



CO-MANAGEMENT OF MUSSEL RESOURCES: THE CASE STUDIES OF SOKHULU AND COFFEE BAY PROJECTS IN SOUTH AFRICA

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Abstract

In this thesis, the researcher has attempted to analyze the full complexities of employing the co-management system in conservation of brown mussels (*Perna perna*) through the use of the case study areas, namely: Sokhulu in KwaZulu-Natal (KZN) and Coffee Bay in the Eastern Cape (EC) Provinces of South Africa. This study is a comparative approach of 2 coastal areas, Sokhulu, in the northern part of KZN and Coffee Bay near the Wild Coast. Communities currently involved in brown mussel resource management in Sokhulu are part of the joint resource management team. The project, started in 1995 by Dr. Harris of KZN Nature Conservation Services (KZN NCS), has proven to be successful in its mission of ensuring wise use of the brown mussel resources. The Coffee Bay project, which was started in 2000, has no local resource management structures yet in place.

The research information was gathered with the assistance of household questionnaire; open-ended interviews; literature review; visual review, and commentaries. Experiences drawn from Sokhulu mussel project in KZN have indicated a need for the establishment of a mussel co-management structure at Coffee Bay for the conservation of the resource, and the well-being of the community.

Some recommendations for implementation of a co-management system at Coffee Bay have been made. The recommendations are in line with the efficient conservation strategies and utilization of brown mussel resources and blend the needs of the community of Coffee Bay, sound resource use principles provided by the resource managers, and practical management requirements. The study does not present statistically significant conclusions hence it has been highlighted that there is a need for follow-up studies with respect to co-management concept if one is to understand more fully the processes involved.

PREFACE

The study described in this thesis was carried out in collaboration with the Schools of Environment, and Development and Human, and Social Sciences at the University of Natal in Pietermaritzburg from September 2001 to December 2001 under the supervision of Mr. M Draper.

This thesis represents original work by the author and has not otherwise been submitted in any form for any degree or diploma to any other university. Where use has been made of the work of others, this has duly been acknowledged.


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LIST OF ABBREVIATIONS AND ACRONYMS

CB	Coffee Bay
CEAD, UNP	Centre for Environment and Development, University of Natal Pietermaritzburg
CPR	Common property resources
CSDS	Centre for Social and Development Studies
DEAT	Department of Environmental Affairs and Tourism
EC	Eastern Cape
ECNC	Eastern Cape Nature Conservation
GRSA	Government of Republic of South Africa
HH	Household
IASCP	International Association for the Study of Common Property
ICLARM and NSC	International Center for Living Aquatic Resources Management and North Sea Center
IISD	International Institute for Sustainable Development
IK	Indigenous knowledge
IUCN	International Union for Conservation of Nature and Natural Resources (i.e. The World Conservation Union)
KZN	KwaZulu-Natal
KZN NCS	KwaZulu-Natal Nature Conservation Services
MCM	Marine and Coastal Management

MLRA	Marine Living Resources Act
NCMPL	National Coastal Management Policy and Legislation
NEMA	National Environmental Management Act
NGO's	Non-Governmental Organizations
NTFP's	Non-timber forest products
RM	Resource Management
RSA	Republic of South Africa
SADC	Southern African Development Community
SARDC	Southern African Research and Documentation Centre
SAWC	Southern African Wildlife College
SK	Sokhulu
UND	University of Natal Durban
UNITRA	University of Transkei
WHO	World Health Organization

CHAPTER 1

INTRODUCTION AND RESEARCH METHODOLOGY

1.1 INTRODUCTION

Brown mussel (*Perna perna*) is a form of shellfish found in intertidal rocky shores. It is common in the warm water of the east and south coasts of Southern Africa from Barra Falsa (22° 55' S) in Mozambique to False Bay (34° S, 18° E) in South Africa (Berry, 1978). Mussels have traditionally been an important source of protein for the coastal communities in South Africa. Due to over-exploitation, brown mussel populations have been over harvested in many coastal areas in the country (Lasiak, 1992).

This study is a comparative approach of 2 areas, namely: Sokhulu in KwaZulu-Natal (KZN) and Coffee Bay in the Eastern Cape (EC) Provinces of South Africa. Both areas are attempting to rehabilitate brown mussels in denuded rocks along their respective coastlines. Sokhulu is in the northern part of KZN and Coffee Bay is near the Wild Coast. Communities are actively involved in mussel resource management in Sokhulu, hence they are part of the joint resource management team involving the community themselves; KwaZulu-Natal Nature Conservation Services (KZN NCS) and its researchers (Harris, 2000). This team is known as the Buhlebemvelo joint management committee (see fig. 2:9). The project, started in 1995 by Dr. Harris of KZN NCS, has proven to be successful in its mission of ensuring wise use of the mussel resources (*The Natal Witness*, 2001). The Coffee Bay project, which was started in 2000, has no local resource management structures yet in place (Calvo-Ugarteburu, 2000). The South African Government recognizes the importance of, and provides for community participation in activities related to sound coastal management (DEAT, 2000). This study investigates the success of the Sokhulu mussel project and makes some recommendations for Coffee Bay.

1.1.1 Background information

Researchers have shown that the utilization of the brown mussels along the coasts, especially in Transkei is unsustainable. There is a long history of brown mussel use as dietary mainstay by local people (Lasiak and Dye, 1989), and because of such dietary mainstay, definitive management by the old system of government in the form of bag-limits including closed areas on the use of mussels did not have the blessing of the community (Simoyi, *pers. comm.*, 2001). Thus, in the area of Coffee Bay along the east coast, there are few if any controls on the use of mussels by the community with the only factor that limits quantities collected being rough sea conditions (Lasiak, 1992). According to Lasiak and Dye (1989), another factor that is contributing to a limited number of mussel quantities to be collected is the mussel stock reduction due to overutilization (see fig. 9: 60).

The Marine and Coastal Management (MCM) Division of the Department of Environmental Affairs and Tourism (DEAT) have developed a protocol of coastal marine conservation in collaboration with the relevant stakeholders¹. It was developed in August 2000 with the aim of artificially re-seeding areas that have been over-exploited around Coffee Bay in the Eastern Cape. An experimental study of establishing artificial mussel clumps showed a survival rate of 80% after 12 months (Dye and Dyantyi, 1994 *cited in* Calvo-Ugarteburu and Dye, 2000). The results from such a study suggest that there is a strong possibility of successfully re-seeding denuded shores provided that the local communities co-operate in the project (Calvo-Ugarteburu and Dye, 2000). The techniques developed in this protocol, modified according to the local needs, are being successfully used in a mussel rehabilitation project at Sokhulu in KZN (Calvo-Ugarteburu and Dye, 2000).

¹ Including Researchers from the University of Transkei Zoology Department.

1.1.2 Study areas

(i) Coffee Bay

Coffee Bay is a coastal area located near the Wild Coast of the east coast of South Africa (see Appendix 3: 94). This is situated in Mqanduli magisterial district, which falls in the Transkei region with several tribal authorities in the EC. Only 1 sub-section of a single tribal authority (Tshezi) has been considered in the district because of its proximity from the coast. Tshezi Tribal Authority is between the Umtata mouth and Hole-in-the-Wall, and extends about 6 to 10 kilometres inland. The stretch of the coast is 18 kilometres. There are about 15 sites which have been selected for the project purpose, of which is mussel reseeding. The project officially started in November 2000.

The Tshezi Tribal Authority community is divided into 8 wards, which fall under the authority of the Chief, Mlungwana Phali who is known by his people as Aa!! Dubul'ingqanga meaning the one who shoots the bird called Bateleur (*Terathopius ecaudatus*), which, according to Xhosa culture, is a sign of bravery. There are 5 Tshezi community wards, which have direct sea access, and the other wards are 6 kilometres away from the coast. They make use of the intertidal resources, especially brown mussels (*Perna perna*). The assumption that a co-management structure can be established with the Tshezi community (see fig. 1:8), which has been selected for the project, it can provide a good model even to other communities.

(ii) Sokhulu

Sokhulu lies in the northern part of KZN, along the east coast of South Africa between St. Lucia and Richards Bay (see Appendix 4: 95). The coastline, which was set-aside for subsistence gatherers, is about 2 kilometres long (Harris, 2000). This stretch is known as Dingini or Flat Ledges. The purpose of the project, officially started on 1 June 1995 by Dr. Harris of KZN NCS, was:

- To investigate the extent and impact of subsistence utilization of the brown mussels (*Perna perna*) in the area specified above.
- To provide mussel subsistence harvesters with legal access to the resource.
- To facilitate the establishment of a co-management structure between the community and the relevant authority.

The project objectives were as follows (Harris, 2000):

- To determine the availability of mussel stocks.
- To determine the community's dependence on the resource and establish a pattern to be followed by the community in harvesting the resource.
- To promote good communication and co-operation between the user-groups and the relevant authority in ensuring effective conservation and utilization of the resource.
- To investigate experimentally in co-operation with user-groups methods of harvesting to maximize yields. The ultimate goal of the Sokhulu mussel project was to develop and facilitate a system of co-management between the user-groups and the relevant authority, which in this case is KZN NCS.

Additional objectives were included with the above-mentioned objectives due to the following reasons (Harris, 2000):

- Both the communities and the relevant authority were having unrealistic expectations with respect to the functioning of the co-management system.
- Since communities were not on good terms with KZN NCS because of the past law enforcement activities, the time needed to address such mistrust was underestimated.
- The realization in 1996 that the area (Dingini) which had been selected for subsistence gathering in collaboration with KZN researchers, community services staff and Sokhulu mussel harvesters would not be sustainable as levels of harvest would not yield sufficient amounts of the resource for the needs of the community. This conclusion was reached through discussion with the harvesters who expressed concern that if bag limits were going to be enforced, it will be not socially acceptable to take less than 25 kilograms of mussels per bag after moving a long distance to the coast. This was then taken into consideration by the researchers and community involved.
- In addition to the above-mentioned reasons, the communities were receiving little information with respect to policy and legislation for marine conservation and utilization.

In order to address the above-mentioned issues, the following objectives were applied (Harris, 2000):

- Community training to enable them to participate actively in decision-making with regard to the resource use.
- Some income options for the people's livelihood were explored; e.g. craft initiative.
- Reseeding of small mussels into areas which were totally denuded.
- Education and awareness campaigns about the Marine Living Resources Act, 18 of 1998 to the community members.

Directing the Sokhulu project towards achieving its goals and objectives

The following are indications that the project has accomplished to a certain extent its objectives (Harris, 2000):

- A local co-management resource structure has been established, composed of community members; the relevant authority, and researchers. Its functions are:
 - a) To present a good relationship between the user-groups and the authority.
 - b) To make decisions with regard to the harvesting of mussels.
 - c) To see that the harvesting system agreed upon is adhered to via community resource monitors.
 - d) Improve networking with other relevant stakeholders.
- Legal access to the mussel resources was obtained, providing a 2-kilometre stretch for use by subsistence harvesters and resulting in a decrease in poaching.
- Sustainable levels of harvest were agreed upon with the user-groups. This level had been reached with the community involved by separating the demarcated subsistence zone into compartments. In each of these compartments, percentage cover and size structure were surveyed. These compartments were harvested at different levels, taking note of the ones that were most heavily utilized. With community involvement, harvest was reduced to achieve sustainability. Contributing to the sustainability of harvest was the implementation of a screwdriver as a tool to harvest mussels instead of sharpened wheel springs or iron bars. Rules to be followed for collection were set by the joint management committee entailing the issuance of permits and the setting up of a collection calendar detailing approved days. The permit is renewed annually.
- Community involvement in resource management has been accomplished through the employment of community resource

monitors. They assist in promoting awareness and environmental education. In this way, compliance is attained, and people's livelihood is improved as the monitors are getting monetary remuneration.

- Capacity building and training have been accomplished through craft training given to community members such as; committee training, adult training, and also monitor training at the Southern African Wildlife College (SAWC).
- The Sokhulu mussel project has facilitated interactions with other communities to share experiences and ideas with regard to problems encountered with mussel resource utilization and conservation.

The following figures show the organogram of both areas

Figure 1: Organization of Tshezi Tribal Authority (Coffee Bay)
(Adapted from the information gathered during the study).

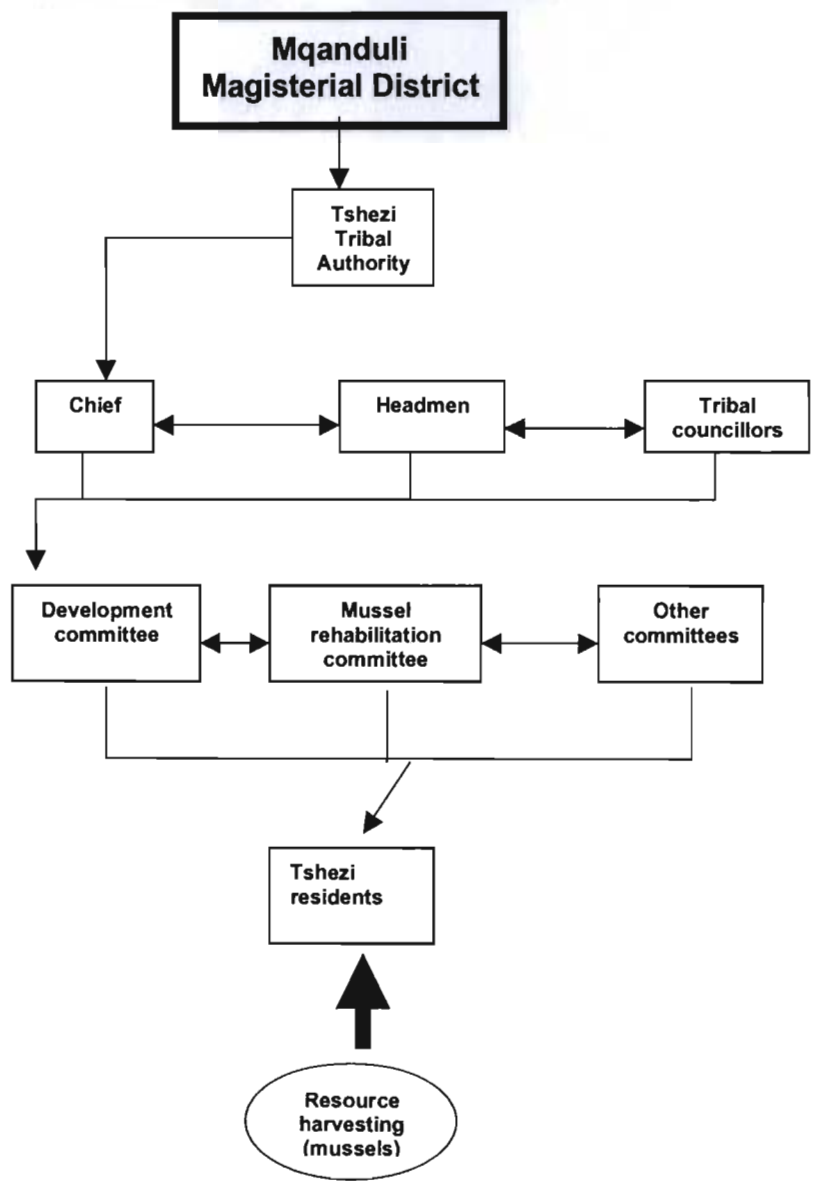
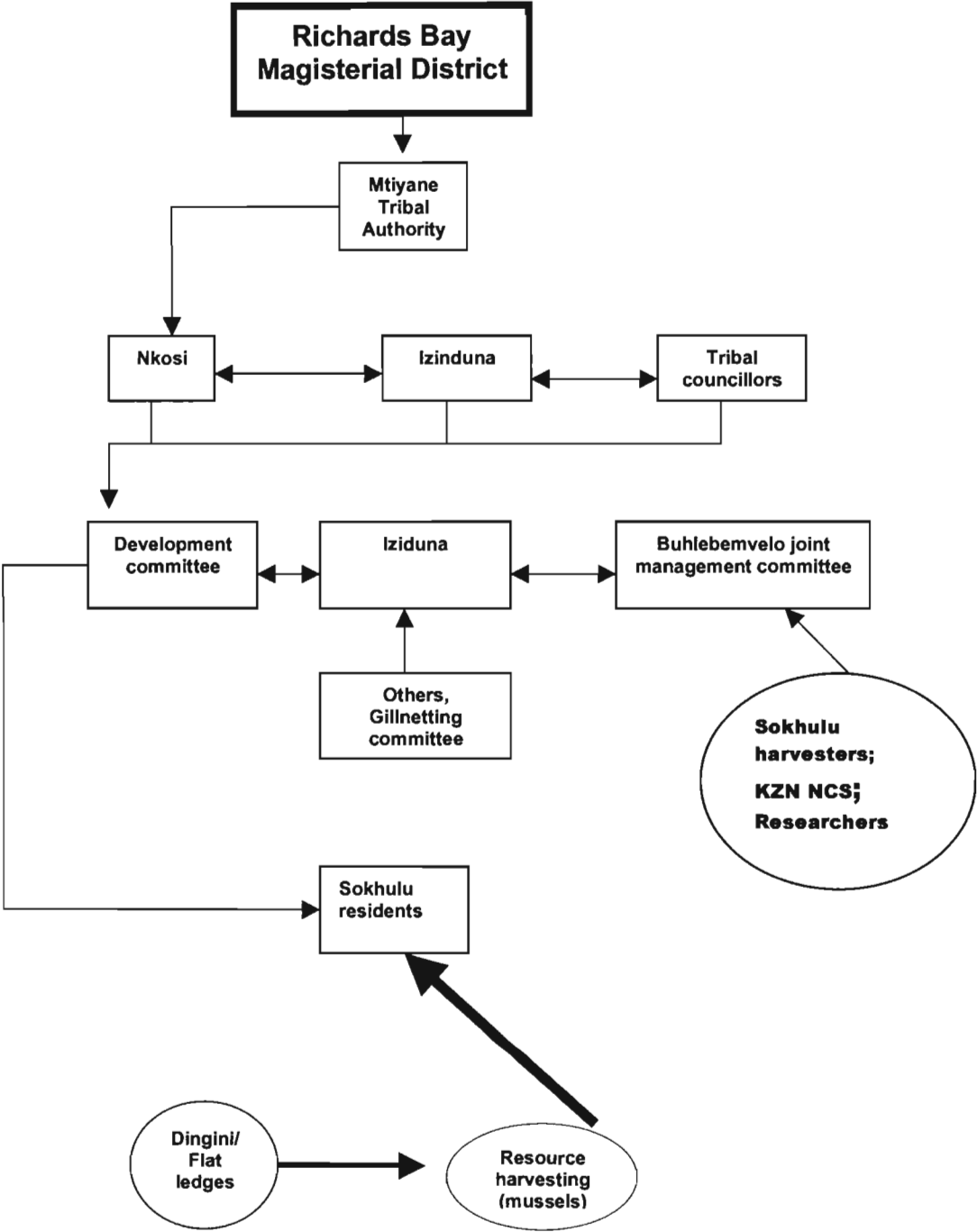


Figure 2: Organization of Sokhulu community
(Adapted from the information gathered during the study).



