

**INFLUENCE OF CO-MANAGEMENT ON THE SUSTAINABLE MANAGEMENT  
OF MARINE RESOURCES IN SHIMONI AND WASINI AREAS OF THE KWALE  
COUNTY, KENYA**

**BY**

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## DECLARATION

I declare that the work presented in this research was written by me and that it has never been presented to any institution for any academic award. Where other people's materials have been used, due acknowledgement and appreciation has been extended. No part of this research project should be reproduced without my consent or that of the University of Nairobi

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## **DEDICATION**

I wish to dedicate this work to my parents Mr. & Mrs. Ogada for guiding and urging me forward; my fiancé Mr. Murras for being my rock throughout this process. Not forgetting my beloved sibling Brenda and Eunice my biggest supporters and cheer leaders. It is my prayers that God rewards you abundantly.

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## ABBREVIATION AND ACRONYM

BMU	Beach Management Unit
CCA	Community Conserved Area
CFA	Community Forest Association
CPR	Common Property Resource
CMC	Conflict Management Committee
CMT	Customary Marine Tenure
EMCA	Environmental Coordination and Management Act
ICFM	Integrated Coastal Fisheries Management
IGA	Income Generating Activities
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
ICZM	Integrated Coastal Zone Management
KWS	Kenya wildlife Service
MPA	Marine Protected Area
MRM	Marine Resource Management
NRM	Natural Resource Management
SK	Scientific Knowledge
SKS	Scientific Knowledge Systems
TEK	Traditional Ecological Knowledge

## **ABSTRACT**

The research study investigated the influence of co-management of marine resources for sustainable development. Co-management is said to be the ideal management tool for sustainable management of marine resources and ensuring that stakeholders are involved in decision-making and management of their resources. The study was undertaken to generate knowledge on the influence of co-management on sustainable management of marine resources. As a result the study area picked had to have some background in co-management. The study was conducted through survey research design using questionnaires semi-structured interviews and focus group discussion used on the sample size of 145 that was picked. The collected data was coded and fed into SPSS 19 for analysis which was represented in terms of simple percentages and frequencies and cross-tabs. In addition chi-square was used to test the hypotheses. The results of the study focused on three variables in co management, institutional design, community participation and socio ecological dynamics. The results showed that 95% of the respondents perceive that the institutional design for co-management as adequate. Community participation is a key ingredient of co-management which was proven right with 82.5% in agreement that communities' role in co-management were clearly defined and they were also involved in the decision making process. Lastly 92.5% of the respondent said that IK is valuable and was not only applied in co-management but it was also effective in its application. In conclusion the study shows that co-management has a lot of positive influences in conservation as well as the well being of community members. Therefore the researcher concluded that co-management is an adequate planning and management tool for sustainable management of marine resources. It was recommended that an improved intergovernmental and interagency partnerships are needed to address cross-cutting and emerging issues in co-management.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background of the Study

Worldwide, there are efforts to implement environmental standards and to regulate activities in coastal and marine areas for the management of development activities, and control of pollution and conservation of marine resources (UNIDO, 2000). At the international level conventions, protocols, and agreements have been providing the basis for cooperation among countries at bilateral, regional and global levels to achieve this objective. Increasingly, within countries, national environmental legislations have been providing practical frameworks towards achievement of the best management approach.

An over-centralized management model, where the artisanal fisherman neither participates nor is represented, brings about an incompatibility between the sustainability objective pursued by States and maximizing fishermen's economic objectives favoured by market forces. The experience to date shows how the involvement of fishermen in the co-management of fishery resources and the green economy can be a means to achieve sustainable development in its three dimensions (social, economic and environmental), together with the eradication of poverty (Gunderson et al 2002).

Except in the immediate past, generally in the African region, environmental values and natural resources factors have not always been integrated into national development plans. Development decisions and social trends appear not to have optimized the value of natural resources. (Akpabli, 2000) Many of the problems and issues facing fisheries can be resolved through developing co-management institutions on a larger scale. In this view, fishery resources are generally too large to be entirely within the control of a few communities. In these cases, it is imperative to provide for representation of fishery groups at different levels. (Such as reconciling local and global agendas, often international agreements on fisheries and local environmental management contradict each other.

The co-management approach has therefore focused on the development of institutional and legal mechanisms to improve fisheries governance through the formation of BMUs to ensure that these stakeholders, particularly the marginalized poor, are able to engage in, and influence decision-making processes relating to fisheries management. Thus the avenue needed by the government to meet its double obligation of attending to international agreements while sharing decision-making power for fisheries management with

communities. Moreover to maintain scientific validity and achieve wide acceptance we have to identify a management knowledge base acceptable to stakeholders (Berkes. F, 2009).

Co-management systems need to reconcile both formal scientific knowledge and indigenous knowledge. One approach may be to identify science-based indicators of the status of the resource system that also reflect the resource users' observations (Huntington. H, 2004). Management arrangements may require access rights to be limited to some resource users and to exclude others, often resulting in conflicts. This can be managed through participatory approaches which are crucial for successful co-management. In addition, existing institutions need to be reformed to empower local communities to participate in determining management objectives (*Ahmed et al 2004*).

In the early 1990s sustainable fisheries management, development, conservation and utilization mandates in Kenya had been structured solely under government departments. A combination of environmental threats and growing evidence of the resulting negative impacts convinced national authorities that it was time to adopt a new management approach involving communities as partners in management.

As a result there was a paradigm (policy) shift from government centered approach to stakeholders (co-management) based approach since 2004. The new dimension was taken to ensure that fisherfolks and other resource users are involved in fisheries management and decision-making process. In addition, there is consensus emerging on the need to manage Kenya's coastal and marine resources through an integrated, rather than a sectoral approach. Integrated Coastal Zone Management (ICZM) brings all those involved in the development, management and use of the coastal zone within a framework that facilitates the integration of their interests and responsibilities (McClanahan T. R. et al 2005).

In case of any fisheries depletion, the major stakeholders (fishers, traders, and consumers) will be the biggest losers in their socio-economic status while the government will lose in revenue and foreign exchange earnings.

In this new approach, the good news can be that, management problems can be solved individually and co-operatively by resource users, thus ensuring that resources are managed sustainably for realization of their full potential contribution to global food security and well-

being of all mankind. Despite these new policy changes, capacity, strategies, and tools of management have not substantially changed. However, stakeholder management groups, such as Beach Management Units (BMUs), in Kenya have strongly taken up the management of fisheries at beach levels.

Adoption of an ecosystem and participatory approach that establishes community conserved areas in the spirit of co-management is a great strategy. These conservation areas managed by Beach Management Units (BMUs) established under the Fisheries bill, 2012 and Community Forest Associations (CFAs) established through the Forest Act, 2005 empower the local communities to become custodians of their marine resources. The long term vision of the study is to have an empowered community that can sustainably manage marine and coastal resources in their locality.

The Kenyan government in collaboration with stakeholders is currently involved in an exercise of carrying out an overall study of the fisheries legislations, institutional framework and policy guidelines in order to address to the new shift of fisheries management. This participation is legally supported by various legislatures, most conspicuous being the Environmental Coordination and Management Act (EMCA) 1999, the Forest Act, 2005 ICZM and the Fisheries bill 2012, Legal notice 402

## **1.2 Statement of Problem**

The marine resource management in Shimoni and Wasini areas has been on the decline for quite sometime. However, since the introduction of BMUs to spearhead management of these resources, there has been some noticeable improvement. Conventional fisheries management approach was widely seen as part of the problem rather than the solution to marine resource utilization. (McClanahan. et al 2008). Co-management addresses more dynamic partnership using capacities and interest of local fishers and communities, complemented by the state's abilities to provide enabling legislation, enforcement and other assistance. Hence the shift from centralized, top-down forms of management (Obura. D et al 2002)

The crisis in fisheries and coastal community pressured the national governments to look for alternative management strategies, as a result the adoption of the conception of co-management as a way to deal with the crisis hence minimize social conflict and maintain social cohesion in addition to compliance with rules and regulations. Co-management has

major influence in creating ownership and allowing fishers take responsibility for number of managerial functions, as a result the communities are able to develop flexible and creative management strategies that meet fishers' needs and local condition.

The research study's focus is on what influence co-management of marine resources has had on the community, this includes the perception of both the co-management parties.

### **1.3 Purpose of the Study**

This research study investigated the influence of co-management of marine resources for sustainable development in Kwale County with Shimoni and Wasini areas as the case study.

### **1.4 Objectives of the Study**

The objectives of this study were:

1. To examine the influence of institutional design in co-management for sustainable management marine resources in Shimoni and Wasini.
2. To determine the extent and influence of community participation due to the adoption of the co-management for the sustainable management of marine resources
3. To assess the influence of integrating indigenous knowledge in co-management of marine resource management.

