students still study

under trees. Apart from building modern schools, it is herby recommend that more scholarships be offered to children whose parents volunteer to engage in the forest conservation initiatives. This will boost the morale of the local communities and help reducing the conflict between humans and wildlife.

The study found out that more women are engaged in forest conservation initiatives than men. It is recommended that more empowerment be availed to women through entrepreneurial initiatives and capacity building, "Green women Chamas" (SACCOS) exemplified by women in Development (WID) as advocated by society for international development (SID) should be intensified. This will offer alternative sources of livelihood than mere subsistence farming which is major currently.

The study recommends education on conservation for the adjacent local communities. Training and education activities should be carried out at different levels. For example, conservation education should be enhanced in ordinarily schools, adult education forums such as small-scale farmers' schools and in agricultural extension workshops. This fosters the goal of disseminating innovative techniques, building local communities' capacity in conflict resolution and boosting public knowledge of human-wildlife conflict. Educating rural communities in practical skills would help them to deal with dangerous wild animals. Further, it would grant them the opportunity to acquire new tools for protecting their livestock and crops.

The study further recommends better sharing of human-wildlife conflict management information. The international union on conservation of nature (IUCN) world park congress

(2003) recommends the establishment of an international forum that should act as a global network for sharing information and expertise in countering human-wildlife conflicts. Additionally, the development of a website encompassing human-wildlife remedial technologies, conflict databases, innovative solutions and their outcomes would benefit from conservation initiatives and human-wildlife conflict management best practices. Such a web-site should in addition provide materials for learning, high-risk hot spots information with links to other related web sites.

The web-based portal should also provide support to different partners dealing with human-wildlife conflict challenge, recommendations optimum management principles and granting access to information.

The creation of partnerships and diverse stakeholders' compliance and collaboration enhances success, foster mutual assistance and boosts the chances of resolving human-wildlife conflicts.

The study recommends for better sharing of income from eco-tourism in Arabuko-Sokoke Forest. Wildlife generates income to the country tourism and in most developing nations such as Kenya, and is a major contributor of gross domestic product (GDP).

The tourism sector should contribute to increased employment through creation of job opportunities. This strategy would change the negative perceptions of the local communities towards wildlife and their conservation. For example, the mangers of Kibale National Park in Uganda have managed to foster positive attitudes towards the park and supportive conservation

behaviour by the local communities through sharing of revenue from tourism with the local populations (Naughton-Treves, 1997).

The government of Kenya, through Kenya wildlife service, should borrow a leaf from Uganda and effect the same strategy at Arabuko-sokoke forest.

The study recommends for better commitment by the National government in addressing the human-wildlife conflict. Lack of government commitment often results in resistance among indigenous people which in turn develops into uncooperative attitude towards wildlife. Many times methods for addressing human-wildlife conflict are constrained by local, national or international regulations, laws and treaties (Fall and Jackson, 2002).

For example, some of the policies are outdated, redundant, contradictory and require clarification. Policies on controlled utilization of wildlife trade of wildlife products and hunting, land tenure, game farming, tourism development schemes should be made to conform to international best practices so as to cater for present and future generations (Kenya wildlife service, 1996). In this regard, there is need to enact human-wildlife conflict management policies which will be conservation-friendly without compromising human welfare and livelihoods.

The study recommends local peoples' participation in matters of conservation and human-wildlife management (Zang and Wang, 2003). Local communities' participation is currently widely advocated in development and conservation.

Participatory protected area management has become popular globally and more so in Africa (Hans, 2003) and the development of a system of returning benefits through resources exploitation in areas surrounding parks has been advocated several times (O' Connell-Ronwell *et al*; 2000). In this regard, the most sustainable approach should ensure the development of a local economy based on wildlife and revenue collection from Arabuko-Sokoke Forest reserve, as well as a reduction in the dependence of the local communities on agriculture and subsistence farming.

Tree planting to boost Carbon Sequestration

The study recommends that more efforts be intensified in tree planting. Reforestation and afforestation efforts need to be invoked. All empty government land should be greened. Increasing the tree population will effectively increase the biomass which will eventually enhance carbon sequestration.

This has a positive effect on reducing adverse climate change and global warming effects. It further boosts carbon trade which is the quest of the global community's developed world. Parliament should therefore enact a national tree planting week possibly starting 1st May every year when the whole country is wet on which all Kenyans shall be mobilized to plant and nurture trees.

