KEY DECISION-MAKERS' PERCEPTIONS OF SUSTAINABLE SEA FISHERIES IN NAMIBIA AND THE IMPLICATIONS FOR ENVIRONMENTAL EDUCATION PROGRAMMES

BY

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ABSTRACT

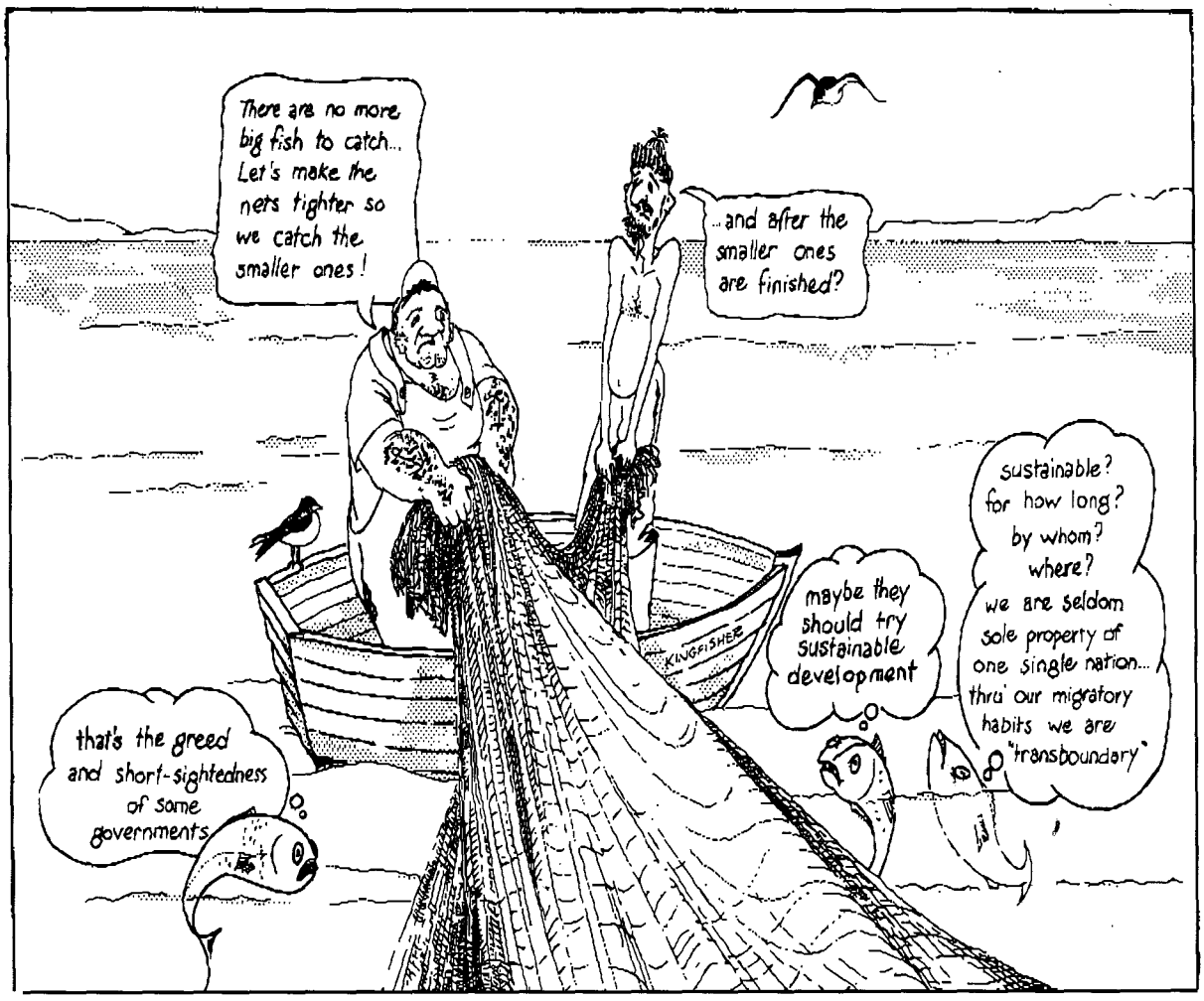
This study investigates key decision-makers' perceptions of sustainable sea fisheries in Namibia, and explores the possibilities for the future development of education programmes that focus on "sustainability" in the fisheries sector.

The concept of "sustainability" and its application in the context of a biological resource, namely sea fisheries, was examined. A series of questions were raised concerning sustainable fisheries: intergenerational implications of patterns of resource use, equity concerns, time horizons, and the protection of marine biodiveristy, among others. Examples from the Namibian and the European Community Sea Fisheries Industries are used to illustrate these issues. In spite of divergent views on what "sustainability" means, the study leads to certain findings that have broader policy implications.

Data was collected from semi-structured interviews undertaken with six (6) key decision-makers in the Sea Fisheries Industry of Namibia, then analysed and assessed. The perceptions of key decision-makers were determined by qualitative analysis in the interpretive paradigm. The data indicated some agreement in terms of what the key decision-makers think about the sustainable utilisation of the fisheries resources. It is almost impossible to have complete agreement, because the decision-makers are from different contextual backgrounds. Those who make the decisions are more concerned about "how to manage" and those who act on the decisions put more emphasis on economic self-interest. Although the interviewees' perceptions of sustainable fisheries was imperfect, there was broad support for its aims and principles.

The study also revealed that the achievement of sustainable sea fisheries development in Namibia will require broader educational and public awareness programmes to enhance participation in decision-making debates. Formal and informal marine environmental education, from the perspective of "Responsible Fishing" has been emphasised.

The Dilemma of Sustainable Fisheries Development



Source: **Sue Abrahams (1997), Geography Department, Rhodes University.**

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As far as the researcher knows, this study is the only one of its kind in southern Africa and no other was thus available to draw on for guidance.

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KEY TO ACRONYMS AND ABBREVIATIONS

BENEFIT	Benguela Environmental Fisheries Interaction and Training Programme
CFP	Common Fisheries Policy
EC	European Community
EE	Environmental Education
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organisation of the United Nations
GDP	Gross Domestic Product
HACCP	Hazard Analysis of Critical Control Points
ICNEAF	International Commission for North East Atlantic Fisheries
ICSEAF	International Commission for the South East Atlantic Fisheries
IUCN	World Conservation Union
LMEs	Large Marine Ecosystems
MEE	Marine Environmental Education
MFMR	Ministry of Fisheries and Marine Resources
MSY	Maximum Sustainable Yield
NATMIRC	National Marine Information and Research Centre
NIED	National Institute for Educational Development
TAC	Total Allowable Catch
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Conference on the Law of the Sea
UNEP	United Nations Environmental Programme
UNESCO	United Nations' Educational, Scientific and Cultural Organisation
WCED	World Commission on Environment and Development

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

This chapter provides the context in which this research was conducted, the aims of the research and the thesis outline.

The background against which this study was initiated has two important dimensions: These are, firstly, the sustainable utilisation or sustainable development, (Ray, 1989) of marine resources that fall within the Sea Fisheries Industry of Namibia as seen against the background of global perspectives. Secondly, to lay a foundation for the future development of education programmes that focus on sustainability in the fisheries sector.

In the course of my work as a curriculum developer for Biology, I became aware of a lack of information about the marine environment in the Namibian education system. As the fishing industry of Namibia is a crucial area of the Namibian economy, this study will have relevance to broader curriculum issues in Namibia.

1.2. BACKGROUND OF THE STUDY

1.2.1 Sustainable use / Sustainable development

This study begins by analysing the concept of sustainable development in the context of the Namibian Fishing Industry. Sustainable development has become a buzzword in conservation and management (Ray, 1989), and represents an attempt to reconcile the environment, its resources, and economic growth and development (Soussan, 1992).

The Fishing Industry of Namibia plays a fundamental role in the economic growth and development in the country, not only as a key contributor to the GDP, but also as a source of wealth which generates employment and a mechanism for the development of coastal communities.

It is important to note that demands for economic growth and development did not always take into consideration the natural equilibrium and the biological regenerating capacity of marine resources. According to Nikitina (1993), the key to economic growth and development is safeguarding the environment through ensuring the sustainable utilisation of natural resources. On the one hand, economic and social development may slow down if not enough attention is paid to the quality of the environment and its resources and on the other, environmental protective efforts may be restrained if economic and social well-being are not provided.

This study examines how the goals of sustainability, which have been advocated by two important milestones in global environment policy, namely the World Commission on Environment and Development (1987) and the United Nations Conference on Environment and Development (1992), can be attained. The Brundtland Report focuses especially on the question: "Is intergenerational equity being preserved?" UNCED emphasises the need for all countries to initiate strategies and measures to halt and reverse the effect of environmental degradation and to promote sustainable and environmentally sound development.

The concept of sustainable development popularised by the Brundtland Report, was incorporated by the Food and Agriculture Organisation of the United Nations (FAO) into the concept of "Responsible Fishing" (FAO, 1994). The FAO believes that the world fisheries can attain environmentally sustainable development through the tenets associated with "Responsible Fishing".

1.2.2 Education for Sustainable Development and Marine Environmental Education

In an interview with The Right Honourable Prime Minister of Namibia, Mr H. Geingob, conducted in June 1997, the ideas of sustainable utilisation of the Sea Fisheries of Namibia were encapsulated thus:

> If we are to protect and preserve our marine fishery resources, we all must do our part, as a nation, as families and as individuals. The need for awareness (education) has never been greater, and the opportunity for us to make a difference is just as great. If we practice and teach our children the right kind of care and commitment for our marine environment, it will continue to bring not only for us its natural gifts, but also for the generations to come.

Namibia's Green Plan defines Environmental Education as "the process of developing an environmentally literate citizenry which is aware of, and concerned about, the environment and is empowered through knowledge, attitudes, skills and shared decision making to individually and

collectively achieve an improved quality of life through sustainable utilisation and appropriate development of Namibia's resources" (Tarr, 1996:131).

There has been a significant increase in activities aimed at meeting these objectives since the independence of Namibia in 1990. Environmental Education in Namibia has been categorised into formal education aimed at schools and teacher training institutions and non-formal education aimed largely at an adult audience, from community members to decision makers in rural and urban areas. Ministries involved in implementing Environmental Education in Namibia are:

The Ministry of Environment and Tourism;
The Ministry of Basic Education and Culture;
The Ministry of Youth and Sport; and
The Ministry of Agriculture, Water and Rural Development.

Environmental Education activities in the public sector cover a wide range of activities and programmes. The implementation of Environmental Education includes unemployed youth, public awareness campaigns, curricula for schools and colleges of education, individuals and organisations active in the field of agriculture, development, mining and other economic activities. These programmes are conducted through awareness campaigns or through one of a number of centres managed by government institutions that focus specifically on Environmental Education.

In considering programmes for sustainability relating to resources, such as fishing, key questions need to be asked to alert learners, whoever they may be, regarding the problematic nature of the notion of sustainability. These questions include:

- What meaning is and ought to be ascribed to sustainability?
- Who is responsible for ensuring sustainability, and for the development of policy and practice in relation to sustainability?
- Is there any awareness amongst communities about the interrelationships between ecology and economics of human development?
- To what extent are people aware of the impact of human activities on the marine environment?
- Is intergenerational equity being preserved?
- Is the diversity of the marine ecosystem being protected?
- What are man's perceptions of, concerns about and attitudes towards the natural environment?

An obvious gap exists in the provision of environmental education programmes that are spearheaded by the Ministry of Fisheries and Marine Resources (MFMR) in Namibia. The establishment of a Marine Environmental Education (MEE) programme, which includes an education and training section for youth and the public at large will contribute to a great extent to the sustainable development of the Namibian Fishing Industry.

Institutions, such as, the Sea Fisheries Institute at Walvis Bay, the Maritime centre at Luderitz and the recently launched Benguela Environmental Fisheries Interaction and Training Programme (The Benefit programme) can be used to promote Marine Environmental Education and Education for Sustainable Development.

The Benefit programme represents an example of international co-operation, where Namibia, together with Angola and South Africa promote optimal and sustainable utilisation of the Benguela ecosystem's living resources by:

- increasing knowledge of fluctuations in important fish resources and
- developing human capacity and infrastructure for marine science and technology (Field, 1995).

Prior to the development of appropriate educational programmes pertaining to the area of study, a situational analysis was needed. The limited resources available in southern Africa pertaining to this topic (Mann-Lang, 1997 - Appendix 1) and the belief in the participatory approach to curriculum development, which is a characteristic of the Namibian Educational Reform, led me to focus on the support of key decision-makers in the Sea Fisheries of Namibia.

Through identifying the perceptions of sustainability in the fishing industry of Namibia, I hope to create an initial data-base that will inform the development of educational programmes, while involving the key decision-makers in the conceptualisation of such programmes.

1.3 THE AIMS OF THE STUDY

The primary goal of this study was to initiate a situational analysis of the Sea Fisheries Industry of Namibia that would inform the development of Environmental Education programmes to promote the sustainable utilisation of marine resources.

In order to achieve this, the study aims to:

develop a contextual background of the status of the Sea Fisheries Industry of Namibia.

investigate the perceptions held by key decision-makers within the Sea Fisheries Industry of Namibia about the sustainable utilisation of marine resources.

analyse documents pertaining to the sustainable utilisation of marine resources, with particular reference to documents relating to the Sea Fisheries Industry of Namibia.

It must be noted that this study focuses only on the fisheries section, while Namibia's marine resources provide much more than just fish (Appendix 8).

1.4 OUTLINE OF THE THESIS

This study has been divided into six chapters. The first chapter introduces the study and provides the general context, which is sustainability and education for sustainable development and marine environmental education. The potential contributions of the study were noted.

Chapter two explains the methodology employed. This chapter explains the choice of the methodological paradigm as well as the specific methods and analyses used.

Chapter three deals with the background and context of the Namibian Fishing Industry. The position and current status of this fishing industry are highlighted here.

The fourth chapter provides an analysis of the literature which pertains to points made in the first chapter. The general intention of this chapter is to highlight two aims: firstly, that there is a diversity of theoretical perspectives inherent to "sustainability" and, secondly, that fishing industries should be encouraged to make use of "Responsible Fishing" as an approach to sustainable development.

The results of the interviews and the interpretation of the data are presented in chapter five, whereas, the concluding chapter six introduces "The Way Forward", makes some recommendations and evaluates the research.

CHAPTER 2

RESEARCH METHODOLOGY

2.1 INTRODUCTION

The first chapter has offered no more than a brief general introduction and a background to this study, relating to sustainability and education for sustainable development in the Namibian Fishing Industry. Various questions have thus far been raised about the notion of sustainability and the extent to which communities are aware of this problematic concept.

These questions have laid the foundation for my argument, which considers "Responsible Fishing" as an approach to the sustainable utilisation of Sea Fisheries in Namibia.

The general lack of published literature on the Namibian Fishing Industry, particularly in relation to literature that can inform marine environmental education (Chapter 1), has necessitated that this study has deviated from the normal research pattern, which first looks at available literature prior to the research methodology. The reason for this deviation is that the search for, and analysis of, documents and other relevant materials which could be related to the Namibian Fishing Industry were an integral part of the research and research methodology.

The questions posed in chapter one, are brought into revision in this chapter. I refer back to some of the questions asked in chapter one and show how they will be answered. In order to answer these questions, I make use of two dimensions in this chapter, namely, an empirical dimension, and a document analysis dimension. Under the empirical dimension, field work and interviews are introduced, and under document analysis, the search for data from existing Namibian documentation from workshops, seminars, etcetera and global literature are introduced.

This study is an example of a naturalistic inquiry and is grounded in a qualitative, interpretive research paradigm (Merriam, 1988), with its primary aim, to analyse the status of the Sea Fisheries Industry of Namibia in order to provide a basis for the future development of environmental education for sustainable development programmes for the Namibian fisheries sector.

A qualitative research specialisation, a case study, has been selected to frame methodological aspects of the study (Cantrell, 1993). The case in this research is the Namibian Sea Fisheries Industry and its associated infrastructure with regard to sustainable development.

2.2 RESEARCH APPROACH

Interpretive theory informs this study. Interpretive theory is a view of research that seeks to understand phenomena and to interpret meaning within the social and cultural context of the natural setting (Cantrell, 1993). In other words, to do a situational analysis of the Sea Fisheries Industry of Namibia as a means to both understand what meaning is given by key decision-makers to sustainable development in the fisheries sector and through this to develop a broader understanding of the Namibian Fishing Industry as a means for the development of curricula programmes in and for the fishing industry.

Unlike positivists who believe that reality exists apart from the researcher and is knowable, interpretive theory holds that reality is constructed. In fact, it is claimed that, research is not a matter of offering interpretations of reality, but one of offering interpretations that become reality, to the extent they are agreed upon (Smith, 1989).

The interpretive research tradition also seeks to identify the subjective perceptions of individuals. Carr and Kemmis (1993) emphasise that to identify someone's motives and intentions correctly, is to grasp the "subjective meaning" the action has for that person. In support of this idea, Fetterman (1988) indicates that researchers from the interpretivistic perspective argue that what people believe to be true is more important than any objective reality; people act on what they believe. Moreover, there are real consequences to their actions. If the aim is to uncover what the key decision-makers, within the fisheries sector of Namibia believe and want to render meaning about their actions and intentions, then as an interpretive researcher I need to interact dialogically with them (Cantrell, 1993).

Unlike positivists who attempt to separate values from facts and offer explanations of reality which are empirically verifiable, an interpretive researcher accepts the inseparable bond between values and facts and attempts to understand realities, especially the behaviour of people, within a social context (Carr and Kemmis, 1986). The complex nature of education for sustainable development and therefore environmental education, entangled in interrelationships that are based on particular social, political, and economic contexts, and consequently laden with values, suggests the relevance of an interpretive paradigm for this research (Connect, 1991).

This research was planned as a case study of a "bounded system", namely the Sea Fisheries Industry of Namibia and its associated infrastructure with respect to sustainable development. Stake (1988:258) identifies a bounded system as one which "emphasises the unity and wholeness of that system, but confines attention to those aspects that are relevant to the research problem at the time". A case study is one of a number of research approaches associated with the interpretive perspective (Cantrell, 1993.87). Within this case study, primary emphasis was place on the meanings constructed by key decision-makers on the complexity of sustainability in the Sea Fisheries of Namibia, while at the same time seeking to place together a situational analysis of the status of the Sea Fisheries Industry of Namibia, in order to inform the development of Marine Environmental Education programmes. This case study sought to describe and understand (i.e. elements of an interpretive research tradition), as opposed to correlate and predict (i.e. elements of the positivist research tradition). Through a qualitative approach, this case study also, produced a wealth of descriptive data and highlighted complexity and promoted broad insights into the Fishing Industry of Namibia.

The interpretive approach is however not without critique. This approach has been questioned, *inter alia*:

- for its subjectivity;
- for its notion that all values are equally valid;
- for its emphasis on field studies, that do not enable the researcher to make clear generalisations. Further to this, one cannot easily determine whether the findings of a case study are particular to it or more generally applicable. The difficulty is even more acute when studies cannot be replicated.
- for its emphasis which is placed on the individual level of analysis.

Given the above, the merit and credibility of this study was increased through the use of methodological triangulation. I included multiple methods of data gathering such as, field work, interviews and document analysis (Miles and Huberman, 1984; Patton, 1990) each of which will be discussed later in this chapter. Triangulation simply means that the researcher can corroborate information in one or more ways. It allows the researcher to cross-check data and interpretations by drawing upon the different data sources and perspectives.

The descriptive nature of both the topic and the aims of this research led to the choice of a qualitative research approach (Koul, 1994). Cantrell (1993) argues that methodology (e.g. interpretive paradigm) also guides choices concerning methods. She says that an understanding of

the appropriateness of a qualitative research method depends upon an understanding and valuing of the assumptions underlying the interpretive paradigm.

