INFLUENCE OF CONSERVATION INTERVENTIONS BY MIKOKO PAMOJA PROJECT ON THE SOCIOECONOMIC WELLBEING OF LOCAL COMMUNITIES LIVING IN GAZI BAY, KWALE COUNTY, KENYA

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DECLARATION

I declare that this document and the research it describes are my original work and that they have not been presented in any other university for academic work.

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This research was conducted under our supervision and is submitted with our approval as university supervisors.

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DEDICATION

I dedicate this to my daughter Avril Chelagat Rotich for whom I wish a thriving life full of wellness.

ACKNOWLEDGEMENT

I would wish to acknowledge Dr. Mark Ndunda Mutinda and Dr. Justus Muteti Kavoi for their guidance in topic selection and structure of this proposal. My sincere appreciation to my family for the sacrifice of our family time while I was writing this proposal, especially my daughter who had to put up with my frequent absence from family activities. All this would not be possible without the sufficient grace and mercies of my God to whom I owe all that I have. Thank you!

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ABSTRACT

The mangrove ecosystem is an important resource that is able to provide the local people with income and worldwide with ecosystem services. But without sustainable management this ecosystem can be easily degraded and not provide all these benefits. The Mikoko pamoja is a project that tries to provide this management and rehabilitation interventions to this ecosystem. This study sought to provide empirical evidence on the influence of conservation interventions on different focal areas of human wellbeing of local communities involved in the Mikoko Pamoja project in Gazi Bay, Kwale County. Specifically the objectives of the study were to: (i)assess how the income generated from the sale of carbon credits influences the wellbeing of the households, (ii) analyse the influence of other mangrove related income generating activities (bee-keeping and eco-tourism) on the wellbeing of households, (iii) assess the influence of benefits obtained from the restoration of degraded and denuded mangrove ecosystems (increased fish stocks and clean environment) on the wellbeing of households, (iv) analyse how development projects (schools, roads and hospitals) implemented from the community development fund influence the wellbeing of the households, (v) Determine the ranking of the of Mikoko pamoja conservation activities in terms of alleviating the wellbeing of the project members. A sample of 327 households involved in the project were selected using stratified random sampling. A structured questionnaire was used to collect data. Descriptive and inferential statistics were used to analyse the data using SPSS version 26. The average wellbeing of the household was found to be 4.12 (on a scale of 1 to 10). The wellbeing of the households participating in the project was found to be statistically ($p < 0.05$) significantly influenced by: sale of carbon credits ($\beta=0.858$, $t=30.08$, $p < 0.001$), mangrove related incomes (beekeeping and ecotourism) $\beta= 0.820$, $t=25.85$, $p < 0.001$, mangrove restoration benefits ($\beta=0.874$, $t=32.46$, $p < .0.001$) and access to community development projects ($\beta=0.842$, t-28.12, $p < 0.001$). In ranking the influence of independent factors on the dependent variable mangrove restoration was ranked highly due to its provision of other benefits such as fishing, income and ecosystem services that are sustainable. The findings of this study will go to inform future strategy development for Mikoko Pamoja project implementers and further policy formulation for conservation initiatives in Kenya to ensure they positively influence the wellbeing of their host communities.

DEFINITIONS

Wellbeing is a global assessment of a person's quality of life according to his own chosen criteria.

Project *i*s a series of tasks that need to be completed in order to reach a specific outcome. In this case, the tasks are directed towards mangrove restoration and subsequent protection.

Mangrove is a shrub or small tree that grows in coastal saline or brackish water. The term is also used for tropical coastal vegetation consisting of such species. Mangroves occur worldwide in the tropics and subtropics, mainly between latitudes 25° N and 25° S. The total mangrove forest area of the world in 2000 was 137,800 square kilometres (53,200 sq mi), spanning 118 countries and territories

Mangrove restoration is the regeneration of mangrove forest ecosystems in areas where they have previously existed. The practice of mangrove restoration is grounded in the discipline of restoration ecology, which aims to "[assist] the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed

Household consists of one or more people who live in the same dwelling and share meals. It may also consist of a single family or another group of people. A dwelling is considered to contain multiple *households* if meals or living spaces are not shared.

Agroforestry is a land use management system in which trees or shrubs are grown around or among crops or pastureland.

Blue Carbon The carbon captured by living organisms in oceans which is stored in the form of biomass and sediments in mangroves, salt marshes and sea grasses.

Carbon credits A carbon credit is a generic term for any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the mass of another greenhouse gas with a carbon dioxide (tCO_2e) equivalent to one tonne of carbon dioxide.

ABBREVIATIONS AND ACRONYMS

ACES	Association for Coastal Ecosystem Services
CMEPSP	Commission on the Measurement of Economic Performance and Social Progress
ESRC	Economic and Social Research Council
GNHI	Gross National Happiness Index
KMFRI	Kenya Marine and Fisheries Research Institute
KNBS	Kenya National Bureau of Statistics
MPCO	Mikoko Pamoja Community Organization
MPSG	Mikoko Pamoja Steering Group
OECD	Organization for Economic Cooperation and Development
SDGS	Sustainable Development Goals
UNDP	United Nations Development Programme
UNGA	United Nations General Assembly
VoP	'Voices of the Poor'
WeD	Wellbeing in Developing Countries
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Across the globe, national governments are increasingly pursuing policies to secure biodiversity and natural ecosystems while ensuring economic prosperity and other aspects of human wellbeing including health, social relations and cultural values. In September 2015, the United Nations launched a set of 17 new Sustainable Development Goals (SDGS) to shape the international development agenda for the next 15 years (UN General Assembly, 2015). In parallel to such policy shifts, several major international non-governmental organizations with a historical focus on nature conservation now explicitly reference people in their mission and vision statements and aspire to achieving socially beneficial outcomes through their conservation efforts (Leisher, Samberg, Beukering & Sanjayan, 2013). To achieve stated political and institutions goals, and to be able to monitor progress towards them, empirical data, relevant metrics, and monitoring systems are needed to quantify the linkages between specific conservation efforts and different aspects of human wellbeing (Lu, Nakicenovic, Visbeck & Stevance, 2015; McKinnon, Cheng, Garside, Masuda & Miller, 2015).

Several conservation projects and policies have achieved both conservation and development goals (Andam, Ferraro, Sims, Healy & Holland, 2010; Baral, Stern & Heinen, 2007) conflicts and negative relationships between conservation and human wellbeing have also been highlighted (Salafsky & Wollenberg, 2000) including loss of access rights (Gleason *et al*., 2010), human-wildlife conflict (Woodroffe, Thirgood & Rabinowitz, 2005) and evictions from protected areas (Brockington & Igoe., 2006).

Increased monitoring of socioeconomic outcomes has thus been dually influenced by a need to demonstrate contributions to broader development goals.

This research seeks to demonstrate these linkages by assessing the direct and indirect influence of conservation interventions on community wellbeing using Mikoko Pamoja, a community-led mangrove conservation project. The project involves the residents of the Gazi Bay area, and in particular, the two largest villages in the area, Gazi and Makongeni, where representatives of the (Mikoko Pamoja Community Organization) MPCO are based. These community representatives represent people in the administrative areas surrounding the villages. The combined population of the two villages is approximately 5400 persons; with Gazi village having 60% of this total. There has been rapid growth in Gazi and around one third of households are recent immigrants from Tanzania. The local people rely heavily on natural resources, in particular on fisheries. In addition to fishing, people rely on mangrove resources, including fuelwood and building poles, and conduct a range of other activities such as small-scale farming, retail and tourism (including welcoming visitors to a mangrove boardwalk). Around one quarter of households also receive remittances from kin living and working outside the area.

1.2 Problem Statement

There are three main ecosystems threatened by the growing population prior to Mikoko Pamoja project: the natural Rhizophora dominated forest was used by local people for fishing, particularly for crustaceans, and for the extraction of forest goods (including legal and illegal removal of firewood and poles). In addition, it was used for legal cutting by the concessionaire as one area of the forest from which he takes his current annual quota of 500 scores of poles per year. The Rhizophora plantation area was used by fishers and suffered poaching of poles. The beach was used by local women for

collecting molluscs and firewood from dead trees and branches. Implementation of Mikoko Pamoja has changed the use of these areas principally by reducing or eliminating the illegal extraction of wood from all the areas (since there is community vigilance around extraction). Fishing activity has not been affected (other than benefiting in the long term from better ecosystem quality). The natural forest has to some extent become inaccessible for legal cutting and the legal quota has been reduced to reflect this. Trees replanted along the beach area will, with time, help protect the adjacent agricultural land against shoreline erosion. From the project design document, one third of all funds generated from the project were anticipated to go directly to the community development account, for spending on local priorities as decided by local people. More than one third of income would be spent supporting project activities that would employ local people and hence bring direct livelihood benefits. Income from the woodlot would also be available after four years and this would also contribute to the development account. This study seeks to find evidence of the influence of all these benefits on the overall wellbeing of all people in the communities involved in the project especially since inequalities in wealth and power exists between people in the area (as they do in all human communities); women have traditionally held less influence than men.

1.3 Purpose of the Study

The purpose of this study was to provide empirical evidence from the Mikoko Pamoja project on the impacts of conservation interventions on different indicators of human wellbeing of local communities.

1.4 Objectives of the Study

The broad objective of this study is to investigate how community-led conservation interventions influence the wellbeing of households of host communities.

The specific objectives were to:

(i) Assess how the income generated from the sale of carbon credits influences the wellbeing of the households

(ii) Analyze the influence of other mangrove related income generating activities (bee-keeping and eco-tourism) on the wellbeing of households

(iii) Assess the influence of benefits obtained from the restoration of degraded and denuded mangrove ecosystems (increased fish stocks and clean environment) on the wellbeing of households

(iv) Analyze how development projects (schools, roads and hospitals) implemented from the community development fund influence the wellbeing of the households

(v) Determine the ranking of the of Mikoko pamoja conservation activities in terms of alleviating the wellbeing of the project members

1.5 Research Questions

This study will come up with answers to the following research questions:

(i) How does the income generated from the sale of carbon credits influence the wellbeing of the households?

(ii) How does the income generated from other mangrove related income generating activities (bee-keeping and eco-tourism) influence the wellbeing of households?

(iii) How do the benefits obtained from the restoration of degraded and denuded mangrove ecosystems (increased fish stocks and clean environment) contribute to the wellbeing of the households?

(iv) How do development projects (schools, roads and hospitals) implemented from the community development fund influence the wellbeing of the households?

(v) Which of the Mikoko pamoja conservation activities ranked highly in terms of alleviating the wellbeing of the project members?

1.6 Significance of the Study

Conservationists have responsibilities towards the communities they work in, to ensure at the very least they do not harm people (Roe *et al*., 2010), a premise that is encapsulated in policy commitments such as the Durban Accord on protected areas (World Parks Congress, 2003). Wellbeing is also important for policy analysis because its pursuit is a primary driver of people's decision-making (Deci & Ryan, 2010). Interventions that support local wellbeing can increase environmentally desirable behaviour, and lead to positive local perceptions and engagement (Coulthard, Johnson & McGregor, 2011). This study will provide a wellbeing framework to Mikoko Pamoja project implementers to provide a holistic way to incorporate goals for different values (e.g. livelihoods and the environment) into decision-making, which can also help to build political support and mobilize more funding. Further, the study will inform policy implementation, especially Article 40 and 41 of the Wildlife Management Act of 2013 on establishment of community wildlife associations and conservation initiatives.

1.7 Scope of the Study

This study will focus on all activities of Mikoko Pamoja project and how they affect the wellbeing of individuals in member communities. The field research will be conducted in Gazi Bay, Kenya (4^{o} 25’S and 39^{o} 50’E). Gazi bay is situated on the south coast of Kenya, some 50 km from Mombasa, in the Msambweni District of Kwale County. The 615 ha of mangrove forest at Gazi bay is the best-studied mangrove

ecosystem in Africa, and amongst the best known in the world (e.g. Huxham *et al*., 2010; Bosire, Dahdouh-Guebas, Kairo & Koedam, 2003; Kairo, Dahdouh-Guebas, Bosire & Koedam, 2001). There is a long history of community participation in and support for mangrove research and restoration (Kairo, 1995) and Gazi village hosts a field station run by the Kenya Marine and Fisheries Research Institute (KMFRI) which specialises in mangrove research.

The target sources of information will include:

i. Mikoko Pamoja Community Organization (MPCO), a government registered community organization that coordinates community engagement, routine project activities and benefit sharing. It is governed by volunteer office members who are village representatives from the project area.
ii. The Mikoko Pamoja Steering Group (MPSG), a group of unpaid volunteers, who provide the necessary technical expertise in biological (carbon accounting) and social (socioeconomic monitoring) areas.
iii. Sampled population representative of all villages benefiting from the project

The study will take place during the 2018/2019 academic calendar of Kenya.

1.8 Delimitations of the Study

This study used a conception of wellbeing that takes account of the objective circumstances of the person and their subjective evaluation of these. Gasper (2007) defines objective wellbeing as ‘externally approved, and thereby normatively endorsed, non-feeling features of a person’s life, matters such as mobility or morbidity’; and subjective wellbeing as ‘feelings of the person whose wellbeing is being estimated’.

The researcher also recognizes that both the objective circumstances and perceptions of them are located in a society and also in the frames of meaning with which we live.

Therefore, for this work, wellbeing will be considered as both a relational and a dynamic concept as ‘feelings of the person whose wellbeing is being estimated’.

1.9 Limitations of the Study

The primary challenge lies in understanding and measuring the multidimensional impacts of nature on people. Feedback loops, direct and indirect human impacts, and underlying drivers like climate change create complex and interdependent relationships between people and nature. From literature review, it is noted that robust ways to measure ecological impacts have been extensively developed, for example by (Underwood, 1994) and (Krebs, 1999). However, no equivalent level of rigor in measuring impacts on people has been conducted. Further, a review of the many existing Human Wellbeing frameworks and focal areas to identify which are relevant to conservation has not yet been done. How human wellbeing is defined determines what is measured, hence the numerous frameworks. For the sake of this work, the researcher will base the definition of human wellbeing on Rachel Dodge and colleagues’ idea of a set point/equilibrium for wellbeing because of the simplicity, universal application, optimism and basis for measurement.

During field survey, the researcher had challenges of getting proper feedback from targeted interviewees due to a lack of proper understanding, especially from host community members of English. However, the researcher translated the research questions into Swahili where necessary.

1.10 Assumptions

The main assumption will be that all other intervening factors that could have an impact on the wellbeing of communities like climate change, ecological mayhem, natural disaster and biodiversity loss will be constant during the period of study.

1.11 Theoretical Framework

Two theoretical frameworks guided this study, they included: the wellbeing in developing countries (WeD) described in a project by the University of Berth (University of Bath, 2002) and the the 'Voices of the Poor' (VoP). These two theoretical frameworks were used to create a feasible checklist of indicators in specific focal areas to consider in conducting the field research.

The first framework comes from the Wellbeing in Developing Countries (WeD) project (University of Bath, 2002). Wellbeing is conceptualized as an outcome and a process, in three interacting dimensions: the objective material circumstances of a person, subjective evaluation of people's goals and the processes they engage in, and a relational component (McGregor & Sumner, 2010). This last dimension acknowledges that individual wellbeing is pursued in relation to other people, that social connectedness is a human need and that definitions of a good life are socially constructed (Deneulin & McGregor, 2010). Culture is often viewed as external in discussions on poverty and wellbeing, but here it forms the lens through which all aspects of wellbeing are constituted (White & Ellison, 2007). The WeD approach emphasizes the holistic, dynamic and social nature of wellbeing. It brings together a unique configuration of interdependent elements, counterbalancing a tendency in policy to privilege material wellbeing and underplay subjective feelings and the social dimension of people's lives (McGregor & Sumner, 2010).