1.1.3 Rationale for the study

The South African government came up with a policy during the year 2000, White Paper on Sustainable Coastal Development because of unsustainable utilization of the coastal marine resources. It was set up to accommodate the interests of user-groups unlike the pre-democratic government policies. The policy has set a number of goals and objectives on Governance and Capacity Building that call for community participation in activities related to sound coastal management (DEAT, 2000).

The resource management strategies, based on control and regulation by the state, have proven inadequate in the past. This has highlighted the need to search for alternative strategies. In a study about fisheries' management, Hara (1996) stated that non-involvement of local community had a negative effect on the long-term sustainability. With the dawn of democracy in 1994, new ways were to be sought to accommodate meaningfully the interests of rural communities.

1.1.4 Approach and Assumptions

Approach

In general, the study has taken a comparative approach of the 2 case study areas in KZN and EC. A historical situation of the 2 areas with regard to brown mussel harvesting has been considered.

Assumptions

The following are some of the assumptions with regard to co-management:

- Co-management strategy is gaining recognition as natural resources are increasingly threatened (IISD, 1997).
- It is the best option for effective resource management.
- Sustainable utilization of the resources can be achieved if the user-groups are involved in resource management (Hara, 1996).

1.1.5 Problem statement

The coastal communities are highly dependant on mussels as a major source of high-quality protein (Lasiak, 1992). The increasing size of the population can be an important source of stress on an ecosystem's sustainability, either directly or indirectly through reducing biodiversity (Margules and Pressey, 2000).

Co-management is recognized as a necessary approach for the conservation of marine resources. Although there has been research conducted at Sokhulu in KZN about mussel re-seeding, it is not known if the participatory approach used there will be appropriate in the EC. The participatory approach involves an establishment of a local co-management structure (Harris, 2000). The structure consists of community members; authority; researchers, and relevant stakeholders e.g. donors (see fig.11: 68). Its functions are:

- To present a good relationship between the user-groups and the authority.
- To make decisions with regard to harvesting of mussels.
- To see that the harvesting system agreed upon is adhered to via community-resource monitors.
- Improve networking with other relevant stakeholders.

The sustainable level of harvest has been agreed upon together with the user-groups involved. Experimental studies were conducted with the help of community members, with such studies involving surveys at different levels of harvest. Special emphasis was placed upon noting the effects on heavily utilized zones, hence the joint resource management committee decided upon agreement on an optimal harvesting system.

1.1.6 Research Question

Can the Sokhulu co-management system in KZN be applied to the EC mussel-reseeding project?

1.1.7 Aim and objectives of the study

Aim

The main aim of the study was to investigate the extent to which co-management principles are being put into practice in the 2 case studies, Sokhulu and Coffee Bay, as well as to assess the implication of the prevailing situation i.e. harvesting methods and control measures on the long-term sustainability of brown mussels (*Perna perna*).

Objectives

The study's objectives were to:

1. Review the Sokhulu mussel project in KwaZulu-Natal with respect to:

(a) Achieving its objectives, which are as follows:

- To determine the availability of mussel stocks,
- to determine the community's dependence on the resource and establish a pattern to be followed by the community in harvesting the resource,
- to promote good communication and co-operation between the user-groups and the relevant authority in ensuring effective conservation and utilization of the resource,
- to investigate experimentally in co-operation with user-groups methods of harvesting to maximize yields. The ultimate goal of the Sokhulu mussel project was to develop and facilitate a system of co-management between the user-groups and the relevant authority, which in this case is KZN NCS.

(b) The model of community participation involved.

(c) Its consistency with national and provincial coastal management policies and legislation.

2. Identify alternative mechanisms/models of community management.

3. Apply to the Coffee Bay mussel project the recommended approaches to be tested.

1.1.8 An overview of the study

There are four chapters in this thesis, which are as follows:

- The present chapter consists of an introduction to the research problem and also the methodology used.
- Chapter 2 is literature review, which supports the study and a conceptual framework within which the study is based.
- Chapter 3 contains of the results with their analysis and discussion.
- Chapter 4 consists of conclusions and recommendations. The appendices in this thesis are made up of a household questionnaire; an open-ended interview guide which are among the methods that were used to collect data for the study, and lastly locality maps showing the study areas also form the appendices.

1.2 RESEARCH METHODOLOGY

It is necessary to highlight the time frame of the study which was allocated 4 months i.e. from September 2001 to December 2001. The researcher started collecting the data from 10 September to 10 November 2001. The study consisted of a combination of techniques comprising qualitative, quantitative, literature review, open-ended interviews, household questionnaire, reviewing of existing reports and visual review and commentaries. This consists of information from primary and secondary data sources. The primary data refers to the use of open-ended interviews, household questionnaires and discussions with other people while secondary data refers to information from literature review, reviewing of existing reports, and visual review and commentaries.

A sample of respondents was chosen through purposive sampling for both study areas. Purposeful sampling refers to a non-probability sampling procedure in which the researcher used his judgement to select respondents that best meet the needs of the study (Bailey, 1982). This was driven by an assumption that a significant percentage of the

respondents are utilizing or used to harvest the mussels from the intertidal zone. Physical surveys of the activities taking place in the study areas were conducted. The purpose was to facilitate understanding of the situation and also to verify the information provided by the respondents. Where the researcher needed some clarity during HH questionnaire interviews, probing with the aid of some follow-ups on responses were made. This helped the researcher to get more information necessary for the study.

Since the perceptions of marine resource users towards co-management as the conservation strategy was the focus of the study, a wide range of issues were investigated with the use of survey methods (Sikhitha, 1999). A combination of research methods such as survey methods involving the collection of information on attitudes and opinions about a contemporary issue are then used (Babbie, 1992).

The study is more qualitative in approach but has been supplemented with some quantitative information. A qualitative approach has helped to gather a large amount of information by going into greater details on the cases that have been examined for the study. The study is both exploratory and explanatory in nature. It is explanatory in the sense that the “why” question of co-management application in brown mussel conservation is verified while on the other side, it is exploratory because examination of cases for the study have been described in detail (Bailey, 1982).

1.2.1 Methods

The methods used are as follows:

Literature Review

A review of relevant literature has been undertaken which helped the researcher by acceding to an understanding of the research topic by way of developing a conceptual framework. A conceptual framework refers to the researcher’s current map of the territory being investigated (Miles & Huberman, 1984). The review of the literature also

helped the researcher to become familiar with the past and present thinking surrounding the relevant concepts to the study. The literature used has been sourced with the use of internet sites, libraries, known researchers and individuals as well as academic institutions and other organizations. This also involved the reviewing of management reports and minutes of the meetings from both KZN and EC provinces. The reports gave a reasonable and reliable body of information that served as evidence in answering the research question. Reviewing the reports integrated the study in terms of the state of working knowledge of co-management strategy.

Open-ended Interviews

The open-ended interviews helped by addressing specific issues regarding perceptions and experiences about co-management as a conservation strategy for marine coastal resources. Some of the issues included finding out about the relationship between the relevant authority and the user-groups. For the purpose of what has been covered by the interview guide, Appendix 2:93 is attached.

Questionnaire

A HH questionnaire for the purposes of collecting data was developed (see Appendix 1:78). It enabled the researcher to probe and make immediate follow-ups on responses. The researcher met each and every respondent interviewed in person. This was the most efficient method as the study focused on rural areas where illiteracy rate is high and mode of communication is moderate to poor.

This has enabled the researcher to gather information through some field visits that were undertaken. The personal contacts with known researchers including individuals helped the researcher by sharing information regarding the study.

1.2.2 Sampling Procedure

A method that has been considered for gathering the necessary information required for the study was purposeful sampling. Purposeful sampling refers to a non-probability sampling procedure in which the researcher used his judgement to select respondents that best meet the needs of the study (Bailey, 1982). This was driven by an assumption that a significant percentage of the respondents are utilizing or used to harvest the mussels from the intertidal zone. The best population estimate of the whole Tshezi Tribal Authority at Coffee Bay is 8, 000 according to the mussel project report (Calvo-Ugarteburu, 2000). The researcher has not been able to find Sokhulu population estimation due to lack of documented information. The gathering of some historical information regarding the study through records and experienced individuals has also been undertaken.

(a) Households (HH)

The Sokhulu community was purposeful sampled for up to 30 HH. Each HH had an average of 6 individuals to make a total sample size of 180 individuals for the 30 Sokhulu HH selected. The sample mainly consisted of females with a small number of males. The age group of samples ranges from 25 to above 50. In each HH, a questionnaire was used to gather information for the study.

In Coffee Bay, 10 villages that form part of Tshezi community were selected out of 15 villages for the study. They were selected because of proximity to the coastline. Each HH is having an average number of 6 individuals. There are about 80 HH per village and this makes a total population of 4, 800 people in the 10 villages of Tshezi. There are 5 out of

10 Tshezi villages selected have direct access to the sea while the other 5 are about 6 kilometres away from the coast.

About 5 HH from each Tshezi village were randomly selected for the study. This made about 50 HH to be selected out of Tshezi 10 villages. The sample size of the 50 HH selected was 300 and this constitutes about 6,25% of the 10 Tshezi villages. The sample composition was made up of widowed old females i.e. above 50 years of age with children, married females without their husbands because of the migrant labour system and also because the men are mostly associated with animal husbandry, hence they were not available at the time of interview. The researcher selected the respondents without prior arrangements to see them. Only 1 questionnaire per HH was used. Respondents comprised of household members who harvested mussels. They collectively answered the questionnaire. Within the HH, it was found that most are middle aged (between 30 and 50 years old) to old (above 50 years old) females who harvest mussels.

1.2.3 Data recording

Data recording was done with the aid of note taking and by ticking the code category or filling in the appropriate space, which appeared on the questionnaire (see Appendix 1:78). The data collected was then clustered into related themes with the use of thematic criteria. The data was subjected into statistical analysis in order to test any significant differences between community groupings with respect to their perspective in co-management as a brown mussel resource conservation strategy (Sikhitha, 1999). Critical analysis of the people's perceptions will be detailed on chapter 3.

1.2.4 Research ethics

Some unethical behaviors such as trespassing into private properties or secretly recording people's comments without their consent were by all means avoided by the researcher, and this concurred what has been noted by Rosnow and Rosenthal (1996). In view of ethical imperatives, the respondents were timously consulted and given the details of the study. Consent from the communities including project managers was obtained but not in writing. During the process of conducting the interviews, the researcher was paying

attention to the respondents in order to build rapport and show respect. This enabled the researcher to answer questions that some of the respondents raised.

1.2.5 Limitations

In general, all studies face limitations and this study was not an exception. The number of questions in the questionnaire were many. It took between 30 to 45 minutes to complete one questionnaire. This created a scenario whereby interviewees got tired and bored towards the end of the questionnaire and hence their responses were not reflective of the real situation on the ground. Such responses were discarded and did not form part of the final analysis of the study's results.

Lack of proper funding was another limitation, which is likely that it had a slightly negative impact on the sample size of the respondents taken.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.0 Introduction

It has been widely documented that in Africa and other parts of the world, the management of natural resources has not lived up to the expectation of ensuring sustainability (Hara, 1996). More and more reports of poaching, logging, over fishing and other inappropriate utilization of natural resources are being reported (Hanna, 1998). To the understanding of the researcher, the reason for this may be because governments assumed a huge load that they can no longer carry on their own due to several factors. These factors include governments' inability to continue with their 'watchdog' role, changing global approaches on governance, worsening poverty levels, and enlightenment of communities as they begin to stake their claims on the natural resources. These and other factors have largely contributed to calls to reassess the appropriateness of existing approaches to managing natural resources (Wily, *undated*).

For a long time, the management of natural resources has practically been a preserve of government (Wily, *undated*) This trend, a legacy many countries adopted from the colonial era is largely blamed for mounting conflicts and unsustainable resource use practices (Hara, 1996). Calls to reassess the approaches of managing natural resources in the interest of sustainability have been growing over the years (IUCN, 1994). A common response that has been noted is the challenge to governments to forge relationships with various stakeholders including local communities and the private sector. This is the bottom line of co-management approaches of natural resources. A myriad of co-management approaches have been advanced, and prominent of these is the CBNRM and joint natural resources management initiatives (IUCN, 1999). A review of factors responsible for the shift towards co-management of natural resources is critical. It must be noted also that most of these co-management approaches have been tested mainly on

quick money-spinning natural resources such as game and forests (IUCN, 1994). Co-management for inland fisheries, especially within southern Africa is far from reaching the stage of game and forests (Kafakoma, *undated*). The same may be said regarding some coastal marine resources such as brown mussels (*Perna perna*).

Thus, there is a need for one to review the literature on decentralized approaches including related subjects with respect to management of natural resources. The review is necessary in order to understand what has been written on the subject under study. A preview of the national policy on sound coastal management and the various expectations of this new legislation will follow the review.

The literature review will then help in facilitating the development of a conceptual framework (see fig. 3:41) for the study. The experiences from the 2 case study areas will be analyzed with the assistance of this conceptual framework.

2.1 LITERATURE REVIEW

Sustainability

The concept of sustainable development resulted from the conflict that arose between development and conservation. The 3 big conservation oriented organizations, namely: International Union for Conservation of Nature and Natural Resources (IUCN); United Nations Environmental Programme (UNEP), and World Wide Fund for Nature (WWF) came up in 1980 with a World Conservation Strategy (WCS) with the aim of integrating the 2 aforementioned aspects (IUCN, 1994). The aim of the strategy is to preserve the genetic, species, and ecosystem diversity in accord with the human world (IUCN, 1994). There are 3 areas of high biodiversity interest that were targeted by the organizations, namely terrestrial, aquatic, and marine ecosystems.

Development and conservation as viewed in the traditional sense have been in conflict, mainly because conservation was understood as being the protection of resources, with development being portrayed as the use, or exploitation of resources (IUCN, 1994). Recognizing the need for both, the 3 organizations, namely IUCN, UNEP, and WWF jointly appointed in 1980 a commission to advise on development and conservation issues. In their report "*Our Common Future*", they emphasized the concept of sustainable development. This aims to improve the quality of human life while living within our ecological means (IUCN, 1994). This reflects a changed view of development, as it takes into account environmental concerns. It is compatible with a more enlightened view of conservation as the wise-use of natural resources.

The concept of sustainability basically involves, in addition to other issues, things like:

- Management of the human impact on non-human world with the aim of achieving the wise-use of natural resources for the benefit of both present and future generations,
- alleviation of the negative environmental impacts of economic development, and
- promotion of environmental education programmes (IUCN, 1994).

The environmental degradation and/or destruction of resources can impact negatively on development. This degradation is one of the consequences of high population growth (Wood *et al.*, 2000). Population growth is particularly evident in the eastern coast of South Africa where there is a noticeable growth in mussel resource consumption (Lasiak, 1992). The growth of the human population, which is linked to high fertility rates, especially in the world's poorest countries like South Africa (Wood *et al.*, 2000). Once the human population exceeds the carrying capacity, the possible results are changes in socio-economic factors, the latter of which will lead to unemployment, inequality of income, and ultimately to the loss of indigenous knowledge (Wood *et al.*, 2000). The loss of indigenous knowledge will exacerbate the unsustainable use of natural resources.

If wild resources are to be managed and their use moved towards sustainability for the national economy and local needs, then those charged with their management must address many issues. These issues are as wide-ranging as international treaties, domestic policy and legislation, rural community empowerment to manage natural resources, and law enforcement as well as research and monitoring. Such a holistic approach is difficult but a necessary one. The South African Government has revised some of the regulations controlling the use of resources to achieve sustainability (DEAT², 2000).

The challenge therefore lies in ensuring the survival of wildlife while meeting the needs of the people, especially those in rural areas. The use of wild resources occurs in South Africa, and will continue to do so. Irrespective of whether such use is for subsistence or commercial purposes, the forces that drive demand and consumption of natural resources

² The White Paper on Sustainable Coastal Development in South Africa recognizes the need for community participation.

have proven to be so resilient as to render most “protection strategies” futile or unaffordable in the long-term (Hanna, 1998). The challenge will be met only when economic institutional structures are put in place, which allow people to use and manage these resources sustainably (Makombe, 1994). In other words, there is a need to realize that protected areas alone cannot ensure the survival of many species, hence community participation (DEAT, 2000).

South Africa is a country rich in biodiversity. It is rated by IUCN as the third in the world. South Africa cannot afford to lose its biodiversity asset, hence there is a need to develop a national strategic action plan for effective biodiversity conservation. The action plan will involve as many stakeholders³ as possible. The livelihoods of many of South Africa’s people are dependant upon this diversity, which also forms the base on which much of the country’s development with respect to the tourism and fishing industries are built (DEAT, 2001/2002).

Brown mussels are regarded as common-property resources, over which a number of users hold rights of access and withdrawal (Ostrom, 1990). The promotion of a participatory approach rather than individual action is the central hurdle in achieving the sustainable utilization or sustainance of common property resources (Ostrom, 1990; 1992). Sustainable utilization of resources will ensure the resources’ continued value for an indefinite period.

Environmental Justice and Poverty

The term environmental justice refers to equitable distribution of natural resources and that all people should bear equal negative environmental impacts (Connelly and Smith, 1999). Environmental justice implies that the poor should also have access to resources and they should not be the ones suffering because of the impacts caused by the actions of the rich, and the rich must not benefit alone. This means all in all that environmental justice entail both economic redistribution and social transformation (Connelly and Smith, 1999).