The term "qualitative research" is used synonymously with a case study as a research approach associated with the interpretive perspective (Cantrell, 1993). Following Locke et al., (1993), qualitative research is a systematic strategy for answering questions about people in a bounded social context. It is a means for describing and attempting to understand the observed regularities in what people do, say and report as their experience. Qualitative research is also exploratory and is used to find one's way into a relatively unstudied field and to lay the groundwork for further research (Tesch, 1992).

In qualitative research the focus of attention is on the perception and experience of the participants. What individuals say they believe, the feelings they express, the explanations they give are treated as significant realities (Seidman, 1991). Qualitative research is seen as relativistic in the sense that it does not seek verifiable and absolute "truth" (Locke et al., 1993).

The working assumption is that people make sense out of their experiences (Seidman, 1991), and in doing so create their own reality. Therefore, in qualitative research, understanding both the content and construction of such multiple and contingent realities is regarded as central to answering the question: "what's going on here?" (Locke et al., 1993). Locke et al., have further noted that this kind of research is descriptive in the context that recorded words rather than numbers are the most common form of data. Theory is created to explain the data as opposed to the collection of data to test a pre-established hypothesis. The main purpose of the researcher is to find out how the participants perceive and understand their environment (Seidman, 1991).

Further justification for using qualitative research is found when comparing it to the aims and results of quantitative research. Kincheloe (1991) states that qualitative research is distinguished from quantitative research in that quantitative research is concerned with frequency while qualitative research is concerned with abstract characteristics of events. Schratz (1993) further argues that educational research which is based on quantitative measurement, variables, experimentation and operationalisation, usually transfers the original "voices" of its participants into statistical data, mathematical relations or other abstract parameters. Consequently, very little is left of the social context in which the research occurs.

Qualitative research on the other hand emphasises the vital "human factor". and preserves the social context of the research setting. Van Maanen et al., (1982) in Schultze (1992) regard

quality as the essential character of something and quantity the amount, and see quality as the what and quantity as how much. Van Maanen et al. further add that qualitative research wants to describe what is occurring in a given place at a given time.

It should also be born in mind, that qualitative research methods potentially yield rich data in relation to the limited number of research participants. Cost in both money and time is a major consideration working in an area as geographically extensive as the marine environment of Namibia (Walker, 1985).

2.3 DATA COLLECTION

While the research method, (qualitative research) describes the overall approach to the problem of sustainable utilisation of fisheries resources, this section is concerned with the procedures and techniques which were adopted for data collection.

This section refers to the nature of the chosen sample of participants, and the selection and development of data gathering devices such as field work, interviews and document and literature analysis. These different stages of data collection inform each other, resulting in a process of data transfer. Aspects of the field work findings laid the basis of designing questions for the interview schedule. Responses from the participants during the preliminary and final interviews contributed towards the selection of the most appropriate documents and literature.

2.3.1 The research sample

The background information for this study was gathered through initial informal discussions with people working in the Fishing Industry of Namibia, such as, certain decision-makers, skippers, deck officers, fisheries inspectors, lecturers at the Maritime Institute, and the mayor of Walvis Bay who represents the local authorities. Informal talks were also held with three experts at the Department of Ichthyology and Fisheries Science, the JLB Smith Institute of Ichthyology, and Albany Museum (Department of Ichthyology) at Rhodes University.

The reason for the broad informal discussions was because I wanted to gain an indepth understanding of the phenomena underpinning the study. Cantrell (1993:90) notes that: "Determining who, what, and when to sample evolves from the initial knowledge, understanding and experience of the researcher; from recommendations given by gatekeepers, informants and experts; and from progressive understanding of the phenomena under study".

The final research sample included key decision-makers in the Namibian Fishing Industry. The six research participants selected for the indepth interview included: two decision-makers in the fisheries sector representing the Government; another two are managers of two different fishing companies who act on the decisions made, and the last two participants are the fisheries scientists who provide the support base for the Fishing Industry and guide decisions that are made.

According to Cantrell (1993), a qualitative approach uses small, information-rich samples selected purposefully to allow the researcher to focus in depth on issues important to the study. In support of Cantrell's idea, Patton (1990) indicates that for qualitative methods, the sample size is based upon the purpose of the study, and not on specific rules. He further says that the researcher looks at what he or she wants to know, what will be useful, what will be credible, and what can be done within the constraints of time and resources.

A very important issue in the use of sampling in this study was to determine the most appropriate size of the sample. A large sample is more representative but very costly. A small sample, on the other hand, is much less accurate but more convenient (Bless & Higson-Smith, 1995).

The rationale for choosing to interview key decision-makers in this study was as mentioned (Chapter 1) based on the philosophy underpinning the Namibian Education Reform programme and that of the recommendations of the 1980 World Conservation Strategy. The latter suggests that the effective incorporation of environmental issues into decision making is a priority and that incomplete understanding of conceptual and practical aspects of sustainability can serve as a barrier to the incorporation of these issues into decision making.

2.3.2 Field work

The term "field work" which I use in this study, refers to the type of exploratory research which Bless & Higson-Smith (1995) describe thus: "The purpose of exploratory research is to gain insight into a situation, phenomenon... The need for such a study could arise out of a lack of basic information on a new area of interest".

It is therefore important that one must be more familiar with a situation in order to formulate a problem. Field work of this nature is often very useful to assess the feasibility of a research project, the practical possibilities to carry it out, the correctness of some concepts, and the adequacy of the method by doing a pilot study (Bless & Higson-Smith, 1995).

Examples of field work which I have conducted were:

- preliminary interviews with some of the experts in sea fisheries at the Department of Ichthyology and Fisheries Sciences, the JLB Smith Institute of Ichthyology, Albany Museum (Department of Ichthyology) at Rhodes University, as well as a questionnaire which was circulated amongst the Higher Diploma in Education (HDE) geography students (1997) at Rhodes University (Appendix 2).

  The valuable information which I gathered from these participants shaped my thoughts with respect to this research project.

- preliminary interviews were also conducted with the above-mentioned stakeholders in the Fishing Industry in Namibia. These initial interviews were conducted in Swakopmund and Walvis Bay over a period of one week during May 1997.

Arrangements for appoinments were made during this pilot interview session in Namibia with the six selected participants on a person-to-person basis for the indepth interviews which were scheduled in June 1997.

The field work helped to clarify concepts and problems and it also allowed for the establishment of a list of possible questions which, in turn, facilitated the elimination of superfluous questions and the reformulation of ambiguous ones. The interactions in the field work phase also helped me to develop and refine my interviewing skills.

2.3.3 The research interview

After the above preparations through field work were completed, the in-depth interviews were conducted with participants working for the MFMR and the fishing companies (see sample).

Semi-structured interviews (Burroughs, 1975; May, 1993; Bless & Higson-Smith, 1995) were used, because they enabled me to develop insights into how the key decision-makers interpreted and made meaning of sustainability. Guba and Lincoln (1981) believe that the semi-structured interview best supports the purposes of naturalistic research. They suggest that open-ended questions are most appropriate when, the issue (e.g. sustainable development) is complex.

Before every interview, I first explained the purpose of the interview, the kind of questions to be asked, the confidential nature of the given information, and that the participant could also ask questions of me. Every participant was given a choice of language (Afrikaans or English) in which the interview could take place. Bless et al., (1995) suggest that the wealth and quality of the data gathered through semi-structured interviews are strongly dependent on the skill of the interviewer, the confidence he/she is able to awaken in the participants, the type of questions which are asked, and the encouraging comments which are made at the correct moment.

To elicit adequate responses from the participants, Koul (1994) has suggested certain rules that should be followed during the conduct of interviews:

- Ask only one question at a time.
- Repeat a question if necessary.
- Try to make sure that the participant understands the question,.
- Listen carefully to the participant's answers.
- Observe the participant's facial expressions, gestures and tone of voice.
- Allow the participant sufficient time to answer the question, but do not let the interview drag.
- Avoid suggesting answers to the questions.
- Do not show signs of surprise, shock, anger, or other emotions if unexpected answers are given.
- Maintain a neutral attitude with respect to controversial issues during the interview.
- Take note of answers that seem to be vague, ambiguous or evasive.
- Ask additional questions (probe) to follow up clues or to obtain additional information.

I found the rules laid down by Koul (1994) very useful in the interviews undertaken for this study. The length of every interview was on an average, one and a half hours. Permission was sought from every participant for the use of a tape-recorder. The taped interview enhanced the accuracy of data and provided a permanent record.

The interview schedule used in the semi-structured interview guided and helped to steer the interview, while it also acted as a checklist to make certain that all areas needing to be explored were covered (Schurink, 1988). The information captured on the tape recordings was transcribed, creating a reliable resource for reference and verifications.

In the course of using interviewing, the following strengths and weaknesses suggested by the literature became apparent. The strengths included:

- the ability to move back and forth in time to construct the past, construct the present, and predict the future;
- access to what otherwise would have been inaccessible;
- possibilities to check information for reflections, and emerging theories with the participants of the setting;
- the ability to gather information systematically; and
- to gain new insights and perceptions.

The weaknesses that were revealed in the information and responses from interviews:

- were highly reflective of participants perceptions and biases;
- depended upon the participants' ability to recall; and
- depended in large part upon the interviewing skills of the researcher (Lincoln and Guba, 1985; Bless, et al., 1995; Patton, 1990).

2.3.4 Document and literature analysis

Document and literature analysis was necessary in order to reduce and synthesise information -- to "make sense" out of information -- with regard to the status of the Sea Fisheries of Namibia that will shape the development of education for sustainable development programmes.

In this section I refer to the document analysis and literature review undertaken as part of the research process. Document analysis refers to "paper" data (Cantrell, 1993). The most common problem when starting document and literature analysis is the identification of relevant sources (Bless et al., 1995), but responses from the interviewees gave direction to the search for the most appropriate documents and literature for this study.

The lack of relevant published literature on the Namibian Fishing Industry contributed to the fact that part of this research was actually searching for, finding and analysing existing documentation which deals with 'Responsible Fishing' and therefore, sustainable development. Part of this research was also to look at global literature and relate it to the Namibian Fishing Industry. This, as already shown, is not simply an adjunct to the research, but formed part of the research.

The reason for looking at documents and literature on sustainable fishing was to develop the

necessary background and situational analysis for environmental education programmes for the Namibian Fishing Industry. An information framework that is pertinent to the Namibian Fishing Industry was crucial.

The time spent on this dimension (document analysis) was considerably more than that needed for the interview and fieldwork. Not all the documents and literature which I used and analysed, dealt with fisheries.

There were occasions where I had to use documentation on, for example, forestry and agriculture in order to understand the concepts of sustainability and sustainable development. The information gathered from these other disciplines was made applicable to fisheries.

The "paper" data scrutinised during the document and literature analysis included, for example, workshop documents, records, annual reports, files, agendas, policy documents, news articles, journals, text-books, circulars, speeches, seminar documents, minutes of meetings, and other similar items (Cantrell, 1993).

It is important to note that the use of document analysis in this study also suffers from strengths and weaknesses. I experienced that documents and literature on sustainable fisheries:

- provided a wealth of information, some which was not accessible through field work or interviewing;
- provided highly reliable information, more especially where the records were official in nature; and
- provided different perspectives on similar information.

On the other hand, valuable unpublished material is not accessible in contrast with data available from interviews. Documentation and literature which are available, could still reflect perceptions and biases of the authors (Bogdan & Biklen, 1982; Cohen and Manion, 1994).

Document and literature analysis as an integral part of research methodology, breaks new ground in the sense that it creates an overview of the various theories and models on, for example, sustainability and environmentalism (Bless & Higson-Smith, 1995). Document and literature analysis involved in this study, not only presented the facts pertaining to the area of study, but also revealed their consequences and implications. The document and literature analysis related to the Sea Fisheries

Industry of Namibia identified current as well as past issues and revealed gaps and ambiguities regarding the knowledge pertaining to the status of the Fishing Industry of Namibia.

2.4 DATA ANALYSIS

The aim of the research and the nature of the data collected lent themselves to qualitative analysis. Both data analysis and interpretation are not processes the researcher does only near the end of the project (Dey, 1993). According to Bogdan et al., (1982:154) data analysis involves working with data, organising it, breaking it down, synthesising it, searching for patterns, discovering what is important and what is to be learned, and deciding what to tell others. On the other hand, Worthen & Sanders,(1987) claim that the aim of interpretation is to combine the results of data analysis with value statements, criteria, and standards in order to produce conclusions and recommendations.

Individual transcripts from the interviews were read closely so as to develop an insight into the interviews and obtain a familiarity with the data. This was accompanied by marking what was considered by me to be important in the transcripts. Recurring key ideas were also marked. Seidman (1991:89) maintains that the researcher must come to the transcripts with an open attitude, seeking what emerges from the text. At the same time Seidman (1991) also acknowledges that no interviewer can enter into the study of an interview as a clean slate. This data reduction phase (Miles & Huberman, 1984) involved making summary sheets of different responses to each question and coding themes and phrases that were repeated or stood out.

In order to group and compare the data, categories were generated from recurring themes, from theoretical perspectives and from the literature read. Referring to how categories are established, Dey (1993:96) explains:
"Creating categories is both a conceptual and empirical challenge. Categories must be 'grounded' conceptually and empirically. That means they must relate to an appropriate analytic context, and be rooted in relevant empirical material. Categories which seem fine 'in theory' are no good if they do not fit the data. Categories which do fit the data are no good if they cannot relate to a wider conceptual context."

According to Dey (1993:112) the categories that we create become the basis for organising and conceptualising the data. Data were organised in terms of categories that were developed. Once categorised, the data were viewed in the context of the new categories. This is described by Tesch (1992) as "recontextualisation".

Once categories were distinguished and studied, connections within and between them could then be established. Dey (1993:139) points out that "we split categories in a search for greater resolution and detail and splice them in a search for greater integration and scope." Most categories in the research data collected displayed interconnectedness within and between themselves. Interpretation and discussion of the research results followed.

An inherent problem with qualitative analysis is well summarised by Patton (1990:372):
"...there are no absolute rules except to do the very best with your full intellect to fairly represent the data and communicate what the data reveals given the purpose of the study. This does not mean that there are no guidelines to assist in analysing data. But guidelines and procedural suggestions are not rules. Because qualitative inquiry depends, at every stage, on the skills, training, insights, and capabilities of the researcher, qualitative analysis ultimately depends
on the analytical intellect and style of the analyst. The human factor is the great strength and the fundamental weakness of qualitative inquiry and analysis."

2.5 SUMMARY

To conclude this chapter, based on the qualitative, interpretive paradigm and the associated educational and philosophical views, the study aimed to go beyond looking at the status of the Sea Fisheries of Namibia. The study was also intended to educate, to conscientise and to initiate discussion around Marine Environmental Education and "Responsible Fishing" in order to develop a framework for educational programmes in the fisheries sector of Namibia.

The qualitative and participatory approach that was adopted through the use of semi-structured interviews did to some extent give the key decision-makers an opportunity to point out their perceptions of sustainable utilisation of marine resources in the Fishing Industry of Namibia. The key decision-makers also had the opportunity of pointing out their views with regard to three areas of focus, namely:

- The meaning of the concept "sustainability";
- Operationalisation of the "sustainability" concept; and
- The role of education in helping the idea of "sustainability".

Emphasising the need to understand the key decision-makers' views, Breiting (1993:199) argues:
"From an environmental education perspective, research should focus on gaining better understanding of people's own perceptions, ideas and other theories (sustainability) in relation to their environment, environmental issues and nature in order to obtain new insights in adapting environmental education to the social and physical context in which the school community is embedded".

CHAPTER 3

BACKGROUND TO AND ANALYSIS OF THE CURRENT STATUS OF THE NAMIBIAN FISHING INDUSTRY

3.1 INTRODUCTION

The previous chapter has concentrated on the research methodology, where the research paradigm, the research procedures and the research techniques were critically analysed, justified and evaluated.

First, this chapter focuses on the geographical, biological and developmental background of the Namibian Fishing Industry. The first part of this chapter briefly sketches the Namibian marine environment. The second part looks at a brief historical overview of the Namibian Fishing Industry. The third part considers the issues and problems related to fishing industries and uses the European Communities' fisheries sector to contrast developments in the Namibian fisheries sector.

Secondly, this chapter, which formed an intergral part of the research, was necessitated because of the limited published materials available on the current status of the Sea Fisheries Industry of Namibia. Thirdly, this situational analysis begins to ask the question, "to what extent is current policy in the Namibian Fishing Industry based on sustainable practices?"

Fourthly, this chapter, in unpacking the status and situation in the Namibian Fishing Industry, is then linked to the global discussion on "sustainability" and "Responsible Fishing" (Chapter 4). Fifthly, this chapter is also an essential part of my research, both in terms of, not only providing the background information, but also in providing me with a basis from which to discuss issues with the key decision-makers.

A brief indication of some of the background and context on why this chapter has been written is as follows:

The international community has recognised the seriousness of the threats that human activities pose for our marine environments and the necessity of devising effective measures to deal with

them. This recognition can be noticed during the late 1980's and early 1990's, when we have come fully to appreciate that there may be inherent interrelations and occasionally tensions between our environmental and our other goals, such as economic development, and that there may consequently be an urgent need to look at our marine environmental problems in new and more comprehensive ways.

Two major "landmarks" in the international communities' efforts to rethink approaches to these issues was the 1987 report of the World Commission on Environment and Development, entitled, Our Common Future, (the Brundtland Report, Chapter 4) and the United Nations Conference on Environment and Development (UNCED) of 1992 (Chapter 4).

The Brundtland Report called for new policies to provide a future basis for development based on enhanced marine resources and publically responsive decision making. UNCED, on the other hand, called for the protection, rational use, and sustainable development of marine resources in oceans and all kinds of seas.

Both, education and training are urgent needs in the Namibian Fishing Industry and long-term programmes on sustainable and environmentally sound development of the marine environment, are required (Chapter 4).

The sources of information for this chapter emerged from documents, such as, annual reports, statistical reports, seminars, journal articles, symposiums, conferences, unpublished papers, personal communications and newspaper articles obtained from the Ministry of Fisheries and Marine Resources in Namibia, and global literature dealing with the sea fisheries sector.

The table below is an indication of the range of documents that were consulted for this chapter.

Table 1: Documents consulted for use in writing this chapter

Document	Date	Reference
The Benguela ecology programme: successful and appropriate.	1989	Butterworth, D.S. (South African Journal of Science, 85, 633 - 643)

The fish sector in Namibia -- A hope for the future?	1990	Lasch, R. (Internationales Afrika-Forum,26(1), 61 - 77
Towards responsible development of the fisheries sector (unpublished paper)	1991	Angula, H. (Former Minister of Namibian Fisheries and Marine Resources
Annual reports of activities and state of the fisheries sector	1993, 1994 & 1995	Ministry of Fisheries and Marine Resources, Namibia
Namibia Brief: Focus on fisheries and research	1994	Blatt, C. (Ed.)
Namibia scores on effective management	1994	Thomson, D., cited in Namibia Brief, (1994: 42)
Investment boom in Walvis Bay -- as Africa's biggest fishing centre expands -- shore factories modernise	1994	Murray, R. Fishing News International, (London), 33(12), 18
Namibianised! -- How development has replaced "the last great coastal free - for - all"	1994	Fishing News International, (London), 33(4), 24 - 26
Fishing Industry Handbooks: South Africa and Namibia	1994,1995 & 1996	Stuttaford, M.
The Benguela current and comparable eastern boundary upwelling ecosystems	Seminar, 1995, Swakopmund	O"Toole, M.J., (Ed.)
Namibia building its own industry -- after expelling 200 -- strong foreign fleet	1995	Stuttaford, M. Fishing News International, (London), 34(9), 20 - 23
Fishery Statistics, 1996: Summary statistical report	1996	Ministry of Fisheries and Marine Resources, Namibia

3.2 NAMIBIA'S MARINE ENVIRONMENT

Namibia's shore borders on the waters of the Atlantic Ocean with a coastline of about 1500km. The waters off the Namibian coast are unusually cold, but support some of the greatest concentrations of marine life found anywhere in the world (O'Toole, 1996). Each year millions of Namibian dollars worth of fish are caught off the coast and sold on the local and international market (Appendix 8). Namibia's marine resources provide much more than just fish. Shellfish, especially oysters (genus Ostrea), crab (genus Cancer), rock lobster (genus Palinurus), seaweed, seals (Halichoerus grypus), oil and guano are some other important commodities that have been obtained from the sea (Appendix 8).