The second framework—the 'Voices of the Poor' (VoP)—is based on empirical data and is familiar to conservationists, because it was used in the Millennium Ecosystem Assessment as a means of conceptualizing relationships between ecosystem services and aspects of wellbeing. The project found five focal areas commonly considered to

constitute wellbeing among individuals across 23 countries (Narayan, Chambers, Shah & Petesch, 2000). They are material assets, health, social relations, security and freedom of choice and action. The last component, which underpins the others, means having a sense of control over one's life and the capacity to achieve what one values doing and being. This is easily overlooked in conventional assessments but may be especially relevant for conservation interventions, which can be rejected if perceived as imposed and undermining freedom with regard to environmental behaviour (Abunge, Coulthard & Daw, 2013). On the other hand, interventions that secure local land tenure and improve natural resource governance could increase feelings of empowerment (Gurney *et al*., 2014).

Theoretical framework for wellbeing evaluation, which links VoP wellbeing domains with perspectives from Wellbeing in WeD is shown in Table 1.1 (Emily et al., 2015). The domains considered include materials, health, social relations, security, freedom of choice and action.

Table 1. 1 Linking wellbeing domains of VoP and WeD Perspectives

VoP wellbeing domains	description and examples	insights provided by WeD perspective and research
material	secure and adequate livelihoods enough food and food security assets, e.g. land, natural resources, livestock, savings and capital, goods, housing, furniture and tools	not only about what people have, but what they can do and be, and how they feel about these things, the ways in which objective material wellbeing outcomes are defined and satisfied are socially and culturally constructed, requiring attention to local context human as well as material resources are important, including knowledge and education
health	feeling strong and well, access to health services, appearing well, having a healthy physical environment e.g. fresh air	Health is subjectively experienced, mental health is as significant as physical health in wellbeing
social relations	good relations with family, community and country, dignity, e.g. not being a burden, feeling listened to, ability to help others and fulfil social obligations ability to care for children (including education and marriage)	collective wellbeing is significant for individual wellbeing in culturally defined ways, social structures and institutions that enable people to pursue wellbeing in relation to one another may be impacted by interventions, people's ideas and strategies for pursuing wellbeing may not be compatible, resulting in trade-offs that must be confronted
security	confidence in the future predictability, peace, safe and secure environment, e.g. safety from disasters personal physical security and safety security in old age and for future generations	people's wellbeing and decisions are influenced by perceptions of future and perceived threats, capabilities to achieve other aspects of wellbeing may increase security, sustained security can only be the outcome of autonomy rather than dependency
freedom of choice and action	sense of control and power ability to pursue what you value doing and being, and meet aspirations, ability to be a good person, e.g. to help others	not about independence but self-endorsement of one's own behaviour, i.e. feeling personal value and interest regarding actions, autonomy can be evaluated with regard to different aspects of people's lives that they value related to the ability to adapt in times of change

1.12 Conceptual Framework

This research will be guided by the relationship between the benefits derived from conservation interventions and the wellbeing of local communities. There are several benefits derived from conservation interventions and Mikoko Pamoja project is used to contextualize these benefits for this study. Firstly, communities benefit from the sale of carbon credits from conservation of the forest to buyers around the world. The community plants mangroves, reduces pressure on the forest, and promotes the sustainable use of the forest. From these activities the community is able to reduce their carbon emissions. The money comes back to Mikoko Pamoja project and the community in Gazi. There is a benefit sharing scheme in place and the money is put back into the project or spent directly on the community. The community then uses the money on different projects according to their priorities. Secondly, the local communities are involved in other mangrove related income generating activities being implemented such as beekeeping and ecotourism. Thirdly, the restoration of degraded and denuded mangrove ecosystems has great benefits to the environment and most importantly to the community including clean air, water, restoration of fish stocks among others. Lastly, the project is implementing other development projects that are intended to directly benefit the local communities; e.g. schools, hospitals, roads, provision of water in homes among others.

The researcher assessed the influence of each of these benefits on different indicators of human wellbeing. The five domains; living standards, health, social relations, security and freedom of choice and action are guided by the two theoretical frameworks discussed above and will be used as key aspects of the host communities affected by the benefits derived directly or indirectly from Mikoko pamoja project.

However, the researcher notes that the two frameworks do not include two critical focal areas; Education and Environment, which ranked top 5 in an assessment of focal areas for measuring the human wellbeing impacts of a conservation initiatives (Leisher, Leah, Samberg, Beukering & Sanjayan, 2013). The two domains and their context specific indicators will therefore be included as dependent variables to be influenced directly or indirectly by benefits derived from the Mikoko Pamoja project. The researcher recognizes that intervening indicators such as population, technology, and lifestyle can lead to changes in factors (project benefits) directly affecting ecosystems, such as the catch of fisheries. Changes in ecosystem services can also have an impact on the wellbeing of communities. However, as an assumption of this work, all these factors will be assumed to be constant during the research period in order to estimate the direct link between the project and community wellbeing.

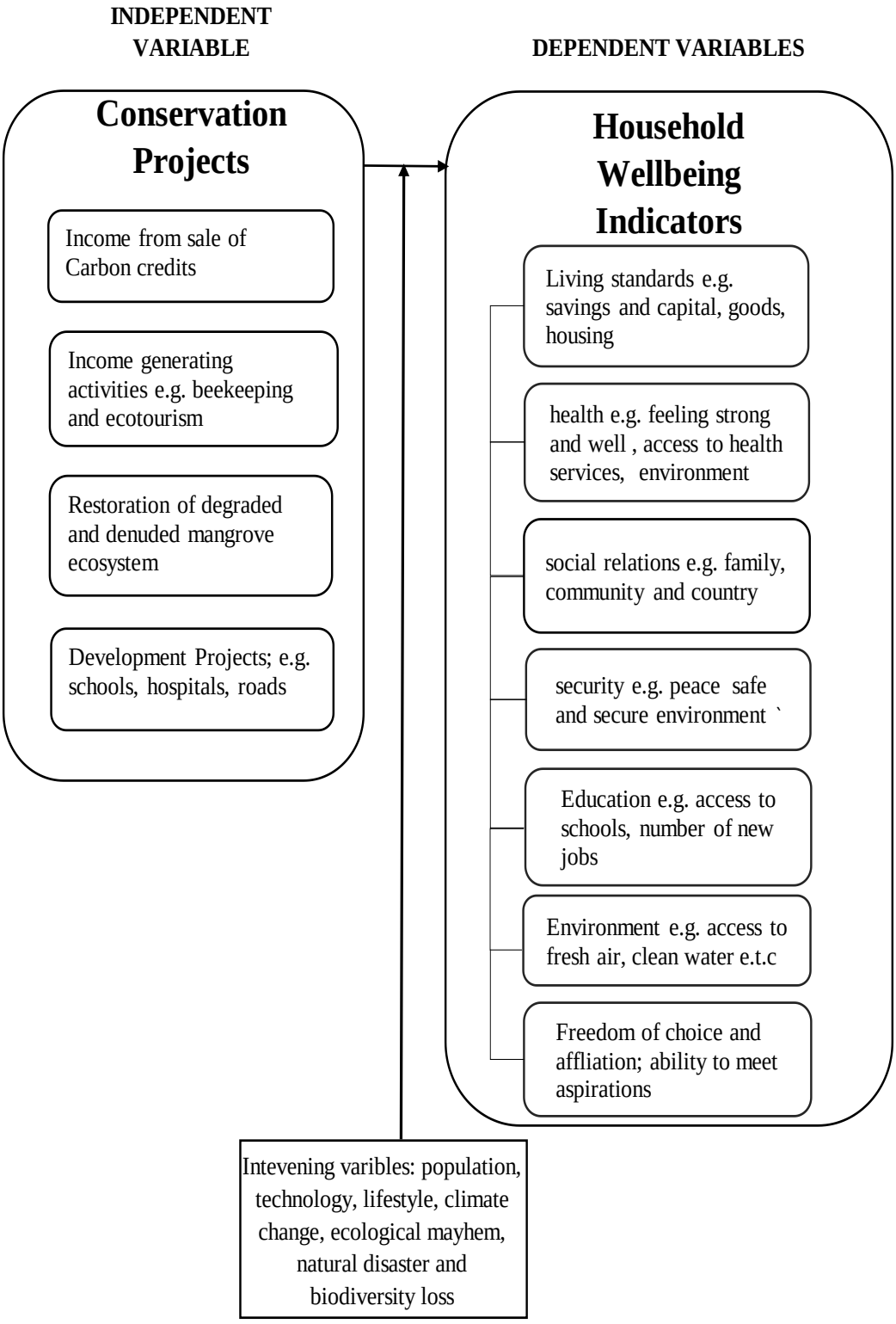

Figure 1. 1 Conceptual Framework Showing the Different Aspects of the Projects and their Influence on the Wellbeing of the Members

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, the researcher defined wellbeing through a theoretical review of existing research in order to set a basis for assessment. Further, the theories that guide this research were reviewed to come up with a conceptualization of the researcher's work. The researcher then identified internationally agreed upon wellbeing focal areas that can guide the measurement of the wellbeing of the host communities of conservation initiatives. Further, through empirical review, the researcher reviewed various literature to answer some of the research questions before going into the field.

2.2 Household Wellbeing

Research in wellbeing has been growing in recent decades (e.g. Diener, Suh, Lucas, & Smith, 1999; Kahneman et al., 1999; Keyes, Shmotkin & Ryff 2002; Stratham & Chase, 2010; Seligman, 2011). However, very early on in the research Ryff and Keyes (1995) identified that, the absence of theory-based formulations of wellbeing is puzzling' (pp. 719–720). The question of how wellbeing should be defined (or spelt) still remains largely unresolved, which, has given rise to blurred and overly broad definitions of wellbeing' (Forgeard, Jayawickreme, Kern & Seligman, 2011, p. 81). This deficit can be traced back as far as Ryff (1989a), who believed that ,there has been particular neglect (in) the task of defining the essential features of psychological wellbeing' (p. 1069). Indeed, Thomas (2009) argued that wellbeing is intangible, difficult to define and even harder to measure' (p. 11).

In this work, the researcher identifies that previous research focuses on the description of what constitutes wellbeing rather than the definition of what wellbeing is. For

example, early work by Ryff (1989a) identified aspects that constitute wellbeing: autonomy; environmental mastery; positive relationships with others; purpose in life; realisation of potential and self-acceptance. More recent research has placed different emphases on what wellbeing is: ability to fulfil goals (Foresight Mental Capital and Wellbeing Project, 2008); happiness (Pollard & Lee, 2003) and life satisfaction (Diener & Suh, 1997; Seligman, 2002a).

Shin and Johnson (1978) seemed to move closer to defining wellbeing by stating that it is 'a global assessment of a person's quality of life according to his own chosen criteria' (p. 478) and this judgement is still reflected in today's literature (Zikmund, 2003; Rees, Goswami, & Bradshaw 2010; Stratham & Chase, 2010). But what, exactly, is ,quality of life?

The World Health Organization (WHO) defined quality of life as: an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment (World Health Organization, 1997)

However, some researchers feel that 'quality of life' is used interchangeably with 'wellbeing' and this has made defining wellbeing "conceptually muddy" (Morrow & Mayall, 2009, p.221). Consequently, it seems that a narrow emphasis on quality of life cannot adequately help us to define wellbeing. Indeed, it would seem that quality of life appears to be a dimension of wellbeing rather than an all-embracing definition.

(Keyes 2002, p.2) consider wellbeing to be more than just happiness. As well as feeling satisfied and happy, wellbeing means developing as a person, being fulfilled, and making a contribution to the community. Unfortunately, again, this appears to be more of a description of wellbeing rather than a definition.

Another theory worth noting is the dynamic equilibrium theory of wellbeing, now more often referred to as set-point theory. This was originally proposed 28 years ago by Headey and Wearing (1989) and suggested links between personality, life events, wellbeing and illbeing. The theory built on the work of Brickman and Campbell (1971), who had previously demonstrated that individuals tend to return to a baseline of happiness even after major life events. Headey and Wearing continued to research their model (1991; 1992) and believed that ‚for most people, most of the time, subjective wellbeing is fairly stable. This is because stock levels, psychic income flows and subjective wellbeing are in dynamic equilibrium' (1991, p. 49). A more recent extension of this theory has been explored by Cummins (2010). The term 'equilibrium' has been replaced by 'homeostasis'; and the term 'life events' with the term 'challenge'. Cummins' theory focuses on the strength of a challenge and how this affects the level of Subjective Wellbeing. However confusing and complex his model is, it concluded that any definition of wellbeing centres on a state of equilibrium or balance that can be affected by life events or challenges.

Linked to challenges is the idea that each individual develops relevant skills or resources to cope with the trials they face. Hendry and Kloep's (2002) lifespan model of development also explores the interaction between life challenges and personal resources. Their theory is based on five key principles:

(i) To stimulate development, individuals need challenge.

(ii) Successful solving of the challenge leads to development.

(iii) If a challenge is not solved, this will lead to problems in meeting future challenges.

(iv) The process of solving challenges is ‚an interactional, dialectical process' (p. 16) that leads to changes in the individual and/or the environment and accordingly stimulates development

(v) Individuals will have differing levels of resources to meet the challenges.

Based on the above research, Rachel Dodge (2002) and her colleagues published an article in the international journal of wellbeing that tries to come up with a new definition of wellbeing focused on three key areas: the idea of a set point for wellbeing; the inevitability of equilibrium/homeostasis; and the fluctuating state between challenges and resources. According to the team;

> "stable wellbeing is when individuals have the psychological, social and physical resources they need to meet a particular psychological, social and/or physical challenge. When individuals have more challenges than resources, the see-saw dips, along with their wellbeing, and vice-versa".

An illustration of this definition is demonstrated in the figure below.

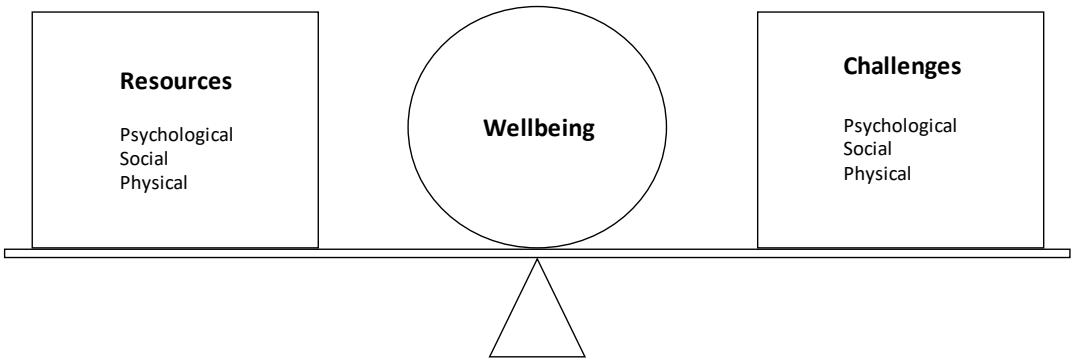

Figure 2. 1: Definition of Wellbeing

Source: (Dodge, *et el*., 2012), the challenge of defining Wellbeing: The Journal of Wellbeing

Rachel Dodge and colleagues believed that the vigour and freshness of this new proposed

definition embraces a number of strengths: simplicity, universal application, optimism and basis for measurement.

Based on this definition, the researcher will use the wellbeing domains in the two theoretical frameworks of wellbeing to conceptualize the evaluation of conservation interventions on host community wellbeing.

2.2.1 WeD Framework

This framework was developed by the WeD Economic and Social Research Council (ESRC) Research Group at the University of Bath. Based on a review of different approaches as presented in one of their working papers, (WeD working paper 9/50) important points of consensus regarding wellbeing are presented below:

First, wellbeing needs to be assessed across a number of different domains, rather than through a single indicator. It has both subjective (thinking/feeling) and objective (having/doing) dimensions. It involves issues of agency, capability, and power - critically involving how people relate to one another. A wellbeing approach thus has implications for 'how' development interventions should be conducted, not only 'what' should be done.

Second, wellbeing has a moral quality – it concerns what people value and hold to be good. Also, different kinds of people will define wellbeing in different ways (e.g. older people will prioritise different things to younger people; men to women; parents to non-

parents; and so on by class, ethnicity, (dis)ability, as well as personal outlook and religious or political commitments).