³ The adjacent communities around the parks are one of the major participants in achieving sustainability.

With the alarming rate of human population growth, the environment, which we depend upon for survival, is degraded. The limited natural resources are drastically reduced and are unable to support the human population numbers (DEAT, 2001/2002). The variety of living things around us is one of the greatest wonders of life on earth. Unfortunately, this variety is being steadily reduced by the actions of people (DEAT, 2001/2002). The reduction of the non-human world is excessive and the situation is rapidly worsening. This has serious consequences for the future (DEAT, 1997).

The concept of environmental justice is introduced to lessen the damage that is caused by humans on the environment. It is difficult for the rural communities to comply with the principles of environmental justice because of the poverty factor. Environmental problems of the Third World, however, are associated with poverty, high population growth rates, overgrazing, desertification and pollution (Wood *et al.*, 2000). The root of poverty is unemployment. According to the report made, World Bank (1990) *cited in* May (1998): 26, poverty is defined as follows: -

“‘The inability to attain a minimal standard of living’ measured in terms of basic *consumption* needs or *income* required to satisfy them”.

When the HH or the entire community is unable to promote a better livelihood due to limited resources, it is regarded as poor (May, 1998). It is further mentioned that expenditure with the aim of meeting basic needs can be used as a poverty line between underprivileged and rich people. It is advisable that in order to measure poverty, monetary value measurement is recommended (May, 2000). Expenditure of less than R352, 53 per adult on monthly basis is used, as a measure to see poor HH while expenditure less than R193, 77 per adult per month is to measure ultra-poor. Poor in this case refers to poorest 40% of HH while ultra-poor as the poorest 20% of HH (May, 1998). According to Klasen (1996) *cited in* May (1998), if an individual cannot expend 1US\$ per day which is currently equivalent to R10, that individual is below the poverty line hence is regarded as poor. The measurements used here are for the economic poverty line and the rural communities are relying on subsistence activities like gathering of mussels for their livelihoods. It has been noticed that the rural areas are where most of the poor people in South Africa are coming from because of no stable income as a result of

unemployment, they depend heavily on subsistence agriculture and natural resource harvesting for their livelihoods (May, 1998).

Because rural communities are depending on natural resources for a portion of their livelihood, environmental degradation is excessive, and unless the trend can be reversed, the rate of biodiversity loss will increase. According to DEAT (1997), the word “biodiversity” a contraction of biological diversity, describes and encapsulates the variety and variability of life-support systems and natural resources upon which we depend on earth. Naess (1986) *cited in* Sessions (1991: 93-4), put the following as one of the eight basic characteristics of deep ecology, “Humans have no right to reduce the richness and diversity except to satisfy vital needs.” This shows that the non-human environment has a right to exist hence man needs to value other things as he/she values himself/herself. In order for the poor to comply, their participation in crucial policy debates about environmental problems is necessary (GRSA, 1998b). What will happen if we do not take immediate action? We will find difficulties in achieving the stable economic development. Ecological processes that support our daily lives will be lost completely.

Community-Based Natural Resource Management (CBNRM)

CBNRM approach is a system that encourages involvement of local communities in any decision related to the management of natural resources of which they are depending upon for their livelihoods. Some of the fundamental preconditions of CBNRM are as follows (Author unknown):

- A distinct community must have a well defined relation to a resource in question,
- the people’s diverse interests must be properly well-matched,
- the benefits of collective action must outweigh the costs,
- the ordinary people must be well capacitated,
- the community interest for the resource must be well suited with international, national, and local interests.

It has been noted in many parts of the African continent that the management of natural resources have been the function of the states, excluding the communities (Wily, *undated*). The policies and regulations that were in place in the 20th century had no

blessing from the community. Communities were regarded as visitors to their own land (Wily, *undated*). This was applicable mostly to terrestrial resources including wildlife and forests. The establishment of such forests reserves and wildlife parks was the result of forced removals of the surrounding communities (IUCN, 1999). Due to pressure from the communities, at the dawn of 21st century there has been a general lessening of the law enforcement by the state. The communities were now called to be represented in decision-making. The new forest laws in the African continent had created a way forward for the indigenous people to manage their own forest reserves (Wily, *undated*). This brings into focus the concept of CBNRM, which is a management strategy that has developed in response to the apparent inadequacies in past conservation and development practice (Hanna, 1998). For the proper and effective management of the natural resources, capacity building for the communities needs to be one of the objectives. According to Kafakoma, (*undated*), CBNRM recognizes that indigenous people have an important role to play in managing natural resources in general. Once the indigenous people recognize the economic value of the natural resources, community development will be uplifted through CBNRM approach (Wily, *undated*).

The failure of development in most African countries has lead to the need of adopting the more socially responsible methods of conservation management like CBNRM. CBNRM has evolved as a management strategy in the light of Africa's development crisis e.g. poaching of wildlife (Kafakoma, *undated*). The reputation of CBNRM in countries like Zimbabwe and Zambia is quite good because of the benefit-sharing schemes, which are employed by the approach. The success of this approach is assumed to lie in the thought that wild game is quickly-generating income, more than other resources like forests and aquatic resources (Nyambe, *pers. comm.*, 2001). A perception exists that CBNRM has got the capability to address the socio-economic and environmental development needs of a community in a sustainable manner. The indigenous people are encouraged to take the initiative with regard to management of the natural resources instead of top-down, government-imposed controls, which have proven to be a failure for the sound use of the resources (Kafakoma, *undated*). This was because the government initiatives were

difficult to implement and were not having the blessings of the ordinary people who are regarded as resource-users.

Resource management and protection

The degree to which the people are depending upon and manage the resource in question is the determinant factor of whether sustainability would be reached (Hara, 1996). The forest resources in Malawi have been disappearing and this is associated with dependence of most of the rural communities on the resource. The incapacity of institutional arrangements has been blamed for this ecological disaster, which then will contribute negatively on the people's livelihoods (Kafakoma, *undated*). Another factor is that Government officials are not properly rendering extension service to the local communities about what is expected out of them with regard to forestry policies and regulations. The assumption is that if extension services can be rendered, they will catalyze compliance by the resource-users (Kafakoma, *undated*). The management of the resource is purely a Government function and the communities are having no say with regard to the use of the resources, and because they are not involved, it is very difficulty for the user-groups to do any community policing to guard outsiders (Hara, 1996)

There are also other various factors, which contribute to the utilization of the forestry resources in Malawi. The following are some of the factors:

- Poverty,
- high population growth rate,
- conflict in policies dealing with natural resource management (Kafakoma, *undated*).

The poverty factor according to May (2000) includes the following:

- Alienation from the community,
- insufficient food supply,
- extended families, which leads to overcrowding,
- dependence on local energy resources e.g. wood,
- unemployment,
- family fragmentation.

To overcome the above factors, the Malawian Government has managed to call for the community involvement in any decision-making related to natural resource management. The communities have to manage their own resources. The use of indigenous knowledge in forest resource management is becoming paramount in community-based resource management systems (Kafakoma, *undated*). There is conflict between the Community By-laws and Government licences to regulate the use of natural resources. This is exacerbated by the lack of joint management from both parties. Therefore, according to Kafakoma (*undated*), it is recommended that for effective forest resource management in Malawi that joint management ventures be entered into by communities and government.

South African Context of Protected Areas

The South African situation is not very different from what has been happening to other African countries with respect to protected area management. The national parks were established at the expense of the indigenous people surrounding the areas (IUCN, 1999). Of greater concern, and probably more significant to this section, is to verify to what extent the decentralized approaches, of which co-management takes part, can effectively manage the natural resources, especially the brown mussels (*Perna perna*). Co-management is the sharing of authority and responsibility among government and stakeholders (IISD, 1997).

The South African protected areas had for a long time been at the interface of the imperatives of conservation and those of poor surrounding communities (IUCN, 1999). The legal and policy framework in which the areas operated was such that the surrounding communities were literally barred from entering the fence of the conservancy, unless as visitors but at a fee they cannot afford (IUCN, 1999).

Even where the parks take the form of private game ranches, there still exists the same hurdle of economic incapacities on the part of the surrounding communities (May, 2000). It is clear that the designation of an area as a specific type of protected area serves different purposes. In general, reserves are meant in helping to conserve the wildlife

therein, control access and utilization of resources, promote aesthetic, cultural, socio-economic, genetic and ecological values (Hanks & Glavovick, 1992).

Like other African countries, South Africa has been facing the problem of how best to conserve its natural resources. The answer has conventionally taken the form of legal prohibition. However, the solutions that have been put forward in the past by separating the surrounding communities from wildlife had not met this challenge (IUCN, 1999). The only 1 observation about conventional conservation efforts has been the almost exclusive emphasis on establishment of protected areas. National parks, and other protected areas including provincial game reserves have formed an essential component of conservation in South Africa and will continue to do so in future (DEAT, 2001/2002). Another feature is that the management has over the years been a responsibility of government alone to the exclusion of the ordinary people surrounding the parks (Hara, 1996). Experience of the researcher in working with protected area management in South Africa, shows that government has failed to stop people from using protected areas. This clearly justifies the need to involve ordinary people in resource management (IISD, 1997).

The implementation of well-intentioned legislation aimed at conserving wildlife has unfortunately antagonized the section of communities who live alongside wildlife (Hara, 1996). The communities adjacent to the parks are the ones who should be strong in lobbying for conservation in South Africa. The alienation of the communities has led to growing distrust in the communities (Hanna, 1998). The rural populations have in some cases been dispossessed of their land to pave the way for a conservancy, and sometimes having to eke-out an existence on marginal lands (IUCN, 1994). The result has been often a park or conservancies surrounded by people who:

- Are excluded from the planning for the area,
- do not understand or agree with its purpose,
- suffer crop, livestock and property damage from wild animals resident in the area,
- derive little or no benefit from the money invested in its establishment and management,
- do not support its existence (SARDC *et al.*, 1994).

In addition, the creation of protected areas has contributed in diminishing cultural values of the local people. This has led to conflict with traditional leaders who have historically been custodians of all natural resources. Another feature is the absence of indigenous knowledge in the management of the protected areas (IUCN, 1999). It is a known fact that the local people have their own systems of managing the natural resources, but these as highlighted before have completely been ignored in government imposed measures for protected area management (IUCN, 1999).

Essentially, the protected area system has meant cutting away the rural people from the natural resources with which they have co-existed for a long time (Hara, 1996). These people are the silent majority who are determining whether much of the country's wildlife will survive. The reality is that people will continue to use natural resources. As such, conservation efforts that continue to concentrate on biological solutions or repressive legislation while ignoring the socio-economic conditions are doomed (Makombe, 1994). Against this backdrop, the indigenous people have developed a distrust of both wildlife management authorities and the concept of protected area management in general (Hanna, 1998). This distrust is also evident from the lack of co-operation between ECNC and the Coffee Bay community in the Eastern Cape Province of South Africa:

On 17 October 2001, there was a celebration of the Marine Day, which was hosted at Coffee Bay. Participants included Environmental Education section of ECNC, Coffee Bay mussel project staff, UNITRA, traditional leaders, and community members, local primary and junior schools of Coffee Bay. The celebration was supposed to have been hold at one of the local community's venues but at short notice it was found that the venue was not available. The only venue available was Nature Conservation campsite but the community was not prepared to use the venue (Calvo-Ugarteburu, 2001). This really shows that rural communities surrounding the protected areas are still having the distrust against wildlife including authorities managing them (Hanna, 1998).

The rural communities see protected areas as being exclusive recreation areas for the minority privileged class of people (Makombe, 1994). A major reason has been the

glaring lack of attention those authorities have paid to the relationship between land-use, wildlife survival, and the rural people's livelihood. In the same vein, the appropriateness of policies that exclude humans from protected areas is highly questionable.

Marine resource use by coastal communities

This part of the section is going to give an international context as far as intertidal marine resource use by both developed and under-developed nations. A case of the South African situation is going to be presented in comparison to what is happening in other parts of the world. The purpose of this section is to differentiate whether mussels have only recently been utilized or if it is an old practice. Seeing that the resources are becoming depleted at an alarming rate, one needs to indicate whether such consequences are the result of the past and present harvesting strategies that are used.

The communities surrounding most coastal areas are just like the ones around protected areas for wildlife due to many opportunities provided by natural marine living resources. Some of these opportunities are related to large-scale commercial fishing, and also to some extent recreational use (Clark, 1990). Although recreational use does not concentrate on one area, instead making use of various areas within a short time with minimal impact as opposed to commercial operations, it can account for a large portion of the total harvest and can contribute significantly to economic activity through associated support industries and stimulation of tourism (Clark, 1990). Developed countries typically have policies and legislation, associated regulations, and implementation systems controlled by dedicated management agencies. It is of great importance that whenever an effective and efficient use of coastal marine resources needs to be achieved, a holistic approach as according to Clark (1990) and Charles (1994) needs to be considered (i.e. environment in its broader sense to include socio-economic; cultural and political aspects).

According to Charles (1994), the poor indigenous people around the world's coastal areas are neglected in favour of the commercial fishing and the opportunities that exist in servicing the recreational sector. The indigenous people are poor because of

unemployment hence they depend on the non-commercial utilization of natural resources to meet basic livelihood needs (May, 2000). Use of natural marine resources primarily for food is most common in under-developed countries but also often occurs alongside commercial and recreational fisheries in developed areas (Charles, 1994). It usually involves the under-privileged components of the community. Offshore activities have been a privilege of the most developed countries and in less developed countries, rural communities are mostly dependent upon localized inshore harvesting activities. According to Fall (1990), the dependence on intertidal inshore activities is generally poorly understood. It is because of this poor understanding by the relevant authorities that management systems of intertidal rocky shores are weakly developed. The subsistence fisheries are usually ignored in most cases by the managers because of lack of understanding of economic benefits offered by them (Satia, 1993). Berkes (1990) notes that subsistence activities are really good for the livelihood of rural communities. Because management of coastal marine resources has been a duty of government alone, rural communities excluded, the following were the consequences:

Over-utilization (i.e. exceeding bag limits) which led to unsustainability of the resources in question, conflict between relevant authorities and user-groups which then led to a mistrust between the two parties (Berkes *et al.*, 2001).

The situation in South Africa is not an exception to the above already described problems. People in South Africa from the intertidal zone have used the brown mussel (*Perna perna*) as food for many generations. This has been shown using archaeological records and studies (Lasiak and Dye, 1989; Lasiak and Field, 1995). Prehistoric shell middens, which have been discovered at various sites along the Transkei coast, indicate that people have been exploiting this resource for a couple of thousand years (Lasiak and Field, 1995). The utilization of mussels has happened possibly for thousands of years (i.e. 4750 BP). Western *et al.* 1994: 333 concurs with this statement by saying,

“Ethnic history is like a bow and arrow. The farther back ... bowstring, the farther the arrow flies.”

According to Lasiak (1992), the indigenous coastal inhabitants of the Transkei region supplement their predominantly maize-based diet with mussels. In Transkei, the Pondo

people were given an undertaking by the British government at the time of annexation that they would be able to continue harvesting shellfish including mussels – presumably for own consumption (Feely, 1989). This clearly shows that people have been depending on the resource to improve their livelihoods. In recent times, the local people have earned money from gathering and catching shellfish including mussels to sell to visitors, coastal resorts, and in some cases, to commercial operators. With the promulgation of the Marine Living Resources Act 18 of 1998 that controls the use of coastal marine resources in South Africa, communities are prohibited from selling without a commercial permit (GRSA, 1998a).

Within recent decades, the intensity of mussel gathering is thought to have increased markedly due to population expansion and the failure of crops during drought periods (Lasiak, 1992). This is believed to have led to the over-exploitation of the brown mussel resource in some parts of the east coast of South Africa.

The political history in South Africa has resulted in the poorer rural communities relying and subsisting on domestic natural resources for their livelihoods. On the other hand also, it enabled them at least partially into a capitalist mode of production as workers. The subsistence mussel gatherers in South Africa are among the communities that depend on coastal intertidal marine resources (brown mussels). A historical utilization of brown mussels by the indigenous communities and the ecological implications of such utilization are supported by an outstanding literature (Siegfried *et al.*, 1985; Hockey *et al.*, 1988; Kyle *et al.*, 1997a,b; Tomalin and Kyle, 1998; Branch and Moreno, 1994; Lasiak and Field, 1995). According to Castilla (1999), this has provided a key contribution to the international debate on community regulation and harvesting impacts on rocky shores. Because the regulations do not have the blessings of the people whom are suppose to drive the conservation of coastal marine resource, the non-compliance continued (Hanna, 1998). An example is along the KZN coast where prior promulgation of the Marine Living Resources Act, 18 of 1998 whereby people were denied access to the coastal resources, brown mussels not excluded. Many people were arrested because of poaching activities that were illegal exercises according to the regulations that were used

to control the marine resources (Sibiya, *pers. comm.*, 2001). According to Hara (1996), the non-involvement of communities in resource management result unsustainability of the resource in question hence conflicts between the user-groups and resource managers normally exists in such a situation.

The dependence on subsistence of coastal marine resources in South Africa overlaps with previously demarcated “homeland areas”. The offshore subsistence gatherers were prohibited to harvest coastal resources by the regulations that were in place unlike their inshore commercial harvesters counterparts (Feely, 1989, unpublished). In many ways the situation surrounding subsistence gatherers both reflects and provides an illustration of other political maladies in South Africa, and the process underway to redress the problems has relevance in the broader social context (DEAT, 2000).

Specific concepts in resource management

According to Oakerson (1992), the specific nature of the resource in question can determine how that particular resource can be managed whether through participatory or individual action. Oakerson (1992) identifies some key concepts of understanding the nature of the resource. The following are the concepts:

- Jointness, which refers to the potential of the resource to support multiple joint users. In this case, it shows that the more the resource is being harvested, the more it becomes available.
- “Exclusion”. Oakerson, 1992 takes the nature of the resource and the technology available as specifying whether or not the resource can be regulated. Rather than having a minimum number of individuals harvesting the resource, he questions whether the resource itself can be amenable to excludability i.e. not to be touched.
- The last concept drawn upon is that of divisibility. It means in this case whether/or not the resource is divisible into parcels. For example, is the mussel resource divisible amongst individual right holders, or to a group of people, or to a large geographical area? For analysis of brown mussel resource management, it is essential to specify boundaries, which are appropriate for the resource. The physical nature of the resource may affect the decision making arrangements set

up to manage the resource, the behaviour of the user-groups and the final outcome of the management of the brown mussel resources.