Domain Awareness System (DAS)

This is a new computer tool that aggregates huge amounts of information in real time to help protect rhinos and other wildlife from poachers in Africa's parks.Domain awareness system(DAS) has been practiced in South Africa and at the Lewa conservancy in Rift Valley, Kenya. The study recommends more research to be done.

DAS is designed to aggregate huge amounts of data in real time, hence troves of disparate information are known. At theLewa conservancy, the software system brings together in a single interactive viewing map GPS readings on movements of all animals, radio and vehicle trackers to follow anti-poaching teams in real time monitoring, camera trap photos and surrounding human settlements where poachers are likely to originate including navigating weather conditions among other issues.

In this way it gives mangers an integrated view of pretty much everything they need to know, minuteby minute in what may be a sprawling protected area. It is anticipated that this software could revolutionize the way large conservation areas are managed in Africa and around the world. The software technology works through a touch screen placed in a bungalow. On the screen are elephants, rhinos and other animal icons. On touching the icon it brings the location and movement of the live animal real time. It can be used for monitoring animal movements, location and even the numbers involved. It can be used even for wild animal stock taking operations.

This interactive map-based management system was developed by settle-based, Vulcan and brings together GPS readings of animal movements, camera trap, photos and more so animals in protected areas can be monitored in real time. (Paul Steyn, 2017)

Finally the study recommends that the current Arabuko-Sokoke Forest high school be upgraded to National school level. Land and funds should be allocated for the construction of Arabuko-Sokoke Forest University for environmental science and technology. This land should be allocated on the ASF buffer zone, not within the forest. This initiative will need political acceptability and legislative enactment to procure the land and funding and essentially needs mutual collaboration between the county, National government, and the global community. In this regard it is further recommended that Environmental impact Assessment (EIA) for this project be embarked upon by the relevant authorities.

7.4 Areas for Further Research

This study identifies three areas for further research since their outcomes will complement the findings of this study. The United Nations Environment Programme (UNEP) whose headquarters is in Nairobi Kenya, should combine efforts with the Global Environment Facility (GEF) and the UNDP to facilitate research on the Mangrove forest ecosystem at Mida creek. Apart from being useful in building material, research needs to be carried out on whether the nine mangrove species at Mida have other medicinal, pharmaceutical or clinical value.

7.4.1 Moringa Oleifera, Neem Tree and Baobab trees

More research will be required in addressing the medicinal health values of Moringa Oleifera, Neem tree and the Baobab tree. These trees easily and naturally grow within the Arabuko-Sokoke buffer zone. Research into their medicinal and herbal value needs to be intensified to come up with scientific findings to help the World Health organization (WHO) and the global community at large.

7.4.2 The Discovery of Titanium Petroleum and Natural gas in Kilifi County

Besides South Sudan, Ghana, and Uganda, Kenya is one of the African countries that discovered viable deposits of titanium, petroleum and natural gas in recent years. Recent discoveries of titanium in Kwale country greatly open the coast region for accelerated economic activity and employment to young Kenyans.

Estimates from base Titanium, the titanium mining firm indicate that Kilifi County has 10 times more titanium than Kwale has (Daily Nation Nov 22. 2013). Kilifi County has 1.4 billion tonnes of titanium. The vipingo, Mambrui and Sokoke areas that have titanium deposits cover 450.7 kilometres in total. Kilifi County is in talks with investors to build a port in Kilifi. Some investors have since shown interest in prospecting for petroleum and natural gas. These discoveries introduce an important factor that will have far reaching implications for the livelihood of the coastal community and the country atlarge (www.ntin.co.ke>business)

In terms of governance, conflict and environmental security, it means an alternative source of livelihood can also be a possible source of conflict between the community, the government and the mining company.

The impact of oil and natural gas discovery at Ngomeni, coupled with the said Titanium discovery will pretty much depend on the institutional structures and frameworks that shall guide among other things, the relationship between the three core stakeholders. The big question hinges on how revenue will be shared among the three stakeholders. This is of profound importance since the constitution (CoK 2010) Article 66(2) stipulates that parliament shall enact legislation to make sure that investment in property shall benefit local communities and their economies.