Third, wellbeing is not a state but a process. Different approaches see this as involving interaction between: person and environment; individual and collective; psychology and social environment; subjective and objective. It also means that how wellbeing is defined and experienced changes over time. Wellbeing may be measured at the individual or collective level (e.g. household, community or nation). Understanding wellbeing as a process, however, means that what is measured is always an outcome of the interaction between the unit that is measured and a wider environment.

Fourth, whether individuals and households can achieve wellbeing depends not only on their own characteristics, but whether their environment provides the enabling conditions. Enhancing wellbeing, therefore, involves both working directly with people and communities and building a broader environment in which they can flourish. Most immediately this involves the provision of infrastructure, services and amenities. But it also concerns for example, the organisation of the economy; the quality of the physical environment; the policy regime; human rights and structures for political participation; the rule of law; and the management of violence and social conflict. Finally, wellbeing is oriented towards positive-sum, 'win-win' solutions. However, how wellbeing is defined, whose wellbeing counts, and how wellbeing is achieved are ultimately political questions (White, 2009)

2.2.2 Voices of the Poor: Crying out for Change Wellbeing Framework

This framework is based on an unprecedented effort to gather the views, experiences, and aspiration of more than 60,000 poor men and women from 60 countries by the World Development Report 2000/2001 on the theme of poverty and development.

Despite the diversity of poor participants, their ideas of wellbeing and the good life are multidimensional and have much in common. Enough for a good life is not a lot, and for those with little, a little more can mean a great deal. Across continents, countries, contexts, and types of people, a good quality of life includes material wellbeing, which is often expressed as having enough; bodily wellbeing, which includes being strong, well and looking good; social wellbeing, including caring for and settling children; having self-respect, peace and good relations in the family and community; having security, including civil peace, a safe and secure environment, personal physical security and confidence in the future; and having freedom of choice and action, including being able to help other people in the community. Wealth and wellbeing are seen as different, and even contradictory.

Descriptions of ill-being are also multidimensional and interwoven. Experiences of ill-being include material lack and want (of food, housing and shelter, livelihood, assets and money); hunger, pain and discomfort; exhaustion and poverty of time; exclusion, rejection, isolation and loneliness; bad relations with others, including bad relations within the family; insecurity, vulnerability, worry, fear and low self-confidence; and powerlessness, helplessness, frustration and anger.

Wellbeing and ill-being are states of mind and being. Wellbeing has a psychological and spiritual dimension as a mental state of harmony, happiness and peace of mind. Ill-

being includes mental distress, breakdown, depression and madness, often described by participants to be impacts of poverty. Children have a distinct view of the bad life.

Despite differences of detail, and contexts that are diverse, complex and nuanced, the commonalities stand out. The same dimensions and aspects of wellbeing are repeatedly expressed, across continents, countries and cultures, in cities, towns and rural areas alike. And they are expressed by different people—women and men, young and old, children and adults. The following domains of wellbeing are identified:

(i) **Material wellbeing** – The main aspects of material wellbeing repeatedly mentioned by different individuals and groups of poor people interviewed are food, assets and work. Food security is identified as a critical component of wellbeing by a large percentage of those interviewed. Assets include a secure tenure or adequate resources especially land for those living in rural areas and savings, capital and access to consumer goods for urban dwellers. Work to gain a livelihood was also identified as a nearly universal aspiration among participants.

(ii) **Bodily wellbeing** – This is the health and appearance, as well as a good physical environment. Access to health services, whether formal or informal, is also key. A healthy and strong body is seen as crucial to wellbeing—not just for a sense of physical wellbeing in itself, but as a precondition for being able to work. A person who is sick and weak cannot work or cannot work well. The third dimension of physical wellbeing is physical environment, for example, fresh air.

(iii) **Social wellbeing** – This includes care and wellbeing of children; self-respect and dignity; and peace and good relations within the family, community and country. Self-respect and dignity, as described by poor people, means being able to live

without being a burden to others; living without extending one's hand; living without being subservient to anybody; and being able to bury dead family members decently. Peace, harmony and good relations in the family and the community are also aspects of social wellbeing. Many poor people consider the absence of conflicts essential for family and social wellbeing.

(iv) **Security** – This includes predictability and safety in life and confidence in the future. Civil peace, a physical safe and secure environment and personal physical security are all considered to be critical. Wellbeing means not being vulnerable to physical disasters, threats and discomforts that are so typical of the places of poor people. These include floods, wild animals, water and air pollution to name but a few. Lawfulness and access to justice, security in old age and confidence in the future are also critical to human wellbeing.

(v) **Freedom of Choice and Action –** This extends to having the means to help others. Being able to be a good person is a feature of the good life that poor people often highlight. A woman from the community of Borborema argued, "the rich one is someone who says, 'I am going to do it,' and he does." The poor in contrast, do not fulfil their wishes or develop their capacities. What people say they wish to be able to do covers a huge range: to gain education and skills; to have mobility and the means to travel; and to have time for rest, recreation and being with people—among others.

The researcher fundamentally focused on this wellbeing framework to conceptualize the basic dimensions of wellbeing on which this research will be focused. These focal areas (dimensions) will be used as the dependent variables with different indicators to showcase any impact from Mikoko Pamoja project on the overall wellbeing of the local communities.

2.2.3 Wellbeing Indicators

A wide range of voices around the world have stressed the need to understand development as a multidimensional phenomenon that involves and affects many aspects of people's lives (UNDP, 2014; World Bank, 2001). Increasingly, it is recognised that current wellbeing and its long-term sustainability are the ultimate goals of development and that these notions better capture the human experience of development (Gough & McGregor, 2007). There is now significant momentum in initiatives to improve the effectiveness of development policy and practice by shifting thinking and measurement beyond its focus on GDP. The calls to move "Beyond GDP" have found strong resonance in many developing and emerging countries. Many of these countries have put in place large consultative processes for developing alternative measures of wellbeing that are now being integrated into their statistical systems.

The call for wider measures of wellbeing has also increasingly been supported by key stakeholders in the global development arena that have called for a multi-dimensional concept of human wellbeing to be brought more firmly into the policy debate. The Millennium Declaration (UNGA, 2000) represented a major step forward in establishing a multidimensional approach to development. More recently, the UN General Assembly adopted the Sustainable Development Goals; a set of 17 goals with 169 targets as part of a wider 2030 Agenda for Sustainable Development. This proposed new agenda is more comprehensive in its approach to multi-dimensionality and builds on strong foundations. In 1990, the UNDP published its first Human Development Report and has continuously evolved its methodology, developing specific measures of multidimensional poverty alongside its well-known Human Development Index. A similar shift towards multidimensionality was apparent in the World Bank's World

Development Report 2000 on multidimensional poverty (World Bank, 2000). This move towards an approach to development and societal progress that is focussed on human wellbeing was given critical momentum by the work of the Stiglitz-Sen-Fitoussi Commission. The Final Report of the Commission in 2009 provided a comprehensive review of the limits of standard economic indicators such as GDP as a measure of a country's economic performance

The Organization for Economic Cooperation and Development (OECD) launched its Better Life Initiative in (2011) to promote the measurement of wellbeing in OECD countries and embed the notion at the core of policy making. OECD has also proposed ways in which the OECD framework can be adapted to specific development contexts and thereby made more universal, by suggesting relevant wellbeing dimensions and indicators that could be used to measure wellbeing in developing countries.

As identified earlier in this paper, the various definitions of human wellbeing determine what is measured, and therefore the conceptualization of human wellbeing can be characterized as diverse, hence the numerous human wellbeing frameworks. However, this research will be limited to analyzing existing research on indicators that can be used to measure community wellbeing from conservation initiatives.

Many large conservation organizations have standards for the practice of conservation, conservation and human rights and conservation-poverty links. However, there has not been consensus on measuring human wellbeing in conservation initiatives.

An article published in the Sustainability Journal in December 2013 by Leisher *et al*., has reviewed the focal areas (domains) for measuring the human wellbeing impacts of a conservation initiatives. The team examines a constituent of 31 existing human wellbeing indices to ascertain if there are particular focal areas relevant to measuring

human wellbeing in a conservation initiative. For the 31 indices reviewed, the focal areas under each index was as per defined by the author's index. The team identified a priority of 5 focal areas with different types of corresponding indicators as defined by different human wellbeing indices. These include health, living standards, social cohesion, education and safety and security.

The most frequent focal area in the human wellbeing indices reviewed is ―living standards, which includes income and wealth. Improving material living standards is often a stated policy goal of international organizations as well as national or local governments, and the ability to provide empirical evidence of how a conservation initiative impacts living standards may be fundamental for an initiative's on-going support. In Kenya, for example, fisheries closures and gear restrictions have led to higher local fish catches, greater income, and more support for fisheries conservation (McClanahan, *et al*., 2010). In certain conservation contexts, such as subsistence livelihoods or non-market activities that expand people's consumption, measuring material living standards may be less relevant. Generally, though, the team hypothesizes that measuring change in living standards is likely to be relevant for measuring human wellbeing impacts from most conservation initiatives.

Health is one of the most frequently used focal areas in human wellbeing indices, perhaps because health is fundamental to realizing one's wellbeing potential. Poor health can limit opportunities for benefiting from other elements of human wellbeing such as better living standards or education. Within the conservation context, health may be linked to the provisioning goods and services that nature provides, such as clean water and adequate food (Millenium Ecosystem Assessment, 2005). Health may also be linked to the consumption of natural resources such as bush meat and medicinal

plants e.g., (Golden, *et al*., 2011; Joshi & Rao, 2011) or to disease and the degradation of nature via zoonotic disease transmission (Quammen, 2012). Thus, including health as a focal area for measuring human wellbeing may be warranted in many conservation initiatives.

The links between education and conservation may be less direct than for the focal areas above, but changes in the management of natural resources such as fuel wood and water supply may change the opportunity costs for school-aged children tasked with collecting these resources. There is evidence showing a correlation between time spent on collecting fuel wood or water and school attendance (Nankhuni & Findeis, 2004; Bandyopandhyay, Shyamsundar & Baccini, 2011 and Boone, Glick, & Sahn, 2011). Given this link, conservation initiatives that impact the availability of these local natural resources may also impact education. Additionally, conservation initiatives that increase local incomes may result in greater local investments in schools and education. Therefore, including education as a focal area for measuring conservation human wellbeing impacts may be relevant to some conservation initiatives.

The capacity of local people to manage their natural resources is often crucial to conservation (Danielsen, *et al*., 2008; Thomas, 2013) and shared social norms and social capital are known to be a success factor for the self-organized social-ecological systems upon which many rural people depend (Ostrom, 2009; Gutiérrez, Hilborn & Defeo, 2011). The human wellbeing literature suggests that social connections and relationships are important for an individual's sense of wellbeing (Helliwell, 2012). We hypothesize that the human wellbeing focal area of social cohesion is particularly relevant to conservation initiatives in developing countries because the level of social

cohesion may correlate with the ability to effectively manage local resources [Tang & Tang, 2010; Gutiérrez *et al*., 2011)

The security focal area is largely about avoiding negative impacts on human wellbeing. The benefits to human wellbeing come from reducing or eliminating vulnerabilities to physical insecurity and economic insecurity that can cause a decline in human wellbeing. In northern Kenya, for example, guards protecting community grasslands also improved local security in villages, and this was cited by local people as of greater value to local human wellbeing than new income-generating activities or school scholarships (Glew, 2012). The team hypothesized that the security focal area is relevant to conservation in contexts where physical violence is prevalent or where a large proportion of the population risks precipitous declines in living standards due to economic insecurities such as being marginally above a poverty line or relying on a single natural resource for their livelihoods.

For the environment focal area, the impact pathway on living standards from a conservation initiative may be more about the volume or biomass of a local natural resource than the variety or biological diversity of the resource (Balmford, Rodrigues, Walpole, Brink, & Kettunen, 2008; Leisher *et al*., 2012). This may be especially relevant for subsistence natural resources usage where human wellbeing depends on an adequate supply of the resource such as fish or animal fodder. Environment may also impact human wellbeing via soil erosion and clean water and air. Including the environmen*t* as a focal area is likely to be relevant to many conservation initiatives and measuring changes in the volume or biomass of natural resources upon which people depend may be particularly relevant.

In writing about common-pool resource management, Ostrom notes that collective choice arrangements allowing most resource appropriators to participate in the decision-making process is vital for successful common-pool resource governance (Ostrom, 1990). Where local people have a say in how natural resources are governed, resource productivity may improve which can benefit both people and nature e.g., (Agarwal & Gender, 2009; Leisher *et al*., 2012). A study comparing different approaches in the governance of marine protected areas found that community-based governance of resources resulted in greater socioeconomic benefits to local people than government-managed national parks (McClanahan, Marnane, Cinner & Kiene, 2006). The team suggests that measuring changes in governance, such as local levels of conflict and leadership, may be important for understanding changes in human wellbeing from a conservation initiative.

Measuring changes in the work-life balance of local people is relevant to conservation in contexts where initiatives may impact travel time for resource collection such as coastal fisheries or may impact time for tasks such as fuel wood collection. In locations where this is the case, and especially where ―time poverty‖ among women is an issue, including the work-life balance focal area may be relevant. For many conservation initiatives, however, the team hypothesizes that this focal area may be a lower priority that those above.

Improving a person's subjective wellbeing may be the ultimate goal of human wellbeing, but it is harder to measure than objective wellbeing and can vary depending on a number of exogenous factors. Given that conservation is only beginning to measure human wellbeing impacts, the challenging measurement of a subjective

wellbeing focal area may be more relevant once basic human wellbeing measurement capacity is in place. Studies of conservation initiatives have noted a bias towards participation by those who are economically better-off e.g., (Weber, Sills, Bauch & Pattanayak, 2011; Groom, Grosjean, Kontoleon, Swanson & Zhang, 2010) and that project benefits tend to flow to the better-off (―elite capture of benefits‖) e.g., (Jumbe & Angelsen, 2006; Jagger, 2008). While an inequitable distribution of benefits may improve human wellbeing for some, inequity may negatively impact social cohesion (Wilkinson & Pickett, 2009). Equity is most relevant in community conservation contexts that depend on the support of the community for success. The team hypothesizes that for community-based conservation, equity is an important attribute to measure. However, indicators on equity could be included within the social cohesion focal area rather than adding it as a stand-alone focal area.

Sacred groves and cultural taboos against fishing in an area or hunting particular wildlife may be perceived by local people as impacting human wellbeing (Bhagwat, Kushalappa, Williams & Brown, 2005; Robson & Berkes, 2012). Measuring cultural impacts on human wellbeing may be relevant for conservation initiatives that are built on cultural knowledge or traditions and especially for indigenous and community conserved areas (Robson & Berkes, 2012). As with equity above, the team suggests that impacts on culture could be measured as part of social cohesion, and a specific focal area may be unnecessary.

In conclusion, the team suggests that given the numerous conservation projects globally that impact the wellbeing of local people, one could conceivably find examples where almost every focal area of human wellbeing in the indices reviewed is relevant. The

choice of which focal areas to include when measuring human wellbeing is likely to be specific to a local context. Indicators are developed for each focal area based on the local context of host communities.

2.3. Income Generated from Sale of Carbon Credits

Carbon credits provide a unique aspect of environmental protection. It allows farmers and individuals, even large companies to earn by exercising and focusing efforts of mitigating carbon emission. The more carbon is saved, ensuring that recommended levels are not only reached but in many cases are lowered, the more income the individual, the community and the country earns.

2.3.1 Definition of Carbon Credits

According to Bigsby (2009) carbon credits are defined as the transactional value given to the cost of polluting the air. Green gas emissions have been the greatest concern for researchers and environmentalists spanning a couple of decades. Various recommendations have been made with regard to enhancing environmental protection for the purpose of reducing green gas emissions. Yet, as the world continues to industrialize, the systems are falling short leading to detrimental climate change effects. Junqueira (2005) and Bosch *et al*., (2008) state that with this system, environmentalist saw a double edged kind of benefit. On the one hand, carbon credits allow us to keep track and entice even large industries to take part in environmental protection on the other hand, with the introduction of carbon credits, green gas emissions are controlled and kept at manageable levels. The carbon credits was introduced in the Paris protocol in 2015, allowing companies and countries to receive what is termed as a carbon certificate, which allows or gives permission to produce a certain amount of greenhouse gases (Gifford 2020). If the company, individual or country is able to keep well below

their credit points, they have a right to sell to those who may exceed their permitted points, therefore creating a trade system that ensures global tracking and maintenance of greenhouse gas levels.