Towards co-management approach

Whenever one needs to take a co-operative management decision about the resource, the environment needs to be considered in its broader sense i.e. socio-economic, cultural, political and biophysical aspects. According to MacDonald (2000), resource management should be addressed once collective-choice rules have been established. According to Ostrom (1992), the key to avoiding the 'tragedy of the commons' lies in employing a participatory approach rather than allowing independent actions. A participatory approach is regarded as the best for common-property management. Its emergence depends on the benefits of participatory behaviour being greater than the ones of pursuing individual activity.

According to Brosius (1997), the following are some of the reasons for the participatory approach to management of brown mussels as one of the coastal marine resources:

- Due to lack of personnel in most government departments, collection of data as well as monitoring and enforcement of regulations tend to be inappropriate,
- greater levels of compliance of the user groups with the regulations,
- the knowledge with respect to the biology of the marine system is gained and this helps the communities to understand the functioning of the system,
- the community becomes part of the decision-making for sustainability of the marine resources,
- the property rights of the community are easily defined,
- a good relationship between the relevant authority and user groups is enhanced,
- people's livelihood becomes improved.

Since in most countries in the African continent the management of resources was the government's responsibility, in a study about fisheries' management, Hara (1996) stated that non-involvement of local community had a negative effect on the long-term sustainability. The regulations that were in place were not taking into account the

people's needs. The results were low levels of compliance, and ineffective controls on exploitation (Hanna, 1998). As a result, interest in decentralized management approaches has increased. The involvement of user-groups (communities) in resource management is seen as the best option for effective and efficient management of the resources. By considering that co-management is the sharing of authority and responsibility among government and stakeholders (IISD, 1997), the new Marine Living Resources Act 18 of 1998, which came into effect on 1 September 1998 in South Africa recognized the involvement of communities in resource management for the first time (KZN Wildlife, 2001).

Attributes for co-management

By involving communities in any development project, they become responsible and able to define their needs. In this way, they see themselves as having efficient control over the process and develop means which are then used to solve process related problems in order to meet their needs (Brosius, 1997). Now, more than seeing themselves as strangers, they feel ownership of the project. As noted by Renard (1994) *cited in* Brosius (1997), the carrying out of activities in management of common property resources from American example, was done by people belonging to the same social group. Ostrom (1990; 1992) and Runge (1992) *cited in* ICLARM & NSC (*undated*) also further acknowledged that for good and sound co-operation among co-management team members, there are two key attributes that catalyses the system:

- if the community members in a team are showing high similarities with respect to socio-cultural, economic interests,
- if most of the community members are highly dependant for their livelihood on the resource in question.

Indigenous knowledge in resource management

The indigenous knowledge (IK) is normally suppressed by the modern, western knowledge in co-management system (Howes and Chambers, 1980 *cited in* Brosius, 1997). Therefore, it is suggested that the indigenous or traditional knowledge needs to be recognized to enhance active participation. Whenever holding meetings, local members

should be given a chance to express their feelings through following participatory rural appraisal (i.e. PRA) procedures. When considering both failure and the success of most co-management projects, the IK levels need to be checked. Some key questions need to be also answered (ICLARM and NSC, *undated*). These are some of the questions:

- Why are some co-management projects are successful, while others are a failure?
- Why do some co-management projects last for a long time?
- How can the success rate be improved?

It has been noted that some attributes like boundary definitions, resource stock, social resemblance of the community may in a way contribute to the failure or success of co-management projects (ICLARM and NSC, *undated*). It is further stated that by looking at relationship with patterns of interaction and outcomes carefully, it is possible to foresee whether the project would be a success or not.

Media coverage of the Sokhulu mussel project

The participatory approach, which is employed at Sokhulu in the mussel rehabilitation project, has gained some publicity (*Natal Witness*, 2001). This is associated with achievement with respect to its objectives that were set before it started. The Sokhulu mussel harvesters are now able to understand the mussel resource productivity (*Natal Witness*, 2001). It is now easy for the relevant authority as resource use managers to properly enforce the regulations. The communities themselves at Sokhulu are able to apply their indigenous knowledge skills with respect to wise use of the mussels along their coast (*Natal Witness*, 2001). Dr. Harris, the initiator of the project is very happy with success of the Sokhulu project. She further said, this was intended to show to what extent sustainability with community involvement could be a success. Now, seeing that the mussel resources are sustainably utilized because of integrating IK and scientific knowledge, this can be also applicable even to other parts of the country (*Natal Witness*, 2001).

It was not easy to reach the stage at which the project is now. During the data collection the Zulu women who are mostly the resource gatherers were reluctant to be part of the project. This delayed the project, and another factor that contributed to the delay was the

cultural rules where women, before taking any step, need to receive the go ahead from the husbands (*Natal Witness*, 2001). The report shows that the majority of the participants are women.

Some highlights about the Coffee Bay mussel project

The general trend of the progress of the mussel rehabilitation project at Coffee Bay is currently moving at a chameleon's pace. Initially the communities started by rejecting the project. The reasoning behind their rejection was that the ECNC is intending to close completely the coast for subsistence gathering (Calvo-Ugarteburu, 2000).

The project manager has highlighted the need to establish a co-management system with the community. It is up to the community to take the lead. The committee was taken to Sokhulu to share ideas about the approach. They all seem to be impressed about the participatory approach followed at Sokhulu. Now, they need to persuade the rest of the community (Calvo-Ugarteburu, 2001). All that is delaying the establishment of the joint mussel resource management committee is the mistrust between the relevant authority (ECNC) and the community that still exists (Calvo-Ugarteburu, 2001).

General livelihood strategies in South African rural areas

The natural resources in South African rural areas are a basic component of local subsistence strategies (IUCN-SA, 1999). The local people's perceptions of benefits arising from the natural resource are expressed within the ambit of their subsistence needs. Thatching grass (*Cymbopogon plurinodis*), fuel wood, non-timber forest products (NTFP's), building materials, water, wild game, and fish are some of the major benefits from natural resources (IUCN, 1999). In rural areas the supply system is based on affordability and the natural environment of the surroundings. The establishment of protected areas in South Africa, introduced restrictions on the activities of the surrounding communities. The most common activities are hunting, fishing, subsistence farming as well as ritual, and traditional purposes (IUCN, 1999).

The rural local subsistence strategies mentioned on the above paragraph have failed to raise the people's living standards (Binns, 1995). They have failed because of top-down approaches, lack of consideration for indigenous knowledge (IK) and disregard for local conditions by development planners (Binns, 1995).

The composition of rural household's livelihoods includes (Carter and May, 1998):

- Income either from primary or secondary labour. In this case primary refers to income generated through direct selling of commodities while secondary is about getting paid through employment.
- Dependence on remittances eg. income through migrant labour system.
- Subsistence agricultural production.
- Welfare payments i.e. either through social pensions or disability grants.

It has been found that in most rural communities, women are the most affected individuals by poverty (Carter and May, 1998). In many instances they are found responsible for raising the young unlike their male counterparts who spend most of the time on animal husbandry or in migrant labour. In order to fight poverty, women have been involved in various livelihood-raising activities. Some of such activities are mussel harvesting which serves as safety net to famine. Community gardening is also relevant as a strategy for food production to fight poverty (Carter and May, 1998).

National Coastal Management Policy preview

The South African Constitution, Act 108 of 1996 calls for co-operation between the various spheres of government and emphasizes the need for public participation in governance (GRSA, 1996). More specific to marine coastal resource conservation, the department of Environmental Affairs and Tourism has a policy on Sustainable Coastal Development in South Africa (DEAT, 2000). The policy has a number of goals and objectives on governance and capacity building that call for community participation in activities related to sound coastal management. The policy builds upon the South African Constitution and National Environmental Management Act, 107 of 1998 to come up with

needs for an effective participatory approach (GRSA, 1996 and GRSA, 1998b). Some of the key issues, which are addressed by policy objectives include:

- Promotion of public awareness.
- Participation, and pride.
- Community involvement.
- Partnership enhancement between relevant authorities and civil society including looking at the improvement of relationship between communities and conservation agencies (see fig. 4:44).

The policy lays out a framework for national, provincial and local coastal management that specifically encourages integration and co-operative governance. As a result of these recent policy and legislative changes at a national level, there is an increased emphasis on integrated and co-ordinated coastal management (DEAT, 2000). Implicit in policy and legislation is the notion that civil society will have to increasingly assume responsibility for protecting and managing the use of marine coastal resources.

2.2 CONCEPTUAL FRAMEWORK

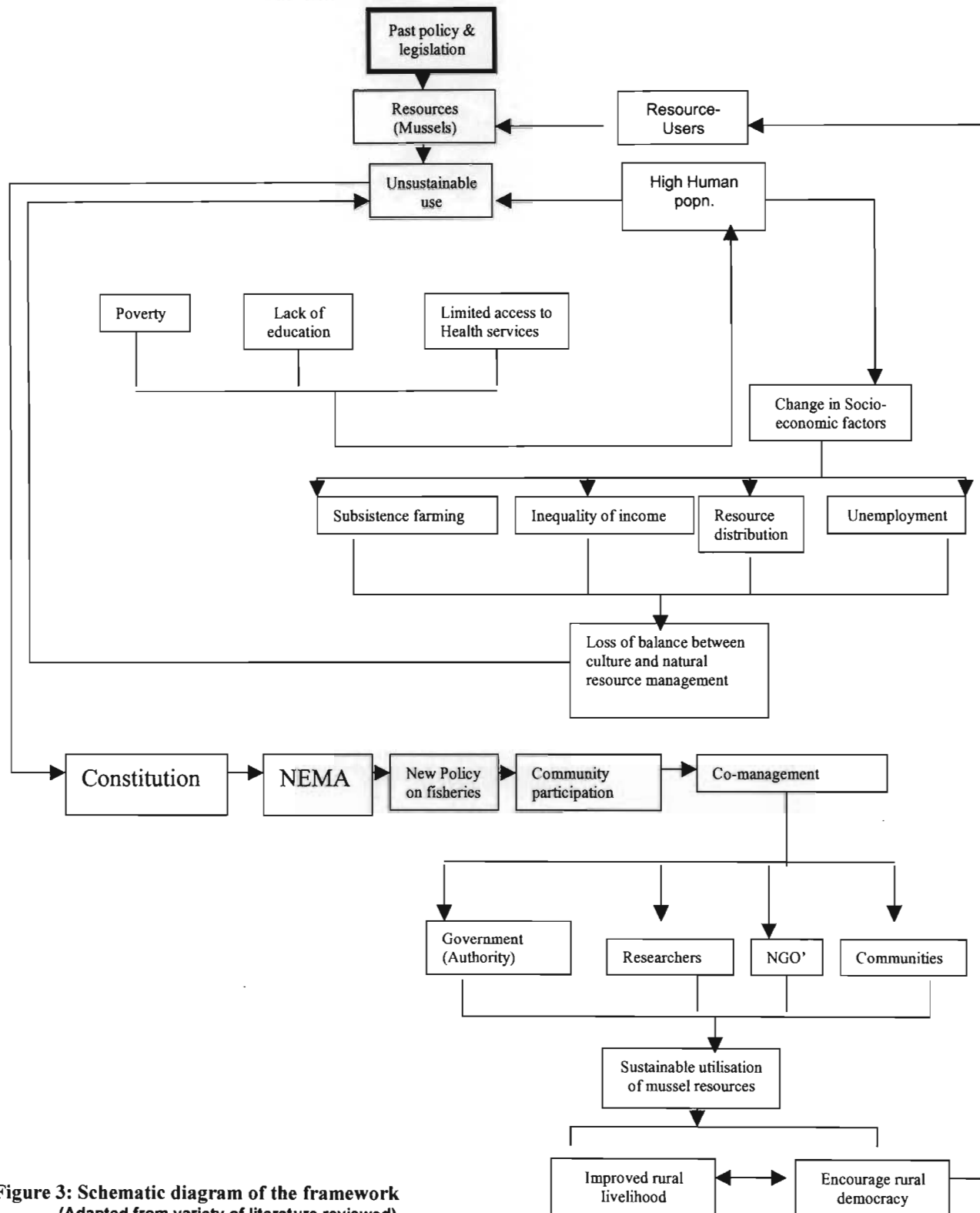


Figure 3: Schematic diagram of the framework
(Adapted from variety of literature reviewed)

The purpose of this part is to introduce the conceptual framework for the study. A conceptual framework could be described as the researcher's current guide to the territory being investigated (Miles & Huberman, 1984). In other words, this part deals with the thinking behind the study. The main issue to be analyzed in the conceptual framework is to determine what factors lead to mussel resource unsustainability, and with what consequences, followed by steps to be taken to overcome the latter. The framework presented in figure 3:41 is intended to allow a clear vision of how all the various concepts come together, and other components to explore how the research problem can be tackled.

Mussels are heavily exploited along the KwaZulu-Natal and Wild Coast by both recreational and subsistence gatherers (DEAT, 1997). Prior to the promulgation of the National Marine Living Resources Act 18 of 1998, mussel conservation and utilization was largely effected by centralized policies, without the blessing of the communities (Hanna, 1998). The use of licences, quotas, bag-limits, and closed and open seasons for harvesting altered the way mussels were utilized by the community for their livelihood (Attwood *et al.* 1998a). The past inadequacy of government legislation that was in control of coastal marine resource use is central to the unsustainable use of mussels (Hara, 1996).

Poor communities are normally located in areas where development is likely to be impeded by the sensitivity of the environment (Wood *et al.*, 2000). These communities are believed by many researchers to be the source of resource unsustainability especially when the traditional system of resource management break down as a result of socio-economic change (Wood *et al.*, 2000). Inequality of income and resource distribution has received much of the blame for unsustainable use of resources e.g. mussels. The human population growth rate in South Africa is leading to the unsustainable use of natural resources. The growth rate of human population in the 2 study areas is rooted in a number of factors. The factors are as follows:

- Poverty,
- lack of education,

- limited access to reproductive health services etc.

In many cases, poverty has been linked with poor resource management e.g. brown mussels as in the case of Coffee Bay (Wood *et al.*, 2000). Most of the literature reviewed has illustrated that the top-down approach has failed to effectively and efficiently manage and conserve natural resources e.g. coastal marine resources, brown mussels (*Perna perna*).

High population growth according to Wood *et al.* (2000) is linked to high fertility rates, especially in developing countries like South Africa. Local population growth is believed to directly affect the use of coastal marine resources and their degradation hence a strategy to conserve such resources is highly recommended (Wood *et al.*, 2000). The new legislation enacted for marine fisheries in South Africa (RSA, 1998a) was aimed at correcting past inequalities with regard to access to resources, and therefore presented a major opportunity for fishing communities who had been marginalized or excluded in the past. Links could be established with other policy processes, including the White Paper on Sustainable Coastal Development in South Africa (DEAT, 2000). According to GRSA (1996) and GRSA (1998b), the White Paper on Sustainable Coastal Development builds upon the South African Constitution, Act No. 108 of 1996 and National Environmental Management Act, 107 of 1998 to come up with needs for an effective participatory approach (see fig. 4:44). Some of the key issues that need to be addressed by the policy objectives are: promotion of public awareness, participation and pride, community involvement, and partnership enhancement between the relevant authority and civil society, including looking at the improvement of relationship between the communities and conservation agencies.

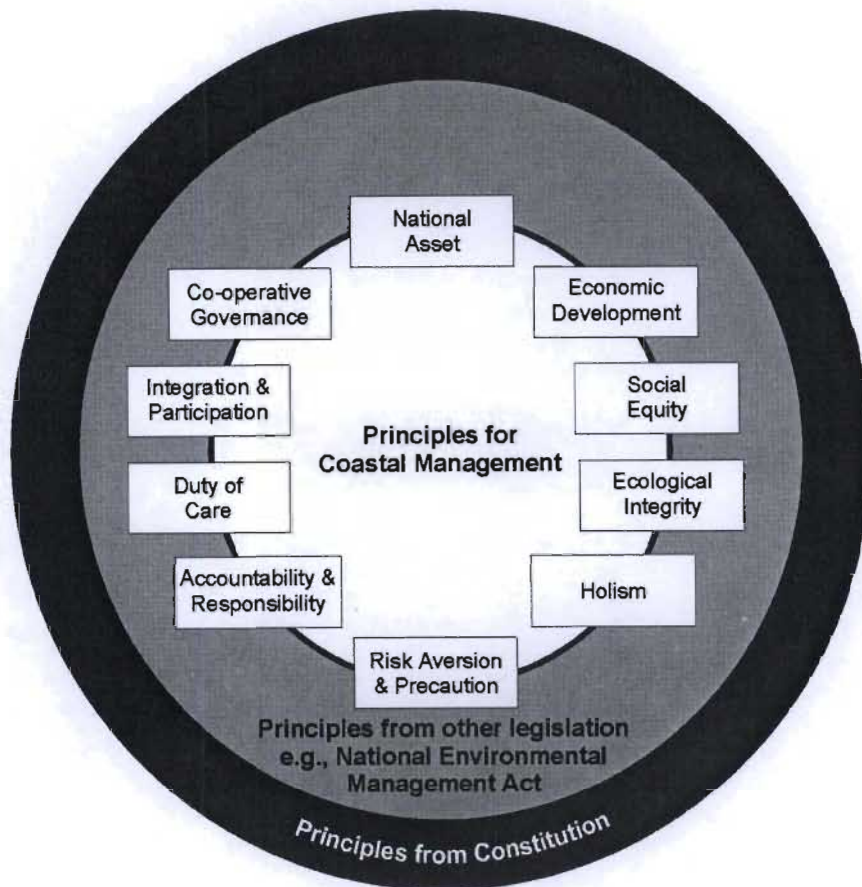


Figure 4: Principles for Coastal Management

Source: Department of Environmental Affairs and Tourism, 2000.