The growth of the Namibian Fishing Industry shortly after Independence was phenomenal. The contribution of fisheries to exports grew from 7,6% to 22,9% in 1995 (MFMR Annual Report, 1995), making it the second largest foreign exchange earner after mining.

The 1996 fishing season, however, saw a decrease in the total fish landed in the commercial fishing sector, compared to the previous five fishing seasons - 1991 to 1995. Annual catches for 1991 to 1996 are detailed in Appendix 8. The total fish landed in 1996 was 516,625 metric tons, which represented a 9% decrease from the 568,634 metric tons recorded in 1995. The statistics also show a 20% decrease over the 647,996 metric tons recorded during the 1994 fishing season.

The drop in the catch is generally attributed to the adverse environmental conditions that prevailed since late 1993 (Appendix 8). A breakdown by landings (in mt) of main species and main industry sectors and a breakdown with regard to the main marine products export value is given in Appendix 8.

The harbours of Walvis Bay, in central Namibia, and Luderitz, in the south serves the Namibian Fishing Industry (Figure 1). In addition, there are a few smaller places along the coast with angling and tourist activities, the most developed tourist and holiday resort being Swakopmund, located on the coast 35km north of Walvis Bay. Other resorts include, *inter alia*, Wlotzkas Baken, Cape Cross, Henties Bay, Möwe Bay, Terrace Bay, Conception Bay and Oranjemund.

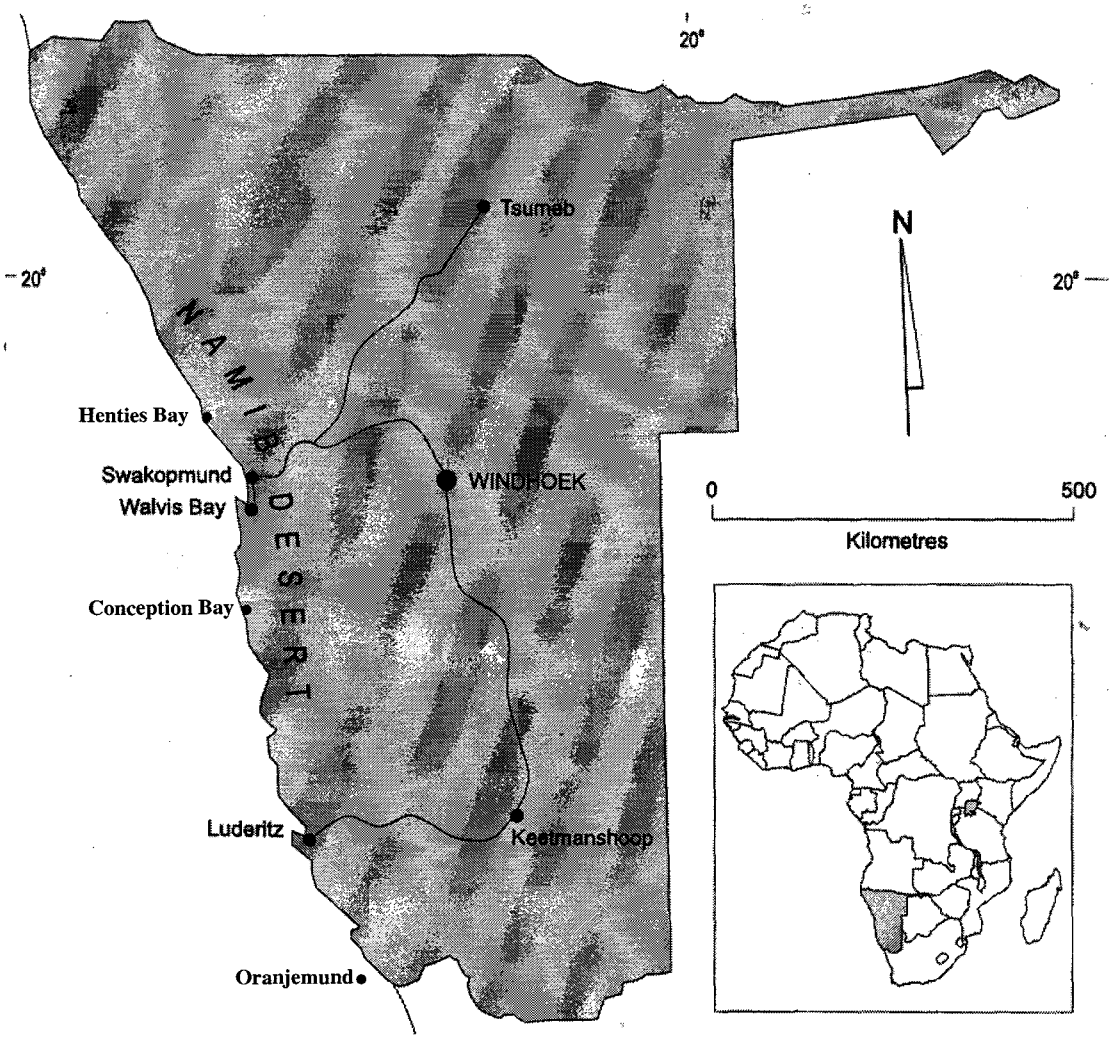

Figure 1: Map of Africa showing the position of Namibia and its marine environment

There are no other permanent settlements along the coast where fishing is undertaken, nor are there fishing areas combined with agriculture, as the coast itself is a desert along its entire length.

Walvis Bay is the main fishing harbour. It is in fact the only deep water harbour in Namibia, allowing a maximum draught of about 9m for vessels entering the port. Most of the fish processing industries and servicing facilities are also located in Walvis Bay. It is a complete harbour that serves all the

needs of the locally based fishing fleets operating in that area with water, food, a shipyard, spare parts, agents, etcetera. There is also a factory producing tins for the canneries. A railway line connects Walvis Bay to Windhoek and the main mining centres. Walvis Bay also has an airport and good road connections.

Luderitz has a fishing harbour that mainly serves the rock lobster industry. It has only limited servicing facilities, including a boatyard.

The harbour can take vessels with a maximum draught of about 6m. Luderitz had no processing factories operational for canning or fish meal until a new factory (Pescanova) for the processing of white fish came into operation in 1991.

The cold Benguela current provides Namibia with fishing grounds rich in deep-water and pelagic fish. Nutrients on the seabed are brought to the surface by a process known as upwelling (Figure 2). The upwelling is caused by longshore winds displacing the surface water which, because of the earth's rotation, is deflected to the left (O'Toole, 1996).

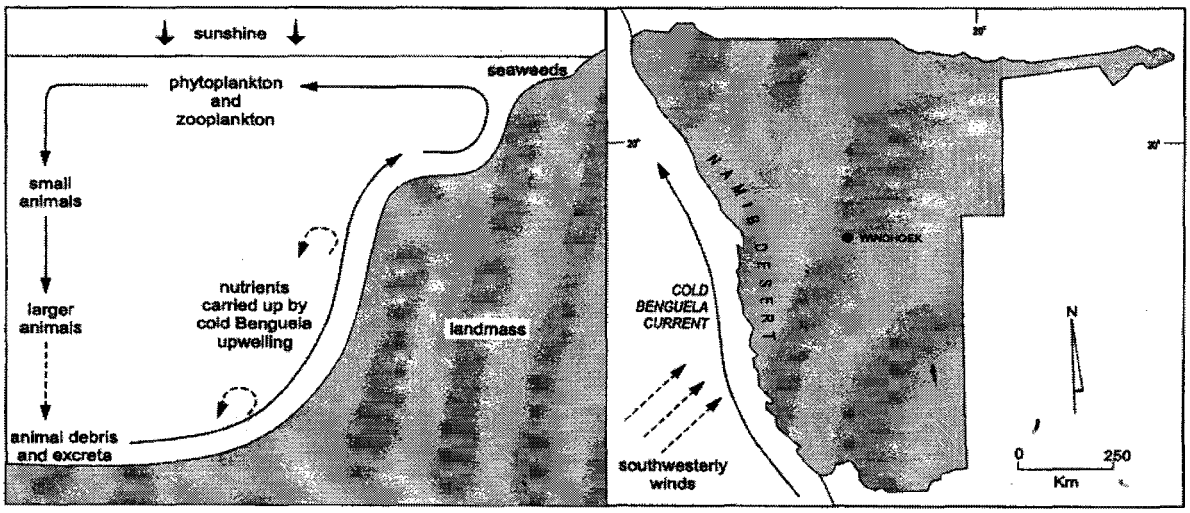

Figure 2. **The Benguela Upwelling brings waters rich in nutrients to the surface. The nutrients provide the basis for a rich marine food chain off the Namibian coast.**

The surface water that moves off-shore under the influence of the wind is replaced by water nearer the seabed, colder and rich in salts on which organisms thrive. The waters off the Namibian coast are exceptionally rich in microscopic marine plants (phytoplankton) and animals (zooplankton), on which all higher forms of life in the oceans ultimately depend (Figure 2). According to Bakun (1993), the Benguela Large Marine Ecosystem possess the strongest sustained locally wind-driven coastal upwelling of any region of the world ocean.

3.3 A BRIEF HISTORICAL OVERVIEW OF THE NAMIBIAN FISHING INDUSTRY

The development of a fishing industry in Namibia was only started in the late 1940s (Angula, 1991; Du Toit et al, 1993).

Before the first factories for processing rock lobster (genus Palinurus) and snoek (genus Centropomus) and pelagic fish were built at Luderitz and Walvis Bay respectively, the only other commercial marine activities were sealing and whaling (Moyo, et al., 1993).

The fishing industry became an important component of the Namibian economy during the 1950s. Three major industrial fisheries were established on the Namibian coast. These consisted of an in-shore pelagic fishery mainly for pilchard and, to a much lesser extent, anchovy which was exploited by a Namibian based purse seine fleet, and an off-shore trawl fishery for hake (genus Merluccius and horse mackerel (Trachurus trachurus). Fleets which exploited the fish in the Namibian waters in those days, were from Spain, South Africa and the former East Bloc countries. Snoek which at that time was also of significant economic importance, was exploited by Namibian and South African based vessels (Blatt, 1994).

Responsibilities for the management and regulation of the Fisheries resources of Namibia prior to independence was divided between the then South West Africa Administration in Windhoek for the in-shore fisheries and the International Commission for the South East Atlantic Fisheries (ICSEAF) for the off-shore deep water fisheries (Prescott, 1993).

At this stage Namibia was one of the few rich coastal fishing areas for which an Exclusive Economic Zone (EEZ) had not yet been introduced. This reason and the abundance of fish in the 1960s and the late 1970s attracted foreign fleets.

Since the mid 1970s, according to Moyo, et al., (1993) there has been a marked decline in catches: by 1981 the pilchard (Sardina pilchardus) had almost disappeared from coastal waters

and all the pilchard processing plants had closed down.

Chenje & Johnson (1994) noted that the following factors were responsible for the collapse of the previously lucrative fishing industry of Namibia:

- overexploitation.
- inappropriate fishing practices.
- the use of small-mesh nets to catch small fish species.
- the use of destructive fishing methods, such as, excessive bodem trawling which damage the sea bottom.
- over-capacity, i.e. too many fishing vessels to catch the fish available.
- greed and short-sightedness of some governments.
- the notion of free-access; common property; freedom of the seas; and inexhaustibility of the seas recognised by some fishing countries.

3.3.1 Namibia: Building a modern fishing industry

The recent history of Namibia's fisheries development is traced from Independence in March 1990. In one of its first actions, the Namibian government established a 200 mile exclusive economic zone in July 1990 on the basis of the United Nations Conference on the Law of the Sea (1982). This gives Namibia the authority to take on rights and responsibilities over this potentially rich, but substantially misused marine ecosystem.

The socio-economic structure of Namibia at Independence was dominated by inequities in economic opportunities. For example, in the fisheries sector, there was no requirement, before Independence, for a foreign investor to sell shares to the Namibian public, but with the Namibianisation of policies (MFMR, Report of Activities & State of the Fisheries Sector, 1995) in the fisheries sector, greater participation and investment by Namibian businesses, and other stakeholders, was possible. To address these inequities, and others, Namibia has to create wealth through economic growth, and fisheries is one of the sectors perceived to have the greatest potential for that growth.

In pursuit of that potential, the Namibian Government took a series of measures:

- A new, separate Ministry of Fisheries and Marine Resources (MFMR) was set up in 1991 to manage Namibian fisheries on behalf of the Government.

- The legislative responsibilities of the MFMR as contained in the Sea Fisheries Act, 1992, are multidisciplinary and not just related to fish stocks and their direct exploitation. These responsibilities can be summarised as : "To provide for conservation and sustainable exploitation, the protection of EEZ rights, sectoral administration, research, institutional development, industrial promotion and international collaboration" (MFMR annual report, 1995, p.17).

- A White Paper, entitled Towards Responsible Development of the Fisheries Sector, on fisheries policy was adopted by the National Assembly in 1991. The paper sets the utilisation of the country's fisheries resources on a sustainable basis as the overall objective for fisheries policy and the development of industries based on them that make a lasting contribution to the country's economy and overall development objectives. It sets out strategies for achieving this objective based on the two main themes of rebuilding and conserving fish stocks and increasing Namibian participation at all levels of the industry (Appendix 3).

- Fishing rights were granted by the MFMR to applicants selected in accordance with criteria set out in the legislation and for terms generally reflecting the extent of Namibian ownership of ventures and the pattern of their investment (Appendix 4).

- Total Allowable Catches (TACs) for marine resources that were overfished were cut to low levels, in other words, the maximum allowed take (TACs) from overfished resources were lowered to protect these resources from extinction. TACs are set annually for major species by the MFMR after consideration of advice from the MFMR scientists and the Fisheries Advisory Council in which the industry and other stakeholders is represented. The TACs are distributed by quotas to holders of fishing rights.

- The impact of fishing in all significant fisheries is controlled either by quotas or limitations on the numbers of licensed vessels.

- Currently, a vessel quota has been put in place in the demersal fishery to avoid over-capitalization, and is planned to be extended to the pelagic fishery.

- In order to encourage onshore processing, an increasing share of the hake quota is being allocated to vessels landing their fish on ice rather than frozen. Onshore processing adds value to the particular fish being caught and also employment opportunities for Namibians.

- The Namibian Government, also, through the MFMR mounted a forceful surveillance and control operation to curb illegal fishing. As a result illegal fishing by foreign vessels is under control today (Namibia Brief, 1994).

  Inspectors are also placed on board all local industrial vessels and monitor all catches. It therefore appears that the quota limits are generally effective and that wasteful practices such as dumping have been substantially curtailed (Namibia Brief, 1994).

- Building on a small, but long established research capacity, fisheries research programmes have been upgraded and are conducted in the newly constructed National Marine Information and Research Centre (NATMIRC).

- Currently, the fishing industry of Namibia is technologically efficient. Operators utilise sophisticated technology ranging from electronic aids, such as, echo-sounders, radio-direction finders, sonar and other electronic devices to find schools of fish, to modern methods used to harvest fish, such as, purse-seine nets, drift-nets and trawl-nets.

Fishing provides thousands of Namibians with employment. In 1993, the labour force in the Namibian Industry was estimated at 11,500 people. Job creation in the sector is around 1,500 new jobs annually. Based on this it is estimated that employment stood at 14,500 for 1995 of which 6,641 were working at sea. Certain predictions indicate that by the year 2000 the fishing industry could provide up to 15 000 jobs (O'Toole, 1996).

This economic growth, contributed by the fisheries sector, is not just a statistical phenomenon. It can be seen in tangible features that touch the lives of many Namibians, especially those in the coastal regions. In Luderitz the employment generated by the new Pescanova Fishing Industries plant has contributed substantially to the progress of the town.

The same can be said about, *inter alia*, the new whitefish processing operations in Walvis Bay, Gendev's new tuna cannery and the new horse mackerel drying and smoking plant at Arandis near Swakopmund (Namibia Brief, 1994).

In the light of the above, it is necessary to start examining the extent to which sustainability and "Responsible Fishing" are being applied in the Fishing Industry of Namibia. In other words, while

these above-mentioned results may be promising in terms of the traditional view of development and economic progress, the question remains as to whether this progress can be linked to sustainability as identified by the principles of "Responsible Fishing".

3.4 ISSUES AND CHALLENGES RELATED TO FISHING INDUSTRIES

The initial framework of this section is based on the paper presented by Thomson (1994), namely, "Namibia scores on effective management", published in the Namibia Brief, 1994 (Appendix 5), from the vantage point of a developing country, Namibia, and compares the similarities and differences, with respect to fisheries management, with the European Community (EC) and its developed Member States.

I will constantly refer to the tools and techniques of fisheries management utilised by Namibia and the European Community in order to highlight why Namibia is seen by Thomson (1994) to perform better than the EC in terms of sustainable fisheries development.

In his article, Thomson (1994) refers to the global mis-management of fisheries resources. He emphasised that fisheries have been characterized by depressed resources, overexpanded fishing fleets, over-capacity (i.e. too many fishing vessels to catch the available fish), overfishing and excessive economic pressures.Thomson also offered the observation that governments have failed globally to halt stock destruction.

Thomson (1994) indicates that at present, alarming signals are coming from Canada and the eastern USA about their cod stocks where expected catches are down from earlier catches, indicating considerable management problems. Pelagic species such as the Peruvian anchovy (genus Engraulis) and the tuna (genus Thunnus) resources in the Indo-Pacific are under severe pressure. In the Gulf of Mexico, Bay of Bengal and South China Sea the mortality of non-target marine organisms is a universal feature of fisheries operations, with two tons of fin fish destroyed for each ton of shrimp (genus Crangon) caught (Thomson, 1994). Morrissey & Robles, (1996), points out that the current shrimp fishing methods and infrastructure in Mexico contributed to the harvest of shrimp-bycatch and it is estimated to be approximately 350,000 tonnes per year. In Europe, too many fish (especially juveniles) have been discarded at sea (Churchill,1993).

According to Thomson's (1994) article, some of the above-mentioned problems could be minimised if governments have the will to solve them and joined forces. A much stronger commitment is

required on behalf of governments in order to obtain the benefits of opportunities for development inherent in the marine environment.

Thomsons' (1994) article also stated that some developing countries, such as Namibia, manage their fisheries wisely and effectively in contrast with the weak performance of some developed states, such as the European Community (EC).

The European Community base their fisheries management on the traditional regulatory approach, namely, the notion of "common property". Thomson refers to this as a "common pond". In contrast to the notion of common property, Namibia is making use of a "property rights" system or also called "rights-based fishing" (McCay, 1996).

These two approaches of resource regulation have many features of an effective fishery management regime in common, but there are certain issues which contribute towards the weak performance of the developed countries in contrast of the "good" performance of the developing countries.

3.4.1 Conservation and management of fisheries resources by Namibia and the European Community

The effectiveness of fishery conservation and management depends on the adequacy of the conservation and management systems behind it, the effects it has on fish and people, and how well the rules are followed and enforced (McCay, 1996).

As background to the Namibian situation, Thomson (1994) pointed out that Namibia bases its fishery conservation and management on an approach called, "rights-based fishing". However, in the case of the EC, Thomson is referring to the traditional regulatory approach, namely, the notion of "common property".