2.3.2 Project Sale of the Carbon Credits

Since the introduction of carbon credits as a viable mechanism for environmental change, innovative projects have been designed and introduced with a two pronged approach: reduce poverty and enhance environmental care. Bigsby (2009) states that the easiest way to gain carbon credits is to ensure environmental protection steps are taken at grassroots level, for example by introducing proper farming techniques including organic agriculture, enhancing good cooking and alternative fuel in low cots communities among others. While individually these may seem like small steps, cumulatively they lead to large carbon deficits which can then be sold. NGOs and development agencies often act as brokers and go between, bridging the gap between the sellers and buyers of the carbon credits. Projects often begin in the form of environmental protection and care systems, which are cumulated and calculated to determine how much carbon credits can be issued per individual change (Gagne 2019, Zhou and Wen 2020). As households make changes, NGOs negotiate for the sale of carbon credits cumulatively and distribute the income to the individual homes either on a monthly or yearly basis. This gives incentive to low class and poor homes to take necessary steps to enhance protection of their own environment as a means of earning income.

2.4 Mangrove related income generating activities in the Project

The Mikoko pamoja project based in the remote villages of Gazi bay has drawn much interest from environmentalists following its fast growth and easy sustainability methods. Aye *et al.* (2019) indicates that before the introduction of the project, the community continually suffered income losses, and fell short of extreme poverty. Social services were difficult to afford and come by and income generation remained a dream despite being located in the rich coastal area. All this could be traced to the diminishing mangrove forests in the area. The mangroves provide and lay foundation for various activities which in turn allow the community to generate much needed income. These include fishing, wood fuel and timber sales. Constant diminishing of the mangrove forests led to increased loss of income and detrimental levels of poverty (Harini *et al.* 2019). The project focused on educating the community on the value of the mangroves, enhancing ownership and thus care of the forests and finally teaching sustainable ways of gaining income from the mangroves. The key determinant of the success of the project is growth in number of mangroves and the health of the trees. Income generated from the project has been distributed to individual homes within the community, through bigger and better fish catch, purchase of books for the school and Ksh. 250 monthly income for each home.

2.4.1 Beekeeping Activities within Mikoko Pamoja Project

Uniquely, the mangroves have provided an ideal shelter and thus foundation for beekeeping. (Arumugam *et al.* 2020, Sabai 2020 and Patel *et al*. 2020) with time, the community introduced one hive which thrived and led to the development of other hives. This was as a result of training on the value of bees in enhancing the health of the mangrove. Mikoko is slowly becoming a honey producing project, from the hives kept strategically around the community. The hives can be built with the help of the

project directors to ensure strategic placement and are often managed in groups to avoid overcrowding.

2.4.2 Ecotourism activities within Mikoko Pamoja Project

The biggest benefit of the project has been the increased attraction to tourists. Despite its location in the interior of the Kenyan coast, the mangroves have provided the most idyllic scenery coupled with a well maintained white sand beach. Sabai (2020) shows that as other coastal regions battle with declining shorelines, this area continues to have a healthy shoreline that is indeed showing signs of growth. The majestic vegetation in itself attracts many tourists and provides an alternative source of income for the community.

2.5 Restoration of Degraded Mangrove Ecosystems

According to Lovelock *et al.* (2019) mangrove restoration is based on the practise of assisting in recovery and resilience which then leads to sustainable adaptation of the mangrove forests and surrounding ecosystems. This is aimed towards achieving the UN development goal 14.2, on enhancing protection as well as focusing attention towards restoration of marine systems.

2.5.1 Mangrove Ecosystem in the Project Area

Structure and ecology of the mangrove ecosystem

Mangrove forests store higher rates of carbon dioxide per unit in comparison to terrestrial forests. They are easy to replant, and require little effort in terms of maintenance. Because of their nature, mangroves support various forms of income generation activities, which is why the Mikoko Pamoja project, is based on mangrove restoration. There are more than 70 species of mangroves along the coasts (Ranjan 2019), with the heaviest present along the Kenyan and Asian coast. Mangrove trees

area structured in a way that allows them to sift the salt coming from ocean water, despite being located in the coastal region. Mangroves are best found and are healthy in salty brackish water, where majority of the vegetative species would fall apart and not survive (Ellison *et al*. 2020).Spatial variation, or zonation, is a common trait for mangrove forests both horizontally and vertically. Certain species are found in monospecific bands parallel to the shore or in mosaics; however, patterns of distribution vary with location, both locally and regionally. There are many hypotheses about how and why zonation occurs, but no consensus has been reached. Interspecific variation is also quite high; mangrove height ranges from only a few feet to over one hundred feet and species exhibit different adaptations to salinity (Bosch *et al.* 2008).

2.5.2 Causes of Mangrove Degradation and Denudation

Mangroves are at highest risk from human activities, such as overfishing. While this may not seem to be directly linked to the destruction of the mangroves, overfishing affects the environment and alkalinity of the water in which the mangroves survive. The delicate environment is then likely to fall apart over time, due to poor adaptability and restoration (Junqueira 2005, Ranjan (2019) and Patel *et al.*, 2020). In addition, human beings are likely to overharvest the mangrove forests. In Kwale for example, timber business was booming and with large sales, mangrove harvesting became rampant. The result is that not only were some species completely deliberately, the mangrove population itself fell short. This was made even worse by constant harvesting for charcoal production (Bayraktarov et al. 2020). Like terrestrial forests, the mangroves have faced the longest and most detrimental forms of deforestation. Harvesting has led to increased erosion and land subsidence, increasing salinization of coastal waters which make it difficult for the survival of the mangrove forests.

Surprisingly, despite understanding and seeing the value of the mangroves, no one takes responsibility for ensuring their sustainability and regrowth.

2.5.3 Benefits of Mangrove Restoration

A direct advantage of the mangrove restoration, is increased fish stock. Sea grass beds and coral reefs depend on healthy mangroves to filter sediments and provide nursery grounds for resident species ().Mangroves are an important part of estuarine food webs, producing large amounts of leaf litter. Leaves drop from the mangrove trees and are quickly decomposed by fungi and bacteria. This decomposed matter is referred to as detritus which is flushed into the estuary by the outgoing tides. This provides a food source for marine life including economically important shrimp, crabs, and fish.

An estimated 75% of the game fish and 90% of the commercial species in south Florida are dependent upon the mangrove system during at least part of their life cycles (Renzi and Silliman 2019).Mangrove roots provide an ecologically important habitat for a wide variety of fish. Jacks (*Caranx spp.*), sheepshead (*Archosargus probatocephalus*), grunts (*Haemulon spp.*), gobies (*Gobiosoma spp.*), schoolmasters (*Lutjanus apodus*), gray snappers (*Lutjanus griseus*), and small goliath grouper (*Epinephelus itajara*) as well as many other species of fish can be found among the tangled roots of red mangroves. Tarpon (*Megalops atlanticus*) cruise in waters adjacent to mangrove roots. The spotted seatrout (*Cynoscion nebulosus*) also thrive in mangroves and can tolerate high turbidity, taking advantage of the prey fish in the mangroves and seagrass beds. The florida gar (*Lepisosteus platyrhincus*) is a top-level carnivore, feeding on a variety of smaller fishes (Canales-Delgadillo *et al*.2019).

2.6 Development Projects Undertaken By the Mikoko Pamoja Project Community Development Fund

2.6.1 Schools

Through funds generated in the project, the community was able to build and restructure he local primary school classes. In agreement, the community went ahead and purchased iron sheets, allowing the community to increase school enrolment and ensure safety of the children as well as comfort while studying. Coupled with this, the next income for the project went into purchase of books for the primary school classes. Having previously relied completely on government donations to support the school, much of which fell short and was non-existent, the school is well on its way to being an independently supported school through the project.

2.6.2. Hospitals

This remote region had in the past suffered from lack of proper healthcare. Omen had to travel long distances with the sick to the main town to get healthcare. Maternal healthcare was especially non-existent with the community relying only on traditional healers for care of the sick. Herbs and traditional medicines were considered the main form of treatment in the region. Neimark *et al*. (2020) states that the Mikoko Pamoja project has grown and drawn much interest from developmental agencies which have gone as far as to invest in local clinics and a mobile centre providing easy healthcare and modern medicine to the sick. Further, the project has facilitated training of the local medicine persons and traditional healers for the provision of better services. This has decreased the cases and incidences of loss of life for treatable diseases such as Malaria and conditions such as child birth.

2.7 Research Gap

Many large conservation organizations have evidence-based standards for the practice of conservation, conservation and human rights and conservation-poverty links. However, there has not been consensus on focal areas and indicators to be used in measuring human wellbeing in conservation initiatives.

Further, from the empirical review of literature, the researcher notes that existing research on focal areas for measuring human wellbeing from conservation initiatives is based on hypothesis that is not supported by empirical evidence e.g. (Leisher *et al*., 2013). This research therefore endeavors to provide empirical evidence that the top 5 ranked focal areas under empirical review (Leisher *et al*., 2013) could sufficiently be used to measure human wellbeing of host communities of conservation initiatives.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study sets out to assess the effect of conservation initiatives on the human wellbeing of host communities using case study of the Mikoko Pamoja community-led. The benefits of the Mikoko pamoja project will be used as independent variables to evaluate the effects on different focal areas of the human wellbeing of the host communities (dependent variables). The chapter presents the research design, methodology, sample size and sampling procedure, and research instrument that will be used to collect data, the data collection procedure and how the data will be analyzed and presented.

3.2 Research Design

The research design adopted for use in this study was descriptive design using a social survey that employed both quantitative and qualitative methods of data collection and analysis to assess the objective and subjective indicators of human wellbeing. Aliaga and Gunderson (2005) stated that quantitative research has to do with applying mathematically based methods (particularly statistics) for collecting and analyzing numerical data in order to explain phenomena (Mujis, 2004). According to Orodho (2005) a survey design helps the researcher to gather information through observation, photography, administration of questionnaires to a sample population, relevant document review, analysis and interpretation. This design is thus relevant for this study and is expected to provide a clear understanding of the effect of the Mikoko Pamoja community conservation project on the human wellbeing of the host communities.

According to Bhattcherjee (2012), research design is a comprehensive plan for data collection in a research project. It is a "blueprint" for research aimed at answering the proposed research questions or testing specific hypotheses and must involve at least three processes: (1) the data collection process, (2) the instrument development process, and (3) the sampling process.

3.3 Research Site

A research site is defined as the particular locality where data will be collected to answer the researcher questions of the study (Leedy & Ormrod, 2010).

The study will be carried out in Gazi Bay area of the southern coast of Kenya, about 50km south of Mombasa, in the Msambweni District of Kwale County. The area under management of the Mikoko Pamoja project is 117 ha; 107 ha of natural mangrove forest and 10 ha of plantation mangroves, as well as plant 8 ha of forest to provide wood for local use as a leakage mitigation activity. These forests are located in zones within an expanse of 615 ha of mangroves.

The mangrove forests of Gazi bay have been exploited for many years especially for building poles and fuelwood (Bosire *et al*., 2003; Kairo, 1995). This exploitation continues today and has produced a human-impacted forest with numerous stumps and other indications of cutting (Dahdouh-Guebas *et al*., 2004).

The Kenyan government owns all the mangrove forests in the country and legal extraction is limited to individuals and groups with a Kenya Forest Service licence, although illegal extraction is common.

The project is expected to protect a total of 107 ha of natural mangrove forest and 10 ha of plantation mangroves, as well as plant 8 ha of forest to provide wood for local use

as a leakage mitigation activity. These forests are located in zones within an expanse of 615 ha of mangroves. In the area there are approximately 5,400 residents in two local villages, Gazi and Makongeni. Livelihoods are provided predominantly fishing, farming and tourism.

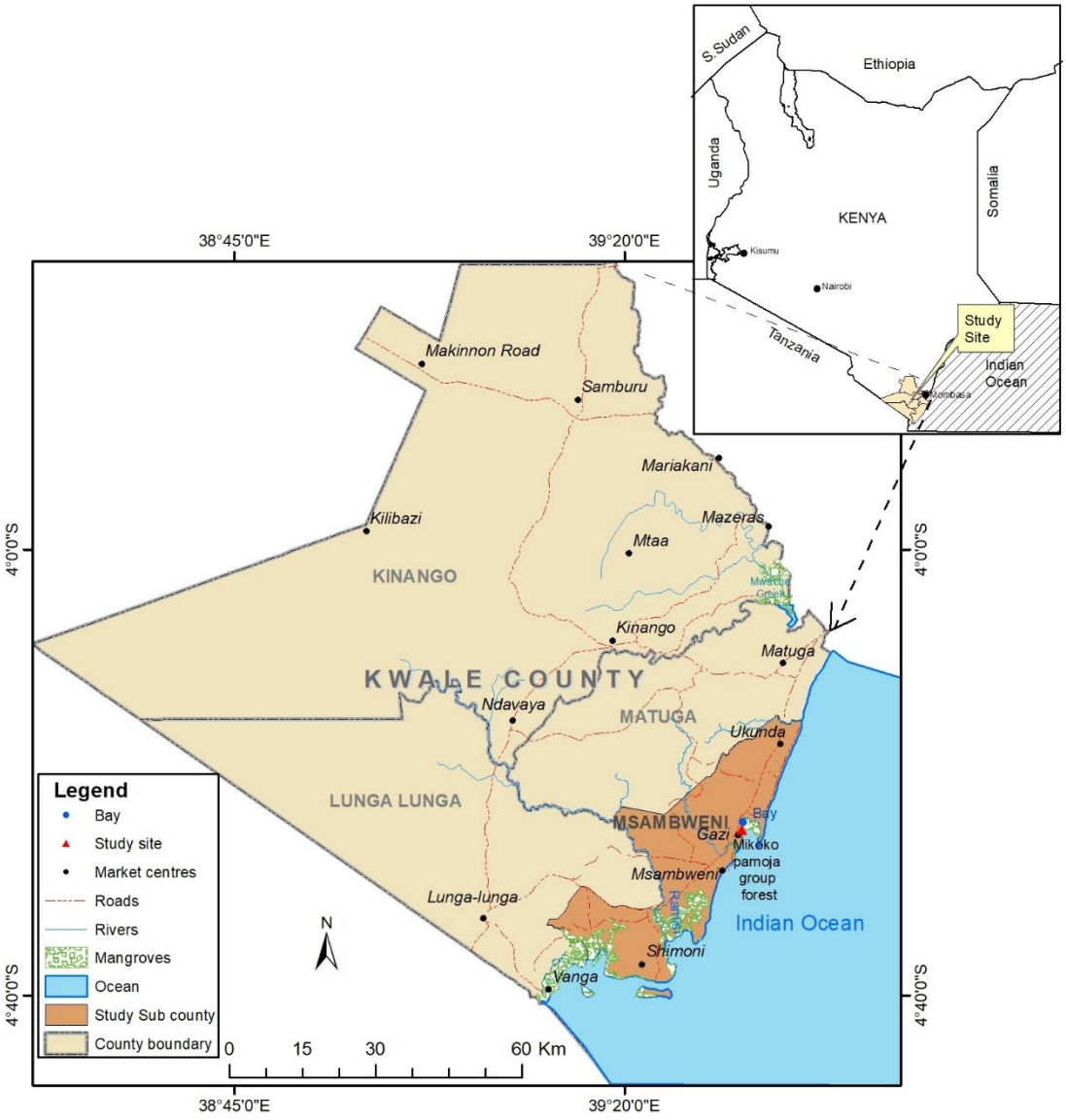

Figure 3.1 Map of Kwale County showing the study area

3.4 Target Population

The study targeted all stakeholders involved in the Mikoko pamoja project., who number 5,000. The project consists of: a Mikoko Pamoja Community Organization (MPCO)- a representation of Gazi Bay, specifically Gazi and Makongeni villages; a Mikoko Pamoja Steering Group (MPSG) which provides technical support to the MPCO; and the project coordinator, The Association for Coastal Ecosystem Services (ACES), a charity registered in Scotland. The two villages will also form part of the target group for this research. A target population is defined as all people or items (unit of analysis) with the characteristics that one wishes to study (Bhattcherjee, 2012).