Given that subsistence fishers are by definition “the poorest of the poor”, they typically have been marginalized historically and often live in under-developed areas, where they will in many cases be the targets of coastal poverty-alleviation and development initiatives (Western *et al.* 1994). The assumption is that if mussel co-management structure can be established at Coffee Bay, communication enhancement with the ECNC as the provincial relevant authority can result (IISD, 1997).

A Sokhulu case study is reviewed relative to the policy processes mentioned already, taking into consideration the stakeholder participation to see if it is consistent with policy and legislation (see fig. 5: 46). The purpose of the Sokhulu mussel co-management project, which started officially on 1 June 1995 by Dr. Harris of KZN NCS was to

investigate the extent and impact of subsistence utilization along part of the east coast in KZN, to provide subsistence gatherers with legal access to a traditional resource, and to facilitate the establishment of co-management of the mussel stocks by the subsistence gatherers and management authorities (see fig. 11:68). An integral part of this project has been the implementation of participatory experimental harvesting, aimed at developing a system of sustainable subsistence mussel utilization and building capacity within the community for participation in management decisions (Harris, 2000).

The Sokhulu project is of particular current relevance because it has practically applied the principles of Marine Living Resources Act, No. 18 of 1998. The act recognizes user-groups (communities) as a new sector, and encourages their participation in the management of coastal marine resources, brown mussels not excluded. Reviewing the Sokhulu project by taking into consideration stakeholder participation and management will facilitate the making of recommendations for the Coffee Bay project (see fig. 5: 46). What is also considered is whether Coffee Bay's past problems in managing intertidal resources will be solved by the approach applicable to Sokhulu (see fig. 5: 46).

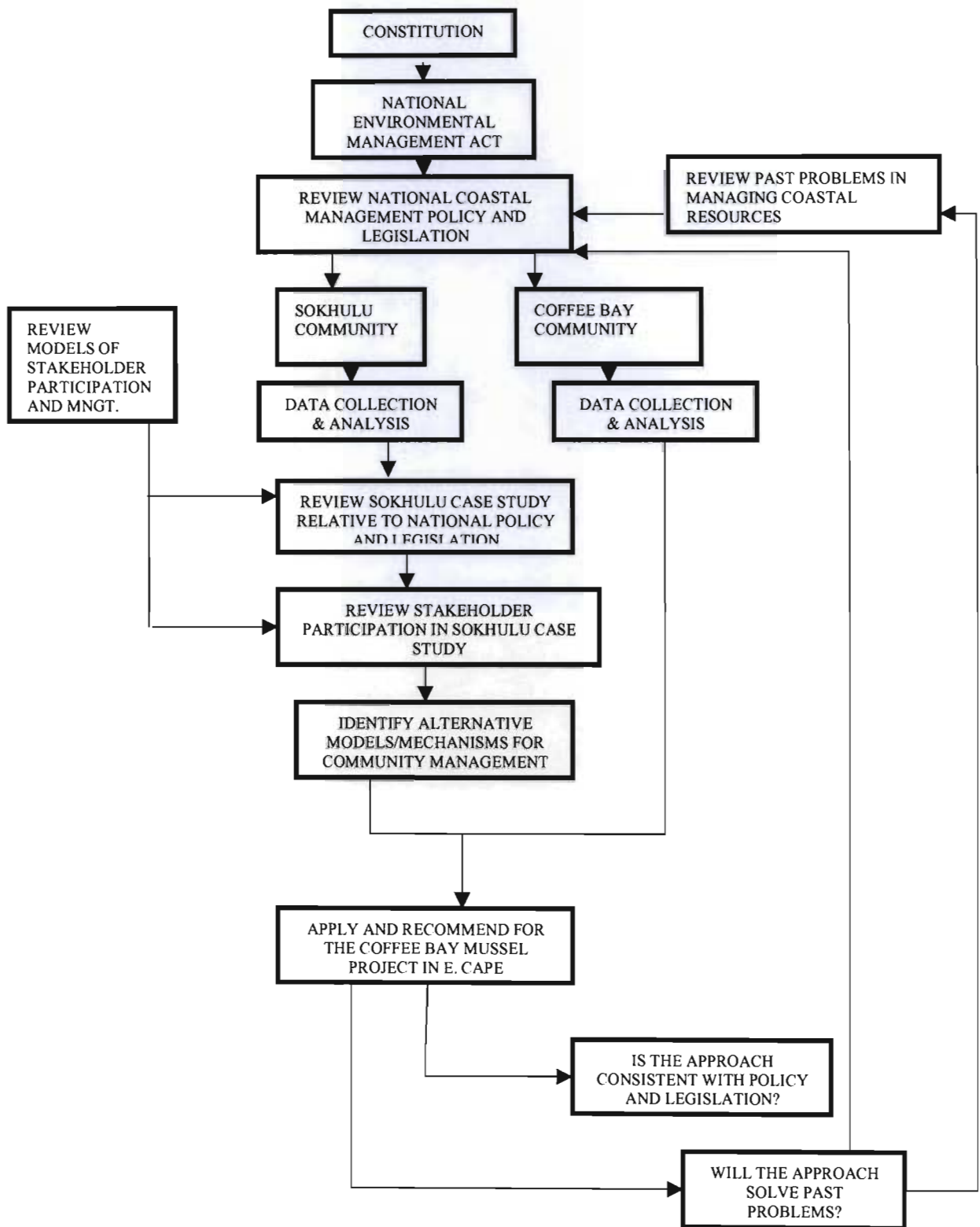


Figure 5: Research process diagram

2.3 Conclusion

The review of literature with respect to the study has been provided. The literature helped the researcher to develop a conceptual framework for which the study is based. In conclusion, the past practices entailed denial of local people access to, and use of natural resources contained in protected areas that were created in line with colonial policies. In many African countries, South Africa not excluded, those practices were given impetus by the legal, and policy framework that was introduced with the on-set of colonization. It has been also noticed that particularly in South Africa, after the 1994 democratic elections, policy reforms, e.g. legislation on Coastal Sustainable Development (DEAT, 2000), were not immediately made, therefore old style forms of government persisted for some years.

CHAPTER 3

RESULTS AND DISCUSSION

3.0 Introduction

Information gathering relating to the co-management system as a strategy for conservation of coastal marine resources, e.g. brown mussel (*Perna perna*) was undertaken via a household questionnaire (Appendix 1:78) that was developed based on the following information:

- Demographic data including income status (socio-economic circumstances),
- growing of crops and vegetables,
- keeping of livestock,
- shellfish harvesting (nature, and mode of use of mussel resources),
- information about the mussel project(s), and/or perceptions about co-management system including current management systems, and problems.

An open-ended interview guide was also developed (see Appendix 2:93) as a means of data collection from relevant authority officials, and researchers. The method of data collection was a combination of qualitative, and quantitative approaches. This resulted in the two approaches to be used in analyzing the findings. Quantitative information will refer only to the questionnaire data. Analytic comparisons made through the description of data were one of the tools that were used in the analysis with also manual analysis included.

Since the study is taking a comparative approach, Sokhulu and Coffee Bay communities were interviewed separately. The questionnaire respondents were of three categories,

namely: households sampled were 30 in Sokhulu i.e. $SKn_1=30$ and for Coffee Bay households were 50 i.e. $CBn_1=50$. Resource managers including researchers, and committee members plus monitors were 4 individuals at Sokhulu i.e. $SKn_2=4$ and also the same group for Coffee Bay were 4 i.e. $CBn_2=4$. The open-ended interview respondents at Sokhulu were 2 individuals i.e. $SKn_3=2$ and also for Coffee Bay the same group were 2 i.e. $CBn_3=2$, this included only government officials (relevant authority officials). A total of 80 respondents were interviewed using the household questionnaire (Appendix 1:78). Each HH is having an average of 6 people both Sokhulu and Coffee Bay. They collectively answered the questionnaire in each HH. The respondents range from 25-29; 30-50, and above 50 years of age. In addition to the questionnaire, information was also obtained by reviewing the relevant literature. The use of statistics in the analysis by testing for any significant differences between community groupings with respect to their perspective in co-management was employed.

3.1 RESULTS

The following is the outcome of the data collected:

3.1.1 Demographic data

The following aspects of biography were determined:

Age; gender; marital status; education; occupation (income); duration of residence in the study area; number of people per household (see Appendix 1:78).

- Age

Table A: The sample of people interviewed at both Sokhulu (SKn₁=30) and Coffee Bay (CBn₁=50) comprised the following age groups:

Age group	Sokhulu (SKn ₁ =30) No. (%)	Coffee Bay (CBn ₁ =50) No. (%)
25-29	8 (26.7%)	13 (26%)
30-50	19 (63.3%)	33 (66%)
Above 50	3 (10%)	4 (8%)

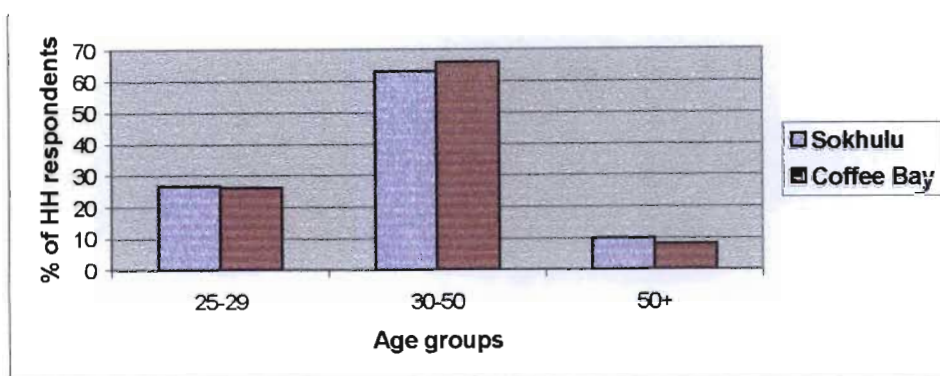


Figure 6: Bar graph showing the age group household respondents at both study areas

- Gender

Table B: The proportion of male to female interviewed at both Sokhulu and Coffee Bay was as follows:

Gender	(SKn ₁ =30)	(CBn ₁ =50)
Male	7 (23.3%)	14 (28%)
Female	23 (76.7%)	36 (72%)

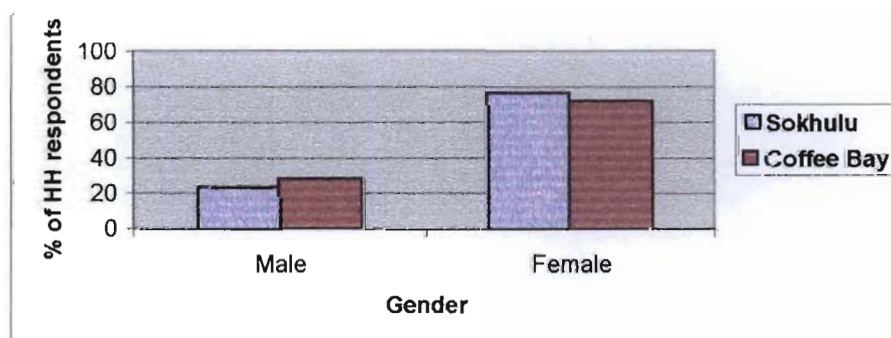


Figure 7: Bar graph showing gender of household respondents at both study areas

The small number of males in both study areas is associated with the migrant labour system. Also because males are not responsible for keeping the HH, but instead are more responsible for animal husbandry, at the time of sampling the men were mostly unavailable.

- **Marital status**

The marital status of the age groups was differentiated. The age group from 25-29 were mostly all single, never married. For Sokhulu ($SKn_1=30$), the number was 8 (25%). Comparing to Coffee Bay ($CBn_1=50$), the number was 13 (26%).

The age group from 30-50 were mostly married but without their husband because of the migrant labour system in both study areas. For Sokhulu ($SKn_1=30$), the group was 19 individuals (63.3%) while at Coffee Bay ($CBn_1=50$), there were 33 individuals (66%).

The age group above 50 at Sokhulu ($SKn_1=30$) was mostly widowed females living without a partner and this was also applicable even at Coffee Bay ($CBn_1=50$). The number for Sokhulu was 3 (10%) while for Coffee Bay, it was 4 (8%).

- **Education**

In both areas, the age group 25-29 had received some school education, 25% of whom had standard 8 or standard 9.

The age group from 30-50 was mostly ranging from no schooling to primary education (Sub A – Std 4) and very few attempted junior school (Std 5 - 7). None had secondary or tertiary education. This is applicable to both study areas. Sokhulu ($SKn_1=30$) showing 19 (63.3%) and Coffee Bay ($CBn_1=50$) 33 (66%).

For both areas, all the individuals in the age group above 50 had no formal education.

- **Occupation of respondents**

In both areas, the vast majority said they were unemployed. The figures for both Sokhulu and Coffee Bay were 77.5% and 76 respectively. When asked to elaborate, many explained that they were either housewives, getting pension of about R560 per person/month or out of jobs and others never worked. Only a small number of 22.5% from both areas that indicated to be temporarily employed or get seasonal jobs.

- **Duration of residence in the study area**

For Sokhulu, all age groups inclusive, when asked about their duration of residence in the area, a greater proportion, i.e. 27 (90%) of the respondents, said they had lived in the area for less than 20 years. Only 3 individuals (10%) who were above 50 had lived in the area for more than 30 years. This may be associated with females who were married from other areas, as a large number of respondents were female.

For Coffee Bay, a small number indicated to have lived in the area more than 30 years, 4 (8%). This is mostly the female group above 50 years. The greater proportion of 46 (92%) said they had lived in the area for less than 20 years. Most indicated that they came from other nearby areas for marriage or getting kraal sites in the case of males.

- **Number of family members per household**

In both study areas, households have an average of 6 individuals.

3.1.2 Growing of crops and vegetables.

For Sokhulu, the majority grows maize 25 (83.3%) while 5 (16.7%) in addition to maize; also grow potatoes, and sometimes spinach/cabbage. In the case of Coffee Bay, 46 (92%) grow maize as a major crop while only a small portion 4 (8%) are growing potatoes, spinach, and cabbage.

3.1.3 Keeping of livestock.

For Sokhulu, the majority does not keep livestock like goats, sheep, cattle but they do have chickens, 27 (90%) while 3 (10%) they possess some livestock like cattle and sheep with chickens also. In Coffee Bay, about 45% that own livestock and also 55% have chickens. Both areas indicated that it is for subsistence purposes only.

3.1.4 Shellfish harvesting (nature, and mode of use of mussel resources).

To establish the nature, and mode of use of mussel resources, the following information was extracted:

- **Do you harvest shellfish?**

For Sokhulu, 25 (83.3%) were yes while only a small percentage 5 (16.7%) said no. Even those who said no, they mentioned that they get mussels from those who collect. In the case of Coffee Bay, 40 (80%) said yes while 10 (20%) said no. Those who said no were mostly from the 6km away from the coast but they do eat if supplied by their relatives.

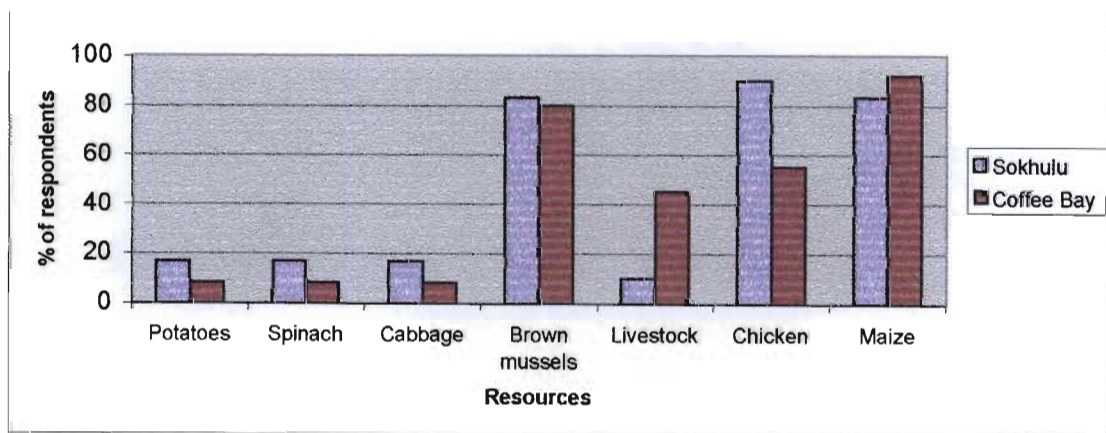


Figure 8: Comparison of the 2 areas with respect to percentage of respondents using different resources

- **Species of shellfish targeted?**

In both study areas, for those who collect, they mentioned that brown mussel (i.e. *Perna perna*) is most favoured because of its easy access to get at the intertidal zone at low tide. Asked what do they collect for? All said for eating and because of the new fisheries

regulation saying that if they don't have commercial permits, they cannot sell hence they all consume.

When asked about the portion of mussel forming the food supply, Sokhulu indicated 12,5% while Coffee Bay was 12% or less in both areas depending on sea condition and mussel availability. When asked about whether mussels are decreasing, the respondents in both areas indicated that mussels have decreased because of the increase in the number of people consuming them.

- **How long have you been harvesting?** They all indicated in both areas that it has been for many years. Although they are mostly new to the areas, they are having some stories from the older people that coastal communities were harvesting mussels for a long time.

3.1.5 Information about the mussel project(s), and/or perceptions about co-management system including current management systems, and problems.

Respondents from Sokhulu when asked about the mussel project's success, all indicated that with the involvement of the community, the project seem to be successful. When they asked how, they all said mussels have settled in some of denuded rocks. When asked what caused that, they said because of the closed and open season, and issuing of regulatory permits for harvesting which community resource monitors enforce employed specially for looking on the resource-usage. When asked about the co-management system which is employed in the case of Sokhulu, respondents all mentioned that it is a good system because they are involved, and in addition they have been taught about the general biology of mussels and how long it takes to reach adulthood and they learnt some more other technicalities involved in conservation of mussels resources. In the case of Coffee Bay, all seem to be aware of the mussel project but about its success, they all had nothing to say because they don't see any established mussels in the rocks. In the case of Coffee Bay, were not sure how the system of co-management is working and they

showed that there is mistrust between the relevant authority (i.e. ECNC) and the community that still exists.