By "rights-based fishing" (Namibia) is meant that those who fish must hold well-defined, tangible, exclusive property rights (Pearse, 1996). Pearse, furthermore, stated that most governments of coastal states excluded everyone from access to the fish stocks except those who hold licenses. And the rights of license holders are specified in quantitative terms and have the character of property. In other words, the total allowable catch (TAC) in a fishery could be divided up and allocated amongst the licensed fishermen, then licenses would convey not simply a right to fish, but a right to take a specific quantity of fish.

By "common property-based fishing" is meant that everyone has a common property right, shared with all his compatriots, to fish in his country's territorial sea and a common property right, shared with people of all nations, to fish in the High Sea as well (Pearse, 1993). A loose legal definition of the term "common property" is: "... that which is not owned, and can be used by all" (Barkai et al., 1996: 27).

Namibia's fisheries conservation and management regime started with the establishment of a 200-mile exclusive economic zone (EEZ) at independence in 1990 and thus replaced as manager the International Commission for South East Atlantic Fisheries (ICSEAF), which had been responsible for fisheries beyond the generally prevailing 12-mile zone that had existed before the extension of limits to 200 miles (Namibia Brief, 1994). Since then, Namibia has developed a small but effective fisheries administration under the auspices of the Ministry of Fisheries and Marine Resources, and this industry has grown rapidly (3.3.1).

While the European Community is an atypical fisheries manager, being an international organisation rather than a normal coastal state, such as Namibia, the EC is nevertheless an interesting subject for a case study in conservation and management in sea fisheries, as the EC is one of the largest fisheries managers in the world in terms of what it has to manage (Churchill, 1993).

Churchill (1993: 141) further claims that the EC has: "... a resource base which yields an annual catch of somewhere in the order of 6 million tons (roughly 8% of the total world fish catch), and a fleet of more than 65,000 vessels operating from hundred of ports in eleven different states".

Since 1983 the EC, rather than its Member States, has been primarily responsible for the management of fish stocks found in the 200-mile zones of its Member States, and also replaces thus as managers the Member States and the International Commission for North East Atlantic Fisheries (ICNEAF) which also had been responsible for fisheries beyond the 12-mile zones (Churchill, 1993).

Churchill (1993: 143) also stated that the competence to regulate fisheries in the EC Member States waters had belonged "... fully and definitively to the Community". But the Member States, according to Churchill, have a secondary responsibility for such management, because the Member States can take fishery management measures in cases where urgent action is required or only local fishermen are affected. Derived from the above it is very clear that a division of competence exist between the EC and its Member States in relation to fisheries management.

It is also clear that the extension of coastal state fisheries jurisdiction to 200-miles by the 1982 United Nations Convention on the Law of the Sea propelled Namibia and the EC into fisheries conservation and management.

The policy framework for the fisheries sector in Namibia is set out in the White Paper of 1991, entitled "Towards Responsible Development of the Fisheries Sector" (MFMR, Report of Activities and State of the Fisheries Sector, 1995). The EC has become involved in fisheries management by requiring the adoption of a common policy for fisheries products, namely, the Common Fisheries Policy (CFP), which implementation started in 1970 (Churchill, 1993).

The following are some key features of the Namibian and the EC fisheries policies. These policies reflect the broad goal of sustainable development that Namibia and the EC has set itself. Namibia and the EC use various techniques and tools of conservation and management to try to attain their goals of sustainable development in fisheries. These are:

- Access rights,
- Total allowable catches,
- Quotas,
- Technical conservation measures, and
- Enforcement mechanisms.

(MFMR, Report of Activities & State of the Fisheries Sector, 1995); Churchill, 1993).

Access Right

In Namibia, rights of exploitation are granted for access to each fishery. Rights are granted for four, seven or ten years, depending on the degree of Namibian ownership and status of investment by the operator. See Appendix 4 for more information about the criteria for granting of Namibian exploitation rights.

In the EC, rights of exploitation are granted for equal access for the fishing vessels of one Member State to the maritime zones of any other Member State (the equal access principle). This regulation empowered the Council (EC) to adopt the necessary conservation measures to prevent a risk of overfishing in Member States' maritime zones (Churchill, 1993).

Total Allowable Catches (TACs)

The cornerstones, both of the Namibian and EC fisheries management are systems of TACs. Each year the Council (EC) and the Fisheries Advisory Council (Namibia) establish TACs for most stocks of commercial interest found in EC and Namibian waters, respectively. Such regulations are usually adopted at the end of the year preceding the year to which they relate and are based on proposals put forward by the Council (EC) or the Fisheries Advisory Council (Namibia). In making their proposals, the Council (EC) or the Fisheries Advisory Council (Namibia) are advised by their fisheries scientists.

Although scientific advice forms the basis for the Council's (EC) proposals for TACs, a tragic phenomenon takes place in the management of fisheries of the European Community. They, on many occasions increased the actual proposed TACs for socio-economic reasons, to exceed the figures recommended by their scientists (Churchill, 1993). It is a phenomenon which does not occur in the Namibian fisheries sector (Namibia Brief, 1994).

The criteria for setting the total allowable catches in Namibia by the Ministry of Fisheries and Marine Resources (MFMR) have been the careful balancing of sustainable resource management on the one hand and the need to look at the socio-economic circumstances on the other hand. Namibia recognised, for example, the need to create employment opportunities in its fisheries sector. Setting total allowable catches in the Namibian Fisheries Sector is not so much a matter of balancing conservation against jobs, but rather of balancing jobs now against jobs in the future. The MFMR realises that if they take more fish now to preserve jobs this year, they will have less fish to harvest, and therefore fewer jobs, next year and in the years thereafter. The MFMRs' opinion is that they have to judge how much fish they can reasonably take this year to preserve jobs without risking the prospects for future employment (Namibia Brief, 1994).

Quotas

Once the Fisheries Advisory Council (Namibia) and the Council (EC) has established a TAC for a stock of fish, they then divide the TAC into quotas allocated to individual members and fishing companies in the case of Namibia, and for the EC to the Member States.The criteria for such allocation are: past catches (see Appendix 4 for Namibia's criteria for granting rights and quotas), while the EC focuses on the needs of certain regions particularly dependent on fishing.

An important question to raise at this stage is: What sanctions are available to try to prevent fishing companies of Namibia or the Member States (EC) from exceeding their quotas? There are a number of sanctions, of varying effectiveness, which can be applied on fishing companies or Member States where they have exceeded their quotas.

In the case of the EC the following sanctions are applicable:

- the Council can bring the offending Member State concerned before The European Court of Justice; or

- a second possible sanction is a financial penalty that can be imposed unto the particular Member State; or

- a final form of sanction for exceeding quotas is to reduce the quotas of the offending Member State for the following year.

In the case of Namibia certain fees are imposed on quotas (Appendix 6). Fisheries inspectors are on board of all industrial vessels who verify and certify the catches and they also monitor all the landings (MFMR, Annual Report, 1995).

Technical conservation measures

While TACs and quotas are the main forms to ensure sustainable use of fisheries resources, various technical conservation and management measures apply for both Namibia and the EC. These can be categorised as follows (Jurgens, 1994; Churchill, 1993):

- closed areas whereby protection is afforded to some fish species during spawning or recruitment. These closed areas could be sanctuaries or marine reserves to serve conservation;

- closed seasons whereby resources are offered protection during certain periods of their life cycles. It is often necessary to protect certain species during spawning and recruitment stages;

- size restrictions, the main purpose of which is to allow the organisms to reach sexual maturity and to be afforded the opportunity to reproduce before being made available to the industry or public;

- restrictions applicable to fishing gear to control the fishing effort. This can be done by limiting the number of vessels, hooks, nets and fishing rods, or by stipulating the specifications of the fishing gear, such as the size of hooks and the mesh size of nets; and

- finally, a method used only in the EC, to limit effort is the provision of financial aid to Member States. This aid encourages a reduction in capacity in the Member States fishing fleets, as well as for modernising some of the vessels.

Enforcement

An integral part of Namibia and the EC's fisheries management systems are their provisions relating to the enforcement of the measures outlined above. The competence to enforce such measures lies largely with the MFMR in the case of Namibia. Some legal enforcement objectives for Namibia are to, (according to MFMRs' annual report, 1995):

- prevent illegal and unregulated fishing activities within Namibian waters;

- prevent illegal and uncontrolled angling along the coast as well as illegal trading of fish and fish products;

- monitor control and enforce regulations on sea birds and seals;

- prevent dumping and pollution within Namibian waters; and

- ensure that all laws and regulations are complied with.

Compliance control activities in Namibia are based on:

- fisheries inspectors in Luderitz, Walvis Bay and Swakopmund who monitor fishing activities and landings through inspection programmes in the ports, during transhipment and at sea;

- a sea surveillance service operated by three patrol vessels at Walvis Bay;

- an air surveillance service; and

- coastal and inland patrols by Fisheries Inspectors with vehicles operating throughout the year.

The competence to enforce conservation measures in the case of EC, lies with the Member States (Churchill, 1993). This is because the EC possesses no real law-enforcement machinery of its own.

Nevertheless, the EC has adopted a regulation (Churchill, 1993) which imposes certain duties on Member States relating to their law enforcement responsibilities.

The main features of this regulation are:

- a general duty on Member States to enforce EC rules relating to TACs, quotas and other conservation measures;

- a duty on skippers and Member States to report catches; and

- the establishment of a group of EC fisheries inspectors to oversee the work of national fisheries inspectors.

Apart from requiring its Member States to take enforcement action, the EC also encourages effective enforcement by providing financial assistance for this purpose to its Member States.

3.4.2 Reasons for the lack of success of the European Community (EC) in fisheries management

Thomson (1994), stated in his article in the Namibia Brief (1994), that a number of countries with developing economies manage their fisheries wisely -- in contrast to most industrialised fishing states with developed economies. And of all the fishing countries he mentioned Namibia as an example of wise and effective fishery management. Namibia's success is in sharp contrast to the weak performance of the European Community with its industrialised fishing Member States.

In both Namibia and the EC there had been years of overfishing which contributed to the reduction of the size of fish stocks. In the case of Namibia it happened before its Independence in 1990 (Namibia Brief, 1994). In the EC overfishing happened before the assumption by the EC of its fisheries management responsibilities in 1983 (Churchill, 1993).

Churchill (1993) stated various reasons for the lack of success of the EC in attaining its goal of sustainable development in its fisheries sector. He holds the opinion that the overfishing phenomenon in the EC has been compounded by the fact that the EC has not set TACs at a sufficiently low level to allow the stocks to reach a reasonable level of sustainability. Churchill (1993) also stated that in a number of cases catches also exceeded recommended TACs -- and this represents continued overfishing.

However, in the case of Namibia, notably after Independence (1990), all Namibian fisheries were brought under a regulatory scheme (see 3.3.1, Namibia: Building a modern fishing industry) based on, *inter alia*, total allowable catches and quotas allocated to fishermen with reference to their historical shares of the catch.

Further reasons for the widespread non-attainment of sustainable development in the EC, according to Churchill (1993), are the following:

- the catching of too many young fish as a result of inadequately observed technical conservation measures;

- the problem of bycatch where the catch (of one or more species) made incidentally when targeting a different species;

- the problem of discarding or dumping, where small fish is thrown back into the sea after it has been caught; and

- the problem of overcapacity, where too many EC vessels are allowed to catch the available fish. This is a situation which is stressed by Pearse (1993: 182) in the following way: "... too many boats chasing too few fish".

Churchill (1993) claimed that EC efforts to reduce the above-mentioned sustained mismanagement of the fishing resources have been signally unsuccessful.

On the other hand, Namibia took the following steps in order to ensure sustainable use in managing its fisheries:

- entry to every commercial fishery in the Sea Fisheries Industry of Namibia is limited by the requirement for the holding of a fishing right and by conditions on these rights (Appendix 4). This measure avoids overcapacity in the Namibian Fishing Industry;

- to avoid the catching of young fish, the Namibian Fishing Industry limits on mesh sizes of nets to be applied in all trawl fisheries;

- Bycatches are managed in Namibia largely by bycatch fees designed to

  stop targeting bycatch species; and

- on the issue of dumping of fish, various conservation measures apply in the Namibian fisheries sector (Enforcement, 3.4.2).

It is also reasonable to say that many of the European Community's fisheries management problems stem from the approach they follow, namely, "common property resource use". The common property resource users in the EC are the Member States, whereby these States hold specific rights to use and enjoy certain resources in common. It is very difficult where there are different "bosses" to look after a resource -- they tend to blame each other when problems pop up.

Pearse (1993: 181) stated that open access, common property fishing, simply "allowed too much fishing", because too many stakeholders are involved. It was this result that Garrett Hardin (1993) labelled the "tragedy of the commons".

In the case of Namibia, the sea fisheries managers follow another regime of the right to fish, and thus give thus fishing enterprises a more clearly defined property right in the resource (Appendix 4). This "rights-based fishing approach" followed in the Sea Fisheries Industry of Namibia breaks with the old tradition of common property right, used by the Member States in the EC.

According to Thomson (1994), the Namibian Sea Fisheries Industry has been promoted by the provision of access rights where this right provides an opportunity for turning much more responsibility over to fishermen to manage fishing activity.

The Sea Fisheries Industry of Namibia recognises the fact that the marine resources are by definition a national asset and the heritage of all citizens. In order to ensure the sustainability of the resource, the MFMR consider it necessary to limit harvesting levels, and therefore access to the resource (Appendix 4).

The move towards property rights for the European Community may create some effectiveness in fisheries management, as it is the case with Namibia, but equally with property rights there is a different range of problems in determining who gets those rights. Once you give a person a right, he/she can then take you to court if you modify his/her rights in any way or other.

3.5 SUMMARY

This study is less concerned with the technical issues pertaining to the fishing industry and more related to the scope of educational programmes that will ensure action for sustainable utilisation of these valued resources.

This chapter also deals with the complexities of the European Communities' common fisheries policy, as well as the Namibian fisheries policy and progress or lack of progress that is being made in this area.

While this study appears to reveal the Namibian Fishing Industry in a very favourable light, in relation to the European Community's Fishing Industry, issues relating to "Responsible Fishing" as the basic principles on which the fishing industry is based, can only be answered through further research.

An analysis of "sustainability" and sustainability within "Responsible Fishing" in the next chapter (Chapter 4), will attempt to highlight some of the problems and some of the solutions. Further to this, the interviews held with selected participants may shed further light on the extent to which the Namibian Fishing Industry is indeed a model for the sustainable utilisation of fishing resources. What this chapter also points out is that any Fishing Industry has a responsibility to ensure the sustained development of ocean fisheries, and that fish is too valuable a resource to be wasted.

CHAPTER 4

THE ISSUES OF SUSTAINABILITY IN TERMS OF "RESPONSIBLE FISHING" AND MARINE ENVIRONMENTAL EDUCATION

4.1 INTRODUCTION

The previous chapter provided a situational analysis of the Namibian Fishing Industry and gave a background which looked at the policy in the Sea Fisheries Industry of Namibia.

This chapter focuses on pertinent literature that helps to answer the key question:

- Is the Namibian Fisheries Sector sustainable in the light of global policy?

I answer this question through examining three (3) related questions:

Firstly, to what extent can the picture in the Sea Fisheries Industry of Namibia be compared to the guidelines given for "Responsible Fishing"?
Secondly, to what extent is Namibia practising sustainable development within its fisheries policy?
Thirdly, to what extent is Namibia practising sustainable development in terms of its fisheries management?

Thomson (1994 in Appendix 5) created a very favourable picture for the Fisheries Sector of Namibia. But the question is to what extent can this favourable picture actually be linked to the above-mentioned questions.

This chapter, furthermore, examines possible links between environmental education theory and environmental education specifically for the Namibian Sea fisheries Industry.

The concept of "Responsible Fishing" was incorporated by the Food and Agriculture Organisation of the United Nations (FAO) and is at the centre of the FAO Member Nations concerns (of which Namibia is also a member) and of relations between protection of the marine environment and fisheries development (FAO, 1994).

Although there is a large, diverse and rapidly growing body of literature about "sustainable development" (Hardoy et al., 1995) only a small proportion of this literature considers sustainable development with regard to the fisheries sector all over the world. This is perhaps surprising, given that fishing activities have played a fundamental role in history, not only as a food source for communities, but also as a source of wealth which generates employment, welfare and a mechanism of development for coastal communities.

The first set of definitions considered in this study, are definitions pertaining particularly to "sustainable development". Further on in this chapter, similar definitions which look specifically at "sustainability" are examined.

4.2 SUSTAINABLE DEVELOPMENT

The way people think about the environment, about economic development and about the links between the two is changing considerably (Tolba, 1991). The 1980s, according to Tolba (1991) saw a radical reappraisal of our concerns over resource availability and use, the environmental consequences of resource exploitation and the relationship between the environment, poverty and economic change. This reappraisal has given rise to a new approach to environmental and developmental issues; an approach which seeks to reconcile human needs and the capacity of the environment to cope with the consequences of economic systems. This new approach is pointed out by Tolba as sustainable development.

According to Hardoy, et al., (1995), the term "sustainable development" brings together two types of thought about the management of human activities. The one mode of thought concentrates on development goals, the other on controlling or limiting the harmful impacts on human activities on the environment. Thus two components can be identified: "development" and "sustainability".

Hardoy et al., (1995) further stated that the literature on sustainable development has grown so rapidly that already there are at least 80 different definitions of sustainable development.

Examples of some definitions of sustainable development are examined to reveal the range of interpretation that has made this concept problematic.

Miller, Jr. (1996:55) describes sustainable development as "forms of economic growth and activities that do not deplete or degrade natural resources upon which present and future economic growth and life depend".

During the 1992 United Nations Conference on Environment and Development, the former U.N. Secretary General Boutros Ghali proposed that "sustainable development" be understood to mean development that "meets the needs of the present as long as resources are renewed or, in other words that does not compromise the development of future generations" (Callicot & Da Rocha, 1996:199).

For Pickering and Owen (1995:301) the concept of sustainable development invokes the present development of available resources without comprising the ability of future generations to meet their needs. In addition, Pickering and Owen say that there are many people who would argue that this is an abstract ideal which is impossible to meet fully. How can this generation understand the needs of future generations, they argue, even before they have been born?

Definitions of sustainable development usually talk of improving people's material well-being through utilizing the earth's resources at a rate that can be sustained indefinitely, or at least over several decades, living off nature's interest rather than depleting the capital. This idea is put forward by Conroy and Litvinoff (1991:134).

In the broadest sense, most literature and discussions about sustainable development fall within the above definitions, although different authors and groups chose to emphasise different aspects. Some authors emphasise the "development goals" and others are more concerned with "sustainability", rather than sustainable development.

Miller, Jr. (1996) stated that although the term "sustainable development" means different things to different people, authors or groups, it still has a unifying approach to concerns over the environment, economic development and the quality of life. He adds that sustainable development has meaning at global, national and local levels, and has value for providing a context within which to understand the influence of the trajectory of growth and change in both developed and developing countries. Miller also stresses that sustainable development, as an idea, needs to be approached with caution. The reason for the wariness is that "governments and businesses have jumped on the sustainability bandwagon and have used this term as a thinly disguised way to justify or promote unsustainable forms of economic growth and development" (p.671).

Understanding the roots of the emphasis on sustainability over development and vice versa, is central to a concern for sustainable development in fisheries, since it has important implications for all fisheries policies.

An emphasis on sustainability only, might include draconian measures to prevent foreign fleets from Namibian waters. Policies on sustainability only would, for example, do little for poorer groups in fishing nations and in many instances may exacerbate their problems. On the other hand, dynamic development can lead to negative effects such as inefficient management, over-investment and environmental degradation.

Pickering and Owen (1995) claim that the idea of sustainable development was first used in the World Conservation Strategy (International Union for the Conservation of Nature - IUCN, 1980). This first formulation stressed sustainability in ecological terms, and was far less concerned with economic development. It argued for three priorities to be built-in to development policies:

- the maintenance of ecological processes;
- the sustainable use of resources; and
- the maintenance of biodiversity.