Environmental peace and security will continue to remain an important factor since the mining and extraction of these minerals will have to consider the environmental impact of this economic activity. Therefore, a study to assess the likely impact of the discovery of titanium, oil and natural gas on the livelihood of the Mijikenda community is a priority undertaking. Some of the key questions could include now that billions of tonnes of titanium deposits endow Kilifi, Kwale and the larger coastal region, will the region still remain marginalized? Will it be a question of resource curse or blessing debate? How will the National government engage the county on these issues?

How is the county leadership prepared to handle such opportunities that can easily spill into a resource curse scenario? What are the likely environmental challenges of the discovery of titanium or its extraction in the county? What impact will this have on the human wildlife conflict already experienced in the Arabuko-Sokoke Forest(ASF) buffer zone?

7.4.3 Challenges of Devolved Governance in Kenya

The promulgation of the new constitution on 27th August, 2010 introduces a challenge with far-reaching implications on governance structures in Kenya. The nucleus of the constitution (CoK 2010, Article 66(2)) is devolution of power from the national government to the 47 county governments. It means that the county governments under the governors must take a leading role in the development agenda of the counties. They are not only required to mobilize resources for the county's development but to also lead the process of the formulation and implementation of governance rules to guide the running of the county governments. Already, this has overwhelmed most governors who had no requisite qualifications and experience on leadership. As a result rampant cases of corruption and embezzlement of public funds has been the order of the day.

The recent general elections in Kenya have seen most sitting governors losing their gubernatorial positions to their shame and frustration. We also experienced an exodus of senators aspiring to be governors. Probably, it has become evident that the position of governor is very attractive despite the challenges involved.

In relation to human wildlife conflicts, environmental security and governance, it means there is need to formulate and implement county laws to address such challenges. It will therefore be of interest to interrogate the implications of the new governance architecture on the livelihood of Arabuko-Sokoke Forest (ASF) buffer zone local communities which should also include issues of land policy in regard to eradicating the squatter problem through issuance of tittle deeds. This will essentially need concerted collaborative efforts and cooperation between the county government and the National land commission.

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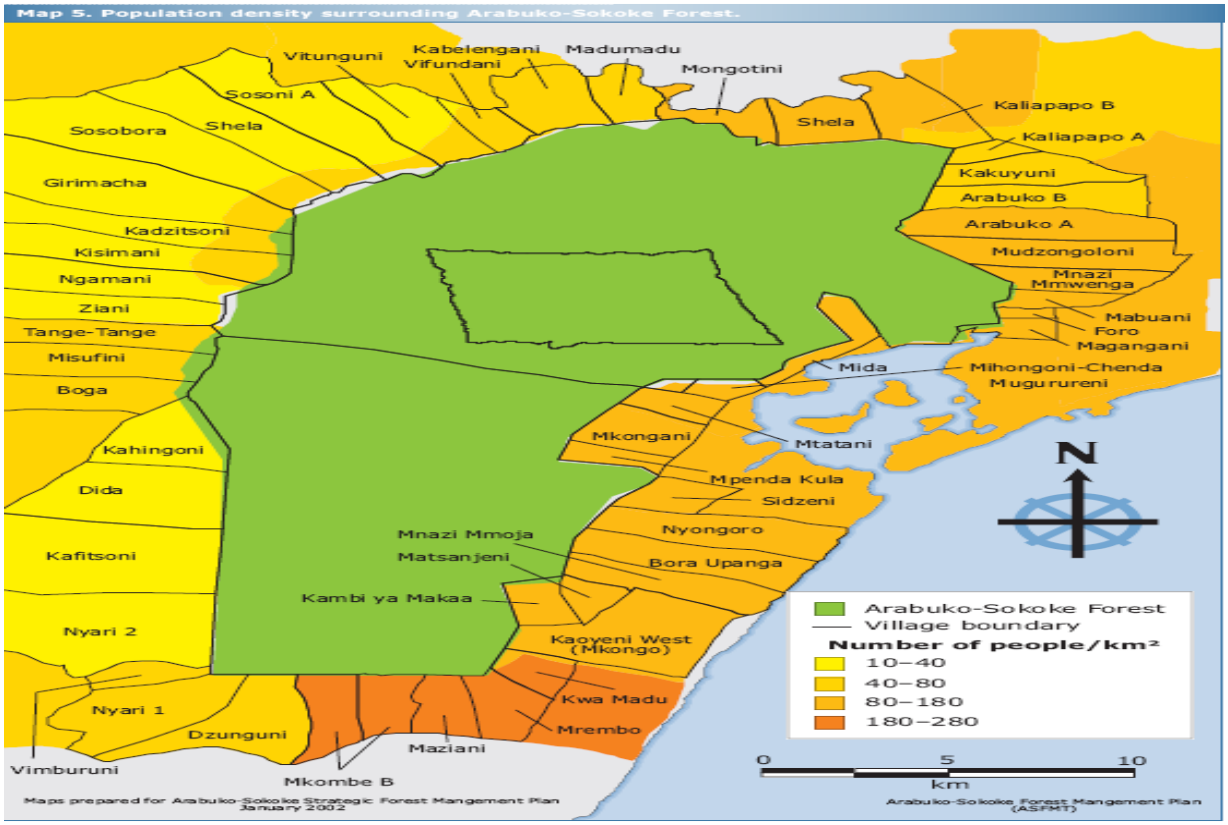
APPENDICES