In addition to the household questionnaire, committee; monitors; resource managers for both Sokhulu and Coffee Bay were also interviewed (see Appendix 1:78, section 1.7). the following information was extracted:

- **Project's purpose?** In both study areas, the respondents said the purpose is for mussel recruitment in denuded rocks.
- **When asked about sustainability,** the answer for Sokhulu was that the mussel resource is sustainably utilized. They all said because of the exercise of powers by community resource monitors, bag limits were adhered to. This is also associated with the employment from the project. In the case of Coffee Bay (CBn₂=4), they all said it is the beginning of the project, the reseeded rocks are not yet ready for harvesting and no decisions had been taken by the committee concerning mussel harvesting. They only look at the reseeded rocks. When asked about co-management, they said since it is in the early stages, there is no such structure unlike at Sokhulu.

For the open-ended interview guide, there was a general positive response about co-management system. Both parties interviewed at Sokhulu (SKn₃=2) and Coffee Bay (CBn₃=2) showed that the co-management approach has seem to be successful in terrestrial (wildlife) conservation, therefore even marine resource conservation would be successful if it is having the blessings of the community.

3.2 DISCUSSION OF THE RESULTS

The research findings from both the open-ended and closed questions have been presented in this paper. Now, this part will try to base the discussion of the study on the findings, also taking into consideration the study's assumptions, which have been laid down already. The purpose of the study will be detailed in this part as the main subject lies within it. In the context of this study, an investigation of the extent to which co-

management principles are being put into practice need to be revealed. This will be shown by drawing experiences from Sokhulu mussel project, which is one of the case study areas that has been examined (refer to fig. 5: 46).

The study provided an opportunity for the collation of information related to the co-management strategy for brown mussels, which are one of the coastal marine resources through the use of the case study areas.

3.2.1 Demographic information gathered

With respect to age and gender, in both study areas, the age group 30-50 was a majority (see table A: 50 and fig. 6: 50) and this implies that most of the harvesting of mussels along the coast for feeding the family is done by this age group. Therefore, it is recommended that this is the group that needs to be mostly targeted for any information related to the mussel resources. The youth followed, with small number of old people in both areas. Most of the youth are in the position of getting jobs while a small number of old people are associated with the life span. With respect to gender, females are the most dominant group in both areas (see table B: 50 and fig. 7: 50). This implies that most of the harvesting is done by the females (*Natal Witness*, 2001). The small number of males involved in mussel harvesting in both areas does not derive from cultural reasons. Rather, they are more responsible for animal husbandry and therefore do not spend time on the coast. Females are the ones who make sure that the family is fed, hence harvesting mussels. This shows that women interact with mussel resources more than their man counterparts. Based on this observation, they need to be empowered to take a leading role in mussel resource management and conservation (*Natal Witness*, 2001). Women are usually found at home and with the researcher's experience in working closely with community relation's staff, women's enhancement of community development activities and/or projects is crucial.

With regard to marital status and education, in both areas, the youth group was mostly single and only those in the age group of 30-50 were married while the old people were mostly widowed females. This implies that because of the age group of 30-50 being

married, the fertility rate is likely to be high, hence making a contribution to the increase in human population growth. This will then have an effect on the consumption rate of the brown mussels (*Perna perna*). The greater the increase in numbers of people, the more resources to be utilized. This brings us to a point where there is a need to manage first, human activities, in order to sustain the brown mussel stock and this is supported by literature reviewed on concept of sustainability (IUCN, 1994). Coming to education, in both areas, the elder generation had not experienced any formal education but with the present generation, the trend is gradually changing with more youth educated (see section 3.1.1 under results). This may have an effect on the suppression of indigenous knowledge (IK) by western scientific ideas in management of the natural resources (Wood *et al.*, 2000). When it comes to resource management, the imposition of a foreign management system in most cases tends to outweigh the value of indigenous knowledge. The views of the local inhabitants need to be considered by the researchers as they are the ones that know their environment through hands-on activities.

For consideration of occupation and duration of respondents in the areas, in both areas the majority indicated unemployed (see section 3.1.1 under results) hence they claim to be poor in that regard. The consideration of occupation is very much important in this research because it helps to determine whether it is unemployment or is the general habit of the community that leads to unsustainable utilization of the brown mussel resources. It has been found that unemployment is having an implication of exerting more pressure on the natural resources to sustain life. According to Lasiak (1992); Wood *et al.* (2000), poverty is one of the contributing factor to unsustainable utilisation of brown mussel resources (*Perna perna*). The literature reviewed confirms that if an expenditure of less than R352, 53 per adult on monthly basis is experienced, that individual is poor (May, 1998). According to the data collected with respect to the income and occupation, most people were unemployed. The older people are getting social grants of R560 per month. Normally each HH is having an average of 6 individuals which makes an expenditure of less than R352, 53 per adult per month hence regarded as poor (May, 1998).

In both areas, it has been noted that by channelling co-management benefits to the community through employment and creation of other economic activities especially in the case of Sokhulu can help to alleviate poverty in the long-term. This will in turn contribute to the slowing down of poverty-induced over-harvesting of brown mussels at the local level along the coast.

Looking at duration of residence, in both areas, most people have recently moved to the areas (see section 3.1.1 under results). Generally, the longer one stays in the area, the more he/she becomes knowledgeable about the resource use including the other related issues. It is also likely that such individuals would be having a historical background with respect to the brown mussel resource usage by the community as food. The mere fact that most of the people are new-comers is associated with growing human population, which leads to more pressure on natural resources (Lasiak, 1992; Wood *et al.*, 2000).

Looking at the number of individuals per household, in both areas there is an average 6 people per HH with more females. This helps to determine the extent to which the brown mussels are harvested by the community for food. Whenever harvesting is done, the harvesters who are mostly women consider the number of individuals at home. It is likely that to have 6 individuals can be one of the contributing factors to the growth of the human population. Human population may exert pressure on the resources and this may lead to their unsustainability (Wood *et al.*, 2000).

3.2.2 Growing of crops and vegetables

This has been one of the important aspects to indicate whether the consumption of brown mussel resources is determined by the rate of crop production. In both areas, the maize is the seasonal major that is cultivated while only a small percentage of other crops like potatoes, spinach or cabbage that are also grown. The proportion of other crops is low (see section 3.1.2 under results). According to Lasiak (1992), crop failure is one of the factors leading to an increase in pressure on brown mussels (*Perna perna*) as source of high-quality protein. It has been suggested that in order to increase the crop production, other agricultural related activities need to be explored. This will involve community

gardens, which will increase the production of crops hence the dependence on mussel resources will decrease.

3.2.3 Keeping of livestock

Again, as in getting information related to crop cultivation, this part also has relevance in finding out whether the rearing of livestock or not will be a determining factor in the harvesting of the brown mussels. In both areas, the keeping of livestock is not a determining factor in the consumption of coastal marine resources. Livestock are kept as a sign of wealth, they are not slaughtered to have meat unless for traditional occasions.

3.2.4 Shellfish harvesting

In both study areas, subsistence farmers depend mostly on the utilization of natural resources (section 3.1.4 under results) to sustain their livelihoods. The brown mussel (*Perna perna*) is the major target species in the coastal communities (see section 3.1.4) serving as a source of high-quality protein (Lasiak, 1992). As a result of the current harvesting rate, the mussel stock decreased in many parts of the east coast of South Africa (Lasiak & Dye, 1989). Due to the high population growth rate, coupled with crop failure due to drought, the utilization of brown mussels as food has become unsustainable (Lasiak, 1992). The communities in both areas concur with the findings of Lasiak & Dye (1989) who claim that the brown mussels are decreasing because of so many people depending on them (see fig. 9: 60).

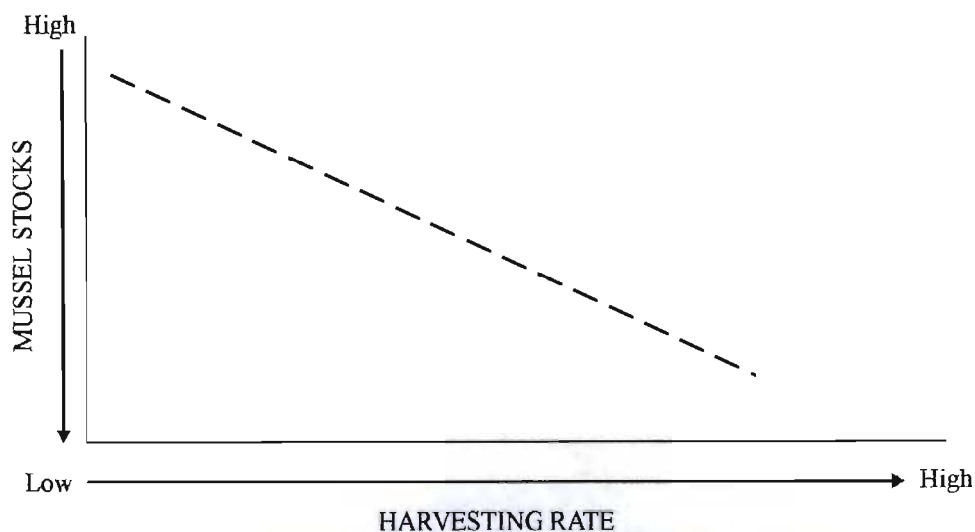


Figure 9: This information depicted in this diagram does not result from the data collected by the researcher but instead adapted from the study findings conducted by Lasiak and Dye, 1989. It simply notes that an increase in the harvesting rate result in a decrease in mussel stocks. This has been considered because it concurs with most of the HH questionnaire respondents in both areas when they said, "Mussels are decreasing because of so many people consuming them".

Table C: Comparison of brown mussel with other food resources as a significant portion of diet in both study areas:

Food resources % of Diet	Sokhulu	Coffee Bay
Brown mussel	12.5	12
Maize/Mealiemeal	25	30
Chicken	10	12
Vegetables	10	5
Red meat	3	4

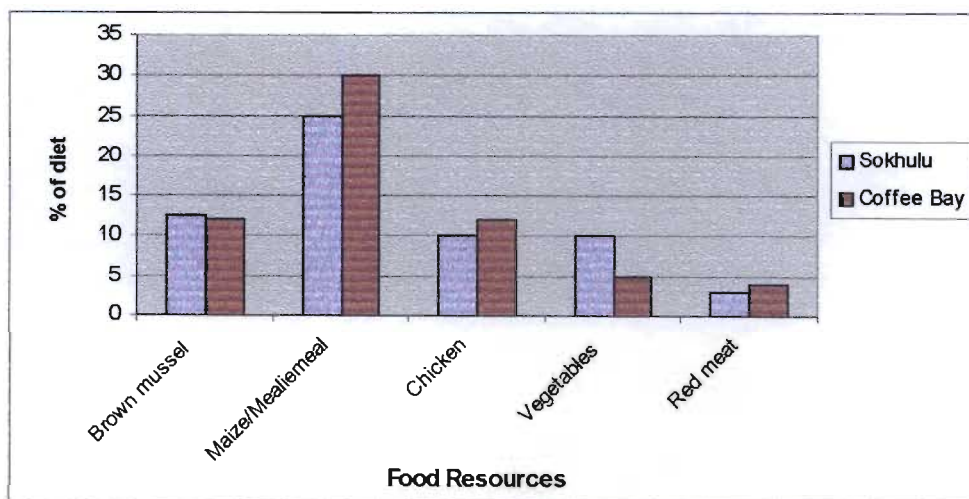


Figure 10: Comparison of brown mussel with other food resources as a significant portion of diet in both study areas. The information reflected on this figure and in table C above was not specifically reflected on the HH

questionnaire but it was gathered through probing and also with the aid of follow-ups that were made by the researcher on responses.

Looking at table C and figure 10 above, mussels are forming 12,5% portion of the diet at Sokhulu as compared to 12% at Coffee Bay. In both study areas, maize is the main crop but it is seasonal, the proportion of other crops grown is small. This makes the mussel consumption to be high as compared to other food resources (Lasiak, 1992). The higher intake of mussel resources helps to keep protein levels reasonable, as proteins are the most important foodstuffs. In adults, proteins repair the worn out tissues in the body, and they are also essential to the growth of children (Eastwood, 1997). According to the report of World Health Organization, a normal person should at least consider 0,75g/kg/day as a minimum protein intake measure (WHO, 1981).

Generally, rural people are under-nourished. They have low caloric intake and by consuming fish, which is rich in protein, their caloric content is boosted (Fincham, *pers. comm.*, 2001). According to Fields (1992), if a HH is unable to direct and meet sufficient resources at that particular time to fulfill human vital needs, that HH is regarded as poor hence in most cases rural people are having a low caloric intake. Looking at figure 8, the intake of starch is exceeding the intake of other nutrients because of their limited availability. By taking about 12% portion of mussel as part of the diet, a balance of carbohydrates and proteins may be achieved (Eastwood, 1997). It is stated that proteins and calories, fat and carbohydrates provide a balance to energy utilization that is on average 37% of total dietary energy (Eastwood, 1997).

The respondents in both areas indicated that harvesting of mussels has been happening for many years. Although they are mostly new in the areas, the long history behind the mussel used by coastal communities could be supported from story-telling by the older people.

3.2.5 Information about the mussel projects or co-management perceptions

All the respondents from Sokhulu stated that the project's success is due to community participation. This implies that, as according to Hara (1996), non-involvement of

communities would have a negative effect on the long-term sustainability of the resources. The respondents all showed that the community at large supports the participatory approach employed at Sokhulu. On the contrary, all Coffee Bay respondents showed no understanding of the co-management but after explanation, they showed that there is mistrust that still exists between them and ECNC.

Coming to the committee, all of the monitors, and resource managers, all showed enthusiasm that a participatory approach such as the one in Sokhulu should be also implemented even in Coffee Bay. There was also a positive response from the results gathered through the open-ended interview guide that a co-management approach should be explored by all resource managers for the long-term sustainability of the brown mussel resources which are part of the biodiversity chain we are dependent upon for our livelihoods.

The South African democratic government after 1994 saw a need of looking at some alternative ways of involving the public (DEAT, 2000) in any resource management. This was due to the unsustainable practices of the resources which were occurring and which are still happening in most parts of the country. The Sokhulu mussel project in the northern KZN east coast which started in 1995 by Dr. Harris of KZN NCS (Harris, 2000) is a good model showing community participation in resource management. Most people including the resource managers at Sokhulu perceive co-management as the best way of conserving the resources. This concurs and proves right the study's assumptions, which states that:

- The co-management strategy is gaining recognition as natural resources are increasingly threatened (IISD, 1997).
- It is the best option for effective resource management.
- Sustainable utilization of the resources can be achieved if the user-groups are involved in resource management (Hara, 1996).

The study also acted as a catalyst to enhance understanding of the real issues and concerns of subsistence mussel gatherers, and indigenous knowledge. In order for sustainability to be achieved, it is necessary that the indigenous knowledge of ordinary

people be integrated into planning and management frameworks. The community at the grassroots level are the ones who are mostly affected by resource use patterns. With the concerns and aspirations of the community, effective resource management would be achieved. This is evidenced by the Sokhulu mussel resource project (see fig. 11:68).

The Sokhulu mussel project also provided awareness about the conservation of brown mussels to the communities involved. This clearly shows that enforcement of management regulations alone is not a solution to the brown mussel resource unsustainability (Lasiak and Dye, 1989). The implicit assumption underlying the Sokhulu mussel project success resulted solely from the awareness that has been gained by the communities with regard to the biology and conservation of the brown mussels. This is also linked to the community's active involvement in management of the brown mussel stocks on the demarcated sites along the respective coastline. The results have established that co-management is regarded as the best strategy for conservation of brown mussels especially with the failure of the past government policies regarding conservation of coastal resources. The findings also indicated that co-management can be implemented even at Coffee Bay provided that the mistrust that is still existing between the communities and E.C.N.C. is cleared. If the brown mussel resource at Coffee Bay is not rescued from being unsustainably through the employment of a co-management structure, the people's nutritional status may be affected. This will be due to the fact that they won't be enough food resource in future, which will serve as a high-quality protein. The nutritional status will be also aggravated by an increase in unemployment and population growth rates (Lasiak & Dye, 1989; Wood *et al.*, 2000).

Policy and Legislation

The Marine Living Resources Act, 18 of 1998 as a policy used to control the conservation and utilization of coastal marine resources lays out a framework for national, provincial and local coastal management that specifically encourages integration and co-operative governance (see fig. 4:44). As a result of these recent policy and legislative changes at a national level, there is an increased emphasis on integrated and

co-ordinated coastal management (DEAT, 2000). Implicit in policy and legislation is the notion that civil society will have to increasingly participate in protection and managing the use of marine coastal resources. The community participation in the Sokhulu mussel project is actively involved in the management of the coastal resources (i.e. brown mussels). This is in line with the policy requirements for efficient and effective conservation and utilization of coastal resources.

The conducting of household interviews was important as to be able to get the views and concerns of the brown mussel harvesters and users themselves. The researcher was able to verify what sort of attitude the user groups have towards the management agencies of resources like ECNC. It was then explicitly noted that in most of the cases, the 'so called' negative attitude is normally exacerbated by lack of communication between the user-groups and the relevant authority.

The communicative and consultative approach that the KZN Wildlife Services community relation's section fostered and explored was of significant benefit. This is shown by the good co-operation between the Sokhulu community and KZN NCS as the relevant authority (*Natal Witness*, 2001). Participation of user groups (communities) in resource management also requires that they have the skills and information necessary to be equal partners in decision-making. This is a key area that requires attention since there is generally poor access to information within the communities. The establishment of local management structures requires that the capacity exists at the local level, within both the community and the authority, to perform administrative and organizational functions.

3.3 Conclusion

In conclusion, the analysis of the study's findings show that people perceive co-management as the best approach in managing brown mussels as marine coastal resources that benefit the local coastal people as a source of food. This is attributed to the benefits received through the system as evidenced by the Sokhulu joint mussel resource management team.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.0 Introduction

The chapter presents conclusions, lessons learnt, recommendations, and finally follow-up studies are called for based on the findings.