3.5 Research Sample Size

A sample is a selection of respondents chosen in such a way that they represent the total population as good as possible (Schrijver, 2013). The study will obtain a sample size by using Krejcie and Morgan (1970) formula for determining the sample size (Robert and Daryle 1970). The formula is as follows:

$$s = X^2NP\ (1-P) \div d^2\ (N-1) + X^2\ P(1-P)$$

Where: N = the population size. P = the population proportion (assumed to be .50 since this would provide the maximum sample size). d = the degree of accuracy expressed as a proportion (.05). The formula provided a sample size of 357 respondents.

Table 3. 1: Sampling Frame

Category of Respondents	Percentage	Sample
Number of households	70	250
Mikoko Pamoja Community organization (representatives from the village groups)	9.8	35
Mikoko Pamoja Steering Group	4.7	17
Association of Coastal Ecosystem Services (project coordinator)	4.7	17
Kenya Forest Service officials	4.7	17
Kenya Marine Research Institute officials	2.8	10
Kenya Wildlife Services	2.8	10
TOTAL	**100**	**357**

3.6 Sampling Procedure

The research adopted different probability sampling techniques to obtain samples for the research. The survey for the village groups was conducted on the basis of households. This ensured that the researcher interviewed 250 representatives from the two villages. The researcher used stratified sampling to divide the targeted households into two strata: direct beneficiaries of Mikoko Pamoja project such as fishermen, direct employees of the project, entrepreneurs such as eco-tourism enterprises and indirect beneficiaries, those benefiting from community project investments such as schools, hospitals, and roads. The researcher then proceeded to obtain samples from within each strata using simple random sampling. Data was then collected on each sampling unit that was randomly sampled from each group (stratum).

The remaining categories of respondents; Mikoko Pamoja Steering Group, Association of Coastal Ecosystem Services (project coordinator), Kenya Forest Service officials, Kenya Marine Research Institute officials and the Kenya Wildlife Service are

considered by the researcher to be information rich cases to enrich the qualitative part of the research. For these groups, purposeful sampling was adopted by identifying and selecting individuals or groups of individuals that were knowledgeable on the benefits of the project and its impact on the human wellbeing of the host communities. The samples were based on the availability and willingness to participate, and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner. The information received from these key informants and the Focus Group Discussions were used to triangulate the household survey data. From this explanation sampling procedure can simply be seen as a method used for selecting sample members from a population (Leedy & Ormrod, 2010).

3.7 Data Collection

Data collection is a systematic approach to gathering information from a variety of sources to get a complete and accurate picture of an area of interest (Simon & Goes, 2013). A semi-structured questionnaire will be used as the data collection tool for this study. Yin (2003) deems questionnaires as one of the most important sources of information useful for understanding complex phenomena and gaining insights from the respondents for a given matter. Table 4 below illustrates the target data for the different objectives of the study.

3.8 Data Processing and Analysis

The study collected both quantitative and qualitative data. The quantitative data was coded for entry into the statistical programme for analysis. Data was analysed using both descriptive and inferential statistics within the Statistical Package for the Social Sciences (SPSS version 22).

Descriptive analysis, which included the use of frequency tables, charts, measures of central tendency and dispersion (means, modes, median, variance and standard deviation) and cross tabulation of categorical variables.

Inferential statistics were used to determine the existing relationships between variables and to answer the research questions. Inferential statistics used included: linear regression analysis to determine the effects of the independent on the dependent variables. Multiple regression analysis was used to rank the independent variables in terms of their effects on the wellbeing of the households (dependent variable). The factors considered by the study include independent variables (X) and dependent variable (Y). The regression equation:

$$Y= \beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+\alpha$$

Where Y is the dependent variable (Wellbeing of the households), β_0 the regression coefficient, β_1, β_2, β_3 and β_4 the slopes of the regression equation, X_1 income from sale of carbon credits, X_2 indirect economic activities, X_3 benefits from restoration of degraded mangrove ecosystems, X_4 benefits from development projects. The α is an error term normally distributed about a mean of 0 and for purposes of computation, the α will be assumed to be 0. The equation was solved by use of a statistical model using SPSS. This will generated a quantitative report from the analysis using inferential statistics. Data collected from the Focus Group Discussions was analysed by use of narratives. The summary of the analytical procedures used are given in Table 3.2.

Table 3.2: Summary of Data Analysis and Statistical Tools Used

Objectives		Variables	Method of Data analysis
(i)	Assess how the income generated from the sale of carbon credits influences the wellbeing of the households	Independent variable: Income from sale of carbon credits Dependent: Wellbeing of households	Descriptive statistics t-test
(ii)	Analyze the influence of other mangrove related income generating activities on the wellbeing of households	Independent variable: (i) beekeeping, (ii) ecotourism Dependent: Wellbeing of households	Descriptive statistics Linear regression
(iii)	Assess the influence of benefits obtained from the restoration of degraded and denuded mangrove ecosystems on the wellbeing of households	Independent variable: (i) clean environment (ii) increased fish stock Dependent: Wellbeing of households	Descriptive statistics Linear regression
(iv)	Analyze how development projects implemented from the community development fund influence the wellbeing of the households	Independent variable: (i) schools, (ii) hospitals (iii) roads Dependent: Wellbeing of households	Descriptive statistics Linear regression
(v)	Ranking of Mikoko pamoja conservation activities in alleviating the wellbeing of the members	All independent variables of study and wellbeing of the members	Multiple linear regression

3.9 Instrument Validity

Instrument validity according to Gall *et al.,* (2007), tells whether an item measures or describes what it is supposed to be measured or described. Mugenda and Mugenda (2003) indicated that content validity indicates whether all important aspects of the variable under study are covered. A pilot survey was conducted prior to the study to test the accuracy and consistency of the questionnaire intended to be used by the researcher so as to test on the adequacy of questions to be collected. The questionnaire was revised to accommodate the changes from the field.

3.10 Instrument Reliability

Ensuring accuracy that gives meaning and permit a generalized interpretation of the research results (Mugenda & Mugenda, 2003) was upheld in this study. Respondents during the pre-test stage were deliberately avoided in the actual stage of data collection to avoid results be contaminated as a result of sentiments (Oluoch, Tmo & Enose, 2014)). By so doing the instruments were expected to gain some consistency and reliability needed to assemble dependable information.

3.11 Ethical and Legal Considerations

The researcher adhered to ethical consents, as respondents' option of whether or not to partake in the study was upheld (Best & Khan, 2002; Gall *et al*., 2007). Before carrying out the study, adequate permission was sought from the appropriate authorities – the university (ANU), the National Commission for Science, Technology and Innovation (NACOSTI) and the respondents. The researcher also ensured that the respondents understood the process in which they were engaging in, including why their participation was necessary, how the data collected was to be used and to whom it was to be reported to.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents and discusses the results of this study based on the formulated objectives and study questions presented in Chapter One. The study evaluated the influence of conservation interventions by the Mikoko Pamoja project on the socioeconomic wellbeing of local communities living in Gaza bay, Kwale County. Descriptive and inferential statistics were used to analyse the data for this study. The findings of the study are presented under the following nine (9) sections: characteristics of the Mikoko Pamoja project participants, socioeconomic wellbeing of households in Gaza bay, influence of income from carbon credits on wellbeing of households, influence of income from mangrove related activities on wellbeing of households, influence of income from mangrove restoration of the wellbeing of the households, influence of income from community development fund on the wellbeing of the households.

4.2 Characteristics of the Mikoko Pamoja Project Participants

Four characteristics of the Mikoko pamoja project participants considered important to this study are presented in this section, they include: sex of the household heads, age distribution of the household heads, marital status, highest level of formal education attained, Number of children per household, monthly household income.

4.2.1 Sex of the Household Heads

The sex of the household heads was noted and recorded during the survey. The data was then analysed and summarised as shown in Table 4.1

Table 4.1: Sex of the Household Heads

Sex	Frequency	Percent
Male	131	40.1
Female	196	59.9
Total	**327**	**100.0**

The majority (59.9 %) of the sampled households were headed by females. This sample population distribution compares well with the estimates provided by the County in 2017, where the population of the females was higher than the males. The females accounted for 51.49 % of the population (Kwale County Government, 2018).

Gender in many African societies is vital as it affects the use and ownership of resources, how farming operations are undertaken, how new ideas and technologies are perceived and how information is disseminated (Kameri-Mbote, 2019).

4.2.2 Age of the Household Heads

The household heads were asked to state their exact ages and the data was recorded and analysed. The descriptive statistics and the frequency distribution for the ages of the household heads is given in Table 4.2.

Table 4.2: Age Distribution of the Respondents

Age Category (years)	**Frequency**	**Percent**
18-28	102	31.2
29-39	97	29.7
40-50	73	22.3
51-61	32	9.8
62-72	19	5.8
Above 72	4	1.2
Total	**327**	**100.0**

Mean 37.2 ± .75, Median 35, Mode 3, Std. dev. 13.6, Min 18, Max 83 years

The majority (60.9 %) of the household heads were below 39 years of age.

4.2.3 Marital Status of the Household Heads

The household heads were asked to state their marital status during the household survey. The information was analysed and the frequency distribution of the data is given in Table 4.3

Table 4.3: Marital Status of the Household Heads

Category	Frequency	Percent
Married	210	64.2
Single with no Children	44	13.5
Single with children	41	12.5
Divorced/Separated	23	7.0
Widowed	9	2.7
Total	**327**	**100.0**

The majority (64.2 %) of the household heads were married, while 26 % of them were single either with or without children.

4.2.4 Highest Level of Formal Education Attained by Household Heads

The household heads were asked to state the highest level of formal education they had attained. The information was then analysed and the frequency distribution is presented in Table 4.4.

Table 4.4: Level of Formal Education Attained by the Household Heads

Education Level	Frequency	Percent
"Madrassa" (Koran teachings)	16	4.9
No Formal Schooling	47	14.4
Some Primary Education	81	24.8
Primary Education Completed	95	29.1
Some Secondary/High School	26	8.0
Secondary/High School Completed	48	14.7
Post Secondary /College Education	9	2.8
Some University	3	0.9
University Completed the Degree	2	0.6
Total	**327**	**100.0**

The analysed data shows that a large percent of the household heads had dropped from school either at the primary level (24.8 %), the secondary level (8 %) or the university level (0.9 %). The ones that had finished their education at different levels included 29.1 % at the primary level, 14.7 % at the secondary level, college level 2.8 % and 0.6 % at the university level. The household heads that had not received any formal education 14.4 %, while 4.9 % had attended *Madrassa* (Koran school).

These results are consistent with nationally instituted surveys such as the integrated household living conditions survey. The survey reports that majority of the population are able to attain at least an upper primary school education. However very few according to the survey, transit to secondary school and even fewer to college (Eisemon 2014)

4.2.5 Number of Children in the Household

The number of children living in each of the household surveyed was noted and the information was analysed and results presented on Table 4.5.

Table 4.5: Number of Children per Household

Number of children	Frequency	Percent
0	55	16.8
1	28	8.6
2	50	15.3
3	56	17.1
4	44	13.5
5	31	9.5
6	20	6.1
7	20	6.1
8	11	3.4
9	5	1.5
10 and Above	7	2.1
Total	327	100.0

Mean 3±.143, Median 3, Mode 3, Std. dev. 2.58, Minimum 0, Maximum 14

The households without children in the Mikoko pamoja project area were 16.8 %. The households with three (3) children were the highest in the project forming 17.1 % of the total population.

Statistics reported by World Bank as cited by Belshaw *et al.* (2001) showed that the community initially had high birth rates with average household members standing at 10 and above. The high birth rates are attributed to two factors; the first being pursuit of labour needed to ensure productivity of land and the second being the increased child and maternal mortality in the area. Families therefore opt for more children in an attempt to shield and ensure a legacy should the children become unhealthy or die. Brown *et al.* (2008) further notes that customs of the community have limited the desire to make use of family planning methods which would control the birth rate.

4.2.6 Household Monthly Income

The monthly income of the household heads within the Mikoko pamoja project were asked to state their monthly income and the information was categorized and the frequency distribution calculated. The data is summarized in Table 4.6

Table 4.6: Monthly Income of the Household Heads

Income (k. Shs.)	Frequency	Percent
Up to 10,000	205	62.7
10,001 –. 30,000	94	28.7
30,001 - 60,000	23	7.0
60,001 –. 90,000	3	.9
120,001 –. 150,000	1	.3
180,001 –. 210,000	1	.3
Total	327	100.0

The majority (62.7 %) of the members of the Mikoko Pamoja project earned less than K. Shs 10,000 per month. This figure translates to less than US $ 3.2 per day (1US$ =103 K. Shs).

4.3 Socioeconomic Wellbeing of the Project Members

The socioeconomic wellbeing of the members of Mikoko Pamoja project was conceptualized as a multi-indicator variable with 32 indicators. The scores for indicators were summed up to form an index. The index had seven (7) domains, as follows: (i) standard of living, (ii) access to health care, (iii) feeling of safety, (iv) improved social relations, (v) spiritual fulfillment, (vi) control of the state of environment, (vii) emotions and affiliations.

These seven domains had 32 indicators as follows: (i) standard of living with six indicators (provision of food, shelter, clothing, capital, assets and work), (ii) access to health care with 2 indicators (provision of health services and cost of health), (iii) feeling of safety with 3 indicators (peace of mind, absence of fear and worry), (iv) improved social relations with 3 indicators (community connections, good family and community relations), (v) spiritual fulfillment with 2 indicators (belief in God and attendance), (vi) control of the state of environment with 8 indicators (control of political situations, material situations, acquisition of services, skills, resources, knowledge loans and information), (vii) emotions and affiliations with 5 indicators (social respect, part of community, fulfill social obligations, listened to, provision of help to others).

The respondents in each of the surveyed household within the Mikoko Pamoja project in Gaza bay were asked to rate (or gauge) their household level of wellbeing based on the 32 indicators of socioeconomic wellbeing using a 10 point semantic differential scale, which ranged between 1 and 10 (1 being Very Low level and 10 Very High level). The scores for each indicator item were added together and a mean calculated. Then all the scores for all the indicators were added together to form an index of socioeconomic wellbeing of the households in Mikoko Pamoja. The internal reliability of the created socioeconomic wellbeing index using Cronbach's alpha (α) was calculated and found to be .856, which was acceptable. The descriptive statistics for the scores of the 32 indicators items are given in Table 5.6 Appendix B. The descriptive statistics for the seven (7) domains and the index of wellbeing are presented in Table 4.7.

Table 4.7: Descriptive Statistics for the Wellbeing Domains of the Mikoko Pamoja Project

Indicator Items	Rating by the Mikoko Pamoja Members					
	Mean	**Median**	**Mode**	**Std. dev**	**Min**	**Max**
Standard of living	4.12	4.33	1.00	2.31	1.00	10.0
Good health	5.13	5.00	1.00	3.08	1.00	10.0
Safety	6.46	7.33	10.0	3.07	1.00	10.1
Social Relations	6.50	6.66	6.00	1.33	10.0	.822
Spiritual fulfilment	7.38	10.00	10.00	3.58	1.00	10.0
Environment	4.22	4.25	1.00	2.08	1.00	10.0
Emotions and Affiliations	4.12	4.28	4.21	1.36	0.76	6.76
Wellbeing index	**4.12**	**4.28**	**4.21**	**1.36**	**0.76**	**6.76**

n=327. 1=Very low and 10= Very High.

The mean of the wellbeing index was 4.12 on a scale of 1 to 10. The index was then divided into six categories and frequency distribution are presented in Table 4.8.