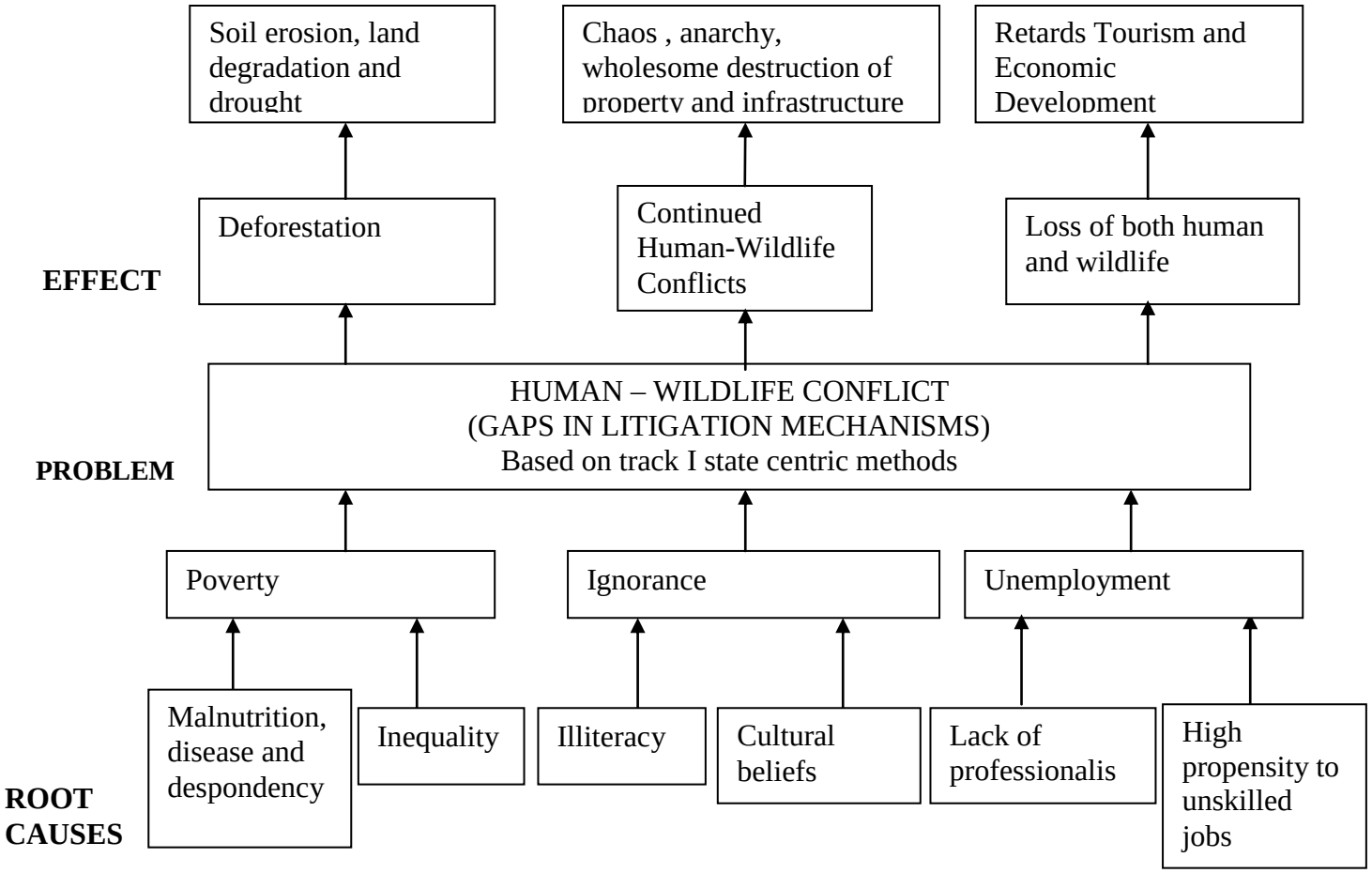
Appendix I: Arabuko – Sokoke Forest Map of Adjacent Communities