4.1 Conclusions

In conclusion, the case studies have provided useful information related to the employment of a co-management strategy for the conservation of brown mussels (*Perna perna*). Their analytic approach often described as both exploratory and explanatory in nature has served as the basis for some of the strongest literature about co-management. The solutions to the problems of unsustainability due to inadequacies of the past government policies and legislation in regulating conservation of coastal resources, specifically brown mussels (*Perna perna*) are well known. They include employment of a participatory approach where there would be a joint resource management team. Final recommendations derived from the participatory process used at Sokhulu will provide the basis for an action plan to be taken at Coffee Bay in EC. Although important similarities emerged from the case studies, each area differs with respect to community dynamics and institutional support. The 2 areas have different geographic backgrounds, as well as differing political orientations.

Implementation of a co-management system will need to be carefully adapted to the situation of Coffee Bay. The model provided in figure 11:68 can provide sufficient information about the use of brown mussels to support informed decisions for the establishment of a local co-management structure at Coffee Bay. It allows the researcher to describe various role players and linkages among factors in one picture. It is also closely linked to the data collected and analyzed.

The case studies also provide the basis for educating people about the necessity to conserve brown mussels, and for debating about how best the co-management system at Coffee Bay can be applied. According to Wood *et al.* (2000), an individualistic resource management is leading to the degradation of the environment as compared to collective actions.

The historical information about the use of mussels by coastal communities provided a very useful understanding of the context in which the unsustainable use of mussels is currently occurring in most parts of the country.

The study has also attempted to expose the way co-management is being applied particularly at Sokhulu in KZN. The study has identified co-management approach as the best system to be followed for effective conservation and utilization of intertidal rocky shore resources like brown mussel (*Perna perna*). The resource is preferred among other coastal resources by the coastal inhabitants of South Africa especially along the east coast, particularly in the KZN and Transkei region of the Eastern Cape Province. It is preferred as a source of high-quality protein.

Moreover, because of the high human population growth rate which is exacerbated by the high rate of unemployment, coastal people are forced to harvest the resource with the aim of feeding the family. According Lasiak (1992), the high dependence on coastal marine resources like mussels is also encouraged by crop failure which, when received a good production, people can benefit. Another factor is the keeping of livestock, which drives people to utilize mussels unsustainably. Livestock needs to be kept as a sign of wealth and also for customary purposes. Based on these factors, the traditional coastal inhabitants don't see the importance of conserving the brown mussels for the future. The communities value their livestock for cultural and traditional reasons more than natural resources like brown mussels (*Perna perna*). According to one of the Coffee Bay HH questionnaire respondents, the communities are using bladed implements or tools to harvest brown mussels (Majogozi, *pers. comm.*, 2001). People have moved away from using traditional tools like sharpened sticks to harvest, hence to say that traditional

cultures that are less destructive of coastal marine resources are left behind. The modernization of traditional societies is having a negative impact with respect to use of indigenous knowledge (IK) in resource management for attainment of sustainability (Wood *et al.*, 2000).

Experiences gained from Sokhulu mussel project in KZN have indicated a need for the establishment of a mussel co-management structure in Coffee Bay. The purpose is the wise-use of the resource for their well-being.

The purpose of the Coffee Bay mussel project is to achieve a sound resource management plan. This has been put together with the help of the management reports and minutes taken from the meetings. However, in order to institute any active resource management, the co-operation and understanding of the user-groups are essential. Currently there is very poor understanding of the needs and concerns of the user-groups by the relevant authority and *vice-versa*. With the aid of the study's conceptual framework, I can say that the sustainable use of the brown mussels (*Perna perna*) resources, and the conservation of biodiversity in the Coffee Bay coastline of the east coast depend on the implementation of an appropriate co-management system. Now, efforts to set up a co-management system at Coffee Bay need to be backed by sound understanding of the needs and concerns of the community by the ECNC as the provincial relevant authority, and *vice-versa*.

The Coffee Bay mussel rehabilitation project, as a government initiative, has full support of Marine and Coastal Management (MCM) Chief Directorate of Environmental Affairs & Tourism (DEAT) national department. Active involvement of ECNC in the project is recommended. There is therefore a fair chance that co-management structure facilitated by the project will have long-term sustainability. An establishment of a good relationship between the ECNC and the user-groups is urgently needed. In this way, a joint management approach with monitoring of harvest by communities could ensure sustainability of the resource.

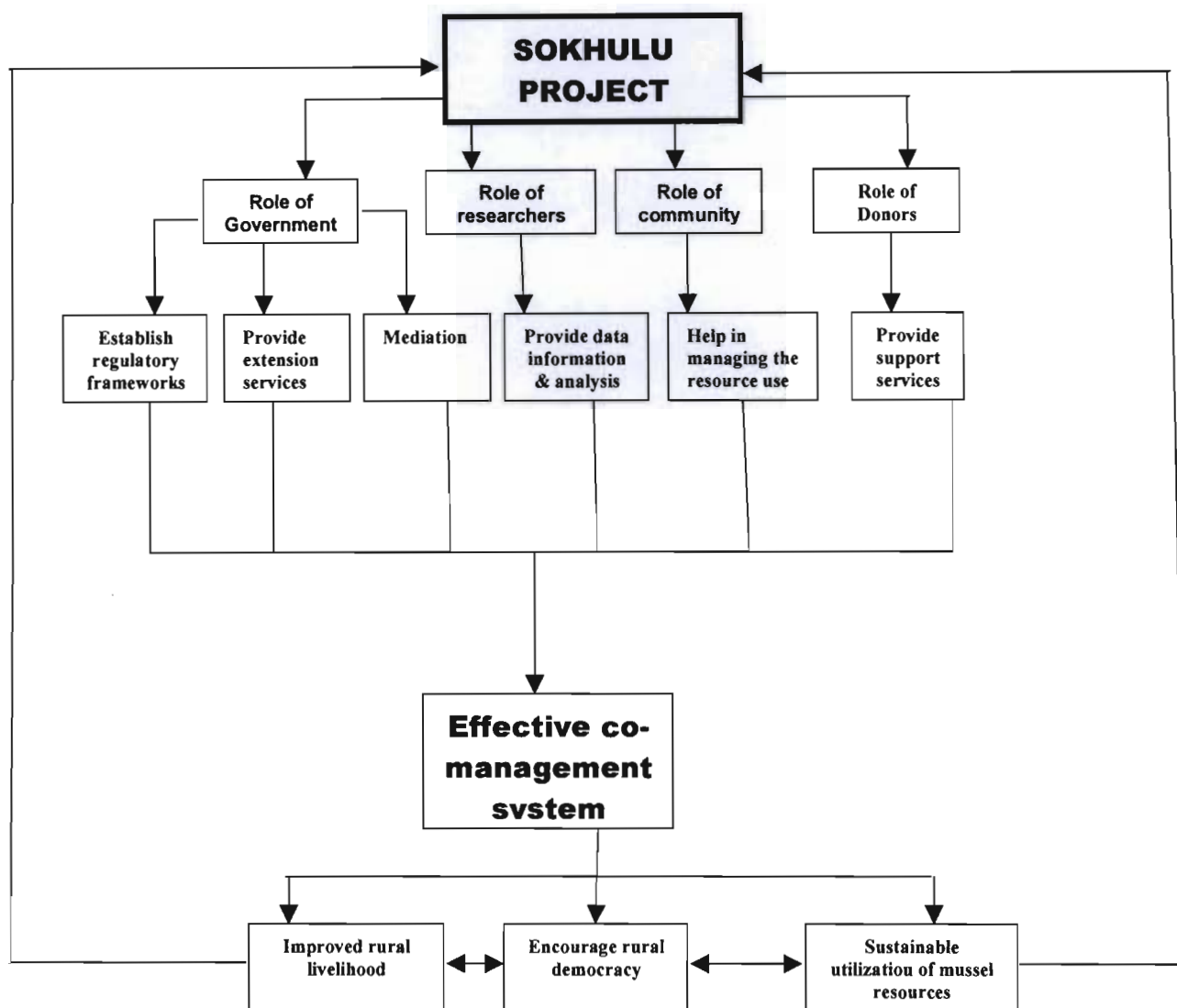


Figure 11: Model showing Sokhulu Participatory Approach
 (Adapted from reviewing Sokhulu mussel project)

4.2 Lessons

Through the research process, this researcher have learnt some lessons and gained experience to achieve successful results in wise use of brown mussel resources, such as:

- Enhancement of the local community's livelihood,
- greater levels of compliance of user-groups with the regulations,
- clear definition of community property rights.

These are basic aspects, which are closely related with each other, and are applied in the process of co-management approach implementation.

4.3 Recommendations

Based on the study's findings and their implications, as well as consideration of the study's purpose and objectives, the following recommendations are presented:

- In order to conserve brown mussels (*Perna perna*), it is necessary to focus not only on their management but also to provide economic alternatives and opportunities to the user-groups (communities) that will discourage them from over-utilization of mussels e.g. craft-making etc.
- Reforms to be formulated between the user-groups i.e. Coffee Bay community and the provincial relevant authority i.e. ECNC. This will pave the way to a close co-ordination between the two parties for effective mussel resource management.
- The Coffee Bay mussel rehabilitation project should foster greater participation of all those involved at the local level.
- Awareness and education of the community about the relevance of the Marine Living Resources Act, 18 of 1998.
- Information flow between the user-groups and the provincial relevant authority needs to be initiated.
- Authority officials must have good mediation skills.

4.4 Follow-up studies

The research was limited because of constraints in time and resources, therefore it is the researcher's point of view that this study was not meant to provide definitive conclusions, but rather to provide information on which further research might be a logical continuation. Looking for other variables associated with the participatory approach need to be explored for complete understanding of co-management. The variables include relationship between social factors (e.g. socio-political aspects) and management factors (e.g. goals).

REFERENCES

Published resources

- Attwood, C.G.; Mann, B.; Beaumont, J. and Harris, J.M. 1998a. Review of the state of marine protected areas in South Africa. *South African Journal of Marine Science* **18**: 341-367
- Babbie, E. 1992. *The practice of social research*. Wadsworth Publishing Company, Belmont.
- Bailey, K.D. 1982. *Methods of social research* – 2nd edition. The Free Press, New York.
- Berkes, F. 1990. Native subsistence fisheries: A synthesis of harvest studies in Canada. *Arctic* **43**: 35-42.
- Berkes, F.; Mahon, R.; Mcconney, P.; Pollnac, R. and Pomoroy, R. 2001. *Managing small-scale fisheries: Alternative directions and methods*. International Development Research Centre, Ottawa.
- Berry, P.F. 1978. Reproduction, growth and production in the mussel *Perna perna* (Linnaeus) on the east coast of South Africa. *Investigational Report by Oceanographic Research Institute in Durban* **48**: 1-28.
- Binns, T. (ed.). 1995. *People and Environment in Africa*. John Wiley & Sons Ltd., University of Sussex, UK.
- Branch, G.M. and Moreno, C.A. 1994. "Intertidal and subtidal grazers". In Siegfried, R.W. (ed.). *Rocky shores: Exploitation in Chile and South Africa*. Springer-verlag, New York: 75-100.
- Brosius, J.P. 1997. Endangered Forest, Endangered People: Environmentalist Representations of Indigenous Knowledge. *Human Ecology*, Vol. 25, No. 1, 1997: 29-45.
- Carter, M.R. and May, J. 1998. *Poverty, Livelihood and Class in Rural South Africa*. CSDS Working Paper No 17. School of Development Studies, UND, South Africa.
- Castilla, J.C. 1999. Coastal marine communities: Trends and perspectives from Human-exclusion experiments. *TREE* **14**: 280-283.

- Charles, A.T. 1994. Towards sustainability: The fishery experience. *Ecological Economics* **11**: 201-211.
- Clark, C.W. 1990. *Mathematical Bioeconomics: The optimal management of renewable resources*. Wiley, Chichester.
- Connelly, J. and Smith, G. 1999. *Politics and the Environment: From theory to practice*. Routledge, New York.
- Eastwood, M. 1997. *Principles of human nutrition*. Edinburgh, UK.
- Fall, J.A. 1990. The division of subsistence of the Alaska Department of Fish and Game: An overview of its research and program and findings: 1980–1990. *Arctic Anthropology* **27**(2): 69-92.
- Government of the Republic of South Africa. 1998a. Marine Living Resources Act, No. 18. *Government Gazette* **395** (No. 18930): 1-66. Pretoria.
- Government of the Republic of South Africa. 1998b. National Environmental Management Act. No. 107. *Government Gazette*. **401** (No. 19519): 1-36. Pretoria.
- Hanks, J. and Glavovick, P.D. "Protected areas". In Fuggle, R.F.; Rabie, M.A. 1992. *Environmental Management in South Africa*. Juta & Co., Cape Town, South Africa.
- Hara, M. 1996. *Problems of Introducing Community Participation in Fisheries Management: Lessons from the Lake Malombe and Upper Shire River (Malawi) Participatory Fisheries Management Programme* University of the Western Cape, School of Government, Western Cape.
- Hockey, P.A. *et al*, 1988. Patterns and Correlates of Shellfish exploitation by Coastal people in Transkei: An enigma of protein production. *Journal of Applied Ecology* **25**: 353-364.
- IUCN. 1994. *Guidelines for Protected Areas Management categories*. IUCN, Cambridge, UK.
- IUCN-SA. 1999. *Land Reform and Conservation Areas in South Africa: Towards a Mutually Beneficiary Approach*. Braamfontein, Johannesburg, South Africa.
- Kyle, R.; Pearson, B.; Fielding, P.J. and Robertson, W.D. 1997a. Subsistence shellfish harvesting in the Maputaland marine reserve in Northern KwaZulu-Natal, South Africa: Rocky shore organisms. *Biological Conservation* **82**: 183-192.

- Kyle, R.; Robertson, W.D. and Birnie, S.L. 1997b. Subsistence shellfish harvesting in Northern KwaZulu-Natal, South Africa: Sandy beach organisms. *Biological Conservation* **82**: 173-182.
- Lasiak, T. & Dye, A. 1989. The Ecology of the Brown Mussel *Perna Perna* in Transkei, Southern Africa: Implications for the management of a traditional food resource. *Biological Conservation* **47**: 245-257.
- Lasiak, T. & Field, J.G. 1995. Community-level attributes of exploited and non-exploited rocky infratidal macrofaunal assemblages in Transkei. *Journal of Experimental Marine Biology and Ecology* **185**: 33-53.
- Lasiak, T. 1992. Contemporary shellfish-gathering practices of indigenous coastal people in Transkei: Some implications for interpretation of the archaeological record. *South African Journal of Science*, Vol. **88**: 19-28.
- Makombe, K. (ed.). 1995. *Sharing the land: Wildlife, People and Development in Africa*. IUCN ROSA, Environmental Issues Series No. 1, Harare, Zimbabwe.
- Margules, C.R. & Pressey, R.L. 2000. *Systematic conservation planning*. Nature **405**.
- Marshall, C. and Rossman, G.B. 1989. *Designing Qualitative Research*. Sage, Newbury Park.
- May, J. 1998. *Poverty and Inequality in South Africa*. Report prepared for the Office of the Executive Deputy President and the Inter-Ministerial Committee for Poverty and Inequality. Praxis Publishing, Durban, South Africa.
- May, J. 2000. *Poverty and Inequality in South Africa: Meeting the challenge*. David Philip Publishers, Cape Town, South Africa.
- Miles, M.B. and Huberman, M. 1984. *Qualitative data analysis: A sourcebook of new methods*. Sage, California.
- Oakerson, R.J. 1992. "Analyzing the Commons: A Framework". In Bromley, D.W. (ed.). 1992. *Making the Commons Work: Theory, Practice and Policy*. Institute for Contemporary Studies, California.
- Ostrom, E. 1990. *Governing the Commons: The evolution of institutions for collective action*. Cambridge University Press, Cambridge.
- Ostrom, E. 1992. "The rudiments of a theory of the origins, survival and performance of common property institutions". In Bromley, D.W. (ed.). Undated. *Making the Commons Work*. Institute for Contemporary Studies, San Francisco.

- Robson, C. 1996. *Real World Research*. Blackwell, Cambridge, MA.
- Rosnow, R.L. and Rosenthal, R. 1996. *Beginning Behavioral Research: A Conceptual Primer* - 2nd edition. Prentice-Hall, Inc., New Jersey.
- Russell, E. *et al.* 2001. Case studies on the Socio-Economic characteristics and lifestyles of Subsistence and Informal Fishers in South Africa. SFTG Report 6, *South African Journal of Marine Science*.
- SARDC, IUCN and SADC. 1994. *State of the Environment in Southern Africa*. Penrose Press, Johannesburg, South Africa.
- Satia, B.P. 1993. *Ten years of Integrated Development of Artisanal Fisheries in West Africa: Origin, Evolution and Lessons Learned*. Programme for Integrated Development of Artisanal Fisheries in West Africa. IDAF Technical Report 50, Cotonou, Benin: FAO
- Sessions, R., 1991: 93-4. Deep Ecology versus Ecofeminism: Healthy Differences or Incompatible Philosophies? *Hypatia* vol. 6, no. 1
- Siegfried, R.W.; Hockey, P.A.R. and Crowe, A.A. 1985. Exploitation and Conservation of Brown mussel stocks by coastal people of Transkei. *Environmental Conservation* **12**: 305-320.
- Tomalin, B.J. and Kyle, R. 1998. Subsistence and Recreational mussel (*Perna perna*) collecting in KwaZulu-Natal, South Africa: Fishing mortality and precautionary management. *South African Journal of Marine Science* **33**: 12-22.
- Western, D. and Wright, M. (eds.). 1994. *Natural Connections: Perspectives in Community-based Conservation*. Island Press, Washington, D.C.
- WHO. 1981. *The treatment and management of severe protein energy malnutrition*. WHO, Geneva.
- Wood, A.; Stedman-Edwards, P. and Mang, J. (eds.). 2000. *The Root Causes of Biodiversity Loss*. Earthscan Publications Ltd., UK.