Pickering and Owen further claim that the emphasis of the report was on the physical environmental in its current state, and this formulation was criticised for being anti- developmental. The report saw economy - environment relationships simply in terms of the human impact on the environment as a static end-state, and tended to imply that any environmental impact was negative. Critics also argued that the report concentrated too much on attacking the symptoms of environmental degradation rather than analysing the causes.

According to Pickering and Owen the report suggested that poverty and the actions of the poor were seen as one of the main causes of non-sustainable development, rather than recognising that poverty and environmental degradation are both consequences of existing development patterns.

This lack of vision of the relationship between the economy and the environment led to a re-formulation of the concept of sustainable development to reflect concerns over what many people saw as an "anti-poor" bias in the IUCN (1980) report.

This re-formulation led to the creation of the World Commission on Environment and Development (better known as the Brundtland Commission). The Commission initiated studies which culminated in the publication of Our Common Future (the Brundtland Report) in 1987; a report which has set the benchmark for all future discussions of sustainable development (World Commission on Environment and Development, 1987).

Our Common Future defines sustainable development at "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

In essence, the vision of sustainable development set out in the Brundtland Report is a call for policies which recognise the need for economic growth and seek to maximise growth, but which do so in a way which does not jeopardise the position of vulnerable people or deplete the future viability of the resource base. It calls for a different attitude to economic development, in which the quality of growth is seen to be as important as the quantity of growth, thus Our Common Future, 1987.

Before discussing sustainable development in sea fisheries, it is worth considering the different interpretations given to sustainability and how these arose.

The growth in concern for "sustainability" brings to light various opinions as to what it means and how it should be applied.

The report, Limits to Growth (1983) published by the Club of Rome in 1972, was among the first to describe the possible link between global economic growth and natural resource scarcity. The viability of continued growth is questioned in this report. According to the report capital investments must be restricted at some point so that continuing development can concentrate on "the most satisfying activities... education, art, music, religion, basic scientific research, athletics, and social interactions..." (p.175).

Ward and Dubos in their book, Only one Earth. (1972), stress the importance of the links between environment and development. Their theory drew together care for the environment and a concern for meeting human needs and eliminating poverty.

4.3 SUSTAINABILITY

This section looks at definitions and unpacks the notion of "sustainability" in contrast to the notion of "sustainable development".

"Sustainability" is not a new concept, but the term has gained much popularity recently (Botkin, 1990). Speaking generally, it means that a resource is used in such a way that it continues to be available.

John Button (1988), in A Dictionary of Green Ideas, defined "sustainability" as follows: "The capacity of a system to maintain a continuous flow of whatever each part of that system needs for a healthy existence".

Miller Jr. (1996) points out that the principle of sustainability implies that we "should try to understand and work with the rest of nature to sustain the ecological integrity, biodiversity, and adaptability of Earth's life-support systems for us and other species".

Little (1990) says that "sustainability" has become the watchword for the management of natural resources. Market forces, technological advancement and resource substitution, according to Little, have contributed towards resource degradation and depletion. "Sustainability" becomes a political challenge for everyone if one looks for example to the notion of a free economy, what governments do, etcetera.

Little (1990) also points out that "sustainability" has a "larger message" rather than what to do and what not to do. This "larger message" according to Little is "intergenerational equity". The political choices we as individuals and the governments are willing to make today, include:

- resource sustainability rather than economic self-interest;
- more capital investment in resource management; and
- individual and community empowerment on resource management which will contribute towards economic prosperity, social improvement, and environmental quality.

The problematic nature of both the "sustainability" and "sustainable development" concepts require further unpacking in order to identify the difference between the two concepts, as well as a working definition for this study.

For me, "sustainable" does not mean the same as "renewable". For example, rice is a renewable resource, since after we harvest the grain and eat it we can grow some more. But it is only sustainable if the farm can continue to produce a high yield of rice year after year indefinitely. If the structure of the soil or its nutrient status becomes less favourable, or soil is lost by erosion, or if insects or fungi harmful to the rice plant increase, then rice production may not be sustainable in the long-term. So we need to consider the whole system, not just a single species. This study assumes that the long-term "sustainability" of the system is of importance.

"Sustainable development" or "sustainability of development" means to me, that today's use of natural resources (living or non-living) and the environment does not damage prospects for their use by future generations. Any approach to manage natural resources should reflect the concept "sustainable development" by establishing mechanisms for intergrating of, *inter alia*, economic and environmental decision-making with emphasis on the early identification and prevention of potential environmental problems.

4.4 RESPONSIBLE FISHING: THE WAY TO SUSTAINABLE DEVELOPMENT

The segregation of sustainable development into its two components, namely the "sustainability" component, and the "development" component, simplifies its application to Sea Fisheries.

The sustainability component is the impact of each fishing industry in the world on the marine environment and its resources. The development component is the performance of each fishing industry and its institutions in meeting its peoples development needs, as the previous section has stressed.

In their role as contributors to the economy, fishing industries, together with the influence of natural and other anthropogenic factors (Meyer, 1996), contributed towards the depletion of traditional fish stocks in certain marine regions (e.g. Namibian pilchards) and in the degradation of marine ecosystems.Barcena (1993) points out that marine fisheries provide 16 percent of the total animal protein available in the world, low cost food for poor people, livelihood for fishermen and their families, and support for related industries as well as social, economic and political stability, for example, for developing countries.

In fact, the reviving nature of marine resources and the misconception of the inexhaustibility of these resources (Polunin, 1980; Shiva, 1991) together with the increasing demands in our nutritional and economic requirements, have brought about development goals, such as, the increase in catches (over harvesting), increase in capacity (overexpanded fleets) and increase in endeavour (overcapitalisation) [Rua, 1994]. These demands do not seek to reconcile human needs and the capacity of the marine environments (Tolba, 1991).

Rua (1994) notes that the factor that favoured the growth of the fishing activity until the 1980s, was the principle of the Freedom of the Seas which was interpreted as a free access to the fishing grounds outside the territorial waters of coastal regions. After the third Conference of Law of the Sea (1982),

the coastal states obtained exclusive responsibility to manage the fishing resources within their own 200 nautical mile zones.

But according to Rua (1994) and Pearse (1996) the introduction of the EEZs do not solve the conservation and economic problems. The reasons are that fishermen of coastal states have replaced their boats with bigger, more powerful vessels, and equipped them with more advanced equipment for finding, catching and handling fish.

Another reason that the EEZs do not solve conservation and economic problems is put forward by Karnicki (1995). He claims that the introduction of the EEZs sends a clear signal that the world's fisheries are moving from a kind of subsistence approach to a market-driven profit-oriented one, where competition and ownership and access to the resources is essentially favouring only economic development.

According to the Food and Agriculture Organisation of the United Nations (FAO) data (1994), fish catches have been increased continuously, from the Second World War until 1990, from 21,9 million to 97,3 million metric tons. It is important to mention at this point that the realisation of the problems facing most of the fishing nations marked the end of the myth of the inexhaustibility of marine resources and emphasised the need for a sustainable development of the marine resources and the industry. The result of this realisation is the concept of "Responsible Fishing". Responsible fishing, according to Harwood (1992) represented a global and integrated approach to fishing issues, based on consensus and international cooperation.

The concept of "Responsible Fishing" surfaced for the first time at the 19th Session of FAO in 1991 (FAO Fisheries Circular No. 877, 1994).

Subsequently an International Conference on Responsible Fishing, organised by the Government of Mexico in 1992, in consultation with FAO, adopted the Declaration of Cancun and requested FAO to draft an International Code of Conduct for Responsible Fishing, in consultation with relevant international organisations. This request was brought to the attention of UNCED in Rio de Janeiro in June 1992. Various principles for environment and development were adopted at UNCED, as well as a blueprint for action for global sustainable development into the 21st century (Agenda 21). These instruments of international cooperation reaffirm traditional goals of sustainable use of fisheries resources and place fisheries in a broader context by "recognising the integral and interdependent nature of the earth, our home" (United Nations, 1992).

The Conference of Rio (1992) clearly reaffirmed that environment, on the one hand, and development and elimination of poverty, on the other, were in fact two sides of the same coin. According to the Rio Conference, all fisheries development and management projects in the EEZs and on the high seas should bear this in the mind.

The concept of sustainable fisheries development (and therefore "Responsible Fishing") implies that development should meet present needs, for example the elimination of poverty, while safeguarding supplies for future generations (Brundtland Report, 1987).

This International Conference of 1992 formulated a declaration which represents a bench mark in the process of international co-operation in search of solutions to the problems facing the fishing sector worldwide (Rua, 1994). This declaration advanced among others the following as guidelines for "Responsible Fishing" (Harwood, 1992).

1. States, with a view to ensuring supply of fish products to feed present and future populations, should adopt effective fisheries planning and management standards which within the context of sustainable development, will promote the maintenance of the quantity, diversity and economic availability of fisheries resources;

2. States should take steps to improve management systems as part of the practice of "Responsible Fishing" and should recognise the principle of sustainable utilisation of marine living resources as the basis for sound fisheries management policies;

3. States should promote and enhance collection of data necessary for the conservation of sustainable utilisation of fisheries resources;

4. States should promote the development and use of selective fishing gear and practices that minimise waste of catch of target species and minimise by-catch of non-target species;

5. States should implement appropriate mechanisms to ensure "Responsible fishing" in exclusive economic zones and other areas under national jurisdiction;

6. International co-operation should include the financial support required by developing countries to enhance their capacity to exercise their sovereign rights by improving their systems for marine scientific research and fisheries management, including surveillance and enforcement;

7. States, in the design and subsequent introduction of new fishing gear and practices, should take into account qualified assessments of impacts on the sustainability of fisheries, giving due consideration to the specific characteristics and biodiversity of different fishing areas;

8. States, to promote the objectives of "Responsible Fishing", should foster international co-operation in the development of effective mechanisms for joint research, information change and transfer of relevant technology and know-how;

9. States should enhance international co-operation to prevent illicit fishing that constitutes an obstacle to achieving "Responsible Fishing" objectives; and

10. States should promote educational programmes and dissemination of knowledge about "Responsible Fishing".

Firstly, at this point I wanted to point out to what extent the picture in the **Sea Fisheries of Namibia** could be **compared to the guidelines given for "Responsible Fishing".** Despite Thomson's favourable picture, there is still some doubt as to precisely what extent Namibian Sea Fisheries policy actually encapsulate the guidelines for "Responsible Fishing".

As far as can be ascertained, it might be 9 out of 10 guidelines which adhere to the guidelines for "Responsible Fishing". Although most of the policy statements pertaining to the Namibian Fisheries Sector (Appendix 3), comply with the above-mentioned ten guidelines of "Responsible Fishing", one very important guideline is lacking. The guideline that "States should promote educational programmes and dissemination of knowledge about "Responsible Fishing" is missing in the curriculum of the Maritime School in Walvis Bay, the Maritime Training Centre in Lüderitz, as well as in the Formal and Informal Educational Systems in Namibia. Namibian fishermen and fishing inspectors get training, *inter alia*, in:

- Fire fighting;
- First aid;
- Proficiency in survival;
- Electronic navigation systems;
- Deck officer Grade 4,3, and 2;
- Marine motorman Grades 1,2, and higher grades;
- Restricted radiotelephone; and
- Cadet training.

According to Elder (1993), governments should aim for a major increase in awareness of the importance and of the mounting threats of the marine environment. Governments should promote the understanding of sustainable resource management, which is part of the guidelines of "Responsible Fishing".

Secondly, I wanted to explain to what extent is **Namibia practising sustainable development within its fisheries policy**. The above-mentioned guidelines on "Responsible Fishing" cover broad and vast, different and interrelated areas of fisheries policies, but I will refer only to some general issues which is important.

Sustainable development implies "the maintenance, rational use and enhancement of the natural resource base that underpins ecological resilience and economic growth" (World Commission on Environment and Development, 1987, pp.57-60).

But long before the notion of sustainable development became fashionable through the work of the World Commission on Environment and Development (WCED, 1987, Our Common Future: The Brundtland Report), forms of the concept (though not using the term) were employed in discussing the goals of fisheries management (Churchill, 1993). Churchill refers to these goals as being the achieving of maximum sustainable yield, MSY, which may be regarded as forms of sustainable development. It is commonly known that most fisheries managers today adopt, at least as their theoretical goals, the same form of MSYs. The 1982 United Nations Convention on the Law of the Sea obligates coastal states to take such conservation and management measures as will ensure that fish stocks in their exclusive economic zones (EEZs) are maintained at or restored to "levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors" (Churchill, 1993). Thus sustainable development (which contributes towards responsible fishing) is generally the goal, at least in theory, of most fisheries management policies today.

The following diagram (Figure 3) is adapted from the article of Barkai & Bergh, (1996), to describe the "maximum sustainable yield" as a management tool of a fish population. If one considers Barkai and

Bergh's (1996), diagram and discussion, one realises how problematic the actual theoretical perspective might actually become in practice.

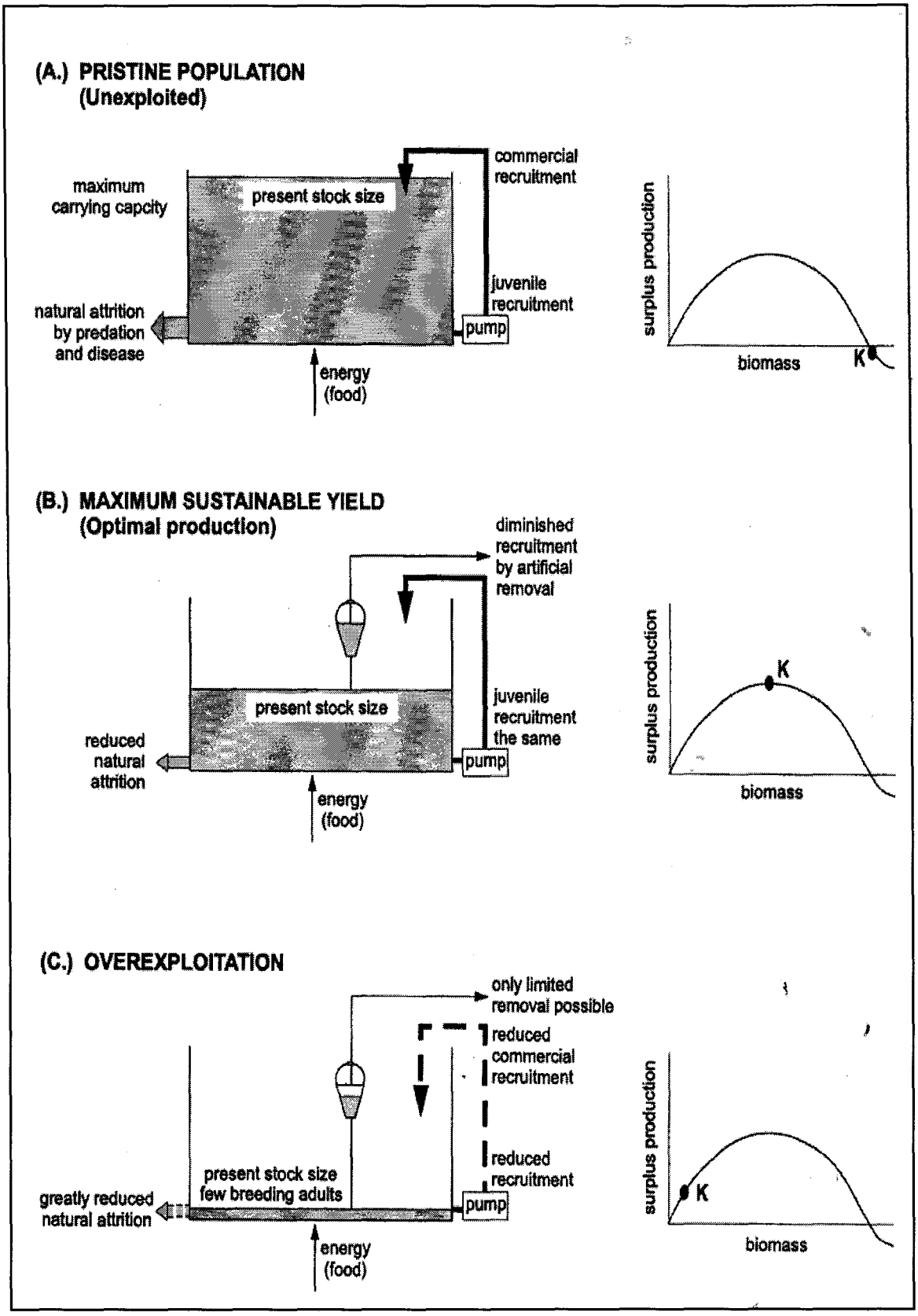

Figure 3. **Maximum sustainable utilisation of a limited resource.**

This figure shows three states of a fish resource, according to Barkai et al., (1996):

- a pristine unexploited state;
- a state of maximum sustainable utilisation; and
- a severely overexploited condition.

The pristine population: (A)

The full container represents the fish population. The full capacity of the container is equivalent to the population carrying capacity. Each year fish are born and are entering the population via the recruitment stream shown on the diagram. The juvenile fish are the result of reproductive activity by mature fish, and the juveniles are pumped from the fish population back into the same container. At the same time that this is going on, fish are dying, Under natural conditions death occurs due to disease or predation. One can see that for the stock size in the large container to remain constant, the number of recruits must exactly balance the number of fish that are dying. At this stage no fishing is taking place.

Maximum sustainable yield ,(MSY): (B)

This stage represents the situation when fishing takes place. The fish population is reduced substantially. The number of fish dying naturally will be fewer, as represented by the reduced natural attrition of predation and disease. However, the number of recruits coming in at the top does not change. This is represented by the pump still working at full capacity. The number of recruits entering the population is therefore larger than the number of fish which are dying. The reason for this is that fish produce eggs over and above what is necessary to keep the population stable (surplus). Left to its own devices, the fish population would return to its carrying capacity level. The only way to keep the fish population level at the same distance below its carrying capacity would be to remove the excess "matured" fish from the recruitment stream using a bucket (i.e. harvest the excess production). This excess production is known as sustainable yield, and if it is not all removed, then the fish population level will increase,. For this reason, the sustainable yield is also called the surplus production.

Overexploitation: (C)

This condition shows what happens if the fish population in the large container is reduced too low. Now the inlet pipe of the pump is only partially submerged to the stock size, and as a result the recruitment stream is reduced in size. Biologically, this means that the number of reproductive adults has been reduced below a critical level and, for the first time, commercial recruitment has decreased. In this situation, the difference between the recruitment stream and the natural mortality stream gets smaller, and as a result the sustainable yield is substantially reduced. Even the removal of a small number of fish will stop the fish population level from rising.

The x-y graphs on the right hand side of the figure represent exactly the same process as described above, and allow one to determine more precisely the population size which produces maximum sustainable yield, and the value of MSY.

However, having said that, it is important to mention that the Sea Fisheries Industry of Namibia also comply with this goal of fisheries management, viz., maximum sustainable yield, as indicated in the policy statements (Appendix 3).

It has been generally assumed that the only means by which we can influence ocean fish is by our fishing activities: how many people fish in which fishing grounds on how many days, at what times of the year, using what equipment and mesh size (Chapter 3; Nikitina, 1993; Churchill, 1993; Pearse, 1993). However, the management of these fishing activities is important.

In theory it might be possible to manage the fish population, according to Barkai & Bergh, (1996) -- Figure 3), through maximum sustainable yields. But what does it tell us about the implications of this whole rhetoric.

Surplus yield models, such as the one in Figure 3 [MSY: (B)] assume that at point **K** there is surplus yield, in other words the recruitment of fish is more than is needed to balance natural mortality, and this surplus yield can be removed by the fishermen without endangering the stock. According to Newman (1993), we need to predict, for each fish species in each area, what the surplus yield is. Newman (1993) further claims that a difficulty in practical application of a model of the type shown in Figure 3 is that it requires knowledge of the size of the fish stock, i.e. the total number or weight of fish of the species (of catchable size) in a large area of the ocean. According to Newman (1993), this can be estimated, but not easily.