### **1.5 Research Questions**

The study was guided by the following research questions

1. How has the institutional design enhanced the transfer of power for co-management of marine resource?
2. How has co-management enhanced participation of resource users and stakeholders in marine resources management?
3. How has integration of indigenous knowledge through co-management enhanced marine resource management?

## 1.6 Research Hypothesis

The research study was tested through the following hypotheses

1. **H<sub>0</sub>**: There is no relationship between transfer of power and co-management of marine resources management  
**H<sub>a</sub>**. There is a relationship between the transfer of power and co-management in the sustainable management of marine resources
2. **H<sub>0</sub>** There is no relationship between co-management and community participation in the sustainable management of marine resources.  
**H<sub>a</sub>**. There is a relationship between community participation and co-management in the sustainable management of marine resources
3. **H<sub>0</sub>**. There is no relationship between co-management and integration of indigenous knowledge in enhancing the management of marine resources  
**H<sub>a</sub>** There is a relationship between co-management and integration of indigenous knowledge and for enhancing sustainability in the management of marine resources

## 1.7 Justification of the Study

Fisheries management institutions in Kenya accept that the traditional centralized, control-and-command approach to fisheries management has failed to safeguard fish resources and the livelihoods of millions of people dependent upon these resources. Bringing out the factors of success for co-management in the study area will promote its wide use and strengthen the Beach Management Units (BMUs) that have been legally established and already, providing opportunities for poor, marginalized groups such as fishing crew and women to engage in decision making processes that affect their means of livelihoods.

The first significant pilot of fisheries co-management was established in 2005 by the community of Kuruwitu in the north coast with areas declared no-take zones. The protection and enforcement of the no-take zone has been successful in protecting marine resources. 2005, (Lee, 2011). Lessons from Kuruwitu and other freshwater and marine areas contributed to designing co-managed Community Conservation Areas (CCAs). The influence of this approach has not been fully embraced since the initiative is still relatively new. This study looks into generating information and exploiting this concept and evaluating its influence to the primary resource users.

### **1.8 Significance of the Study**

Co-management is expected to enhance sustainable use of marine resources and ensure that fishers and other fish stakeholders are involved in fisheries management and decision-making and their diverse capacities harnessed in implementation process in fisheries. It can be used to minimize resource use conflicts, prevent destruction of ecosystems and over-exploitation of resources. Being a newer initiative there is little information on the knowledge base on co-management. As a result the research study will help provide additional information that will help in bridging this gap.

### **1.9 Basic Assumptions of the Study**

1. Poverty may cause people to value short term gains as opposed to long term benefit, hence jeopardize the co-management initiative, which calls for some measures of conservation.
2. Resources users may not appreciate the link between their fishing activities and the condition of the resource or ecosystem.
3. People living in these areas already heavily dependent on fishing and may find it difficult to engage in other livelihood activities.
4. Where people have limited livelihood options, except for fishing, they are more likely to have an incentive to cooperate and solve problem.
5. Determining the influence of co-management for marine resources may be fruitful.

### **1.10 Delimitations of the Study**

The study focused on the influence of co-management in sustainable resource management. This was guided by supporting parameters of co-management such as the resource use conflict management mechanisms, the institutional design in-place that enhances community participation as well as the socio-economic dynamics due to integration of IK in marine resource management. The study will consider the mentioned parameters only in Shimoni and Wasini areas.



### **1.11 Limitation of the Study**

The subject of co-management of marine and fisheries resources was relatively new therefore very few community members could be aware of the subject which may hinder the quality of the response. However during the study it was realized that as much as community members were not conversant with co-management they knew about the BMU institution which is quite popular. There is also very little documented literature on the study area. The research report will provide additional information about the study area. Similarly, people trapped in poverty may find little intensive to participate in the study. During the research study the research assistants ensured that the instruments were distributed and collected on Friday afternoon when community members are relaxing. Fatigue among respondents may limit the number of individuals willing to participate as a large number of unrelated studies have been carried out in the area. This was addressed by ensuring that the questionnaires and focus group discussions were concise and interesting, in addition Swahili was used in data collection making the exercise relatable.

### **1.12 Definition of Significant Terms**

**Co-management:** An arrangement where resource users and the government share responsibility in the management of resources.

**Community participation:** A process involving communities in understanding of the processes and mechanisms of resource management involving both information relay and feedback.

**Sustainable development:** development that meets present needs without compromising the ability of future generations to meet their own needs from the marine resources

**Conflict management** is the process of limiting the negative aspects of conflict owing to marine resource use while increasing the positive aspects of conflict.

**Institutional Design:** specific institutional characteristics that are thought to increase the likelihood of sustained collective action in the marine resources by creating conditions that encourage users to cooperate with common property institutions.

**Indigenous Knowledge** are defined as a cumulative system of knowledge, practice, and belief, which are and have been employed in marine resource management.

### **1.13 Organization of the Study**

This project report is divided into five chapters. Chapter one presents the introduction to the study, the study problem and its objectives; followed by the research questions and hypotheses. It closes with information on the rationale for its undertaking, scope, limitations and definition of significant terms. Chapter two presents the literature review, culminating in identification of the research gap on co-management and formulation of the conceptual study framework. Chapter three gives the methodology applied in the study, including research design, data collection methods and procedures, validity and reliability of the research instruments. It concludes with the operational definition of variables. In chapter four the data generated in the study is analyzed, presented and interpreted. Chapter five closes the project report with information on the summary of the findings, discussions, conclusions and recommendations. Areas for further study are then proposed as the closure to the project report.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

In this chapter a review of literature on co-management was spelt out. The researcher also provided background information on marine resources as open access resources. This was followed by an overview on co-management and related policies, including information on the institutional design for sustainable fisheries, community participation, and the influence of integrating indigenous knowledge in co-management of marine resources by coastal communities. The final section shows the literature gaps identified and was concluded with a conceptual framework that shows the different variables, indicators and their relationships.

### **2.2 Marine Resources as open access resources**

The concept of open access, much maligned in recent social science literature on common property resources as contributing to the 'tragedy of the commons' is the main principle of access to coastal and marine resources as has been experienced in most of Java and throughout Indonesia (Bailey and Zerner 1992). Commons thinking has been evolving to deal with the complexities of resource problems, turning to the examination of scale, self-organization and resilience (Gunderson and Holling 2002). Commons theory can provide insights into the solution of regional and global commons problems by looking beyond the community-based resource management paradigm, toward commons governance in complex systems (Dietz et al. 2003, Berkes et al. 2003). Theoretically, there are four management solutions for common property resources: open-access, private property, state property, and communal property (ICLARM & IFM, 1998). These four management scenarios are ideal-types in reality; the management of a Common Property Resource CPR combines these different types of control (Pomeroy & Berkes, 1997). As an outcome co-management was recently highlighted by fisheries scholars as the ideal management strategy, as it combines aspects of state and community control (e.g. Pomeroy & Berkes, 1997; ICLARM & IFM, 1998). Co-management involves a partnership between the government and a community of resource-users in which the community develops a system of access rights and rules, while the state provides the legal and political authority needed to enforce this system. Co-management offers the opportunity to leverage the unique capabilities of both the state and the resource community.

### **2.2.1 Overview of Co-management for Sustainable MRM and Related Policies**

The term ‘co-management is recognized as a “broad concept spanning a variety of ways by which the agency in-charge and other stakeholders develop and implement a management partnership” (Borrini-Feyerabend, 1999).

Co-management strategy is an effective approach in curbing illegal fishing and management of conflicts which is best handled in a bottom-up approach with least input from government. In addition active involvement of natural resource users such as the members of beach management units (BMU) in formulation of policies regulations and by-laws ensures high degree of compliance to fisheries laws and regulations in beaches. Depending on the local conditions of policies devolution and governance structures, co-management has proven to be a successful approach that can lead ultimately to increased benefits for those dependent on fishery. (Arnason R. 2001)

Evidence that co-management arrangements can help to sustain marine resources and improve fishers’ livelihoods is accumulating. Successful co-management has institutional, socio-economic, and contextual attributes that need to be considered by managers and policy-makers. Local institutions that are well-organized and functioning are a critical ingredient of making co-management work (Crona 2006). This is manifested by the level of compliance which has been a continual challenge for many fisheries management and marine conservation initiatives. Institutional design principles are thought to create conditions conducive to cooperation in common property scenarios (Ostrom E. 1990), and it was realized that high levels of reported compliance are positively related to graduated sanctions designed by co-management partners.