Source: www.mapdata@2016google

Prepared by: Arabuko- Sokoke Forest Management Team (January 2002)

Appendix II: Problem Tree Analysis



Source: The Author: 2015)

Appendix IV: Research Questionnaire Response

My name is Samuel Kiti Lewa. I am a PhD research Scholar with Wangari Maathai Institute for peace and Environmental studies, University of Nairobi, **Reg No:**

A82/96888/2014, **Cell Phone: +254722369553, Email: revkitilewa@yahoo.com.** My Research specialization is the impact of Resolution methods in the management of human-wildlife conflict for sustainable Development. My case study is Arabuko-Sokoke forest Reserve. Kindly respond to the research questions below to help me facilitate this research work. Kindly note that your responses will be treated with utmost confidentiality and will be used for academic purposes only. Thank you for your cooperation

Draft Questionnaire

CATEGORY I): Research Questions to the Local Adjacent Communities

How old are you? Tick as appropriate

15 -25 [ ]

25-35 [ ]

35-45 [ ]

45-55 [ ]

55-65 [ ]

65 and above [ ]

Gender (Tick as appropriate)

Male [ ]

Female [ ]

How long have you lived in Arabuko- Sokoke forest buffer zone?

……

……

What is the number of people in your family?

……

How do you earn a living?

……

……

How do you get food for the family?

……

……

How do you get relish e.g vegetables, and meat for your diet?

……

……

How do you build your houses? Do you use timber or iron related materials?

……

……

Do you use charcoal as a fuel for cooking purposes? If yes, what is the source of this charcoal?

……

……

Have you ever visited the forest with the aim of either getting animal protain (Hunting), getting building materials, (Logging) or accessing fruits and vegetables?

……

……

In case you get building materials from the forest, do you normally have a license for this activity? If yes do you replant/ replace the trees you cut down after you achieve your required materials

……

……

Which crops do you plant in the forest adjacent areas i.e buffer zones

……

……

Which wild animals have been notorious in destroying your crops and property?

……

……

Do you experience any human-wildlife conflicts in the area?

……

……

i)What resolution methods are employed in Human- Wildlife Conflicts?

…….

…….

ii) What measures has the National and county Government taken to curb this problem?

……

……

What measures have you as local community done to curb this menace?

……

……

Are you satisfied with the impact of these measures so far?

……

……

What other measures do you think can be employed to curb human wildlife conflict in Arabuko-Sokoke buffer zone? Please explain

……

……

How much rainfall do you receive in the area? Do you depend on rain water for Agriculture or do you practice water harvesting for your agricultural activities?

……

……

How is the infrastructural network of the Arabuko-Sokoke buffer zone? E.g. How is the road network; electricity distribution and the school (Primary and Secondary) distribution of the adjacent area?

CATEGORY II): Research Questions to Government and Professional Personnel within and around Arabuko- Sokoke Buffer Zone (FGD)

How old are you? Tick as appropriate

15-25 [ ]

25-35 [ ]

35-45 [ ]

55-65 [ ]

65 and above [ ]

Gender (Please tick as appropriate)

Male [ ]

Female [ ]

What is your level of education?

……

……

What is your profession?

……

……

How long have your been into this profession

……

……

Who are the managers in the Arabuko – Sokoke Forest Reserve?