Krebs (1985), argues that numbers of fish can be estimated by mark-and-recapture methods where individual fish of the same species are caught, marked and released. Krebs further claims that some of the same species are caught soon afterwards, and the proportion of those marked is used to estimate the total population.

This can work well for animals in small habitats with clear boundaries, e.g. fish in a lake or small mammals in a wood, according to Krebs (1985), but it is difficult to apply to ocean fish, with much larger areas and ill-defined boundaries.

Another possibility is stated by Pitcher & Hart, (1982), and that is to estimate egg numbers by sampling in the spawning area, and to calculate the number of adult fish from this, from the known mean number of eggs per female. Sonar (sound-echo) has been used successfully to determine numbers of some fish. Pitcher et al., (1982), claim that it works best if the fish form dense localised shoals. Newman (1993) argues that all these methods are time-consuming and often difficult to apply.

Another point which Newman (1993) makes about the maximum sustainable yield models is that the catch is simply treated as total weight of fish, irrespective of size. Newman further argues that one of the things fishermen can control is the minimum size of fish caught by the size of mesh used. Increasing the mesh size sometimes, according to Newman, increases the catch on a long-term basis. In other words, if the small fish not caught this year are still in the sea next year they will be larger, so the total weight of the catch will be increased. In practice some of them will have died, so the maximum mesh size depends on two things; namely, the rate of growth of the fish and their rate of natural mortality.

The following discussion is deals with the **third dimension**, namely, the extent **to which Namibia is practising sustainable development in terms of its fisheries management**. Again, the above-mentioned guidelines for "Responsible Fishing" cover broad and vast, different and interrelated areas of fisheries management. But I will refer to some features of how the Sea Fisheries Industry of Namibia manage its fisheries.

The organisation of the Ministry of Fisheries and Marine Resources (MFMR) reflects various legislative responsibilities (Chapter 3) to be managed through one Directorate concerned with research and resource management, and another Directorate responsible for the operational aspects of fisheries management and the administration of the MFMR (Namibia Brief, 1994).

Directorate of Resource Management

This Directorate undertakes research [through the National Marine Information and Research Centre, (NATMIRC) in Swakopmund], to provide advice on the maximum utilisation of fish resources.

The principal role of this Directorate is to provide advice to the Minister of Fisheries and the Sea Fisheries Advisory Council on:

- the status of fish stocks and recommendations on their appropriate yields under the current management regime; and

- necessary measures for protecting resources, such as, species and fish size limitations, closed seasons, closed areas, and limitations on the types and effectiveness of fishing gear as mentioned in Chapter 3.

To make recommendations on these matters, this Directorate carries out stock assessment surveys and scientific work on fish stocks (Namibia Brief, 1994).

A key component of "Responsible Fishing", according to Harwood (1992), is the collection from commercial operations of the accurate and timely information necessary for sound stock assessment. "Responsible Fishing" recognises the need to secure commitments from all states for improved catch and effort data collection and increase co-operation in data exchange, stock assessment and scientific research.

Directorate of Operations

This Directorate's responsibility is the practical management (see Chapter 3: monitoring, surveillance and control) of fish exploitation. It is entrusted for the application and enforcement of all fisheries legislation, and the specific management measures and conditions applicable to fishing rights (Chapter 3). The application of rights of exploitation and fishing quotas, the issuance and administration of fishing licences and the collection of quota fees and other levies, as mentioned in Chapter 3 are some of the resposibilities of this Directorate.

One of the elements of "Responsible Fishing" is that States should enhance their capacity to exercise their sovereign rights by improving their systems of surveillance and enforcement.

Southern Africa Development Community (SADC)

The Southern African Development Community has twelve members, namely, Zambia, Tanzania, South Africa, Swaziland, Malawi, Lesotho, Botswana, Angola, Namibia, Mauritius, Mozambique and Zimbabwe. Each SADC member country is responsible for coordinating regional issues pertaining to a particular sector.

In addition to its fisheries management tasks in southern africa, Namibia has been assigned the role of Sector Coordinator for Marine Fisheries and Resources for SADC. To fulfill this role, the Ministry of Fisheries and Marine Resources of Namibia has established the SADC Sector Coordinating Unit (Namibia Brief, 1994).

This coordinating function of Namibia, with regard to fisheries management, complies to one of the cornerstones of "Responsible Fishing", namely, that States should co-operate on bilateral, regional and multilateral levels to establish, reinforce and implement effective means and mechanisms to ensure "Responsible Fishing" (Harwood, 1992).

Co-management

Another feature that one might highlight in the Sea Fisheries Industry of Namibia's management regime, is that there are two (2) extremes of fisheries management, viz., that fisheries management (Namibia Brief, 1994):

- is a government responsibility (Chapter 3), and
- lies also in the hands of the industry which includes fishermen's organisations, such as:
    - the Pelagic Fishing Industry Association;
    - the Namibian Monk and Sole Association;
    - the Namibian Hake Fishing Association;
    - the Midwater Trawling Association; and
    - the Namibian Tuna Association.

Meyer (1996), claims that fisheries management is subject to government-industry collaboration in some form or other.

According to Namibia Brief (1994), the government and industry realises that the way in which Namibia's marine resources are managed will profoundly influence the access of products to markets and the prices they may achieve. The view of Meyer (1996), concerning government-industry co-management, is supported by McCay (1996), who has identified various factors which can lead to the effectiveness of fisheries management planning and co-management.

In some countries, according to McCay (1996), fishermen participation takes place through consultative arrangements, i.e. fishermen are heard and asked for advice or may simply act as lobbyists. In other countries, according to McCay, some, if not, all management functions are delegated to fishermen's organisations. Here, fishermen's organisations operate as responsible co-partners in fisheries management. For example, the government decides total allowable catches (TACs), whereas quota allocation and distribution are left to the discretion of the industry. In the literature such arrangements are often labelled "co-management". According to McCay (1996), there are obvious benefits to co-management such as:

- it brings knowledge from all sectors into the management process;

- participatory decision-making enhances greater legitimacy of rules and regulations, and hence, promoted compliance among stakeholders; and

- it introduces more democracy into the regulatory process and will therefore produce regulations more responsive to changing ecological and social conditions.

McCay (1996), however, has illuminated some problems of co-management. He says that its a risk to set the fox to keep the geese. He refers to this situation as "the fox in the henhouse" syndrome or the problem of the "tyranny of the minority". McCay, further suggests that some fishermen are better organised and have more power than others and may therefore be influential. McCay , concludes by claiming that the success of a "co-management programme" depends on how well it is adapted to local circumstances.

This chapter has drawn some general lessons from the Namibian experience for improved fisheries management practice. In particular when considering the guidelines for "Responsible Fishing", policy and management, great attention should be paid in order to ensure sustainable development in the Namibian Sea Fisheries Sector.

The principles of "Responsible Fishing" provide a possible focus for environmental education programmes that are aimed at creating understanding about, and action for, a sustainable fishing industry in Namibia. The next section examines possible links between environmental education theory and environmental education specifically for the Namibian Fishing Industry.

4.5 THEORETICAL PERSPECTIVES ON ENVIRONMENTAL EDUCATION

4.5.1 Introduction

The discussion of the theoretical perspectives on environmental education provide, first of all, a possible link between the principles of "Responsible Fishing" and environmental education theory and environmental education specifically for the Namibian Sea Fisheries Industry, and furthermore, provide a background against which decision-makers' perspectives can be considered and measured.

One of the main priorities at the moment in the Namibian Fisheries Industry is to educate and train personnel, for both fisheries and related industries and its ministerial staff, principles of "Responsible Fishing". We learn in this chapter that "Responsible Fishing" is a form of sustainable development in the fishing sector.

Education for "Responsible Fishing" is an urgent need (see guideline number 10 for "Responsible Fishing", 4.4) and long-term programmes, ranging from environmental awareness programmes for fishermen, deck officers, skippers, coastal communities, to management's exposure to sustainable development and environmental protection of the marine environment, are required.

This discussion begins by giving a brief outline of the unprecedented upsurge in environmentalism (see below) and the role education can play in the environmental challenge. The next section discusses the trends and patterns in environmental education and gives a route map of the origins of environmental education from nature education to outdoor education.

4.5.2 Environmentalism

Environmentalism relates to man's awareness of, and concern for, the total environment (Button, 1988:156). Environmentalism relates also to man's perceptions and attitudes towards the natural environment (Bowlby and Lowe, 1992).

This concept is linked to value judgements and personal opinions and is therefore a very broad and subjective topic. There are so many viewpoints encompassing, for example, the awareness of, and concern for, the total environment; the extent to which man should be allowed to modify his environment; what forms of environmental conservation should take place, according to what motivations; and how political those measures of conservation should be (Bowlby & Lowe, 1992).

This section will trace the development of some environmental thinking or ideas, chronologically, with particular emphasis on the evolution of ideas about the environment which started with economic and social change during industrial developments in the West, as well as the evolution of environmental education since the two international meetings - the Belgrade Workshop of 1975 and the Tbilisi Conference of 1977.

Changing ideas about the environment start with economic and social change during industrial developments in the West. Up until the middle ages, there was a strong belief that as animals and plants had no souls, humans need not be concerned about any pain they might cause to them (Bowlby and Lowe, 1992:162). However, during the period of Enlightenment (18th century), the acceptability of sentiment arose among the educated classes as they acknowledged the importance of feelings and emotions as justifications for action. During the same period, because of shifts in economic life (Industrial Revolution), people moved from the rural areas to the cities. Because the cities became heavily polluted by industrial processes, people started getting a new appreciation of the rural areas as a place for recreation and the enjoyment of natural beauty. People started to perceive the rural areas as a place to escape from the stress of the cities. As clearer distinctions between urban and rural space developed, a whole new attitude towards the non-urban environment began to emerge (Bowlby & Lowe, 1992).

The enlightenment also introduced a new way of thought, namely that of scientific rationalism. This school of thought advocated the application of human reason to the scientific study of nature, and the separation of values from facts. There was an increase in the scientific study of the environment, but any values one might attach to it were of no significance. This is what Bowlby & Lowe, (1992) refer to as the empirical attitude towards the environment: "that human beings should

develop and apply science to conquer and organize nature" - a belief honoured by Francis Bacon (1561-1626). That means that through the application of rigorous science humans would be able to create and rule over an ideal world. This imperial tradition has been dominant in the West and has inspired much of the scientific advancement of the 19th and 20th centuries (Bowlby & Lowe, 1992). The above mentioned period was the time when new ideas about nature and the relationship between human beings and nature were being formed and debated.

Since about 1960, according to Button (1988:156), there has been a sustained and growing concern about environmental issues, caused by the speed of social and economic change which intensified as the western countries transformed into industrial nations. It is strange for me because, even today, politicians and industrialists are so interested and sometimes concerned about the environment, but then contrive to produce weapons and other poisonous materials of human and environmental destruction. Self-reflection will be a valuable exercise in this regard - thanks to the rise of green-thinkers. Environmental concerns were fuelled by some important "landmark" texts during the 19th century, such as:

R. Carson's Silent Spring (1962) which documented the pollution of air, water and wildlife from pesticides such as DDT (in Miller Jr., 1996:41).

In Small is Beautiful (1974), E.F. Schumacher states that it is the illusion of the modern age that the problem of production has been solved; that is that we can continue to produce and consume at ever increasing rates, virtually for evermore. This illusion, he says is based on our unwillingness to recognize that the finite planet is our capital and capital is not something we create but something which we live off (in Dobson, 1991:29).

An international group of industrialists, scientists and researchers, called The Club of Rome, produced a report in 1972 entitled The Limits to Growth, and its basic message -- that infinite growth in a finite system is impossible -- is the foundation stone of green political thinking (Meadows,1983).

It is important to differentiate between "thinkers" and "doers". We must get started in order to reach a solution for the environmental crisis. However, people will only appreciate and care for the environment when they become aware of the environmental concerns and through the implementation of education and communication programmes (IUCN/UNEP/WWF 1980). Stretton (1976) puts it this way: "It is easy to describe the mess the world is in, and to preach large changes of heart. Short, saleable books which do that may be useful if they persuade people in good directions, but only

if people know how to move in those directions" (quoted in Huckle's article in Our Common Future: Pathways for Environmental Education, 1990:22).

Apart from the central texts mentioned above, key international events reinforced the need for radical social and economic change, if humans were planning on having a future on planet earth:

- The United National Conference on Human Environment, in 1972, recommended that UNESCO establish an international programme for environmental education for world communities. This task submitted to UNESCO culminated in the creation of the International Environmental Education Programme (IEEP) in 1975.

- Two inter-governmental meetings - the Belgrade Workshop of 1975 and the Tbilisi Conference of 1977 - contributed to the identification and definition of principles and guidelines for the development of environmental education globally.

- The World Conservation Strategy (IUCN/UNEP/WWF, 1980), which gave fluency to the term "sustainable development", primarily sought to protect essential ecological processes, life-support systems and genetic diversity, as well as the sustainable utilisation of natural resources. Most significantly, the Strategy explored the links between economic growth and environmental preservation. It linked poverty, development and the environment and described the dilemma of rural people in some developing countries destroying natural resources in order to free themselves from starvation and poverty. In the report, education is seen as playing a key role in remedying such matters.

- Our Common Future, the Report of the World Commission on Environment and Development (also known as the Brundtland Commission), published in 1987, included the concept of sustainable development which is central to this document. This report provided a strong statement on the link between poverty and environmental concerns. The report promoted increasing economic growth as a solution to both concerns. It came under criticism for this approach and the resultant ambiguity around the concept of sustainable development.

- In 1991, the follow-up to the World Conservation Strategy - Caring for the Earth: a strategy for sustainable living (IUCN/UNEP/WWF, 1991) - was launched. This document, like the World Conservation Strategy, also highlighted the role of education in bringing

about changes towards sustainable lifestyles. It called for an environmental education that would enable citizens to understand, appreciate and implement sustainable practices. The document firmly established education for sustainability as the central goal of environmental education in the 1990s: "Sustainable living must be the new pattern for all levels: individuals, communities, nations and the world. To adopt the new pattern will require significant changes in attitudes and practices of many people. We will need to ensure that education programmes reflect the importance of an ethic for living sustainably" (IUCN/UNEP/WWF, 1991:5).

- The UN Conference on Environment and Development (UNCED) also known as the Earth Summit held in Rio de Janeiro, 1992, was a biggest ever gathering of many governments and NGOs to consider an environmental agenda for global change. Two international environmental conventions were opened for signature at UNCED:

  - the Convention on climate change and
  - the Convention on Biological Diversity

  In addition, UNCED produced documents like:

  - statement of forest principles and
  - Agenda 21.

Perhaps the most important document produced at UNCED was Agenda 21. It contains proposals to guide international action respecting environment and sustainable development well into the twenty-first century. The document focuses on four main themes:

1. the social and economic dimensions of sustainable development;
2. the conservation and management of natural resources;
3. the methods for strengthening the role of the major development and environmental protection; and
4. the means of implementing sustainable development and environmental protection policies.

Agenda 21 was created for use by governments, development agencies, the United Nations, and the independent organisations involved in every area in which human activity affects the environment. In fact, under the Agenda 21 agreement, nations of the world are supposed to produce plans to implement its recommendations before the turn of the century.

Via Agenda 21, the international community recognised the crucial role that education will have to play to bring about sustainable development and environmental protection. Section 36.1 stated that education, public awareness, and training are linked to virtually all the other concerns of Agenda 21. Section 36.3 notes that to be effective, education about sustainable development and environment should be integrated in all disciplines at all levels of education. This section adds that education about sustainability and environment should deal with the physical, biological and social environments as well as with economic development.

Section 36.5 goes on to point out that governments and education institutions should conduct a thorough review of curricula to ensure a multidisciplinary approach and that they should prepare strategies aimed at integrating education about sustainable development and environment into all levels of schooling within the next three years.

If environmentalism is to be taken seriously, then I think it is necessary:

1. not to deal merely with one crisis after another, but to stress the need for environmentalism to look deeply into the causes for what currently happens, and to accept only radical change rather than temporary alleviation, as the ultimate goals.

2. to eliminate the elitist tendency of environmentalism, which proposes reforms which will make life more pleasant for the already privileged but overlooks social and economic oppression and inequality. "What we need now is social environmentalism which can have real meaning and relevance to the masses of people, an environmentalism which is not held static by ideological dogma but recognises the full implications of an environmental perspective" (Hutton, 1988: 157).

3. for education systems to assess their role in furthering recommendations to realise sustainable development and environmental protection. How might, for example, the education and training section in the Ministry of Fisheries and Marine Resources of Namibia respond to Agenda 21's recommendations to promote education and training about sustainable development and environmental protection?

4.5.3 Patterns and trends in environmental education

A need for education about the environment has been verbalised over the past century - plus, increasing dramatically in volume and intensity since industrialisation (Wilke, 1993:24 and Irwin, 1990). It is generally acknowledged that, in a curricular sense, the primary antecedents for today's environmental education are nature study, conservation education and outdoor education (Wilke, 1993). Environmental education has been used as a synonym for the three (nature study, conservation education and outdoor education), singly or in any combination (Disinger, 1986).

One can see that the emphasis of the three predecessors was, and is, respectively, the natural environment, the pastoral environment, and the environment as the preferred venue for learning.

Nature education, conservation education, outdoor education and environmental education all have, in my opinion, a common goal the understanding and appreciation of the natural world.

The difference between the disciplines can best be portrayed by the following descriptions as stated by the National Conference of the Conservation Education Association (1970):

Nature education is defined as a platform for engaging the individual in experiences that provide a basis for understanding environmental relationships. It can take place in any location where the natural world is observed. Thus the emphasis is on the natural environment.

Conservation education is the study of man's intelligent use of his natural environment through the development, management, preservation and renewal of natural resources for his material, cultural and aesthetic needs to benefit present and future generations. Thus the emphasis is on the pastoral environment.

Outdoor education is a method of teaching wherein established disciplines, topics and concepts which can best be taught outdoors are taught outdoors. The emphasis is on the environment as the preferred venue for learning.

Environmental education is the study of all things surrounding man which affect his existence. It is aimed at developing an informed citizenry motivated to the recognition of problems and to collective action for solution.

Derived from the above-mentioned descriptions of the various disciplines one can see that environmental education differs in the sense that it embraces many other fields and not only the natural world. According to Disinger (1986) environmental education deals with the interactions of science and technology with society, with emphasis on associated environmental ramifications. Disinger also suggest that the "environment" of concern, for environmental educators, cannot be limited to the natural environments only, but includes, and should stress, the human environment.

The ideas of Disinger about environmental education are given further substance by Irwin (1990) where he clarifies the concept of environmental education in the following way:

> ".... it embrace ecological knowledge and understanding, total people - environment relationships, ethics, politics, sociology and public participation in decision making".

In spite of their differences, nature education, conservation education, outdoor education and environmental education are being used by environmentalists and environmental educators as strategies in order to contribute towards environmental quality or to solve environmental problems.

Sauvé (1996) gives different conceptions of the environment to be used as tools in developing frameworks for education and training for sustainable development.

According to Sauvé certain roots of environmental education can be found, for example, in the nature education movement of the 1920s, referring to the environment-as-nature. Some environmentalists or educators today see the environment-as-nature as something to be appreciated, respected and preserved. Nature exhibitions are an example of an educational strategy adopted to this view. Van Matre (1990) promotes nature-immersion strategies.

The roots of environmental education can also be found in the conservation movement which arose in the 1950s (Sauvé, 1996). The conservation movement sees the environment-as-a-resource to be managed. Our survival, life quality, and economies are totally dependent on the resources. Therefore, we must carefully manage our resources. We must make the necessary decisions to ensure adequate resource for ourselves and future generations. Environment as a resource should be managed according to the principles of sustainable development (Our Common Future, 1987). Examples of teaching/learning strategies of this view of the environment are:

- environmental auditing
- environmental impact assessment

- park, museum and aquarium observations
- 3Rs campaigns, (**R**eading, w**R**iting, and a**R**ithmetic).