In the fisheries sector, most of the world fish catch comes from the coastal waters mainly because here the resources are closest to where a majority of fishermen and consumers live (Berkes, 2007) However, the multiple uses already referred to make the application of fishery management measures in isolation of doubtful efficacy; the appropriate context could properly be referred to as Integrated Coastal Fishery Management (ICFM). ICFM is seen as an opportunity to secure the necessary support to establish a framework for the integration of the fisheries sector’s concerns into coastal area planning. This implies that other human activities are evaluated as suitable or otherwise depending on their impact on fisheries.

There is no single management panacea for the problems facing the world's fisheries, but co-management arrangements that reflect local conditions can help to sustain fisheries and the people that depend on them, even where poverty is pervasive and national governance weak. The likelihood of co-management becoming successful is, however, higher when specific institutional, socio-economic, and contextual conditions are in place. Communities, donors, and managers can facilitate desirable co-management outcomes by implementing locally-appropriate strategies to address these critical conditions (Berkes et al., 2007)

In a study published in *Global Environmental Change* by (J.E. Cinner, 2012) where they studied the transition to co-management in Kenya, Madagascar and Tanzania. Showed the move toward co-management was largely driven by donor ideology and subsequent support. The communities involved went from relying on metaphysical explanations of environmental change to the acknowledgement that human actions influence the natural environment. This was for example the case in the octopus harvesting systems of southwestern Madagascar. Initially the discourse about octopus fishing was dominated by metaphysical explanations about yields. After experimentation with co-management based on rotational closure, people realized their actions can influence octopus abundance and catch rates. In addition, it contributed to the reduction of user conflict which was done by assignation of a value to a particular area of the coastal zone which would require a restriction on access, and necessitate zonation, which ensure that a proportion of the coastal ecosystem is protected from resource exploitation (Agardy, 1994).

### **2.2.2 Institutional design in co-management**

In many parts of the world, inshore marine resources are being increasingly managed through collaborative arrangements between communities, governments, civil society and other groups. However, co-management of fisheries resources has had a mixture of successes and failures. Theorists and applied researchers have suggested a series of preconditions or factors thought to improve the chances of successful common-pool resource management. These include common property institutional design principles and their contextual conditions. The analysis demonstrates the large theoretical and empirical gaps in the evaluation of these management systems and begs for a more scientific, and critical approach (Wamukota et al 2011).

Co-management has become a popular resource management tool whereby communities manage resources in partnership with government agencies, civil society and other groups

(McClanahan et al 2007). There is some evidence for success when a number of co-management attributes are present, notably strong leadership, catch quotas, social cohesion and protected areas. The movement toward co-management is partly a response to the perceived failures of many top-down governance institutions in the midst of growing competition for resources, resource scarcity, and efforts to reduce the rate of resource decline (Berkes et al 2008).

Marine waters are an open access resources vested in the government, so ownership is not permitted. MPAs have traditionally been found and managed by the government of Kenya with minimal stakeholder engagement. The enactment of the Fisheries (BMU) Regulations of 2007, however, saw co-management gain prominence. BMUs allow resource users such as fishermen to manage their landing sites and in so doing conserve resources. Prior the formation of BMUs, major concerns of the fishing industry included; use of illegal and/or destructive fishing gears, over fishing, environmental degradation and cross border fishing conflicts. The perception of the communities was that the fisheries belonged to the government. This therefore led to the exploitation of the resource unsustainably. Involvement of the stakeholders (BMU) has reduced the resource use conflict. The BMUs have minimized use of illegal fishing methods and are actively involved in the collection of data. Other advantages include stakeholders' participation in decision making process and motivate the fishers to adhere loyally to the set regulations. Both (Fisheries Department and BMUs) systems have clearly defined membership rights conflict management mechanisms, rights to organize and congruence between the rules and local conditions which enhances resource management.

Key institutional arrangements thought to facilitate the success of collectively managed resources include; (Hilborn et al 2007).

1. Group participation in affecting rule change;
2. Congruence between rules and local conditions;
3. Individual participation in affecting rule change;
4. Rules that change adaptively in response to economic or ecological conditions;
5. Accountability for rule enforcers (that is, whether the enforcers can actually be held accountable to a higher authority);
6. Accountability mechanism for rule enforcers (presence of a mechanism to monitor those enforcing the rules);

7. Sanction increase with repeated or elevated offenses;
8. Conflict resolution mechanisms.

Research on the governance of common-pool resources also highlights the importance of contextual conditions in the success of common pool resource management. These include the size of the resource, the level of dependence on the common pool resource demographic factors, levels of social capital and the presence or level of conflicts. The full list of contextual conditions thought to influence the success of common-pool resource management is generally large. However, specific co-management attributes (design principles and contextual conditions) are expected to promote successful commons governance (Ostrom 2007).

Whether a co-management system is successful can be examined and evaluated in a number of ways. Success can be related to the social dimensions of the system (including economic, attitudinal and behavioral aspects), the condition of the resource itself, and aspects of the wider ecology (e.g. maintenance of ecosystem functions) (Brooks et al 2006). In a global review of successful fisheries management systems, (McClanahan et al 2009) found that many studies rely on attitudinal and social organization metrics of success, and not necessarily on proof of sustainable resource utilization or ecological improvements enhanced by transfer of power . (Guitierrez et. al., 2011) used ecological, social and economic metrics and summed them such that it was not possible to distinguish the specific contributions toward success and evaluate possible trade-offs.

### **2.2.3 Community Participation and co-management**

(Arnason 2001) noted that recently interest in community fishing rights has increased. Community management, where communities or otherwise defined groups are given certain exclusive rights, seems particularly attractive where other rights based approaches cannot be applied for socio-political or enforcement reasons. Arnason (2001) argues that the great advantage of communal fishing rights is that they are often socially acceptable and facilitate effective law enforcement on the basis of social and physical proximity and social pressures. This is manifested in the way fisheries co-management brings together fisherfolks, processors, environmental organizations and other user groups into the management process in roles that range from advisors to co-equal decision makers with government agencies. The idea behind co-management thought people having direct involvement in planning and

decision making is more likely to result in fishery regulation that have better design greater buy-ins and improved compliance. (Pinkerton, E. and M. Weinstein 1995)

The primary advantage of co-management is that, within the right institutional and legislative framework, it allows the knowledge and understanding of all stakeholders to be reflected in the decision-making process and their diverse capacities to be harnessed in implementation. This has the potential to improve the sustainability of fisheries resource exploitation, increase the efficiency of management and improve equity outcomes. generally the assignment of a value (expressed as some form of rent for use) to a particular area of the coastal zone which would require a restriction on access (either through the economic cost of the rent or through socially established limits), and necessitate zonation (whereby different uses are kept physically separate, so as to avoid adverse impacts on other users and uses, and perhaps above all, on the environment and the natural resources). Among the measures which fall within coastal zonation, are closed areas or marine parks which ensure that a proportion of the coastal ecosystem is protected from resource exploitation (Nadasdy, P. 2003).

Theory and experience suggests that if given exclusive rights fishing communities can control and properly manage their own resources and avoid over-exploitation with minimal government intervention. Ostrom (1990) suggested that if a community of fishers exhibits a high degree of social, cultural and economic homogeneity, then fishers would be well posed to successfully manage the resources.

The government of Kenya upon the realization that without the support and involvement of these stakeholders especially the resource users in the management, the ongoing decline in trend may not be reversed, thus deliberate measures were put in place to facilitate the sharing of responsibility in the management of the country's fisheries resources.

Subsequently, the concept of co management in fisheries resources was adopted with Beach Management Units been established at the local landing stations to bring on board all stakeholders with interest in fisheries resource management.

#### **2.2.4 Indigenous Knowledge Systems and Co-management**

Traditional ecological knowledge (TEK) is defined as a cumulative system of knowledge, practice, and belief, which evolves through adaptation and is perpetuated through



intergenerational cultural transmission (Berkes 1999). Customary marine tenure (CMT), in contrast, comprises a set of rights to use, ownership, or access to marine areas, which are often community-based and related to indigenous forms of governance and kinship relations (Cinner 2005; Cinner and Aswani 2007)

In a society that is based on cultural and traditional systems, it is important to recognize traditional knowledge systems and develop management actions that reflect the existence of these systems in order to be effective and successful. Maintaining a clear medium of communication through outreach and awareness activities ensure longevity of community participation in conservation activities (McClanahan T. R. et al 2005). First meetings and group meetings are the primary venues for the exchanging of science and traditional knowledge in these communities. The relationship between the two types of information can be difficult to link. Sometimes it is better treated as a single unit but most of the time it is science and the traditional knowledge from these meetings are complimentary.

The recognition of indigenous communities and their knowledge as essential in the process of resource management has become an important factor in conservation biology. The relationship between humans and their resources are documented and used as basis for decision making in communities engaging in conservation activities. (Berkes 2008) describes this relationship as “people were linked to nature through the category religion and belief. This traditional knowledge is important for the sustainability of not only species and its habitat diversity but also the communities that harvests them to determine ideal time of harvest, how much to harvest and time for closures.