……

……

Are you aware of any incidents of human- wildlife conflicts in the said forest reserve?

……

……

If yes, how have such conflicts been managed?

……

……

Are there documented policies on how to manage human –wildlife conflict so far?

……

……

If yes, which are these policies and how are they administered?

……

……

What has the government done regarding resolution of human wildlife conflict?

……

……

Was the local community consulted in arriving at the resolution methods employed in managing human wildlife conflict?

……

……

In your opinion, which method is most suitable to manage human wildlife conflict for peaceful coexistence and sustainable development?

……

……

What benefit will accrue to the local community if the forest resource is sustainably managed?

……

……

Are you satisfied with the mechanisms for managing human – wildlife conflict adopted up to now?

……

If no, what are your suggestions

……

……

Apart from the National, County Government and the local community, who are the other parties involved as stakeholders in the human wildlife conflict?

……

……

What is their role in escalating or resolution of human – wildlife conflict?

Role in escalating human – wildlife conflict

……

Role in Resolution of human wildlife conflict

……

Specifically explain the role played by Kenya Wildlife services in the resolution of human wildlife conflicts?

……

……

Is there any national policy in place curbing human-wildlife conflict?

……

……

Explain the benefits to the local community if the forest resource is sustainably managed.

……

……

What inputs do you think the political and local leadership can invoke to ensure sustainable management of the forest resource for sustainable development?

……

……

What do you think would be the Global community's role in fostering community Based Natural Resource Management Mechanism (CBNRM) for the benefit of buffer zone communities? Please explain your ideas.

……

……

Thank you for your Responses

Appendix V: WMI Directors, Introduction Letter

UNIVERSITY OF NAIROBI
COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES
WANGARI MAATHAI INSTITUTE FOR PEACE AND ENVIRONMENTAL STUDIES
OFFICE OF THE DIRECTOR

Telephone: 020-2506448, 0788526473
Email : wmi@uonbi.ac.ke
Website : wmi.uonbi.ac.ke

P.O Box 30197- 00100
Nairobi,
Kenya .

March 7, 2016

TO WHOM IT MAY CONCERN

RE: INTRODUCTION LETTER FOR MR. SAMUEL KITI LEWA

Mr. Samuel Kiti Lewa is a PhD student at Wangari Maathai Institute for Peace & Environmental Studies. He is currently undertaking research on **"The Impact of Alternative Resolution Methods in Managing Human-Wildlife Conflict: The Case of Arabuko-Sokoke Forest, Kenya"**
He will be working in Kilifi County collecting data for his research project.

Any assistance rendered to him will be highly appreciated

Yours faithfully,

DIRECTOR
WANGARI MAATHAI INSTITUTE FOR PEACE AND ENVIRONMENTAL STUDIES
UNIVERSITY OF NAIROBI
P. O. Box 29053 - 00625 NAIROBI

PROF. S. G. KIAMA, BVM, MSC, PHD, MKNAS
DIRECTOR
WANGARI MAATHAI INSTITUTE FOR PEACE & ENVIRONMENTAL STUDIES

VISION
'Excellence in experiential learning transformational community outreach and research for sustainable environment and cultures of peace

Appendix VI: Research Permit

THIS IS TO CERTIFY THAT:
MR. SAMUEL KITI LEWA
of UNIVERSITY OF NAIROBI, 0-80112
MOMBASA,has been permitted to
conduct research in *Kilifi County*

on the topic: *THE IMPACT OF ALTERNATIVE RESOLUTION METHODS IN MANAGING HUMAN WILDLIFE CONFLICT. THE CASE OF ARABUKO-SOKOKE FOREST KENYA.*

for the period ending:
3rd July,2018

Permit No : NACOSTI/P/17/3449/17870
Date Of Issue : 4th July,2017
Fee Recieved :Ksh 2000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 14600

CONDITIONS: see back page

Appendix VII: Research Authorization

NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/17/3449/17870** Date: **4th July, 2017**

Samuel Kiti Lewa
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The impact of alternative resolution methods in managing human wildlife conflict. The case of Arabuko-Sokoke Forest Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Kilifi County** for the period ending **3rd July, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Kilifi County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kilifi County.

The County Director of Education
Kilifi County.

National Commission for Science, Technology and Innovation is ISO9001: 2008 Certified