Table 4.8: Frequency Distribution of Wellbeing Categories of Project Members

Wellbeing Categories	Frequency	Percent
Below 1	5	1.5
1.01-2	27	8.3
2.01-3	32	9.8
3.01-4	65	19.9
4.01-5	113	34.6
5.01-6	62	19.0
Above 6	23	7.0
Total	**327**	**100.0**

n=327

The majority (74.1 %) of the Mikoko pamoja members rated their wellbeing to be lower than 5 on a scale of 1 to 10. The chi-square test was used to test the equality of the wellbeing categories and the results are presented in Table 4.9.

Table 4.9: Chi-square Test for Equality of the Categories of Wellbeing Index of Mikoko Pamoja Project Members

Categories	Observed N	Expected N	Residual	Statistics
Below 1	5	46.7	-41.7	χ^2 = 168.45
1.01-2	27	46.7	-19.7	*df*= 6
2.01-3	32	46.7	-14.7	*p*= .001
3.01-4	65	46.7	18.3	
4.01-5	113	46.7	66.3	
5.01-6	62	46.7	15.3	
Above 6.01	23	46.7	-23.7	
Total	**327**			

The chi-square test indicates that the majority of the Mikoko pamoja project members had a wellbeing index of between 4 and 5. This result was found to be statistically significant (χ^2 104.02, *df* 3, *p* .001). This level of wellbeing can be described as low.

4.4 Influence of Income from Sale of Carbon Credit on the Wellbeing of Mikoko Pamoja Project Members

The first objective for this study was to assess how the income generated from the sale of carbon credits influences the wellbeing of the households involved in the Mikoko pamoja project.

4.4.1 Income from the Sale of Carbon Credits by the Mikoko Pamoja Project

The variable income from the sale of carbon credits for this study was operationalized as the amount of money received from the project as proceeds to the members or for the sale of carbon credits. The income was estimated based on benefits accrued from use of clean water, hospital fees and cash payments from the project. The money received by the member over the last five years was averaged and is presented in Table 4.10 together with the descriptive statistics and frequency distribution.

Table 4.10: Descriptive Statistics and Frequency Distribution for the Variable Income from Sale of Carbon Credits

Income Categories	Frequency	Percent
Below 1000	32	9.8
1001-2000	30	9.2
2001-3000	66	20.2
3001-4000	111	33.9
5001-6000	65	19.9
Above 6001	23	7.0
Total	**327**	**100.0**

Mean 3242±74.5, median 3301, mode 3222, SD 1348.9, min 196.2, max 5775

4.4.2 Influence of Income from the Sale of Carbon Credits on the Wellbeing of Households within the Mikoko Pamoja Project

The first research question for this study was sated as: how does the income generated from the sale of carbon credits influence the wellbeing of the households?

The question was answered by the use bivariate linear regression to determine if statistical significant influences existed between the sale of carbon credits and wellbeing of households involved in the Mikoko pamoja project in Gaza bay, Kwale. The dependent variable was the index of household wellbeing of the members of Mikoko pamoja project, while the independent variable was sale of carbon credits. The results showing the proportion of the variance explained by the independent variable using R and adjusted R square for the model is shown in Table 4.11.

Table 4.11: Proportion of the Variance Explained Using R-square for the Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.858[a]	.736	.735	.70339

a. Predictors: (Constant), total activities participated in

The model indicates an adjusted R^2 value of 0.735; this means that the independent variable sale of carbon credits explained approximately 73.5 % of the variation in dependent variable Household wellbeing. The R^2 value of 73.5 % is considered by Cohen (1988) to be of high. The statistical significance for the whole regression model was determined using the F test and the results are presented in Table 4.12.

Table 4.12: Statistical Significance of the Regression Model using the *F* Test

	Sum of Squares	***df***	**Mean Square**	***F***	***p***
Regression	447.745	1	447.745	904.971	.001
Residual	160.798	325	.495		
Total	**608.543**	**326**			

The results of the *F* test for the whole regression model was found to be significant statistically, $F(1, 325) = 904.9$, $p = .001$) indicating that there was a statistically significant linear relationship. Sale of carbon credits statistically significantly predicts the household wellbeing of the members of the Mikoko pamoja project. The coefficients for the regression model are given in Table 4.13.

Table 4.13: Regression for the Model between Carbon Credits Income and Wellbeing of Members of Mikoko Pamoja Project

	Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**
	B	**Std. Error**	**Beta**	***t***	***p.***	***VIF***
(Constant)	1.885	.084		22.461	.001	
Sale of carbon credits	.951	.032	.858	30.083	.001	1.000

The severity of multicollinearity of the variables included in the regression model was quantified using the variance inflation factor (VIF). The VIF was 1.0 indicating the absence of multicollinearity. Income from sale of carbon credits was found to have a positive statistically significant ($\beta = .858$, $p = .001$) influence on the wellbeing of

households which are members of the Mikoko pamoja project in Gaza bay, Kwale County.

4.5 Mangrove Related Income Generating Activities and Wellbeing

The second objective of the study was to analyse the influence of mangrove related income generating activities (bee-keeping and eco-tourism) on the wellbeing of households in Gaza bay, Kwale County.

4.5.1 Mangrove Related Income Generating Activities in Mikoko Pamoja Project

The independent variable mangrove income generating activities was operationalized as an index that combined the number of mangrove related income generating activities undertaken by household participating in the Mikoko Pamoja project. The mangrove related income generating activities were: bee keeping, ecotourism, fishing, business related to mangrove (sell products), transport of mangrove products, agroforestry, aquaculture, and seaweed farming. The household involvement in the mangrove related activities is shown in the multiple response Table 4.14.

Table 4.14: Household Involvement in the Mangrove related Activities (Multiple Response Table)

Activities	Frequency	Percent
Fishing	232	70.9
Business related to mangroves	177	54.1
Agroforestry	139	42.5
Ecotourism	96	29.4
Transport	81	24.8
Aquaculture	59	18.0
Seaweed farming	42	12.8
Bee keeping (Apiculture)	25	7.6

n=327

The mangrove related activity undertaken by most of the members was fishing (70.9 %), followed by business (54.1 %). The activity with few participants was apiculture (7.6 %).

The variables forming the activities were assessed as dummy variables (or a 0, 1 variables), in that the households that were participating in the activity were accorded a score of one (1), while the ones that were not involved in the activity were assigned a score of 0. The scores were then summed up to create the index of mangrove related income generating activities. The frequency distribution and the descriptive statistics of the variable are shown in Table 4.15.

Table 4.15: Mangrove Related Income Generating Activities Undertaken by the Members of Mikoko Pamoja

Number of Activities	Frequency	Percent
1.00	41	12.5
2.00	72	22.0
3.00	76	23.2
4.00	64	19.6
5.00	37	11.3
6.00	13	4.0
7.00	15	4.6
8.00	9	2.8
Total	327	100.0

Mean 3.39± .09, median 3, mode 3, SD 1.73, minimum 1, maximum 8

4.5.2 Influence of Income from Mangrove Related Activities on the Wellbeing of Households participating in Mikoko Pamoja Project

The second research question was stated as: how does the income from mangrove related activities influence the wellbeing of households that are members of Mikoko pamoja project in Gaza bay, Kwale?

The question was answered by conducting a bivariate linear regression analysis to determine if statistical significant influences existed between the income from mangrove related activities and the wellbeing of households within the Mikoko pamoja project in Gaza bay, Kwale. The independent variable was the index of income from mangrove related activities in the Mikoko pamoja project, while the dependent variable was the wellbeing of households found within the Mikoko pamoja project. The results showing the proportion of the variance explained by the independent variable using R and adjusted R square for the model is shown in Table 4.16.

Table 4.16: Proportion of the Variance Explained Using R-square for the Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.820[a]	.673	.672	.78275

a. Predictors: (Constant), number of activities involved in

The model indicates an adjusted R^2 value of 0.673; this means that the independent variable income from mangrove related activities explained approximately 67 % of the variation in dependent variable Household wellbeing. The R^2 value of 67 % is considered by Cohen (1988) to be of high. The statistical significance for the whole regression model was determined using the *F* test and the results are presented in Table 4.17.

Table 4.17: Statistical Significance of the Regression Model using the *F* Test

	Sum of Squares	*df*	Mean Square	*F*	*p.*
Regression	409.416	1	409.416	668.21	.001
Residual	199.127	325	.613		
Total	**608.543**	**326**			

The results of the *F* test for the whole regression model was found to be significant statistically, $F(1, 325) = 668.21$, $p = .001$) indicating that there was a statistically significant linear relationship. Income from mangrove related activities statistically significantly predicts the household wellbeing of the members of the Mikoko pamoja project. The coefficients for the regression model are given in Table 4.18.

Table 4.18: Regression for the Model between Income from Mangrove Activities and Wellbeing of Households in Mikoko Pamoja Project

	Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**
Model	**B**	**Std. Error**	***Beta***	***t***	***p.***	***VIF***
(Constant)	1.931	.095		20.27	.001	
Mangrove income	.646	.025	.820	25.85	.001	1.000

The severity of multicollinearity of the variables included in the regression model was quantified using the variance inflation factor (VIF). The VIF was 1.0 indicating the absence of multicollinearity. Income from mangrove related activities was found to have a positive statistically significant ($\beta = .820$, $t = 25.85$, $p < .001$) influence on the wellbeing of households which are members of the Mikoko pamoja project in Gaza bay, Kwale County.

4.6 Mangrove Restoration Benefits and Wellbeing of the Project Members

The third objective of this study was to assess the influence of benefits obtained from the restoration of degraded and denuded mangrove ecosystems (increased fish stocks and clean environment) on the wellbeing of households in Mikoko pamoja project in Gaza bay, Kwale County.

4.6.1 Mangrove Restoration Benefits

The independent variable mangrove restoration benefits was operationalized as index that combined the perceived ecosystem services arising from the restoration of mangrove ecosystem, these benefits include: clean air, clean drinking water, high fish stock, beautiful and serene environment, and shoreline protection. The indicators (benefits) were assessed as dummy variables (or 0, 1 variables). The indicators were then summed up to form the index of mangrove restoration benefits. The descriptive statistics and the frequency distribution of the index is given in Table 4.19.

Table 4.19: Frequency Distribution and Descriptive Statistics for the Index of Mangrove Restoration Benefits

Number of perceived Benefits	Frequency	Percent
1.00	40	12.2
2.00	44	13.5
3.00	106	32.4
4.00	74	22.6
4.01	1	.3
5.00	48	14.7
6.00	14	4.3
Total	**327**	**100.0**

Mean 3.27± .07, median 3, mode 3, SD 1.32, minimum 1, maximum 6

4.6.2 Influence of Mangrove Restoration Benefits on the Wellbeing of Households within Mikoko Pamoja Project

The third research question was stated as: how well does the mangrove restoration benefits influence the wellbeing of households that are members of Mikoko pamoja project in Gaza bay, Kwale?

The research question was answered by conducting a bivariate linear regression analysis to determine if statistical significant influences existed between the benefit

from mangrove restoration activities and the wellbeing of households within the Mikoko pamoja project in Gaza bay, Kwale. The dependent variable was the index was the wellbeing of households found within the Mikoko pamoja project, while the independent variable was ecological benefits arising from mangrove related activities in the Mikoko pamoja project, while the dependent variable was the wellbeing of households found within the Mikoko pamoja project. The results showing the proportion of the variance explained by the independent variable using R and adjusted R square for the model is shown in Table 4.20.

Table 4.20: Proportion of the Variance Explained Using R-square for the Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.874[a]	.764	.764	.66432

a. Predictors: (Constant), access to ecosystem services

The model indicates an adjusted R^2 value of 0.764; this means that the independent variable benefits from mangrove restoration explained approximately 76 % of the variation in dependent variable Household wellbeing. The R^2 value of 76 % is considered by Cohen (1988) to be of high. The statistical significance for the whole regression model was determined using the *F* test and the results are presented in Table 4.21.

Table 4.21: Regression for the Model between Benefits from Mangrove Restoration and Wellbeing of Households in Mikoko Pamoja Project

	Sum of Squares	Df	Mean Square	*F*	*p*
Regression	465.113	1	465.113	1053.904	.001
Residual	143.430	325	.441		
Total	**608.543**	**326**			

The results of the *F* test for the whole regression model was found to be significant statistically, $F(1, 325) = 1053.9$, $p = .001$) indicating that there was a statistically significant linear relationship. Benefits from mangrove restoration activities statistically significantly predicts the household wellbeing of the members of the Mikoko pamoja project. The coefficients for the regression model are given in Table 4.22.

Table 4.22: Regression for the Model between Benefits from Mangrove Restoration Activities and Wellbeing of Households in Mikoko Pamoja Project

	Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**
Model	**B**	**Std. Error**	**Beta**	***t***	***p***	***VIF***
(Constant)	1.174	.098		11.98	.001	
Ecosystem services	.901	.028	.874	32.46	.001	1.000

The severity of multicollinearity of the variables included in the regression model was quantified using the variance inflation factor (VIF). The VIF was 1.0 indicating the absence of multicollinearity. Ecosystem services arising from the benefits of mangrove restoration activities was found to have a positive statistically significant ($\beta = .874$, $p = .001$) influence on the wellbeing of households that are members of the Mikoko pamoja project in Gaza bay, Kwale County.

4.7 Access to Community Development Projects and Wellbeing of Members

The fourth objective of this study was to analyse how community development projects (schools, roads and hospitals) implemented from the project fund influence the wellbeing of the households within the Mikoko pamoja project in Gazi bay, Kwale County.

4.7.1 Access to Community Development Projects

The independent variable access to community development projects was operationalized as an index that combined development projects undertaken by the Mikoko pamoja project fund. The development projects included: schools, water points, roads, hospitals, and community centres.

The access to development projects was measured as the number of project facilities the member had access to using a dummy variable (or a 0, 1 variable). The scores were then summed up to form the index of access to facilities developed using project funds. The descriptive statistics and the frequency distribution of the index is presented in Table 4.23.

Table 4.23: Descriptive Statistics and Frequency Distribution for the Index of Mangrove Restoration Benefits

Access to Facilities	Frequency	Percent
1.00	40	12.2
2.00	75	22.9
3.00	99	30.3
4.00	75	22.9
5.00	38	11.6
Total	327	100.0

4.7.2 Influence of Access to Community Development Projects on the Wellbeing of Households in Mikoko Pamoja Project

The fourth research question for this study was stated as follows: How does access to community development projects influence the wellbeing of households found in Mikoko pamoja project?

The research question was answered by conducting a bivariate linear regression analysis to determine if statistical significant influences existed between the access to community development projects and the wellbeing of households within the Mikoko pamoja project in Gazi bay, Kwale. The dependent variable was the index of wellbeing

of households found within the Mikoko pamoja project, while the independent variable was access to community development projects in the Mikoko pamoja project, while the dependent variable was the wellbeing of households found within the Mikoko pamoja project. The results showing the proportion of the variance explained by the independent variable using R and adjusted R square for the model is shown in Table 4.24.

Table 4.24: Proportion of the Variance Explained Using R-square for the Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.842[a]	.709	.708	.73850

The model indicates an adjusted R^2 value of 0.708; this means that the independent variable access to community development projects explained approximately 71 % of the variation in dependent variable Household wellbeing. The R^2 value of 71 % is considered by Cohen (1988) to be of high. The statistical significance for the whole regression model was determined using the *F* test and the results are presented in Table 4.25.

Table 4.25: Regression for the Model between Access to Community Development Projects and Wellbeing of Households in Mikoko Pamoja Project

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	431.296	1	431.296	790.823	.001[b]
Residual	177.247	325	.545		
Total	**608.543**	**326**			

The results of the *F* test for the whole regression model was found to be significant statistically, $F(1, 325) = 790.82$, $p = .001$) indicating that there was a statistically significant linear relationship. Access to community development projects statistically

significantly predicts the household wellbeing of the members of the Mikoko pamoja project. The coefficients for the regression model are given in Table 4.26.