Local practices provide an effective management strategy to regulate complex multi-species fisheries in places where biological, economical and social information do not exist and government presence is weak (Cinner et. al. 2007). For example, the integration of this knowledge with ecological processes have been used by researchers to manage coral reef ecosystems through implementation of MPA’s and for the management of single important species such as the bumphead parrotfish in the Solomon Islands. In the mentioned study, Aswani and Hamilton (2004) reported that the integration of traditional knowledge and marine science enabled them to identify species and important associated habitats in order to develop urgent management needed for this species on the verge of extinction.

Traditional knowledge is raw and plentiful in traditional societies made up of authoritative figures such as chiefs and village councils and the working class of women, men and

children. These various social groups interact differently with the resources and these interactions are reflected in their roles within a traditional system. Although it is poorly documented in many islands and coastal communities, cultural considerations contribute to the design of management projects as management objectives of fishing regulations and provide incentives for participatory learning processes and modern management of fisheries (Leopold et al 2008). This allows recognition and inclusion of indigenous practices that are complimentary and socio-culturally and ecologically feasible (Hviding 1991). It strengthens areas of management where important social and cultural information are absent by providing leverage for these missing components that drive the effectiveness of resource management.

The best available knowledge is not just found in scientific literature, but also among local stewards such as fishermen, farmers, birdwatchers, urban dwellers and others who interact with ecosystems on a day-to-day basis (Barthel et al. 2010). Different knowledge systems generate different insights about the dynamics of social-ecological systems (Ernstson and Sörlin 2009), and when they are combined, a richer, often surprising picture may emerge (Carpenter et al. 2009) that enables a more fine-tuned design of management (Crona 2006).

Management and governance of social-ecological systems needs to be ecologically informed. Ecological knowledge and understanding helps reconnect management practice, networks and institutions to stewardship of ecosystem (Berkes and Folke 2001).

### **2.3 Literature Gaps**

Co-management has several attractions because it is based on a participatory process and a negotiated agreement between government and a community. However, much more needs to be done to make it successful. The research study covered the institutional design, community participation and indigenous knowledge systems that have made co-management successful. However, there is so much that was not been covered; hence the researcher recommended them for further research.

The sustainability of co-management is pegged on the market nature of small scale fisheries products and services which will establish the economic status of co-management. Very little on co-management have been documented in this study's study area.

## **2.4 Summary of Literature**

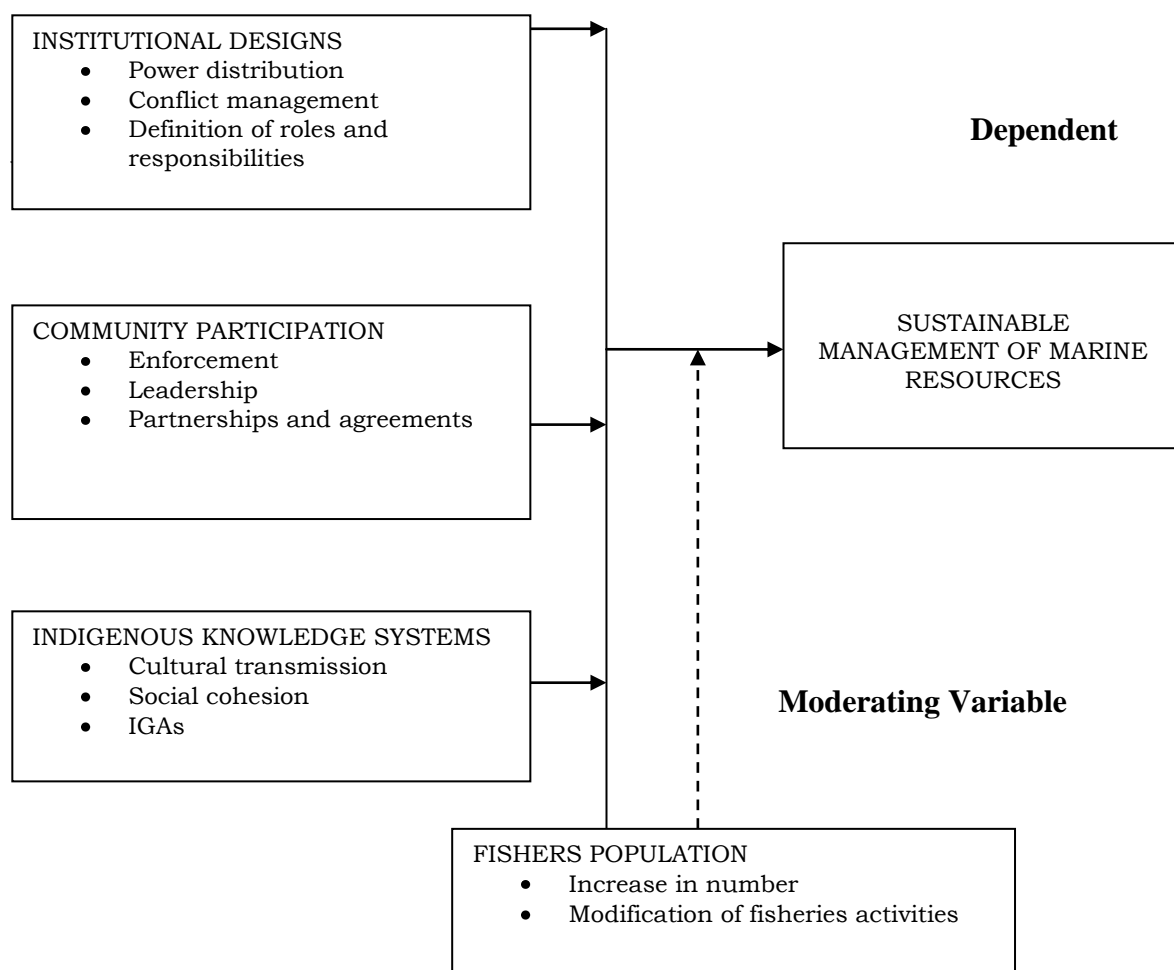
This chapter has reviewed the literature related to the various themes in the study. These include financial resources, technological aspects, policies affecting solid waste management and the community participation in solid waste management. As the second largest city in Kenya, Mombasa has a serious solid waste management problem. Urban settlements in the city are characterized with worsening waste disposal situations which the municipal authorities seem unable to deal with. A survey of literature on the solid waste disposal situation in the city shows that no major research has been done on the subject and it is the need to investigate the problem that has motivated me to embark on this research.

## 2.4 Conceptual Framework

The conceptual framework below shows the relationship between the variables of interest and the resulting indicators. The study's independent variables are the institutional design, community participation, and indigenous knowledge systems. These are the factors that make co-management feasible. The dependent variable is sustainable MRM, using the framework as a guide assessment the influence of co-management for sustainable MRM was adequately conducted.

**Figure 2.1 Conceptual framework**

### Independent Variables



## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter examined the research design, the location of the study, population, sample size, data collection methods and procedures, validity and reliability of the research instruments, ethical considerations and data presentation and analysis techniques used and the operational definition of variables. The chapter described in details what was done and how.

### **3.2 Research Design**

The study assessed the influence of co-management in the management of marine resources in Shimoni and Wasini. The study was conducted through a survey research design. In the study, both areas had familiarity with co-management as a management tool for fisheries resources which are jointly managed by the Beach Management Units and the Fisheries Department in the areas. The principle method of obtaining information was through semi-structured interviews with key stakeholders whereas questionnaires and focus discussion groups were employed for community groups. Identification of interviewees was purposeful according to their areas of expertise. In addition stratified sampling was applied for the local community.

### **3.3 Target Population**

The population targeted is in Shimoni and Wasini areas. The population in Shimoni village is 4,520 according to the administration data from the chief's office and the Wasini Island has a population which is 3,600. Therefore the target population is 8,120 which include the 396 Shimoni BMU members and the 153 Wasini BMU members. The target population already has co-management structures in-place in fisheries management. Manifested in these structures Community Conserved Areas (CCAs) also known as Locally Managed Marine Areas (LMMA). The Shimoni Community Conserved Area (CCA) is located at the sea front of Shimoni starting at Waga and extends to Nyuli and Jironi areas. The Wasini CCA is located at the sea front of the Wasini village starting at PiliPipa Restaurant (*Domo la Vumba*) on the North and extending westwards through *Masulini* to *Kijiwe Jahazi* in the south.