In the early 1970s the environment came to be perceived mainly as a problem (Sauve, 1996). This is the biophysical environment, the life support system, which is threatened by pollution and degradation. The teaching/learning strategy which can be adopted for this view of the environment is the problem-solving approach (Hungerford, 1992).

Also during the 1970s the notion of the environment as a "place to live" was becoming more popular with some environmentalists (Sauvé, 1996). This is the day-to-day environment, at school, at home, in the neighbourhood, at work and at play.

This environment is characterised by its human, socio-cultural, technological and historical components. David Orr (1992:131) cited in Sauvé (1996), proposed an education for reinhabitation or, in other words, a kind of education which will make it possible for people to go on living in that environment.

In the 1980's, a strong preoccupation with the biospheric scope of the environment has emerged according to Sauvé. The environment -as-a-biosphere view was triggered by the globalisation of information and by the growing awareness of the interrelationship between global and local environmental phenomenons. This type of environment is, among others, James Lovelock's (1986) self-regulating organism called GAIA. Lovelock pointed out that life on Earth "interacts so closely with the atmosphere that the atmosphere itself might be considered as an extension of life". Lovelock's GAIA theory "sees the biota and the rocks, the air, and the oceans as existing as a tightly coupled entity" (Lovelock, 1988) cited in Sauvé (1996).

We should think globally and act locally according to this view of the environment. Among suggested teaching/learning strategies, we can find case studies applied to global issues.

The concept of environment-as-a-community-project looks at the environment as a project for everyone. This environment belongs to everyone. This view identifies the environment as a problem which should be resolved by everyone. The socially critical environmental education says that the environment is not only for environmental educators/environmentalists, but it is for everyone, from grass-roots level to the politicians - the whole community. A teaching strategy for this view of the environment is an action-research process for community problem solving.

For the development of an environmental education programme, framework or a process for the fishing industry of Namibia, one can make use of the various conceptions of the environment singly, or as one package which can be used in various teaching/learning situations.

Views on education and training in a fishing industry can be shaped by a number of different perspectives, however, the dominant orientation in the Namibian fishing sector is the vocational, where the educational courses offered at the Maritime Institute at Walvis Bay and the Maritime Training Centre at Lüderitz are only concerned with skills development.

4.5.4 Links between environmental education theory and marine environmental education

Fortner et al., 1989, suggested that marine environmental education is part of a larger movement that has been afloat for several decades under the various banners of conservation education, outdoor education and environmental education. Marine environmental education is defined by Fortner & Mayer (1989: 303), as "that part of the total educational process which enables people to develop a sensitivity to and a general understanding of the role of the seas in human affairs and the impact of society on the marine environments".

A basis for the future development of education programmes are necessary for sustainable development in the fisheries sector of Namibia. The adoption of a narrow view of the environment, namely, "environment-as-a-resource" ... to be managed and protected (Sauvé, 1996), is appropriate so as to ensure the sustainable utilisation of the fishing resources.

The development of environmental education programmes in the Namibian fishing sector is vitally important towards sustaining the industry for future generations. In this section I will briefly attempt to illustrate some ideas in order to lay a basis for a framework for environmental education in the fisheries sector of Namibia.

At present, the fishing industry of Namibia is one of the cornerstones of the economy. Therefore, policy-makers and educationalists alike need to take serious account of the need to give young people, and indeed adults, the opportunity to gain thorough knowledge about the marine environment. Educational programmes with a primary or concentrated focus on sustainable development (and therefore of "Responsible Fishing") and environmental protection do not exist in

the curriculum of the Maritime School and Maritime Centre, as well as in the Formal and Non-Formal Education Systems in Namibia (personal observation, 1997).

The principles and guidelines on environmental education from the Belgrade Workshop (1975) and the Tbilisi Conference (1977) form the basis of this discussion and they are stipulated in the UNESCO - UNEP Environmental Education Newsletter, Connect (1992), as follows:

1. The environmental problem is actually situated outside the environment proper; it is, above all, the result of a human complex of understandings and values determining the attitudes and behaviour of individuals as both consumers and producers. This proposition has an often misinterpreted corollary which it would be best to clarify. The stake and challenge of the environmental problem is not the preservation of nature for its own sake, but rather, for its vital material support of continuing human progress.

   In other words, the problem of the marine environment is not in the marine environment. But the problem is in the values, attitudes, behaviour and understandings of human beings with respect to their marine environment. If you solve this problem in the human beings (i.e. including all stakeholders in the fisheries sector of Namibia -- the users as well as the producers) then you have solved some of the problems in the marine environment. The need for conserving the marine environment is not just for the sake of conservation. How people conserve the marine environment will help the vital material support (for example, marine resources) by the marine environment to human needs. The interest is not only in conserving the marine environment, but also in sustaining continuing human progress.

2. The environmental problem is also a complex, multidimensional reality which covers every domain of our experience - matter, life, culture. Since no scientific or technological discipline, in itself, can comprehend the environment in its entirety, all environmental actions - and all the more so environmental education - must encompass a holistic, interdisciplinary approach.

   In other words, the marine environmental problem has many dimensions, for example, it concerns matter (i.e. renewable and non-renewable marine resources); it concerns life (i.e. all living marine organisms); and it concerns culture (i.e. language, beliefs, attitudes and behaviour). The conservation approach must concentrate on matter, life and culture. Science, technology or marine environmental education on their own will not solve the

marine environmental problem completely, but it must be a holistic, interdisciplinary approach.

3. Accordingly, environmental education should not simply be a new discipline, but rather a means of deepening, and enriching with its environmental knowledge and values a variety of disciplines, at all levels and in all forms of education.

In other words, knowledge that comes from marine environmental education should be applied to other disciplines.

4. Environmental education should embody a special cultural sensitivity, so as to reinforce a universal, effective reaction to problems of the environment, each culture defining the most relevant ways and means for arriving at common ends.

In other words, the human culture itself should be sensitive to the marine environment. The way people think and their values should be sensitive to the marine environment.

5. Environmental education should project itself in time, so equipping today's active populations to better manage their relations with the environment as both producers and consumers. It should thus project itself into the future, educating children and youth, whose decisions and activities will weigh heavily on tomorrow's environmental quality, in the light of a new environmental ethic and knowledge.

In other words, marine environmental education should be offered now and immediately in order to equip and prepare children and the youth with knowledge about the marine environment which will ultimately contribute towards the long-term maintenance of marine resource quality and ecological integrity.

6. Lastly, environmental education should not be just an intellectual abstraction, but rather should be plunged into daily life, provoking initiatives, social participation and the search for realistic solutions - with due respect for others and in a concentration of interests, without which, history has taught us, no problem can be lastingly resolved.

In other words, marine environmental education should not only be theorised, but it must be practical and real, relevant to daily life.

The success of the development of education programmes for sustainable fisheries in the future, depends on how well the two (2) dimensions, namely, the guidelines on Environmental Education, as discussed above, and the guidelines for "Responsible Fishing" are linked.

4.6 SUMMARY

The concept of "sustainability", and its extention "sustainable development", with respect to resources and the environment are used extensively by a broad spectrum of individuals and organisations in this chapter. The chapter has highlighted how these two (2) terms, "sustainability" and "sustainable development" are found in government policy pronouncements, publications of international events, professional literature, and the popular media.

"Sustainability" and "sustainable development" has become part of the development rhetoric, in part due to the Brundtland Commission (1987) which used "sustainable development" as its key organising concept. These two (2) concepts are invariably used in this chapter to describe a goal which, superficially at least, is indisputably desirable. The appeal of these two concepts is the common-sense notion that we don't want to move ahead one step only to slip back two.

This chapter has also dealt at some length with the concept of "Responsible Fishing". The key elements that are associated, in this chapter, with the guidelines of "Responsible Fishing" are:

- the fisheries policy, globally advocated as being the achieving of maximum sustainable yield (MSY); and
- sustainable fisheries management.

This chapter addresses developments in the Sea Fisheries Industry of Namibia in the changing focus on fisheries policy and management methods as goals for the protection of the marine environment.

Also, an analysis of the various changes in the Sea Fisheries Industry of Namibia in the conservation of marine living resources, after the Independence of Namibia (1990), reveals that the Ministry of Fisheries and Marine Resources (MFMR) has only partially provided for sustainable development (and therefore "Responsible Fishing") for marine living resources. Despite certain positive results, the Namibian Sea Fisheries Sector has been unable to adequately deal with one of the guidelines for "Responsible Fishing", which is that States should promote the knowledge about responsible fishing in educational programmes. To some extent this problem may be due to over-reliance on training of fishermen about the "life at sea" and training them to sea-going vocations and skills for operating fish processing plants.

Another purpose of this chapter was also to look at part of the Namibian fisheries management system, which is the centralised government agency, namely, the Ministry of

Fisheries and Marine Resources, which has the mandate and power to manage fisheries. This chapter, has however, explored the questions:

- How does the Namibian Sea Fisheries Sector practising "Responsible Fishing" in terms of fisheries management?; and
- To what extent do user groups participate in regulatory decision-making?

The possible links between environmental education theory and marine environmental education were explored in this chapter.

Finally, this chapter elaborated on the previous chapter and provided the platform for my discussions with the key decision-makers (Chapter 5).

CHAPTER 5

INTERVIEW ANALYSIS

5.1 INTRODUCTION

This chapter is a logical development of chapters 1 to 4, in that the discussion hinges on:

- "sustainability" and its corollary "sustainable development" of marine resources in the Sea Fisheries Sector of Namibia, and
- the various questions asked which lay the basis for the future development of marine environmental education programmes.

This formed the basis of the discussions held with the key decision-makers interviewed who as identified (Chapter 2) were:

- two representatives from the Ministry of Fisheries and Marine Resources (MFMR);
- two managers of two different fishing companies; and
- two fisheries scientists working for the MFMR.

This chapter presents and analysis the results of these interviews. The semi-structured interview had the following three (3) focus areas (Appendix 7):

- The first focus area involved unpacking the principle of "sustainability" with reference to a single biological resource, namely, sea fisheries;
- The second focus area examines perceptions of how to determine and maintain the sustainable utilisation of fisheries resources; and
- The third focus area is that of the sort of role education can play in helping the idea of "sustainability".

These three focus areas will form the outline of this chapter.

5.2 FOCUS AREA 1: THE CONCEPT OF "SUSTAINABILITY"

This section examines the views of the research participants about the concept of "sustainability" and its application in the Sea Fisheries Sector of Namibia. A series of meanings and understandings were raised concerning this concept by the key decision-makers during the interviews.

What was evident from the interviews was that various categories (Table 5.2) were strongly linked to the notion of "sustainability" (Chapter 4).

A brief explanation of each of the categories which emerged from this focus area (Table 5.2), in relation to Chapter 4, is as follows:

- The "management" of fisheries resources identifies where the emphasis is put by the participants on the actual management of the resources, rather than on promoting the environmentally sustainable development of the fisheries resources in the Exclusive Economic Zones (Ray, 1989).

- Whereas, in the "maintenance" of the resources, the participants are of the intention to maintain or to simply keep going as they have being before and is therefore not compatible to current thinking of sustainability as discussed in chapter 4 (Botkin, 1990).

- "Sustainable use" is identified in chapter 4 as being the use of natural resources which are necessary to economic development, but that there are finite limits in their supply, as opposed to the view of some participants that these are sufficient resources (Meadows, 1983).

- "Sustainable development" is segregated into two components, namely a 'sustainability' component and a 'development' component, in contrast with the view of some participants who put more emphasis on the 'sustainability' component (Hardoy, et al., 1995).

- "Equity between intergenerations" examines where fisheries policies also include the notion of prosperity's equity, rather than only the rules and regulations of resource management (World Commission on Environment and Development - Our Common Future, 1987).

- In the case of "conservation", the emphasis is on the need, not only to protect fisheries resources, but to change mind sets that will actually produce sustainability (Little, 1990).

- Problems related to the term "sustainability" as identified in chapter 4 reveal the participants misuse of the term (Miller, Jr., 1996).

Table 5.2: Categories occurring in the meaning of the concept "sustainability"

Categories	Examples of responses	Frequency of Occurrence
Management	"Sustainability is the watch-word for the management of fisheries resources as one year gives way to the next".	6
To maintain	"I think, sustainability, simply means to me, that you must maintain a system to keep going, and to be able to serve all the different stakeholders".	5
Sustainable use	"Its the ability to harvest a living resource without jeopardising the future potential".	6
Sustainable development	"Because sustainable utilisation would mean that there are resources, properly managed, sufficient, and you can utilise those resources to the benefit of the country".	4
Intergenerational equity	"My understanding of sustainability in its simplest is that my children, my grand-children, your children and your grandchildren, will have the same opportunities to use the marine system that I have".	5
Conservation	"But, also, in a much broader sense, that all the other species are still there. That the beaches are still clean, that the dolphins and jellyfish are still out there. So, that's no good to just preserving one species. We have to protect the entire marine ecosystem".	5
Sustainability needs to be approached with caution	"Well, I think sustainability, just like eco-systems or just like many other words, sort of becomes fashionable. As soon as words becomes fashionable they become misused".	5

Further analysis of the interviews with the key decision-makers revealed that all six participants viewed sustainability as including management mechanisms as one possible solution to the problem of the environmentally sustainable development of living marine resources.

One participant explained thus:

> Sustainability is the point where you are exploiting a resource where that resource is being exploited to a certain level that it still has a chance of renewing itself and to ensure that this resource is sustainable for the future.

Five participants noted that one must define "sustainability" by the term "to maintain". One participant elaborated thus:

> Sustainability means to prevent a resource from going into extinction, but to maintain the resource at a healthy level and harvest a percentage of that biomass which is available by doing so, still allowing us space for the resource to renew itself to grow.

Again, all six participants have viewed sustainability in the context of direct natural resource use. For them "sustainable" means most simply that an activity can be carried out within some band of intensity, through-out the foreseeable future. This is exemplified by the fisheries concept of sustainable yield (Chapter 4).

One participant put it this way:

> Sustainable in the sense that you will be able to harvest a yield from that resource without putting undue pressure on the resource.

"Sustainable development" as a key concept was perceived by four of the participants. To make his point one decision-maker elaborated thus:

> Sustainable development of the marine resources would enable us on the long term, to use those resource to the socio-economic benefit of the country.

Five participants viewed "intergenerational equity" as part of the concept of "sustainability". One decision-maker explained her perception on "sustainability" in the following way:

> Sustainability does not only mean the 'fair' allocation of resources among ourselves, but, it has to do with what we pass along to our children and to the generations that follow. Will they have as good a resource base as we do?

Five participants identified the 'wise use' of natural resources as the meaning for conservation, which is also part of the concept of "sustainability". One participant elaborated:

> Sustainability implies conservation or the wise use of natural resources over generations, and not only for the good of single lifetimes. The marine environment consist of a very high biological diversity and productivity, providing habitats to many marine species. Through conservation one can protect certain species, especially when allocating resources to competing utilizations.

Five participants indicated that "sustainability" needs to be approached with caution. The one participant explained that:

> The concept of "sustainability" became the new orthodoxy, and as the case with all bandwagons it is used and abused to justify some fisheries policies which are clearly neither sustainable nor developmental.

Despite the fact that "sustainability" received extensive support in various ways by the key decision-makers in the fisheries sector of Namibia, what emerged from the general responses of the decision-makers was that the range of understanding of the concept of "sustainability" could be closely associated with a number of perceptions in current use, as mentioned in Chapter 4. These include aspects, such as, the management of natural resources, development and use of fisheries resources in a sustainable way, a fair distribution of resources to the benefit of many, to nature conservation. Of particular importance about the concept of "sustainability" is that it has implications for ecological or environmental, social and economic systems. What appears to be evident from the responses of the decision-makers is the strong emphasis on environmental or ecological sustainability.

What was also noted was that ideas relating to the following points, according to Goodland & Daly, (1995), were not picked up by the responses of the participants. These points are:

- a general obligation to preserve the environment and natural resources;
- community rights and interests;
- maintenance of "natural capital"; and
- management for environmental problem solving.

5.2.1 Management

Although I use the heading "management", the discussion under this heading is aimed at a certain type of fisheries management strategy - that of "maximum sustainable yields" (Chapter 4, figure 3). The other views of the decision-makers, in terms of the meaning of "sustainability" are all part and parcel of a greater fisheries management strategy as summarized in Table 5.2.

One participant held the opinion that:

> Sustainability is surely the watch-word or buzzword for the management of fisheries resources.

This view is supported by Pearce (1989) and Little (1990). These two writers argue that with the advances in technology and because of competition, as a result of market forces, more fish are being removed from the sea in the Exclusive Economic Zones (EEZs). Fishermen replaced their boats with bigger ones, which are equipped with more advanced equipment for finding, catching and handling fish. According to these two writers, the EEZs also contributed towards a change from a subsistence approach to a market-driven profit-oriented one. It implies that marine resources need to be managed in the EEZs in a sustainable way.

Therefore, "sustainability" should be the key word in any fisheries management system, because it implies, *inter alia*, the maintenance, rational use and enhancement of the fisheries resources.

Another thing that emerged was that all six participants were in favour of the attainment of a maximum sustainable yield (MSY) as a management mechanism for sustainable fisheries. Most fisheries managers today adopt, at least as their theoritical goal, MSYs (Churchill, 1993).

All the participants expressed strongly positive feelings towards the use of "sustainable yields". The following interview excerpt exemplifies their feelings:

> We are in favour to use sustainable yields as a technique to help prevent commercial extinction and allow depleted stocks to recover.

The importance of "sustainable yields" has been clearly spelled out by another key decision-maker in the following way:

> That commercial exploitation need not progressively reduce the strength of a fish population, provided it is exercised at or below the fisheries "maximum sustainable yield".

One participant expressed the belief that there are a lot of issues that one needs to consider before reaching a formula (MSY) to apply sustainable policy from exploiting fisheries resources. He stated that:

> Determining sustainable yields is difficult. Estimating mobile aquatic populations isn't easy, and sustainable yields shift from year, because of changes in climate, pollution, the dynamic behaviour of the resources and other factors.

One participant went further to explain the issues regarding sustainable yields and said that estimates of sustainable yields vary widely and can be used to justify any catch level, including ones that will deplete fish stocks. He added that the sustainable harvesting of an entire annual surplus of one species may severely reduce the population of another species that relies on it for food.

Figure 3 in Chapter 4 gives a detailed description on how to attain a MSY. This description elicited and cautioned that fisheries managers must manage a resource in such a way that they will be able to harvest a yield from that resource without putting undue pressure on the resource. In other words, to prevent the resource from going into extinction, but maintain the resource at a healthy level and harvest a percentage of the fish biomass which is available. By doing so you still allow space for the resource to renew itself to grow. Botkin (1990) and Button (1988) holds the same view that a resource is used in such a way that it continues to be available.

One key decision-maker identified a central problem regarding understanding of the Namibian marine ecosystem and how this affects the Namibian fisheries policies:

> So, before you come up with an approach that will give you the parameters within which you going to work in order to ensure that you are attaining sustainability, you need to understand the many issues, the many factors that could affect your approach.
> You need to understand, first of all (my view), the ecosystem that you are dealing with. Once you have understood how that ecosystem functions, you can then start formulating your ideas on how to exploit the marine life of that ecosystem on a sustainable manner. Unfortunately, too little is known presently about the Benguela Ecosystem. So many of the formulas that are being applied now, are mostly based on assumptions. We think that the ecosystem will do this; we think and we assume that the growth rate will be this; we assume that the migration pattern of the fish is this and that. We are assuming all the time.If we could ascertain the movements, the happenings, the actual events that takes place in our ecosystem over a period of time, then we could come up with an average assessment.