Table 4.26: Regression for the Model between Access to Community Development Projects and Wellbeing of Households in Mikoko Pamoja Project

	Unstandardized Coefficients		**Standardized Coefficients**			**Collinearity Statistics**
	B	**Std. Error**	**Beta**	***t***	***p.***	***VIF***
(Constant)	1.236	.110		11.18	.001	
Access to Development	.966	.034	.842	28.12	.001	1.000

The severity of multicollinearity of the variables included in the regression model was quantified using the variance inflation factor (VIF). The VIF was 1.0 indicating the absence of multicollinearity. Access to community development projects was found to have a positive statistically significant (β= .842, *p* =.001) influence on the wellbeing of households that are members of the Mikoko pamoja project in Gazi bay, Kwale County.

4.8 Ranking of Mikoko Pamoja Conservation Activities in Terms of their Effectiveness in Alleviating the Wellbeing of the Project Members

The fifth objective of this study was to rank all the Mikoko pamoja conservation activities in terms of their effectiveness in alleviating the wellbeing of the project members.

The analysis was done by the use of multiple linear regression, where the four independent variables used in this study formed the predictor variables, they included: sale of carbon credits, mangrove related income generating activities, benefits of mangrove restoration, and access to community development projects. The dependent

variable was the wellbeing of the project members. The results showing the proportion of the variance explained by the independent variable using R and adjusted R square for the model are shown in Table 4.27.

Table 4.27: Proportion of the Variance Explained Using R-square for the Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.935[a]	.874	.872	.48792

The model indicates an adjusted R^2 value of 0.872; this means that the independent variables collectively explained approximately 87 % of the variation in dependent variable Household wellbeing. The R^2 value of 87 % was considered by Cohen (1988) to be of high. The statistical significance for the whole regression model was determined using the *F* test and the results are presented in Table 4.28.

Table 4.28: Regression for the Model between Independent Variables and Wellbeing of Households in Mikoko Pamoja Project

Model	Sum of Squares	*df*	Mean Square	*F*	*p.*
Regression	531.887	4	132.972	558.558	.001
Residual	76.656	322	.238		
Total	**608.543**	**326**			

The results of the *F* test for the whole regression model was found to be significant statistically, $F(4, 322) = 558.55$, $p = .001$) indicating that there was a statistically significant linear relationship. The four independent variables were statistically significant predictors of household wellbeing of the members of the Mikoko pamoja project. The coefficients for the regression model are given in Table 4.29.

Table 4.29: Regression Model between the independent variables and Wellbeing of Households in Mikoko Pamoja Project Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
Model	**B**	**Std. Error**	**Beta**	**t**	***p***	***VIF***
(Constant)	1.017	.078		13.08	.001	
Carbon credits	.298	.042	.269	7.142	.001	1.614
Mangrove activities	.187	.026	.237	7.290	.001	1.708
Mangrove restoration	.315	.041	.305	7.758	.001	1.957
Access to development	.248	.042	.216	5.929	.001	1.408

The severity of multicollinearity of the variables included in the regression model was quantified using the variance inflation factor (VIF). The VIF were below 2.0 indicating that the values were within acceptable limits and the regression model was useful in making the predictions.

All the four independent variables had positive statistical significant ($p < 0.05$) influence on the wellbeing of the members of the Mikoko pamoja project. The variable benefits from mangrove restoration was found to have the highest statistical significant ($\beta = .305$, $p < 0.001$) influence on the wellbeing of households that are members of the Mikoko pamoja project in Gazi bay, Kwale County. This was followed closely by the sale of carbon credits ($\beta = .269$, $p < 0.001$), then mangrove related income generating activities ($\beta = .237$, $p < 0.001$) and finally access to community development ($\beta = .216$, $p < 0.001$).

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents a discussion of the research findings, summary of the main findings, conclusions, recommendations, and recommendations for further study. The first section of the chapter presents the discussions of the findings of the study. It is followed by the summary of the main findings, then conclusions of the study, which are organised by the objectives of the study. Recommendations of the study are then stated and recommendations for further study are made

5.2 Discussions

The findings of the study are discussed in this section. The findings are discussed relation to other related studies. The discussion is based on the five (5) study objectives.

5.2.1 Influence of the Sale of Carbon Credits on the Wellbeing of the Members

The income from the sale of carbon credits was found to statistically significantly influence the wellbeing of households participating in Mikoko pamoja project in Gazi bay, Kwale County. Income generated from sale of carbon credits has a positive impact on the socio-economic wellbeing of the households (Mwamba, Wanjiru, Huxham, Shilland, & Ruzowitsky, 2018). The Mikoko pamoja community project with 498 households and 5,400 members has dedicated a total of 117.4 ha to mangrove conservation and restoration, which is estimated to sequester 3,000 metric tons of $C0_2$– equivalent per year carbon per year, which are sold on voluntary carbon markets through Plan Vivo Certificates (PVC) (Equator Initiatives, 2020). Through these initiatives the project earns K.Shs 1,440,000 (US $ 12,000) per year, which is reinvested in community projects that benefit 5,400 members (Mwangi & Evans, 2018). The

communities benefit from this sale of carbon credits through provision of clean water, health care, and cash payments, aspects that are related to the wellbeing of the members (Equator Initiatives, 2020)..

The concept that is employed in the Mikoko Pamoja project is the Payment for Ecosystem Services (PES). The scheme involves paying the communities for protecting or conserving natural resources to provide for ecosystem services, among the common services provided include carbon sequestration, provision of clean water among others (Bremer, Brauman, Nelson, Prado, Wilburn, & OFiorini, 2018). The PES scheme have been found to have the potential to contribute to local livelihoods (financial, natural, social, human, and physical capital) and sustainable resource management (Bremer, Farley, Lopez-Carr, Romero, 2014). PES schemes have been found to also have positive effect on forest cover, through forest regeneration (Ruggiero, Metzger, Tambosi, Nichols, 2019). Osano, Said, de Leeuw, Ndiwa, Kaelo, Schomers, Birner, and Ogutu (2013) working in Maasai Mara ecosystem, concluded that PES schemes provided a source of income diversification for livestock herders, reduced poverty levels and buffered households from livestock income declines during severe droughts.

5.2.2 Influence of Mangrove Related Income Generating Activities on the Wellbeing of Households Participating in Mikoko Pamoja Project

Income generating activities that are related to mangrove growing such as bee keeping, ecotourism, were found to have positive statistical significant influence on the wellbeing of the households participating in the Mikoko pamoja project in Gaza bay, Kwale County. The more the households participated in these income generating activities the higher was their wellbeing.

Income generating activities conducted within the mangrove ecosystem are generally introduced to diversify the incomes of farmers and also because they are not affected directly by climate as the mangrove plants are. Maurice (2006) states that bee keeping and eco-tourism activities were first introduced in the projects not as a system of environmental control, but rather as an alternative means of diversifying farmer income. Unlike crops, planting and animal keeping bee keeping and eco-tourism does not necessarily become influenced or affected by weather change. In addition, there is a ready market for products locally, which reduces both the cost of transportation and marketing for such products. These activities are therefore ideal in terms of increasing income and allowing families to access better and higher quality social amenities. Skovdal *et al.* (2010) further notes that while many farmers began with just one hive, income and training has allowed them the opportunity to diverse to more than one hive. This is in addition to the growing eco-tourism base within the project, as other local farmers seek to see, identify and train on the new opportunities in both farming and income diversification

5.2.3 Influence of Ecosystem Services Obtained from Restoration of Mangrove Ecosystems on the Wellbeing of Households in Mikoko Pamoja Project

Ecosystem services arising from the restoration of the mangrove ecosystem tended to statistically and significantly influence the wellbeing of the households participating in the Mikoko pamoja project positively. The ecosystem services had positive influence on the wellbeing of the households. Mangrove ecosystems have been touted as extremely productive ecosystems, providing a number of benefits to people. They provide ideal environment for the growth and expansion of a large variety of fisheries and fish animals.

A study by McField and Kramer (2007)on the Mesoamerican reef, for example, showed that there are as many as 25 times more fish of some species on reefs close to mangrove areas than in areas where mangroves have been cut down. This makes mangrove forests vitally important to coral reef and commercial fisheries as well. Farmers engaged in mangrove and ecosystem restoration are likely to enjoy a wide range of fisheries products in addition to having a clean environment for production and sustenance of the product. Sale from these products increases income and allows the farmer to access a wide range of diverse markets, which are yet to be saturated. It is much easier therefore for such a farmer to create a large base income as well as access various socio-economic services, provide highly nutritious food to the family increasing the potential for health and development.

5.2.4 Influence of Access to Community Development Projects on the Wellbeing of Households Participating in Mikoko Pamoja Project

Influence of sale of carbon credits

. Income from sale of carbon credits was found to have a positive statistically significant (β =.858, p =.001) influence on the wellbeing of households which are members of the Mikoko pamoja project in Gaza bay, Kwale County. From the initial stages of the project design, the focus of the project was to improve the welfare and wellbeing of the people in Gaza. Staats *et al.* (2004) in his study found that there is less probability of individuals undertaking or taking up new behaviour and investing in the same if it is not directly linked to improved wellbeing. Mangroves in themselves have often been a source of income, through constant completing and the aspects of the Tragedy of commons, where each individual seeks to maximise profit from a common resource have decreased the effectiveness and economic value of the mangroves. The Mikoko Pamoja project in turn introduced a new aspect where individuals could earn and

continue earning through environmental protection, in specific changing behaviour and the relationship of the community members to the mangrove forests. Since the initial introduction of carbon credits, the focus has always been on the large scale sellers that is, companies, the government and institutions and not individual communities (Bosire *et al.* 2010, Kairo 2018). Mikoko Pamoja focuses on the earnings to the community which in turn ensures earnings to individuals. (Ostrom) states that for each individual to agree to participate and invest in the wellbeing of the community, they often calculate the costs and benefits not to the group as a whole but rather to themselves individually. Where such benefits outweigh the costs, participation and long term goals are possible. Carbon credits provide a possible long term source of renewed wellbeing at minimum costs.

Mangrove related income generation and wellbeing

The results of the *F* test for the whole regression model was found to be significant statistically, $F(1, 325) = 668.21$, $p = .001$) indicating that there was a statistically significant linear relationship. Income from mangrove related activities statistically significantly predicts the household wellbeing of the members of the Mikoko pamoja project. Besides their ecological value, mangroves often provide an avenue for alternative income generation. While the ecological aspect in itself has high earning points, to the community and individual participants the economic value of mangroves may hold a higher value. In the past, mangroves have been a source of timber ad fuel, from which individual households have earned an income. One cannot take out this source of income without introducing a new source that is directly linked to the mangroves if the project is sustainable. Sena (2015) and Thompson *et al.*(2017) state that for the Mikoko Pamoja project two sources have been directly linked that is eco-

tourism and beekeeping. Through the growth of the mangroves, the coastal town has developed a scenic view which attracts both local and international tourists. The calm area, which is not as crowded as the nearing large towns of Kwale, Kilifi, Malindi and Mombasa is quickly becoming a renowned attraction point for people visiting the coast. From here, tourists can not only enjoy the peaceful environment but also explore various unique vegetation species and even engage in activities such as bird watching.

In the Gaza region, beekeeping is an enterprise with social, economic and ecological benefits that only requires minimal time, labour and resources. It provides additional income to farmers through honey production and other bee by-products like pollen, wax, propolis, royal jelly and bee venom. With the mangroves, the population of bees has increased and production of the same products continues to attract new investors every year. Currently the demand for the bee products remains much higher than the production, however it is expected that with time supply will not only catch up but increase to allow exportation.

Mangrove restoration benefits and wellbeing

Benefits from mangrove restoration activities statistically significantly predicts the household wellbeing of the members of the Mikoko pamoja project. For decades the community has relied on ecological activities that are supported by mangroves, top among them being fishing. Over time however, overfishing and poor mangrove maintenance depleted the population of the fish. Fishermen had to go a longer distance for a smaller catch and sometimes still did not manage to catch any fish. The situation was so dire that majority of the fishermen began considering relocation to major towns for employment, a situation that led to the splitting of families. Following the restoration of mangroves, fishing in the area has begun to thrive again. Fishermen only

need to go a shorter distance, for fewer hours and return with bigger fish. This has not only had a direct impact on the income earned in the households but also the physical and emotional health of the household heads. Because they no longer have to contend with long hours and distances, they are able to rest and reduce the stress level thus causing healthier lifestyles. Families are able to stay together, creating strong social networks which play a crucial role in the wellbeing of the individuals.

Access to community development projects and wellbeing

What is unique about the Mikoko pamoja project is that it focuses on community participation. The coming together of all community members to bring about positive change. Community collective action brings together the interests of individual community members for a greater response and advantage (Sena 2015). As such, the benefits of the community project have mostly been spent as a community group rather than individual. Upon the sale of carbon credits, the community members come together, bring their ideas and agree on how to spend the income. The first portion of income was spent in improving the community primary school. The school had dilapidated buildings, often exposing young learners to the elements of weather. The school, being public relied mostly on government funds which were not forthcoming. The project has built new classrooms, allowing for easy and safe learning. Enrolment has increased, parents within the community spend little to nothing spending children to school. Education levels are therefore expected to rise. According to Mwangi and Evans (2018)the same holds true for the local clinic, which has been newly equipped and staffed in collaboration with other investors, mainly development agencies. Maternal deaths have decreased and care for the sick has improved. Traditional healers have received training allowing them to care for and make the best decisions for their

patients. The recent portion of income not only purchased books for the students but was also distributed to the community households. With these projects, the community has not only enjoyed the benefits of better and more accessible social services, but also pride in being part of the community success. Community members own the projects, which they have structured and invested in, with little to no help from the government.

5.2.5 Ranking of Mikoko Pamoja Conservation Activities in Alleviating the Wellbeing of the Members of the Mikoko Pamoja Project

The variable benefits from mangrove restoration was found to have the highest statistical significant (β = .305, *p* =.001) influence on the wellbeing of households that are members of the Mikoko pamoja project in Gazi bay, Kwale County. This was followed closely by the sale of carbon credits (β = .269, *p* =.001), then mangrove related income generating activities (β= .237, *p* =.001) and finally access to community development (β= .216, *p* =.001). According to Cousins *et al.* (2018), mangrove restoration has both direct and indirect benefits to the wellbeing of households. Not only does it provide new avenues for income and income diversification it also improves the environment in which the household's exists thus contributing on various ends to the wellbeing. It provides both economic and emotional wellbeing to the community. When the households have better access to fish and income, face better opportunities to diversify their income they in turn feel safe, have better social ties and networks and are much healthier emotionally. While for the project directors, the initial focus was mails poverty reduction as well as environmental protection, mangrove restoration has gone far beyond the initial goal. Mangrove restoration affects the initial environment as well as provides other unseen benefits. Gaza has become a competing tourist sport as tourists seek to enjoy the fruits of the community, long scenic routes, diverse vegetation and clear waters. Fishing has increased not only in terms of number

of fish harvested daily but also ease of access, diversity of species, and health of the fish and the size of the fish. As more benefits are accrued, the community has developed stronger social ties that are directed towards protecting and increasing these unique benefits.

The second ranking activity is carbon credits. It is to be remembered that carbon credit sale is the original foundation for the project. The carbon credits are sold through the NGO that brokers the sale. The money earned is determined in terms of spending by the community allowing for development project investments as per the needs of the community. Roads, schools and clinics have been supported by the project. Mangroves provide the best and highest possibility of harvesting carbon dioxide. They have a great impact on climatic change and depletion of greenhouse gases. Based on this, the higher the mangrove restoration, the higher the income to be earned by the community (Herr *et al.* 2019).Beyond-carbon impacts of creating just employment or saving habitat for an endangered species are actually the main motivators of the project, and the verified emissions reductions that result are themselves a "co"-benefit – and a means of leveraging carbon finance to implement project activities.