### **3.4 Sample Size and Procedure**

The following formulae by Bill Godden were identified by the researcher mainly because it is popularly used in descriptive statistics dealing with probability. In these formulae two calculation processes were applied, the first for the Sample Size for an infinite Population

(where the population is greater than 50,000) and Sample Size for Finite Population (where the population is less than 50,000)

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where: Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal  
(0.75 used for sample size needed)

c = confidence interval, expressed as decimal (0.07)

$$SS = \frac{\text{New SS}}{(1 + \frac{\text{SS} - 1}{\text{Pop}})}$$

Pop = Population (11,720)

(Bill Godden, January 2004)

Therefore the sample size obtained was 145 people. The table below shows the representation of representation.

**Table 3.4.1 Number of study respondents**

<b>Respondent Category</b>	<b>Number in each Category</b>	<b>Percentage</b>
Community Members	77	53.10%
BMU	61	42.07%
Key informants	7	4.83%
<b>TOTAL</b>	<b>145</b>	<b>100%</b>

The sample from the general respondents consisted of any member of the public, selected using the stratified sampling. This was to determine if the influence of co-management is felt by everyone. The key informants mainly included the fisheries personnel i.e. the area fisheries personnel and the county fisheries personnel. The other key informants included personnel from Kenya Wildlife Service and a representative from the tourist hotels in the area and lastly private tour company representative will be purposively identified.

**Table 3.4.2 Number of key respondents**

<b>Key informant</b>	<b>No. to be sampled</b>
Fisheries Department	3
KWS	1
Tourist Hotel rep	2
Tour Operators	1
<b>Total</b>	<b>7</b>

### **3.5 Data Collection Instrument**

To obtain the best results the best way to collect adequate data for the research combined both qualitative and quantitative approaches, some of the data obtained were qualitative in nature and were best obtained through interviews and focus group discussions while others were qualitative thus could be gathered through questionnaires and observation schedule.

#### **Questionnaires**

Questionnaires are frequently used in quantitative research and social research. They are a valuable method of collecting a wide range of information from a large number of individuals, often referred to as respondents. Adequate questionnaire construction was critical to the success of a survey. The questionnaire was with the general respondents and BMU members. The instruments were pilot tested to ensure it captured the intended information and that the respondents were able to comprehend the questions asked. A documentary analysis was carried out to draw upon the strengths of the different methods to improve the quality and validity of the data.

#### **Semi-structured interviews**

Semi-structured interview were employed because it does not limit respondents to a set of pre-determined answers, in addition it allows respondents to discuss and raise issues that you may not have considered. For this reason the researcher used this tool with the key informant from the stakeholders in target area.

### **Focus group discussion**

Focus groups were identified to facilitate discussions that allowed the researcher to see community members' perspectives. Focus groups were employed with the BMU members including the BMU official.

### **Desk study review**

Desk study will be carried out to examine the global development of marine protected areas including the growth of community involvement in the management thereof and the objective of sustainability in resource utilization. This is attained through a review of progress in the global attitude to conservation looking at the case example of techniques in the field.

### **3.6 Data Collection Procedures**

For adequate response rate the researcher submitted official writing to relevant stakeholders (Fisheries Department personnel, Beach Management Unit leaders, Kenya Wildlife Service personnel and other stakeholders). The researcher with the help of trained research assistants present the letters, interview schedule and questionnaires to the respondents. At the local level focus group discussion were conducted by the researcher with an assistant helping in note taking.

### **3.7 Validity and Reliability of Research Instrument Procedures**

This section explains the validity and reliability of research instruments.

#### **3.7.1 Validity of Research Instruments**

Pre-testing questionnaires helped the researcher find ways to increase participants' interest, helped in discovering question content, wording and sequencing problems before the actual study and also helped in exploring ways of improving overall quality of study. To establish the validity of the research instrument the researcher sought opinions of experts in the field of study. This facilitated the necessary revision and modification of the research instrument thereby enhancing validity. Content validity was obtained by asking for the opinion of the supervisor, lecturers and other professional on the adequacy of the questionnaire.



### **3.7.2 Reliability of Research Instruments**

Reliability was increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. A number of measures were taken to ensure reliability. Themes on the interview questions were based on the objectives stated in the study. To achieve reliability of the questionnaire, the instrument was designed with great care matching questions with objectives for the study. The questionnaire was tested in the two areas of the study to a small group. The responses from the pilot study revealed ambiguity in some questions within the questionnaire hence they were also left unanswered while others appear to have been too difficult for the respondents to understand. The questionnaires were therefore revised to address these issues.

### **3.8 Data Analysis and Presentation Technique**

Both qualitative and quantitative data were gathered for the study using questionnaires, interviews, focus group discussion and documentary sources. After collecting the data from the targeted respondents the questionnaires were coded and fed into SPSS 19 for analysis in order to generate descriptive picture of data generated. Simple percentages and frequencies were used to analyze the quantitative data from the questionnaire. In addition chi-square was used to test the hypotheses. The qualitative data from interviews and focus group discussion were analyzed manually by making summaries of their views and supported with data from documentary sources and the researcher's field observations on the influence collaborative management to sustainable development. The analysis was organized under themes from the data and the research questions that guided the entire investigation.

### **3.9 Ethical Consideration**

A number of ethical issues were addressed in the course of the research including informed consent, access and acceptance as well as confidentiality and anonymity. In the conduct of this research, the principle of informed consent was given the required attention by explaining the purpose of the study to participants and making them aware that participation was optional and they could choose to answer any question in the course of the interview. In recognition of the ethical requirements that information obtained from a participant during research was confidentially, none of the information provided by interviewees was disclosed to other people.

### 3.10 Operational definition of variables

Objective	Variable	Indicator	Measurement	Scale	Type of research	Data collection method
1. To examine the institutional design in co-management for sustainable management marine resources in Shimoni and Wasini.	Institutional design	<ul style="list-style-type: none"> <li>• Conflict management</li> <li>• Definition of roles and responsibilities</li> <li>• Power distribution</li> </ul>	<ul style="list-style-type: none"> <li>• How conflict management has been influenced by co-management</li> </ul>	Nominal	survey	Interviews with key informants and questionnaire
2. To determine the extent of community participation in co-management for the sustainable management of marine resources	Community participation	<ul style="list-style-type: none"> <li>• Enforcement</li> <li>• Partnerships and agreements</li> </ul>	<ul style="list-style-type: none"> <li>• Community members magnitude of involvement in decision making on their resources</li> </ul>	Nominal	Survey	Focus group discussion, questionnaire and interviews
3. To assess the integration of indigenous knowledge in the co-management of marine resource management and utilization	Socio-economic dynamics	<ul style="list-style-type: none"> <li>• Knowledge systems</li> <li>• Diversity</li> </ul>	<ul style="list-style-type: none"> <li>• co-management's effort in incorporating traditional knowledge for better marine resource management</li> </ul>	Nominal	Survey	Focus group discussion, Questionnaire

## CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION OF FINDINGS

### 4.1 Introduction

The study investigated the influence of co-management on the sustainable management of marine resources, using Shimoni and Wasini areas in Kwale County as the case study. The data is presented using frequency distribution tables and percentages; cross tabulation has also been used to show relationship of variables. In all instances, the Chi-square statistic was calculated to test the significance in the relationship between variables. This chapter therefore presents the results of the analyses.

#### 4.1.1 Response Rate

Table 4.1 shows the variation in the response rate in each targeted area. Ninety questionnaires were distributed in the two areas considering the population size. Therefore, 60% of the questionnaires were distributed in Shimoni and 40% in Wasini. Response from Shimoni respondents was better with only three questionnaires not returned, whereas the response from Wasini had seven not returned. Generally in rating response, 60% is rated as marginal, 70% reasonable, 80% is good while 90% would be excellent (Mundy, 2002). Therefore the general response was very good with a response rate of 88%

**Table 4.1: Questionnaire response rate**

Area	Distributed	Returned	Percent %
Shimoni	54	51	94.4
Wasini	36	29	80.6
Total	90	80	100

### 4.2 Institutional Design supporting co-management as a tool for sustainable management of marine resources

The results of the study show that the respondents are of the opinion that the institutional arrangement in place is adequate. According response from interviews with FiD and KWS, this is because of transfer of power through the BMU Regulation 2007 Regulation 6, 7, 8 and the by-law tailor made by individual BMU to meet their needs. The interview with KWS personnel revealed that involving community members through co-management is a good

move toward sustainable MRM initiatives. In addition, the community has the rights through the BMU to control the access of fisheries in their area of jurisdiction. In that the only legal right of access to exploit fisheries resources at gazetted and designated landing sites is through joining a BMU. As a result 90% of the respondents as shown in table 4.6 are in agreement that co-management that has resulted to improved environmental condition and conservation measures. Institutional structure of the BMUs was found to be adequate. Adaptability of the by-laws and BMU organizational adequacy were generally satisfactory.