Unpublished resources

- Calvo-Ugarteburu, G. 2000. Rehabilitation of denuded rocky shores in Transkei. Unpublished December Progress report. University of Transkei, Umtata, South Africa.
- Calvo-Ugarteburu, G. 2001. Rehabilitation of denuded rocky shores in Transkei. Unpublished January; July & October Progress reports. University of Transkei, Umtata, South Africa.
- Calvo-Ugarteburu, G. and Dye, A.H. 2000. Rehabilitation of denuded rocky shores in Transkei. Unpublished Project proposal. University of Transkei, Zoology Department, Umtata, South Africa.
- Department of Environmental Affairs & Tourism (DEAT), 1997. White Paper on the Conservation and Sustainable use of South Africa's Biological Diversity. Government Printer, Pretoria.
- Department of Environmental Affairs and Tourism, 1997: 46 (unpublished). A Marine Fisheries Policy for South Africa White Paper. Cape Town, South Africa.
- Department of Environmental Affairs and Tourism. 2000. White Paper on Sustainable Coastal Development. Government Printer, Pretoria, South Africa.
- Feely, J.M. 1989. Project proposal for effective conservation of marine resources along the Wild Coast: Report made for potential funders. Unpublished report, Department of Agriculture & Forestry, Former Homeland Transkei Government, Umtata, RSA.
- Fields, G.S. 1992. Data for measuring poverty and inequality changes in the developing countries. Paper prepared for presentation at the Conference on Data Base for Development Analysis. Yale University.
- Harris, J.M. 2000. Mussel utilisation by subsistence gatherers along the Northern KwaZulu-Natal coast. Unpublished Project final report. KZN NCS, Durban, South Africa
- Hlatshwako, S. 1999. Fly fishing and tourism: a sustainable rural community development strategy for Nsiken? Unpublished Master's dissertation, University of Natal, Pietermaritzburg, South Africa.
- KwaZulu-Natal Wildlife. 2001. Implementation Plan for Subsistence Fisheries in KwaZulu-Natal, 28 March 2001. Unpublished document providing summary of the agreed approach and process to be followed.

MacDonald, C. 2000. Assessing common property institutions in the South African countryside. Paper presented to the Eighth Biennial Conference of the International Association for the Study of Common Property (IASCP), Bloomington, Indiana USA, 31st May – 4th of June 2000.

Natal Witness, 2001. *The Natal Witness*, 3 December 2001. Pietermaritzburg, KZN, South Africa.

Sikhitha, M.E. 1999. A survey of conservation attitudes of the rural communities around Thathe forest, Northern Province. Unpublished Master's dissertation, University of Natal, Pietermaritzburg, South Africa.

Internet resources

Author unknown. On line: <http://www.cbnrm.uwc.ac.za>

Department of Environmental Affairs & Tourism (DEAT), 2001/2002. "A Bioregional Approach to South Africa's Protected Areas". On line: <http://www.environment.gov.za/docs/2001/bioregional/bioreg.pdf>

Government of the Republic of South Africa. 1996. "The Republican Constitution, Act No. 108 of 1996". Government Printer, Pretoria. On line: <http://www.polity.org>

Hanna, S. 1998. "Co-management in small-scale fisheries: Creating effective links among stakeholders". A Presentation at an International Workshop on Community-Based Natural Resource Management (CBNRM), Washington DC, United States, May 10-14, 1998. On line: <http://www.worldbank.org/wbi/conatrem/hanna-paper.htm>

ICLARM and NSC. (Undated). "Analysis of Fisheries Co-Management Arrangements: A Research Framework". Prepared by Fisheries Co-Management Project Core Staff. On line: <http://www.idrc.ca/cbnrm/documents/iclarm.cfm>

IISD. 1997. "Co-Management background". Published by the Information for Sustainable Development Team, International Institute for Sustainable Development (IISD), April 1997 (Updated June 1998). On line: <http://iisd.ca/ic/info/Co-Management.htm>

Kafakoma, R. (Undated). "Institutions for forestry management on customary land in Malawi". On line: <http://www.cbnrm.uwc.ac.za>

Wily, L.A. (Undated). "Democratizing the commonage: The changing legal framework for natural resource management in Eastern and Southern Africa with particular reference to forests". On line: <http://www.cbnrm.uwc.ac.za>

Personal Communication

Fincham, R.J., *pers. comm.*, 2001. CEAD, UNP, South Africa. 10/12/2001

Majogozi, M., *pers. comm.*, 2001. Coffee Bay, Mqanduli, South Africa. 13/10/2001.

Nyambe, N., *pers. comm.*, 2001. CEAD, UNP, South Africa. 7/12/2001.

Sibiya, C.S., *pers. comm.*, 2001. KZN Wildlife Services. Durban, South Africa.
4/10/2001.

Simoyi, E.M., *pers. comm.*, 2001. Coffee Bay Mussel Rehabilitation & Development
Committee. Mqanduli, South Africa. 10/10/2001.

APPENDICES

APPENDIX 1

QUESTIONNAIRE

1.1 Researcher's introduction

I am Qondile Paliso studying at University of Natal, Pietermaritzburg branch. I am currently conducting a research on co-management as a strategy in conservation of brown mussel resources, taking Sokhulu (KwaZulu-Natal) and Coffee Bay (Eastern Cape) projects as case studies. This research will upon completion contribute towards the effectiveness of the policy on conservation and regulation of such resources.

I am, therefore, kindly requesting for your permission to ask you some questions that will assist in informing the research. Please be advised that you are free to tell me if you do not feel safe in participating in this research. However, if you accept to be interviewed, the information that you shall give will be treated with the utmost confidentiality it deserves.

1.2 Personal and household information (adapted from Hlatshwako, S. 1999)

(i) Name (optional)

CODE BY OBSERVATION

(ii) Sex

Male	1
Female	2

CODE BY ASKING

(iii) Marital status

Married monogamous	1
Married polygamous	2
Living with partner	3
Divorced	4
Never married	5
Other (specify)	6

(iv) Village

(v) Chiefdom.....

(vi) What language do you speak?

Xhosa	1
Zulu	2
Other (specify)	3

(vii) Duration in location

(viii) Were you born here?

Yes	No
1	2

(ix) Has your family always lived here?

Yes	No
1	2

(x) Where did you live before coming here?

(xi) Age (A) BELOW 18 (B) 18 – 30 (C) 30 – 50 (D) ABOVE 50

Below 18	1
18 – 30	2
30 – 50	3
Above 50	4

(xii) What educational standards have you done or attempted

(A) SECONDARY (B) PRIMARY (C) NONE (D) OTHER.....

Secondary	1
Primary	2
None	3
Other	4

(xiii) Can you read: with ease; with difficulty or cannot read

With ease	1
With difficulty	2
Cannot read	3

CODES FOR QUESTION XIV

Column E-Sex		Column F-Relation to head of HH		Column G-Education		Column H-Employment status		Column J-Frequency of I	
Male	1	Household head	1	No schooling	1	Self-employed	1	Every week	1
Female	2	Husband/wife	2	Sub-a/b	2	Employed full-time	2	Every month	2
		Child	3	Standard 1	3	Employed part-time	3	Once in 2 months	3
		Parent	4	Standard 2	4	Employed seasonal	4	3 or 4 times a year	4
		Grandparent	5	Standard 3	5	Not employed	5	Once or twice a year	5
		Grandchild	6	Standard 4	6	Retired/Pensioner	6	Less than once a year	6
		Other relative	7	Standard 5	7	Student	7	Never	7
		Non-relative	8	Standard 6	8	Disabled/disability grant	8	Other (specify)	8
				Standard 7	9	Housewife	9		
				Standard 8	10				
				Standard 9	11				
				Standard 10	12				

				Tertiary (N/Univer sity)	13				
				Tertiary (Universit y)	14				

(xiv) How many family members including yourself, relatives who are staying with you?

A	B	C	D	E	F	G	H	I	J
No	Surname	Name	Age	Sex	Relation with head of HH	Education	Employment status	Money contributed to HH	Frequency of I
1									
2									
3									
4									
5									
6									

(xv) Does your household have a working: radio; television?

Yes	No
1	2

(xvi) If not, how do you get news about development issues for the community: through Chief/Headman or Children or Ward representatives or Friends or Partner or other?

Chief/Headman	1
Children	2
Ward representatives	3
Friends	4
Partner	5
Other	6

(xvii) How much do you earn per month?

(A) LESS THAN R500 (B) BETWEEN R500 AND R1000 (C) MORE THAN R1000
(D) NOT EMPLOYED

Less than R500	1
Between R500 and R1000	2
More than R1000	3
Not employed	4

(xviii) If not employed, how are you supporting yourself including the family?

(A) PENSION (B) MIGRANT REMITTANCE (C) DISABILITY GRANT (D) OTHER,
MENTION

Pension	1
---------	---

Migrant remittance	2
Disability grant	3
Other	4

1.3 Crops and vegetables

- Do you grow vegetables or crops in your household?

Yes	No
1	2

- If yes, to what extent?
- Is it for subsistence or commercial purposes or both?

1.4 Livestock

- Do you keep livestock?

Yes	No
1	2

- If yes, to what extent?
- Is it for subsistence or commercial purposes or both?

1.5 Shellfish harvesting

- Do you harvest shellfish?

Yes	No
1	2

- If yes, what species?
- Is it for subsistence or commercial use?

- iv. If for commercial use, to whom do you sell?
- v. What portion of household income/food supply are shellfish?
- vi. How long have you been harvesting? OR When did shellfish (mussel) become an important resource for the people?
- vii. Would you say over the past years, the stock has increased or decreased?
OR no idea.
- viii. If it has decreased, would you say, it is because of over-utilization with respect to number of people depending on the resource or any other cause?
- ix. Who is doing most of the harvesting and why?
- x. What is being used for harvesting?
- xi. Who else is harvesting the resource beside community members?
- xii. What do they use for? [Any idea?]
- xiii. What traditional practices that are being employed to regulate mussel consumption?

1.6 Mussel project

- i. Is there anyone in your household who earns from the project?

Yes	No
1	2
- ii. If yes, what is he/she doing?
- iii. Would you describe the project as successful or not or no idea?
- iv. If it is successful, it's because is needed by the community hence their participation or is because of benefit sharing received or any other reason?
- v. If it s not successful, why?
- vi. Would you recommend this type of a management system (co-management)?

- vii. If not, why?
- viii. What resource management alternative would you recommend? Give reasons.
- ix. In the context of coastal conservation, what other marine resources consumed?

1.7 MUSSEL RE-SEEDING PROJECT

- **Section A** (to be administered to Committee, Resource Managers, and Researchers)

(i) Name/ Anonymous, Status?

(ii) What is the purpose of the project?

.....

(iii) Is the purpose of sustainable mussel harvesting being achieved?

(A) FULLY (B) PARTIALLY (C) NOT AT ALL (D) UNCERTAIN

Fully	1
Partially	2
Not at all	3
Uncertain	4

(iv) Is there ever a need for community/committee to make any decisions pertaining to mussel utilization and conservation in Sokhulu/Coffee Bay?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
Sometimes	2
Never	3
Uncertain	4

(v) How were the mussels during the old system of Government utilized?

(vi) Were you practicing bag limit in mussel resource harvesting during the old system of Government?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
--------	---

Sometimes	2
-----------	---

Never	3
-------	---

Uncertain	4
-----------	---

(vii) What lead you to decide about this type of a project?

(viii) How important mussels in this area? In the context of coastal conservation, what else is a priority?

• **Section B** (to be administered to Monitors and Committee members)

(i) For how long have you been involved?

.....

(ii) How much time do you spend on this work?

(A) DAILY (B) WEEKLY (C) MONTHLY (D) OTHER

Daily	1
-------	---

Weekly	2
--------	---

Monthly 3

Other 4

(iii) Is this, (A) TOO MUCH (B) ADEQUATE (C) TOO LITTLE (D) OTHER

Too much 1

Adequate 2

Too little 3

Other 4

(iv) Does this affect your other activities?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always 1

Sometimes 2

Never 3

Uncertain 4

(v) How are the other activities affected?

.....

(vi) Is there a conflict between your position as a monitor/committee members and your position as a community member?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always 1

Sometimes	2
Never	3
Uncertain	4

(vii) Do the committee ever implement the decisions that they make pertaining to mussel utilization and conservation?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
Sometimes	2
Never	3
Uncertain	4

(viii) Do the committee ever implement the decisions that they make pertaining to transgressors?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
Sometimes	2
Never	3
Uncertain	4

(ix) What kind of power and authority do the monitors and committee members need to carry out their functions as part of the co-management team?

.....

(x) Are there any individuals or groups or organizations that impact positively on the operations of the co-management team?

Yes	No
1	2

If yes, who are those individuals or which groups?

(xi) Are there any individuals or groups or organizations that impact negatively on the operations of the co-management team?

Yes	No
1	2

If yes, who are those individuals or which groups?

(xii) Are there any conflicts, which the committee does have with other individuals or groups or organizations?

Yes	No
1	2

(xiii) How are conflicts managed/resolved by the committee?

.....

(xiv) Do you feel that there is ever co-operation between the committee and the local communities?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
--------	---

Sometimes	2
Never	3
Uncertain	4

(xv) Do you feel that there is ever co-operation between the committee and the Relevant Authority?

(A) ALWAYS (B) SOMETIMES (C) NEVER (D) UNCERTAIN

Always	1
Sometimes	2
Never	3
Uncertain	4

(xvi) How many members each of the following categories are in the committee?

(A) MALE (B) FEMALE (C) YOUTH.....

APPENDIX 2

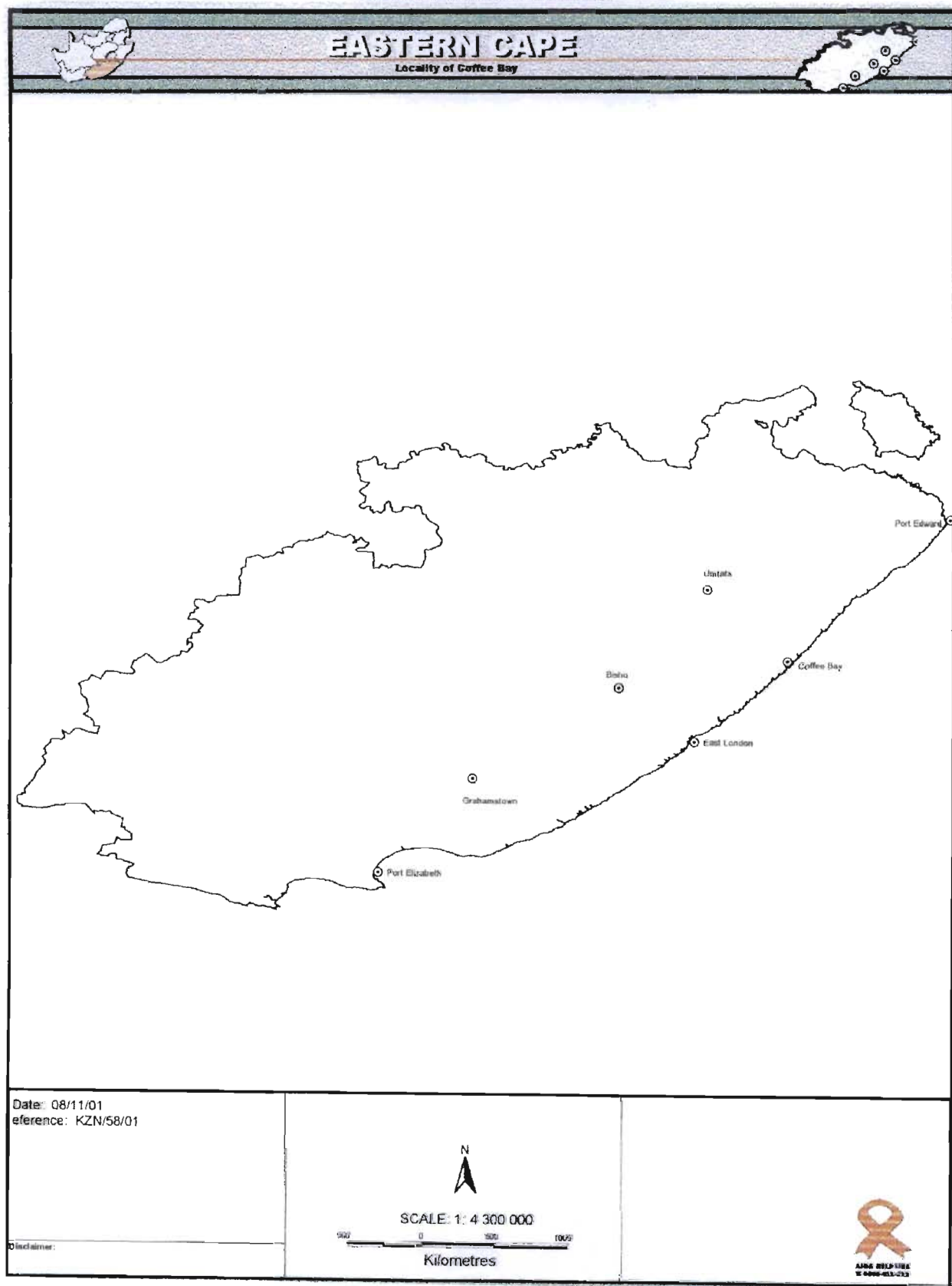
OPEN-ENDED INTERVIEW GUIDE

The open-ended interviews helped the researcher in addressing some specific issues regarding perceptions and experiences about the utilization and conservation of the marine coastal resources. Some areas that were covered are implied in the following preliminary questions:

- what lead to adoption of the co-management strategy?
- how is the relationship between the relevant authority and user groups?
- how were the coastal resources (brown mussels) previously managed in the old system of Government?
- what implication(s) does or do co-management strategy has or have to both authority and user groups?
- what key policy areas that support co-management?
- what benefit sharing scheme is being employed?
- when did shellfish (brown mussel) become an important resource for the people?
- how were the mussels in the old South Africa previously being utilized?
- were you practicing bag limit in mussel resource harvesting during the old system of Government?
- how important mussels in this area? In the context of coastal conservation, what else is a priority?
- what traditional practices being employed to regulate mussel consumption?
- how long have you been harvesting mussels?

Those interviewed included project managers, monitors, resource users, researchers, government officials, and committee members. They were identified by visiting the sites. No other categories of respondents were identified except the ones mentioned. Responses were recorded by use of note taking.

APPENDIX 3
LOCALITY MAP OF COFFEE BAY



LOCALITY MAP OF SOKHULU