Mangrove activities such as bee keeping as quickly gaining popularity y among members of the community. They provide a unique and low competition opportunity for income earning. Although such initiative require individual investments and training, they are in themselves an opportunity to go beyond what has been the norm. Mainly such activities are encourages to reduce reliance on the mangrove trees and forests (Emily *et al.* 2015, Cousins *et al.* 2017). With diversification, households are able to enjoy a stable livelihood that is not easily affected. Individuals may enjoy the

peace that comes from engaging in alternative sources of income which would not be possible or sustainable without the mangroves. Finally, the mangrove project has increased access to various community development projects. The main projects have focused on social services that is, healthcare and education which have become easily accessible and of better quality. In an area where even the basic education was difficult to come by, enrolment in primary schools has increased. Children no longer have to brave harsh elements in class, parents no longer have to buy books as they are available and the need for child labour has sufficiently decreased to allow for stable school attendance. According to Okafor- Yarwood *et al.* (2020) while the community relied on the major hospital in Kwale level 5 for healthcare and treatment, where transport and time required for such aces required heavy investment, today there is a well equipped health centre for the same. Traditional healers have also been properly trained especially in matters of child birth reducing maternal deaths significantly.

5.3 Conclusions

From the findings of the study the following conclusions were made:

(i) Sale of carbon credits has a statistically significant influence on the wellbeing of households found within the Mikoko pamoja project in Gazi bay, Kwale County.

(ii) Income from mangrove related activities was found to statistically influence the wellbeing of the members of Mikoko pamoja project significantly.

(iii) Ecosystem services arising from the restoration of the mangrove ecosystems statistically influenced the wellbeing of the members of Mikoko pamoja project significantly.

(iv) Access to community developments by the members of the Mikoko pamoja project statistically significantly influenced the wellbeing of the households positively

(v) In assessing the influence of independent variables on the wellbeing of the households, the following ranking was realised: ecosystem services from mangrove restoration was found to have the highest statistical significant influence on the wellbeing of households that are members of the Mikoko pamoja project in Gazi bay, Kwale County. This was followed closely by the sale of carbon credits, then mangrove related income generating activities and finally access to community development.

5.4 Recommendations

The project

The efforts on restoration of the mangrove ecosystems and involvement of the communities should be enhanced by the Mikoko Pamoja project through members training and providing the raw materials needed in the exercise. This will improve on the generation of ecosystem services from the project and increase incomes and wellbeing of the community.

Income from sale of carbon rights can be used as a marketing tool to attract participation of more households in the project. In addition, income needs to be directed towards direct benefits for participating members to allow for stronger participation and sustainability of the project in the future.

Mangrove activities: are yet to bring about maximum profit. Participation in the same has been limited. This is mainly because community members lack the ability and knowledge to maximize the benefits of mangrove activities. Further training and creation of a knowledge base on the same is needed.

5.5 Recommendations for Further Study

- The contribution of collective action in enhancing the sustainability of mangrove protection projects
- Factors enhancing ownership of the mangrove community projects
- Factors enhancing intergroup and community participation in mangrove restoration projects

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APPENDICES

Appendix A: Research Instrument (Questionnaire)

Identification:

Dear respondent(s),

I am a researcher from the Department of Environment and Natural Resources Management at the Africa Nazarene University – Nairobi, Kenya. I am carrying out a research entitled: 'An evaluation of the impacts of Mikoko Pamoja Conservation Project on the Wellbeing of local communities in Gazi Bay, Kwale County.

Please respond to the subsequent items, as your views are considered important to this study, based on your competence and honesty. To ensure anonymity, we will not write your name anywhere on the instrument. Please note that any information given will be treated with utmost confidentiality and will only be used for the purposes of this study.

Thank you for your cooperation.
Kind Regards

Ruth Moraa Nyamasege
M.Sc. in Environment and Natural Resources Management
Africa Nazarene University.

Section 1: Socioeconomic

1.1 Gender _____

1.2 Ethnic community _____

1.3 Year born _____

1.4 Marital status _____

1.5 Number of children: _____ male _____ female_____

1.6 Number of children living away from the home _____

1.7 State if any of the children remit income to the home _____

1.8 Highest academic qualification Academic _____

1.9 Occupation (man) _____ income _____

1.10 Occupation (wife) _____ income _____

Section 2: Benefits from Mikoko Pamoja project

2.1 Are you directly employed by Mikoko Pamoja Project? Yes [ ] No [ ]

If yes, what's your role?_____

_____

2.2 Do you feel the opportunities for economic and social mobility (material resources) have increased? Decreased? because of the project? Yes [ ] No [ ]

Why and for whom? _____

_____

_____

2.3 What are the consequences of this changes? _____

_____

2.4 Who or which group(s):

Have benefited the most? _____

_____

Which have not? _____

_____

Who have been negatively affected and why? _____

_____

2.5 What needs to change in the project for the poor to have greater economic opportunities?

_____

_____

Is this likely? Yes [ ] No [ ]

Section 3: Income from the sale of carbon credits

3.1 Do you receive any money from the sale of carbon credits? Yes [ ] No [ ]

If yes, how much income have you received in the past one year? _____

3.2 How satisfied are you with the income you receive from the sale of carbon credits?

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

Section 4: Income from indirect economic activities

4.1 Which of the following indirect economic activities have you received income from?

Bee-keeping_____ Eco-tourism_____

4.2 How do you receive income from these activities

Directly_____

Indirectly_____

4.3 How much income have you received in the past one year _____

4.4 How satisfied are you with the income you receive from the sale of carbon credits?

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

Section 5: Benefits from the restoration of degraded and denuded mangrove ecosystems

5.1 Do you have access to the following ecosystem services? Please tick the level of satisfaction for each

Clean air Yes [ ] No [ ]

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

Clean drinking water Yes [ ] No [ ]

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

High fish stocks Yes [ ] No [ ]

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

Access to a beautiful and serene environment Yes [ ] No [ ]

1 [ ] Not satisfied 2 [ ] Moderately satisfied 3 [ ] Satisfied 4 [ ] Very satisfied

Section 6: Access to development projects

6.1 Which of the following development projects do you have access to?

Roads_____ Schools_____

Hospitals_____

6.2 Do you think investment in these projects are aligned with the priories of your community?

Yes [ ] No [ ]

If no, why? _____

_____

6.3 Do you feel involved in the decision making process on the priority projects to be invested in? Yes [ ] No [ ]

Section 7: Social relations

7.1 Do you feel the project has promoted social cohesion within your family and in your community? Yes [ ] No [ ]

Why?

_____

_____

7.2 Do you feel included in active participation and decision making in the project?

Yes [ ] No [ ]

If no, why? _____

_____

7.3 Do you feel left out of society, or looked down upon or excluded from active participation in your community activities towards the project? Yes [ ] No [ ]

7.4 Is there more or less social unity and sense of belonging than before the project?

Yes [ ] No [ ]

7.5 Are there differences in power between those included in the project and those excluded? Yes [ ] No [ ]

Section 8: Security

8.1 Are there more or less crime and conflict than before the project, or has it stayed the same? _____

8.2 Are there conflicts between groups in the community? Which groups? Why?

_____

_____

8.3 Have intergroup conflicts increased or decreased because of the project? Why?

_____

_____

8.4 What triggers conflicts? _____

_____

8.5 How can the situation be changed? _____

_____

Section 6: Wellbeing of the people

Has the Mikoko Pamoja project assisted you to achieve the following? If it has rate the assistance on a scale of 0 not assisted /contributed to 10 highly assisted / contributed.

Statement	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Has the resettlement programme assisted you in the following	**Not assisted / contributed**										**Highly Assisted / Contributed**
1.Improved your standard of living (Material Provision)											
Food,											
Shelter,											
Clothing											
Capital											
Provision of Assets											
Work (paid labour, employment)											
2.Assisted in your health (Good Health)											
Access to health services											
Feeling strong and well											
Cost of health services											
3.Made you to feel more safer (Safety)											

Peace of mind											
Absence of constant fear											
Secure environment											
4.Improved your Social Relations											
Connection with the other community members											
Good relations with family											
Involvement in civic activities											
5.Assisted in your Spiritual Fulfilment											
Belief in God											
Attendance to Worship areas (Church, Mosque, Shrines)											
6.Freedom of choice and Action											
Ability to Control Political situations											
Ability to Control Physical situations (Material situations)											
Ability to Acquire Services											
Ability to Acquire Resources											
Ability to Acquire Skills,											
Ability to Acquire Knowledge,											
Ability to Acquire Loans											
Ability to Acquire Information											
7. Access to a clean environment											
Access to clean drinking water											

Distance to nearest fresh water source											
Access to clean air											
Access to serene and beautiful spaces											
8. Access to education											
Access to schools											
New schools established											
Number of new jobs as a result of education											

Table 4.6: Descriptive Statistics for the Level Wellbeing of the Women in Isinya

Indicator Items	Rating by the Resettled communities					
	Mean	**Median**	**Mode**	**Std dev**	**Range**	**Alpha**
Standard of living	**4.12**	**4.33**	**1.00**	**2.31**	**9.00**	**.844**
Food provision	4.73	5.00	1.00	3.00	9.00	
Shelter	4.64	5.00	1.00	3.16	9.00	
Clothing	4.26	4.00	1.00	2.84	9.00	
Capital	3.40	3.00	1.00	2.49	9.00	
Assets	3.86	4.00	1.00	2.74	9.00	
Work	3.85	3.00	1.00	2.79	9.00	
Good health	**5.13**	**5.00**	**1.00**	**3.08**	**9.00**	**.742**
Health services access	5.11	5.00	1.00	3.23	9.00	
Cost of health	4.87	4.00	1.00	3.29	9.00	
Feeling strong and well	5.41	5.00	1.00	3.24	9.00	
Safety	**6.46**	**7.33**	**10.0**	**3.07**	**9.00**	**.777**
Peace of mind	5.97	7.00	1.00	3.41	9.00	
Constant Fear	6.22	8.00	1.00	3.46	9.00	
Secure environment	7.20	8.00	10.00	3.18	9.00	
Social Relations	**6.50**	**6.66**	**6.00**	**1.33**	**10.0**	**.822**
With Community	6.51	7.00	9.00	2.04	7.00	
With Family	6.78	7.00	7.00	1.89	7.00	
Good Community	6.42	7.00	5.00	1.99	6.00	
Spiritual fulfilment	**7.38**	**10.0**	**10.00**	**3.585**	**9.00**	**.944**
Belief in God	7.37	10.0	10.0	3.59	9.00	
Worship area attendance	7.39	10.0	10.0	3.58	9.00	
Environment	**4.22**	**4.25**	**1.00**	**2.08**	**9.00**	**.992**
Politics control	3.97	3.00	1.00	3.24	9.00	
Acquire physical material	4.39	3.00	1.00	3.38	9.00	
Acquire services	4.82	4.00	1.00	3.24	9.00	
Access to resources	4.30	4.00	1.00	2.85	9.00	
Ability to acquire skills	4.24	4.00	1.00	2.78	9.00	
Acquire knowledge	4.81	5.00	1.00	2.96	9.00	
Ability to acquire loans	2.52	1.00	1.00	2.27	9.00	
Acquire information	4.75	5.00	1.00	2.98	9.00	
Emotions and Affiliations	**5.93**	**5.80**	**5.20**	**1.50**	**6.20**	**.961**
Respect	6.89	7.00	9.00	1.88	6.00	
Part of community	6.94	7.00	9.00	1.88	6.00	
Social obligations	6.73	7.00	9.00	1.93	6.00	
Listened to	7.03	7.00	9.00	1.74	6.00	
Help others	7.17	7.50	9.00	1.74	6.00	
Wellbeing Index	**4.12**	**4.28**	**4.21**	**1.36**	**6.00**	

n=327. 1=Very low and 10= Very High.

Appendix C: ANU Letter

AFRICA NAZARENE
UNIVERSITY

19th June, 2018

RE: TO WHOM IT MAY CONCERN

Ruth Morua Nyamasege 16J03EMEV005 is a bonafide student at Africa Nazarene University. He/She has finished his/her course work and has defended his/her thesis proposal ***entitled "An evaluation of the influence of conservation intervention on the wellbeing of local communities in Mikoko Pamoja project, Gazi bay, Kwale county.***

Any assistance accorded to him/her to facilitate data collection and finish his/her thesis is highly welcomed.

Prof. Rodney Reed
Deputy Vice Chancellor, Academic Affairs

P.O Box 53067 - 00200 Nairobi, Kenya • Tel: 020 292 717061 - 5 • Fax: 020 201 3235 • Cell: 0747 874 - 11 • Email: [illegible]

Appendix D: NACOSTI Permit

THIS IS TO CERTIFY THAT:
MS. RUTH MORAA NYAMASEGE
of AFRICA NAZARENE UNIVERSITY, 41607-100 NAIROBI,has been permitted to conduct research in *Kwale County*

on the topic: *AN EVALUATION OF THE INFLUENCE OF CONSERVATION INTERVENTIONS OF MIKOKO PAMOJA PROJECT ON THE WELLBEING OF LOCAL COMMUNITIES OF GAZI BAY, KWALE COUNTY*

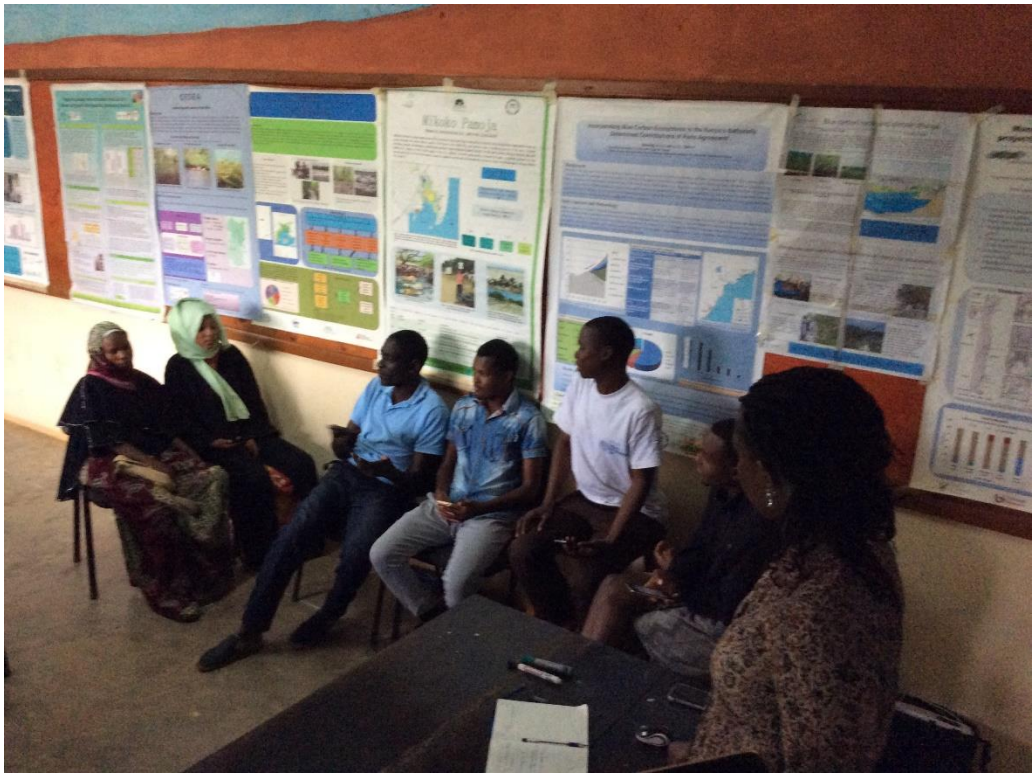
for the period ending:
23rd August,2019

Permit No : NACOSTI/P/18/50152/24693
Date Of Issue : 2nd September,2020
Fee Recieved :Ksh 1000

.....
Applicant's Signature

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

Appendix E: Photos from the Study Area



Training the enumerators

Enumerators

Dispensary funded by funds from sale of carbon credits

A community projects supported by the Mikoko Pamoja

A project within the study area constructed with carbon credits funding

A well-managed mangrove ecosystem

Mangrove ecosystem

Mangrove plant

Fishing boats next to a mangrove forest

Mangrove plant showing the root system

Planting mangrove trees by the project members on a degraded beach

Land prepared ready for planting

Members preparing the land ready for planting mangrove

Young mangrove seedling

Transporting seedling for planting

Planted mangrove beds

Planting

A degraded site during rehabilitation