**Table 4.2: Relationship between Institutional arrangement contribution to resource conservation and its adequacy for Sustainable Development**

		Institutional arrangement in co management is adequate for SD					Total
		Strongly disagree	Disagree	Neutral	agree	Strongly agree	
Institutional arrangement has enhanced resource conservation	No	0	2	7	1	0	10
	Yes	1	2	7	42	18	70
Total		1	4	14	43	18	80

The BMU allows control of access to fisheries resources by limiting numbers and types of fishing boats and gears. Most importantly they set their management rules locally at the beach level through by- laws and ordinances.

#### **4.2.1 Conflict management Structures in co-management for sustainable MRM**

The conflict management structures are as a result of the institutional arrangement set in co-management. The results from the data collected show that 95% of the respondents perceive that conflict management structures in co-management are adequate in solving marine resource based issues that the BMUs demonstrated ability to resolve internal conflicts. This is as represented in table 4.3. In establishment of co-management BMUs are expected to develop conflict prevention mechanisms that would lessen the possibility of conflicts arising. The responses indicate that the conflict management mechanisms employed is fruitful.

**Table 4.3: Co-management as a solution in resource conflict management**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
No	4	5.0	5.0	5.0
Yes	76	95.0	95.0	100.0
Total	80	100.0	100.0	

The common sources of resource use conflicts as derived from the study are largely related to gear use, overlapping institutional mandate in the government sector such as Kenya Forest Service and FiD and lastly the inadequate BMU leadership as shown in table 4.4

**Table 4.4: Main sources of resource based conflict**

	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Shared co-management areas	14	17.5	17.5	17.5
Gear use	37	46.3	46.3	63.7
Overlapping institutional mandate	6	7.5	7.5	71.3
Inadequate BMU leadership	23	28.7	28.7	100.0
Total	80	100.0	100.0	

The FiD heavily relied on early warnings signs and information, such as complaints from stakeholders and cases from to anticipate conflict. Table 4.5 below demonstrates results obtained on the most preferred conflict resolution mechanism. Moreover, the respondents said that when conflicts were beyond the reach of the BMU, the FiD takes over. This is first addressed in a conflict resolution meetings involving a wider audience, including village elders and other agencies (local administration, KWS, etc.). During the focus group discussion it was mentioned that newly established BMU networks within the county can be used as a platform to resolve conflicts of a bigger magnitude such as shared co-management area related conflicts. To enhance compliance to the decisions made from the resolution committees BMUs opted to integrate traditional conflict resolution mechanisms with the newly instituted BMU mechanism.

**Table 4.5: Mechanisms to address conflict management**

	Frequency	Percent	Valid Percent	Cumulative Percent
CMC in BMUs	44	55.0	55.0	55.0
Local conflict resolution mechanisms	10	12.5	12.5	67.5
Report to fisheries dept	26	32.5	32.5	100.0
Total	80	100.0	100.0	

BMU regulation 2007 has opened an avenue of resource use conflict management through formation of Conflict and Management Committee (CMC) in every BMU. However the local conflict mechanism is still preferred by 12.5 % of the respondents. From the study it was realized that there have been cases involving BMU members and external persons such as some tour operators and hoteliers who sometimes failed to recognize the BMU legitimacy. The general perception is that conflict resolution measures applied are mostly satisfactory at all levels.

The researched sought to test, the first research hypothesis as per the results obtained to establish presence or absence of a relationship between the transfer of power through involvement in conflict management and definition of roles in co-management for sustainable MRM. The study utilized chi-square test in testing this relationship.

***H<sub>0</sub>** There is no relationship between transfer of power and co-management for sustainable marine resources management*

***H<sub>a</sub>**. There is a relationship between the transfer of power and co-management in the sustainable management of marine resources*

**Table 4.6: Relationship between the transfer of power and co-management in the sustainable management of marine resources**

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.679 <sup>a</sup>	1	.001		
Continuity Correction <sup>b</sup>	6.618	1	.010		
Likelihood Ratio	7.323	1	.007		
Fisher's Exact Test				.013	.013
Linear-by-Linear Association	10.545	1	.001		
N of Valid Cases	80				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .65.

Based on the results of the table 4.6 above the Chi-square value is at 10.679 at a degree of freedom of 1. The chi-square value is higher than the expected value. Therefore the null hypothesis is therefore rejected

### **4.3 Community Participation in Decision making for sustainable MRM**

Community members have been given rights to manage the fisheries resources and make decisions on how to manage and control their resources this includes the right to decide which gear can be use. The response from the study show that the there is a strong relationship between respondents opinion on the clarity of the co-management roles of BMUs and community's involvement in decision making on Natural Resource Management (NRM). 82.5% of the respondents agreed that the roles were clearly defined and that community members are involved in community development. The study showed that the communities' sense of ownership of the marine resources has been developed and enhanced due to community consultation and involvement in decision making this mainly happened during assembly meetings. Generally the response on community participation in decision making was satisfactory.

**Table 4.7 Relationship between defined roles for FiD and BMU and community involvement in decision making on NRM**

		Involvement of community and BMU in decision making on NRM		Total	
		No	Yes		
Clearly defined roles for FiD and BMU	No	Count	8	6	14
		% within Involvement of community and BMU in decision making on mr	61.5%	9.0%	17.5%
	Yes	Count	5	61	66
		% within Involvement of community and BMU in decision making on MR	38.5%	91.0%	82.5%
Total	Count	13	67	80	
	% within Involvement of community and BMU in decision making on MR	100.0%	100.0%	100.0%	

As a result of community participation in decision making the result from the study showed an increase in level of compliance with marine resource management (MRM) to laws and regulations. Table 4.8 shows that 87.5% are of the view that co-management has influenced compliance to MRM law and regulations.

**Table 4.8 Co management influence to compliance mrm laws and regulations**

	Frequency	Percent	Valid Percent	Cumulative Percent
No	10	12.5	12.5	12.5
Yes	70	87.5	87.5	100.0
Total	80	100.0	100.0	



**Table 4.9 Research Hypothesis testing**

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	20.851 <sup>a</sup>	1	.000		
Continuity Correction	17.368	1	.000		
Likelihood Ratio	16.472	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	20.591	1	.000		
N of Valid Cases	80				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.28.

*H<sub>0</sub>* There is no relationship between co-management and community participation in the sustainable management of marine resources.

*H<sub>a</sub>*. There is a relationship between community participation and co-management in the sustainable management of marine resources

Based on the results of the table 4.9 above the Chi-square value is at 20.851 at a degree of freedom of 1. The chi-square value is higher than the expected value. Therefore the null hypothesis is therefore rejected.

#### **4.4 Integration of Indigenous Knowledge in co-management for sustainable MRM**

With the introduction of co-management the communities are at liberty to use traditional methods. The table 4.10 shows that 92.5% of the respondents are of the view that IKS is applied in co-management and that it is effective in marine resource conservation.

Previously IKS had been left out in marine resource management in favour of scientific knowledge systems which was seen as the panacea to resource degradation, however, it have little impact. The focus group discussion highlighted that management measures of community conserved areas (CCAs) are based on traditional ecological knowledge. This include, fishing gears, biological monitoring of the area and seasonal closures.

**Table 4.10: Relationship between application of IK and effectiveness of IK in resource conservation**

		Effectiveness of IK					Total	
		Not effective	Little benefit	Average	Good	very effective		
Application of IK	No	Count	1	1	2	2	0	6
		% within effectiveness of IK	100.0%	33.3%	11.8%	4.8%	0.0%	7.5%
	Yes	Count	0	2	15	40	17	74
		% within effectiveness of IK	0.0%	66.7%	88.2%	95.2%	100.0%	92.5%
Total	Count	1	3	17	42	17	80	
	% within effectiveness of IK	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

To test the relationship between application of IKS in co-management and the perceived effectiveness of this application in marine resource conservation, Chi-square test was used.

**Table 4.11: Relationship between integration of IK in co-management and effectiveness of IK in resource conservation**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.497 <sup>a</sup>	4	.002
Likelihood Ratio	10.406	4	.034
Linear-by-Linear Association	10.548	1	.001
N of Valid Cases	80		

a. 7 cells (70.0%) have expected count less than 5. The minimum expected count is .08.

*H<sub>0</sub>. There is no relationship between integration of indigenous knowledge and co-management in enhancing the management of marine resources*

*H<sub>a</sub> There is a relationship between integration of indigenous knowledge and co-management for enhancing sustainability in the management of marine resources*

The Chi-square statistic was computed at the 0.05 level of significance to determine whether there was a correlation between integration of indigenous knowledge in co-management to the effectiveness in sustainable development. The test results as shown in table 4.11 revealed that there is a significant relationship. The null hypothesis is therefore rejected.

## **CHAPTER FIVE: SUMMARY, FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

In this chapter, the researcher summarizes the findings of the study based on the three objectives of the study. In each case, the researcher briefly states the findings and the general implications of co-management towards sustainable development of marine resources in the study area. At the end of the chapter, the researcher states recommendations and highlights areas that need further research.

### **5.2 Summary of Findings**

The study was designed to assess the influence of co-management in sustainable management of marine resources. Three areas of focus were identified to guide in this assessment. This includes the institutional design or arrangement, level of community participation conflict management and the socio-economic dynamics due to application of IK.

#### **5.2.1 Institutional design**

Institutional design set for co-management is seen to ensure that local communities, the primary resource users, are involved in the marine resource management. This is manifested by transfer of power; this is a shift from the previously employed top-bottom management style to bottom – up method. The results of the study show that this has developed a sense of ownership; therefore the community is forced to be cautious and adapt better ways of sustainable resource exploitation.

Conflict management measures in co-management have resulted to a decline in resource use conflict and when the conflicts arise the community members have faith in the mechanisms set. The study showed that compliance and validity of the conflict management committees in the BMU was dependent on the incorporation of the local and traditional resolution methods as a result; the committees are composed of members in the community who are known to address general community conflict. Stakeholders such as FiD, KWS, hoteliers and Tour operators are of the opinion that co-management has enhanced order in resource utilization making it a good environment for the stakeholders undertaking. For example, tourist handling has improved, cleanliness of the seascape and general order among fishers as they go about their business.

### **5.2.2 Community participation**

Co-management is manifested through active participation of community members as was realized in the study. Through involvement and participation, the community members have become enlightened on destructive practices in the sea as a result; this has increased the level of compliances to the set rules and regulations. In addition the community members have become conversant with their roles and responsibilities in co-management.

Leadership in co-management was also discussed in the study; it appeared that the community is empowered in picking their leaders. Empowerment is equivalent to “letting the power out” since people already have the power. Kenyan leadership is democratic and the same has been adopted in co-management structures such as the BMUs. The study showed that leadership on BMU affairs was generally satisfactory. However, leadership challenges within BMUs were numerous they are constantly addressed according to the set regulations. The regulations are guided by the Fisheries Act and the Kenyan constitution which emphasizes critical leadership issues such as integrity.

### **5.2.3 Socio-economic dynamics due to application of IK**

There have been a number of notable socio-economic changes since establishment of co-management. The study showed that the target BMUs have developed sustainable alternative livelihood for its members, for example Wasini have established an ecotourism venture through the CCAs which is rapidly becoming a tourist hot-spot and Shimoni has attracted private companies dealing with octopus harvesting and aquarium fishery which has created employment to the community members and revenue for the BMU.

Assessment of the effectiveness of the integration of IK in co-management showed that Fishers use traditional local knowledge and skills to perform duties. This knowledge is also used in weather forecasting which is useful in predicting changes in the sea conditions in order to guide fishers in the sea. Social cultural practices were equally observed, where applicable, such as in conflict resolution and conveying messages through the well established community social networks. In multi-cultural, multi-religious areas, where BMU

### **5.3 Discussion of Findings**

The first objective was to examine the institutional design for co-management as tool for sustainable management of marine resources. Three indicators were used to inspect the adequacy of the design, they include; transfer of power, conflict management and definition of roles and responsibilities. Response from the study showed that there was general acceptance of the institutional design as adequate for sustainable management of the marine resources. According to the respondents from Fisheries Department, co-management of fisheries resources has marked changes in use of destructive practices and slight increase in government revenue. Reduction in destructive fishing, as discussed earlier was largely attributed to co-management arrangements, where BMUs enact and enforce by-laws against these practices thus enhanced cooperation between the community and Fisheries Department. This is in agreement views from the literature review that institutional design principles are thought to create conditions conducive to cooperation in common property scenarios (Ostrom E. 1990), and that high levels of reported conformity are positively related to graduated sanctions designed by co-management partners.

The second objective was to determine the extent of community participation due to co-management for the sustainable management of marine resources. The indicators applied to discuss this include, developing a sense of ownership and compliance to set regulation. The results obtained showed that community participation has been enhanced through co-management; it has created opportunities for community members to coordinate and collaborate in resource management. Conservation and sustainable development is one of the main goals of BMUs in their activities they ensure protection of wildlife hence a boost to tourism. Now community members have to comply with the set rules on capture of marine mammals and endangered species as well as destruction of breeding sites. This has enhanced collaboration with stakeholders such as KWS and hoteliers who are the most interested parties. This is in agreement with the information in the literature review expressing that if given exclusive rights fishing communities can control and properly manage their resources and avoid over-exploitation with minimal government intervention. Moreover Ostrom (1990) suggested that if a community of fishers exhibits a high degree of social, cultural and economic homogeneity, then fishers would be well posed to successfully manage the resources.

The last objective was to assess the integration of IK in co-management. Majority of the respondents said indigenous knowledge systems have been heavily employed in co-management citing examples of its application. For example an area in Wasini has been successfully closed to fishing to conserve the coral gardens and resident species therefore, generates revenue from tourism, this developed as a result of knowledge passed-on through generations. For a better management both traditional and scientific knowledge are employed especially in bio-ecological monitoring of the enclosure. These traditional measures have contributed to improved socio-economic status of communities in these areas especially from tourism and fisheries. The research findings concurs with the literature review text from a study on management of bumphead parrot fish in Solomon Island by Aswani and Hamilton (2004) that reported that the integration of traditional knowledge and marine science enabled them to identify species and important associated habitats in order to develop urgent management needed

There are some perceived challenges of co-management in sustainable MRM that were mentioned during the study. Generally co-management with FiD and KWS has been a relatively easy task however there are conflicts with the Kenya Forest Service that arise in mangrove management especially in licensing of loggers. In addition some corruption cases have been mentioned where BMU leaders get compromised by illegal fishers.

Similarly, changes in stakeholder income and private sector investments were minimal. There was a perception that following introduction of Locally Marine Managed Areas (LMMAs), stakeholders benefited directly or indirectly through creation of fish reservoirs and tourism. A slight improvement of stakeholder income could have been realised. On the other hand, some hoteliers and tour operators do not recognize BMUs thus they do not comply with the regulations set. This is common especially with access to CCAs.

## **5.4 Conclusions**

The study set out to assess the influence of co-management in sustainable management of marine resources. The main co-management structure employed in the study was the BMUs. In conclusion the study showed, there is high appreciation of BMUs as management structures in co-management. Due to the perception that community rights over the management of resources has improved since the inception of the BMU/CCA model. There is

effectively outlined in the institutional arrangement for co-management highlighting an improved government-community relation as management is decentralized. In addition there has been increased compliance to the set marine resource management thus reducing the use of destructive gears and general degradation of the environment.

Community participation has been enhanced further with the support from stakeholders that has contributed to the success of co-management; The government policy (Fisheries Policy) recognizes co management is global phenomenon that covers a range of resources beyond fisheries and is way to go, therefore providing an effective institutional policy and legal frame work for co management. In co-management communities have the right to develop mechanisms to resolve internal conflicts. The BMUs have a Conflict Management Committee Conflicts set up through the by-laws, it is mainly composed of community members who handle conflicts in the community this is an integration of traditional conflict resolution mechanisms with the newly instituted BMU mechanism.

Finally the study shows that co-management has a lot of positive influences in conservation as well as the well being of community members. However for the tool to function effectively indigenous knowledge systems have to be incorporated. Therefore the researcher is of the view that co-management is an adequate planning and management tool for sustainable management of marine resources.

## **5.5 Recommendations**

In line of the research finding the following recommendations were made.

1. There is need to draw a comprehensive monitoring and evaluation criteria to evaluate the performance of fisheries co-management arrangement. Overall, monitoring and evaluation was moderately unsatisfactory.
2. Recognition of BMUs by other government agencies as legitimate fisheries co-management institutions
3. Enactment of support legislation (EMCA,NEMA,KMA, Forest Act, Wildlife Act etc) in order to give BMUs additional legal backing
4. Improved intergovernmental and interagency partnerships are needed to address cross-cutting and emerging issues



## **5.6 Areas Recommended For Further Research**

Following the findings of the study, the researcher identifies the following areas that could be explored as a basis for future research.

The sustainability of co-management is pegged on the market nature of small scale marine based products and services which will establish the economic status of co-management. Very little on co-management have been documented in this study's study area.

BMU profiles depend on a laid down structure outlined in the BMU regulations. Adherence to this structure which is not fully functional, implying that presence of a structural framework, may not guarantee good results. This will form a backbone to study the factors affecting the performance of BMUs in coastal Kenya since their inception.

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## APPENDICES

### APPENDIX 1: Letter of Transmittal

University of Nairobi  
School of Continuing and Distance Education  
Department of Extra Mural Studies  
P.O. Box 88732-80100  
Mombasa, Kenya

Dear Sir/Madam

#### TO WHOM IT MAY CONCERN

I **Agatha Ogada**, registration number **L50/70641/2011** a student pursuing a **Masters of Arts Degree in Project Planning and Management** at the School of continuing and distance education in the University of Nairobi.

As part of the course I am required to go to the field for data collection and prepare a research project report. I am collecting data related to my research topic: **THE INFLUENCE OF CO-MANAGEMENT OF MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT IN KWALE COUNTY; CASE STUDY OF SHIMONI AND WASINI, KENYA**

This information been gathered is purely for academic purposes and will be treated with utmost confidentiality. Thank you for your cooperation

Yours Sincerely

**AGATHA OGADA**

**APPENDIX 11: Letter of Informed Consent**

*Dear Sir/Madam,*

You are being invited to take part in a research study being conducted by Ms. Agatha Ogada, a Masters student at the University of Nairobi. The purpose of the research is to explore the influence of co-management in sustainable management of marine resources; a case study of Shimoni and Wasini areas in Kwale County-Kenya. Before you decide to participate in this study, it is important that you understand what the research will involve. Please take the time to read the following information carefully. If you need more information, please do not hesitate to contact the researcher using the address provided below.

There are no risks or discomforts that are anticipated from your participation in the study. You may decline to answer any or all questions and you may terminate your involvement at any time you choose. If you do not want to be in the study, you may choose not to participate and leave your answers blank.

The information gathered during this study will remain confidential and only the researcher will have access to the study data and information. You are at liberty to include your name on the questionnaires or not. Any other identifying details will not be revealed in compiling the results of the study. Information gathered will only be used for academic purposes.

By signing this consent form, I confirm that I have read and understood the information and have had the opportunity to seek clarification. I understand that my participation is voluntary and that I am free to withdraw at any time. I voluntarily agree to take part in this study.

**Respondent:**

Signature..... Date.....

**Researcher :**

Signature.....Date.....

**Researcher:**

**Agatha Adhiambo Ogada - Mobile No. 0720583450**  
**Student (MA.PPM) L50/70641/2011**  
**University of Nairobi**



**APPENDIX 111: Questionnaire for BMU and Community Members**

**TOOL A: QUESTIONNAIRE**

**SECTION 1: BASIC INFORMATION**

Sheet No.

Village: .....

Date: \_\_\_/\_\_\_/\_\_\_

Name of BMU: .....

Name of Respondent (optional) .....

Gender: .....

Status of respondent in BMU:

Official [ ] please specify ..... Member [ ] Non-member [ ]

**SECTION 2: INSTITUTIONAL DESIGN (Official)**

2.1 What are the major sources of marine resource based conflict? (*Tick where appropriate*)

- i. Shared co-management area [ ]
- ii. Gear use [ ]
- iii. Overlapping institutional mandate [ ]
- iv. Inadequate leadership i.e. BMU [ ]
- v. Others

.....  
2.2 Has co-management helped in conflict management? Yes [ ] No [ ]

If yes, explain:

.....  
.....

2.3 In co-management of marine resources, what mechanisms have been put in place to address conflict management?

- i. Conflict Management committee in the BMU [ ]
- ii. Local conflict resolution mechanisms [ ]
- iii. Report to Fisheries Department [ ]
- iv. Others [ ] *specify please*

.....  
.....

2.4 Does co-management influence compliance to marine resource management laws and regulations?

Yes [ ] No [ ]

2.5 Co-management has improved knowledge of fisheries laws and regulation

- i. Strongly disagree [ ]
- ii. Agree [ ]

- iii. Neutral [ ]
- iv. Disagree [ ]
- v. Strongly agree [ ]

2.6 The institutional arrangement is in place for co-management is adequate for sustainable management

- i. Strongly disagree [ ]
- ii. Disagree [ ]
- iii. Neutral [ ]
- iv. Agree [ ]
- v. Strongly agree [ ]

2.7 The institutional arrangement has enhances resource conservation Yes [ ] No [ ]

Explain.....  
 .....  
 .....

**SECTION 3: COMMUNITY PARTICIPATION (General)**

3.1. Are you conversant with the contents of BMU Regulations 2007 on co-management?

Yes [ ] No [ ]

Explain.....  
 .....

3.2 What is the mandate of this BMU/ community in co-management?

.....  
 .....

3.3 Are there clearly defined roles for fisheries department and BMUs Yes [ ] No [ ]

Explain if yes.....  
 .....

3.4 Is the BMU/community adequately involved in the decision making on their resources?

Yes [ ] No [ ]

If No, give reasons

.....  
 .....

3.5 Do you consult the Fisheries office/Fisheries Officer on BMU matters? Yes [ ] No [ ]

If yes give details.....  
 .....

**SECTION 4: TRADITIONAL ECOLOGICAL KNOWLEDGE**

4.1 What local/ traditional measures are employed for sustainable marine resource use?

.....  
.....

4.2 Is indigenous knowledge systems incorporated in management of co-management areas?

Yes [ ] No [ ] Explain if yes.....

.....

How effective are the measures (**rate from 1-5; 5 – very effective, 4 – good, 3 – Average 2 – little benefit, 1- not effective**)?

.....

.....

4.3 Has the establishment of co-management areas affected livelihood? Yes [ ] No [ ]

If yes explain how

.....

.....

**APPENDIX 1V: Interview Schedule for Key Respondents**

**CO MANAGEMENT.**

**TOOL B: INTERVIEW SCHEDULE FOR KEY RESPONDENTS**

Date:...../...../.....

Sheet

No.....

Name of officer:.....

Interviewer:.....

Organization: ..... Station: .....

**1. BASIC DATA:**

1.2 Rank/Title:

1.3 Briefly, describe your duties and responsibilities

**2. VIEWS ON CO-MANAGEMENT:**

2.1 Do you deal with BMUs in your work? Yes [ ] No [ ]

2.2 The fisheries co-management institutional is design adequate.

- i. Strongly disagree [ ]
- ii. Disagree [ ]
- iii. Neutral [ ]
- iv. Agree [ ]
- v. Strongly agree [ ]

2.3 What rights does the community have?

- i. Strongly disagree [ ]
- ii. Disagree [ ]
- iii. Neutral [ ]
- iv. Agree [ ]
- v. Strongly agree [ ]

2.4 Is there a notable change (socio-economic) since the implementation of co-management?

Yes [ ] No [ ] explain

2.4 Do you think co-management of marine resources/fisheries has helped conservation initiative?

Yes [ ] No [ ] Details

2.5 What role has co-management played in resource base conflict management?

2.6 How would you rate the community in co-management of marine resources?

- Poor [ ]
- Average [ ]
- Good [ ]
- Exceeding expectation [ ]

### **3. CHALLENGES:**

3.1 What are the main perceived threats in co-management?

3.2 How does the community deal with the threats?

3.3 What is the impact of non-fishing activities in the coastal zone?

### **4. SUCCESS/FAILURE**

4.1 In what ways has the transfer of rights been successful (or not) taking into account effects on men and women, on different groups, on the marine environment in general, on the fish resource in particular?

4.2 What are the factors that have most contributed to the success of co-management (or not)?

4.3 What factors outside the community (government policy, NGOs, incentives, support etc) have most contributed to the success (or have represented a barrier to success)?

4.4 What things need to change for the future or should have been done differently?

## **APPENDIX V: Focus Group Discussion Guide**

### **FOCUS GROUP DISCUSSION GUIDE**

#### **1. INSTITUTIONAL DESIGN**

- i. What are the main sources of resource use conflict? What mechanisms are used to solve them?
- ii. Are the methods effective?
- iii. What is the general view of the institutional arrangement of co-management?

#### **2. COMMUNITY PARTICIPATION**

- i. Is the community involved in management of the marine resources?
- ii. Do you participate in decision making process in the management of these marine resources?
- iii. What is your view of level and effectiveness of collaboration with FiD, BMU and other Stakeholders?

#### **3. LOCAL KNOWLEDGE AND SOCIO-CULTURAL ASPECT**

- i. Is IK incorporated in management of the marine resources? How effective is it?
- ii. What socio-economic benefit has co-management had to the community

#### **4. CHALLENGES:**

- i. What are the main perceived threats in co-management?
- ii. How does the community deal with the threats?

#### **5. SUCCESS/FAILURE**

- i. In what ways has the transfer of rights been successful (or not) taking into account effects on men and women, on different groups, on the marine environment in general, on the fish resource in particular?
- ii. What are the factors that have most contributed to the success of co-management (or not)?
- iii. What things need to change for the future or should have been done differently?