According to this participant's perception, the insufficient knowledge of a marine ecosystem can hamper the sustainable development of a fisheries resource. In other words, following this key decision-maker's statement, the effectiveness of fishery management depends not only on the fishing rights in the EEZs, but that all decision-makers must have a profound understanding of how the marine ecosystem works. Incomplete understanding of the ecosystem can lead to irresponsible decision-making.

The perceptions of sustainable yields from the participants is supported by the 1982 United Nations Convention on the Law of the Sea (UNCLOS). MSYs also comply with one of the guidelines of "Responsible Fishing", namely:

> "States should implement appropriate mechanisms to ensure responsible fishing in exclusive economic zones (EEZs) and other areas under national jurisdiction " (Harwood, 1992:36).

5.2.2 Conservation

Five participants identified the wise use of fisheries resources as directly linked to conservation, protection and preservation. The responses revealed that the participants used words, such as, preservation, conservation and protection interchangeable, without distinguishing between the different concepts.

The general view of the participants was that for them "sustainability" outlines three objectives regarded as necessary for fisheries resource conservation, namely, maintenance of essential ecological processes and life-support systems; the presentation of genetic diversity; and the sustainable utilisation of species and resources.

One participant holds the view that it is very difficult to conserve the content of the seas. He felt that:

> To protect marine biodiversity for the sake of "sustainability" is very difficult, because much of the damage is not visible to most people. And the seas are viewed by many as an inexhaustible source of resources that is capable of absorbing an almost infinite amount of waste and pollution.

To support the view of this decision-maker, the issue of inexhaustibility, has been clearly spelled out by writers, such as, Rua (1994), Polunin (1980) and Shiva (1991) in Chapter 4.

To make his point clear on the issue of biodiversity one key decision-maker elaborated:

> The problem is that most of the oceans' areas lies outside our (Namibia) legal jurisdiction and is thus an open-access resource subject to over exploitation, because of the tragedy of the commons. Irresponsible fishing practices, by fishermen of other countries, near our waters makes it difficult for us to preserve our marine biodiversity, as well as the ecological integrity of our marine ecosystem.

One of the key components of responsible fishing was the development of an international code of conduct with regard to the protection of biodiversity in the high seas. During the International Conference on "Responsible Fishing" held in Cancun (Chapter 4), the representatives from various countries discussed high seas fishing issues. The primary concern was the impact of unregulated high seas fishing on stocks which straddle into zones under national jurisdiction.

The declaration that comes up from the Cancun Conference on "Responsible Fishing" was:

> "The freedom of States to fish on the high seas must be balanced with the obligation to co-operate with other states to ensure conservation and rational management of the living resources, in accordance with relevant provisions of the 1982 United Nations Convention on the Law of the Sea (UNCLOS)" (Harwood, 1992:36).

On the question of local co-operation, one participant has this to say:

> Many of the problems we have in the conservation of resources relate back to the interaction between the government, industry and scientists. How the three groups co-operate is critical to getting management and conservation to work.

In response to the above-mentioned statement, McCay (1996) notes that the effectiveness of fisheries resource conservation depends on the government, the industry, the adequacy of the science behind it, the effect it has on fish and people, and how well the rules are followed and enforced. McCay (1996) asserts that co-management or power-sharing in a partnership between government agencies and citizens with a stake in the fisheries is important. McCay (1996) further stated that co-management is about process and the delegation of power and responsibility to deal with, for example, conservation issues.

Conservation of fisheries resources were often described as an holistic and integrated approach. One participant stated that:

> If it is not done in a kind of holistic way - holistic means that you look at everything to work together. If you does not approach conservation holistically - where you don't have input from all the stakeholders, for example, the environmentalists, the biologists, the sociologists, the economists and the marine environment -- if you don't put all those together to conserve the marine living organisms, then you've got no chance of carrying on of being "sustainable'.

This view may be identified with Barcena (1993), who indicates that a holistic, multidisciplinary and inter-sectoral approach to conservation is required in a fisheries sector to identify and deal with potential interactions, allocate resources, anticipate and avoid conflict, minimise environmental degradation and face the challenge of potential climatic change.

However, the conservation approach to "sustainability" must be accepted warily. Little (1990) does not agree with the fact that one must only conserve or protect the fisheries resources. He suggests that we need to move from a conservation mentality to a mentality that can actually produce sustainability. In his view, the route to sustainability is not through conservation measures only, which merely postpone resource depletion, but through "regeneration" one can restore depleted fisheries. Little (1990) claims that through the concept of regeneration, one can empower fishermen and the community to protect and enhance the fisheries resource base through the introduction of, for example, fish-farming and aquaculture.

The introduction of these measures will make the remaining stock increase and grow.

5.2.3 Sustainable development

Four of the participants argued that "sustainability" refers to types of developments, in the Fishing Industry of Namibia, that are economically viable, do not harm the environment and are socially just. "Sustainable development" was the weakest promotion of "sustainability" that comes up.

The general trend of the responses was to separate the concept of "sustainable development" from that of "sustainable use". However, Ray (1989) suggests that "sustainable development" can be used interchangeably with "sustainable use".

Two participants out of the six revealed similarities in their definitions as can be detected from the following two interview excerpts. One participant believed that:

> "Sustainable use" is the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Another one is of the opinion that:

> "Sustainability" refers to development that safeguards the maintenance of genetic diversity, habitats and ecological processes in our marine ecosystem to the improvement of the quality of life for present and future generations.

These two definitions emphasised the approach of "sustainable development" which seeks to reconcile human needs and the capacity of the environment to cope with the consequences of economic systems [Hardoy et al., (1995); Miller, Jr. (1996); Pickering & Owen, (1995)].

On the other hand there were participants who separated the term and used it in considerably different contexts. Those participants who represent the government used the term "sustainable development", while the scientist and participants representing the industry tended to favour the term "sustainable use".

One can see, thus, that some people put more stress on sustainability in ecological terms (in other words, a biological emphasis). This idea with a biological emphasis on "sustainability" has been nurtured by the World Conservation Strategy (IUCN, 1980), and was according to Pickering & Owen, (1995) and Soussan (1992), far less concerned with economic development.
They (Pickering and Soussan) argued that stress on sustainability in ecological terms, puts more emphasis on the physical environment in its current state, and that this idea was criticised for being anti-developmental.

However, "The Limits to Growth" published by the Club of Rome in 1972, reported that if the present growth trends in, for example, pollution, and resources depletion, continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable results will be a rather sudden and uncontrollable decline in both population and industrial capacity.

Those participants who emphasised "sustainability" in ecological terms, furthermore, link their definitions to the three priorities of ecological sustainability, that is: maintenance of ecological processes; the sustainable use of resources; and the maintenance of biological diversity, as seen by Yeld (1997) and IUCN, (1980).

Whether to draw a distinction or not, between the two concepts, namely, "sustainable use" and "sustainable development" appears to be a moot point, in other words they are neither right or wrong. What is apparent, however is that decision-makers in the Fishing Industry of Namibia need to have better clarity and explanation about "sustainable use" and "sustainable development" in policy documents, in order to foster ecological sustainability and sustainability of social and economic development.

The Namibian Government has however, shown its support by reshaping its policies in a White Paper (1991), entitled "Towards Responsible Development of the Fisheries Sector" (as indicated in Chapter 3). Policies outlined in this document were translated into legislation by a new Sea Fisheries Act (1992). The legislative responsibilities of the Namibian Fishing Industry can be summarised as:

> "To provide for conservation and sustainable exploitation, the protection of exclusive economic zone (EEZ) rights, sectoral administration, research, institutional development, industrial promotion and international collaboration" (MFMR Annual Report, 1995:17)

Within the academic circle, a great deal of literature has been produced (see Chapter 4), to foster the concept of "sustainability" and to make it legally operational and practically implementable.

A guideline of "Responsible Fishing" states that:

> "States should recognise the principle of sustainable development/use of marine living resources as the basis for sound fisheries, management policies" (Harwood, 1992:35.

5.2.4 Intergenerational equity

The greater majority of the participants see equity and the redistribution of welfare as central to the sustainability debate. Their definition of "sustainability" includes the element of a fair distribution of resources and opportunities between current and future generations, as well as between individuals in the current generation.

One participant held the following view about equity between intergenerations:

> "Sustainable", to me, means that to be involved in a process which requires that the use of environments and resources by one group of people does not jeopardise the environments and well-being of other people or destroy the capacities of future generations to satisfy their reasonable needs and wants. In other words, "sustainability" must supports fairness between all species for the present generation (also called intra-generational equity), and the fairness for future generations (called intergenerational equity).

The view of this key decision-maker in the Sea Fisheries of Namibia is also supported by works of many writers mentioned in Chapter 4. Discussions with some experts in sea fisheries at the Department of Ichthyology and Fisheries Sciences, the JLB Smith Institute of Ichthyology, and the Albany Museum (Department of Ichthyology) at Rhodes University elicited similar opinions about intergenerational equity.

The five participants who expressed a positive feeling towards intergenerational equity, deal broadly with "sustainability".

Little (1990) claims that people who emphasise resource management are "technical specialists" and that they should have "a larger message", namely, intergenerational equity.

Intergenerational equity is, according to Little (1990), a jargon term which is "greatly appreciated by hard-nosed scientists and resource managers who do not wish to appear soft hearted" (p.310). Little (1990) suggests that we need to provide equity between intergenerations with respect to allocation of resources. Furthermore, he claims that we need policies that change the "rules of the game", so that economic self-interest operates on behalf of resource sustainability, rather than in contravention of it. Fisheries policies must include prosperity's equity and not only the rules and regulations of resource use, according to Little (1990).

Finally, Little (1990) suggests that whether we create or do not create a sustainable fisheries resource base, to pass along to our children and to theirs, depends on the willingness and political choices made by decision-makers today.

But one participant expressed strongly negative feelings towards intergenerational equity. His perception about prosperity's equity exemplifies his feeling. He notes that:

> Future generations have nothing they can exchange to the present generation, and there is no way to represent their interest adequately.

Pickering & Owen, (1995) in support of this negative view (in Chapter 4), claims that there are many people who would argue that intergenerational equity is an abstract ideal which is impossible to meet fully. In addition, they argued that this generation could not understand the needs of future unborn generations.

5.2.5 Sustainability needs to be approached with caution

While the majority of the key decision-makers bought into the idea of "sustainability", it must be noted that not all of them accepted it without reservations.

After I had asked the question on the definition of "sustainability" of one of the participants, he laughed at me and said:

> I hate this word "sustainability". Most people make jokes about this word nowadays. The word "sustainable" always comes in a time frame, because what is sustainable to one person might not be sustainable to another. It comes down, whether what "sustainable" means over the next 50 years or 150 years.

This response, when considered in the view of Ray's (1989) question, has considerable pertinence. Ray (1989) raised the question: "How can use of fisheries resources possibly be made sustainable given present population levels and per capita demands?" (p.83).

Ray (1989) further argues that the answer depends on the point of view, training and physical location of the participant, as well as on the time-space scales involved. Any discussion of sustainability must first answer the questions:

> What is to be sustained?
> For whom?
> How long?
> Where?

For a biologist, for example, "sustainable" may mean "forever", but for example, a politician, "sustainable" might not be "forever". The value of the concept of sustainability, however, lies in its ability to generate an operational consensus between groups or people with fundamentally different answers to the above-mentioned questions, i.e. those concerned either about the survival of future generations, or about the survival of marine life, or human health, or the satisfaction of immediate subsistence needs, etcetera. It is, therefore, vital to identify those aspects of "sustainability" that do actually cater to such diverse interests, and those that involve trade-offs.

The fact that most of the participants claim that "sustainability" has become a catch-all phrase, and that its precise meaning is by no means clear, and that it appears to be an oxymoron, the notion of

"sustainability" does offer a vision of a future world which meets the needs of all the global community without undermining the integrity of the environment (Rees, 1992).

When one looks at the key ideas which emerge from the recurring themes (in the categories column), and the frequencies of occurrences in the responses of the participants, it is obvious that there is some agreement in terms of what the key decision-makers in the Fishing Industry of Namibia think about the sustainable utilisation of the fisheries resources.

It is almost impossible that you can have complete agreement, because the decision-makers are from different backgrounds and they are also different stakeholders. When one looks at the dimension in totality in terms of the definitions of "sustainability" by the participants, it is obvious that the emphasis that the participants placed was very much in relation to their context. Those who make the decisions are more concerned about "how to manage" than the socio-economic development. These decision-makers put more emphasis on individual and community empowerment on resource management which will contribute towards economic prosperity, social improvement, and environmental quality. Those who act on the decisions put more emphasis on economic self-interest, they put their faith in the technological fix, and they wanted to compete with "market forces" (Little, 1990).

The question remains: Can "sustainability" really be effective in the Namibian Fishing Industry, where you don't have a congruency of ideas in terms of the meaning of "sustainability" among the decision-makers? It is important that those who see the marine environment purely as a provider of wanted goods and services must have a very clear idea also of sustainable development, which means a change in consumption patterns towards fisheries products, and a change in investment patterns towards augmenting marine environmental capital (Rees, 1992). According to Thomson (1994), the greediness and short-sightedness of some people have led to the collapse of some fisheries in the world. He further says that the fall of those fisheries was caused by depressed resources, overexpanded fishing fleets, over-capacity, overfishing and excessive economic pressures. We need to reconcile human needs and the capacity of the marine environment to cope with the consequences of economic systems (Tolba, 1991).

The final questions which I want to raise are:

- To what extent should my education programme that I am looking at, perhaps close the gap between the contextualisation or compartmentalisation of thinking of the key decision-makers in the Fishing Industry of Namibia?

- Are these divergent thoughts of the decision-makers really a recipe for sustainable use of fisheries resources, especially when one looks at "Responsible Fishing?

- Should the scientists, politicians and industry in the Fishing Industry of Namibia not have a shared vision that crosses the different compartments?

- To what extent can an education programme perhaps look at that idea of development that crosses links, so that the fishermen who are interested in entrepreneurship and self-interest, also have a broader vision - and that the management cadre also have a broader vision to draw on knowledge and understanding?

5.3 FOCUS AREA 2: OPERATIONALISATION OF THE "SUSTAINABILITY" CONCEPT

Expanding on the first question dealing with the definition of the concept "sustainability", the second question was aimed at exploring key decision-makers' perceptions of the operational aspect of "sustainability" in the Sea Fisheries of Namibia.

Crean et al., (1996) argues that the way the concept "sustainability" is perceived, influences the way we view and maintain sustainable utilisation of fisheries resources.

The question: "Do you think that one can determine and maintain sustainable utilisation of fisheries resources"? (Appendix 7, question 5), was asked as a means to explain the following issues:

> Who's responsibility is it to determine and maintain the sustainable utilisation of fishing resources? Should it be the responsibility of the government or should it be the responsibility of all the stakeholders?

In the context of marine resources and the environment, according to Botkin (1995) and Button (1988) (Chapter 4), to sustain would literally mean to determine and maintain or prolong the productive use of resources and the integrity of the resource base.

The ways to go about in order to determine sustainable utilisation of fisheries resources were discussed in Chapter 4 and 5.2.1 in the following way:

> If natural growth and reproduction exceeds mortality, there is some annual increment in fish biomass available for harvest. If the annual harvest is just equal to the annual increase in biomass, a steady - state physical equilibrium can be reached. However, with changes in fish population or technology, according to Meyer (1996); Rua (1994); Karnicki (1995) and Pearse (1996), the quantity of the annual harvest can change over time. The biologically determined harvest rate, at least in theory, is called the maximum sustainable yield, MSY (Chapter 4). In this situation, the goal of "sustainability" is being the management of a renewable resource stock, namely, the fish in the sea, by regulating the rate of harvest.

The question on how to maintain sustainable utilisation of fisheries resources, elicited spontaneous and varied responses, with participants' responses ranging from:

- the allocation of total allowable catches (TACs) which is a conservation measure that limits fishing mortality:
- the introduction of technical conservation meansures; to
- the implementation of enforcement measures.

Table 5.3 lists the participants responses in various categories which was strongly link to the operationalisation of the "sustainability" concept and therefore it was also thought that a considerable amount of unpacking (through probing) of these perceptions of the key decision-makers needs to be done for all dimensions indicated in the category column.

A brief explanation of each of the categories which comes out of this focus area (Table 5.3) in relation to Chapter 3, is being explained as follows:

The Namibian Fishing Industry has a responsibility to ensure the sustained development of ocean fisheries as contained in the new Sea Fisheries Act of 1992. In order to achieve this, the fisheries sector of Namibia accepts the need for controlling rates of use of marine resources by means of total allowable catches (TACs) and quotas and also by means of improvement of technical conservation measures. The need for strict enforcement and the fixing of punishments which fit the crimes is also accepted by this fishing industry.

Total allowable catches refers to a system of access right which allows a maximum take (determined annually by the relevant authority) from a resource which is set on natural social or economic grounds (Namibia Brief, 1994).

With quotas (catch controls) we are looking at a particular conservation measure which allows individuals or companies to catch a stipulated quantity of a specific species (Namibia Brief, 1994).

Technical control measures, which is also part of the regulatory measures currently applied in Namibia's Sea Fisheries, refers to the indirect control through, for example, closed areas, closed seasons, fish size limits or restructions on fishing gear (Churchill, 1993). By monitoring, control and surveillance we are looking at a unit of fisheries management which is based on the need to monitor and control fishing activities in order to verify that industry practices and behaviour are consistent with the regulations established to implement the Namibian government's fishery policy objectives, and to correct behaviour and practices which are not (Barkai & Bergh, 1996).

Table 5.3: Categories occurring in the operationalisation of the "sustainability" concept

Categories	Examples of responses	Frequency of Occurrence
Total Allowable Catch (TAC) and Quotas	"A TAC is a maximum allowed take (annually) from a resource, generally set on natural, social or economic ground". "A quota is a portion of a TAC allotted to an individual or group of individuals for a specified period".	4
Technical conservation measures	"Means (other than catch or effort control) whereby control can be exerted over the catches taken from a resource, examples include limitations on gear, seasons, fish size and areas".	4
Monitoring, control and surveillance	"A very important issue in the monitoring and control of marine fisheries is the extent to which regulations can be enforced".	6

Further analysis of the interview with the key decision-makers revealed that the majority of participants perceived that fishing restrictions won't work workout adequate monitoring and enforcement and cooperation among the fishers, while some participants expressed concern about the fact that the maintenance of sustainable utilisation is not likely to be successful if it is not found reasonable by fishermen who are supposed to be involved in it.

The next sections analyses each of the sub-themes in the categories column in more detail.

5.3.1 Total Allowable Catch (TAC) and Quotas

One of the cornerstones of fisheries management is the system of TACs (Churchill, 1993). Each year the Fisheries Advisory Council in Namibia establishes TACs for most stocks of commercial interest found in Namibia waters by means of a regulation. Once the Fisheries Advisory Council has established a TAC for a stock of fish, they then divide the TAC into quotas allocated to individual members and fishing companies.

Churchill (1993) asserts that the reason why a system of TACs and quotas was introduced was largly historical, because before the inception of 200-mile exclusive economic zones, that was the system that most fishing industries used around the world and that was also the system with which people were familiar with at the time. It was accepted because people knew what they were getting. Churchill adds that if anybody wanted to change the system of TACs and quotas they would have to convince managers and other stakeholders of fisheries that change was going to be better for them.

Miller, Jr (1996) expresses strongly positive feelings towards TACs and quotas. He notes that the managers of marine fisheries use several techniques to help prevent commercial extinction, to allow depleted stocks to recover and to maintain sustainable utilisation of fisheries resources. He further adds that fishery commissions, councils and advisory bodies can set annual quotas and establish rules for dividing the allowable catch among the participating stakeholders.

Four participants pointed out that they are in favour of TACs and quotas to help maintain sustainable utilisation of fisheries resources.

One key decision-maker was of the opinion that:

> The importance of fishing levels of TACs, which allow for the renewal of resources cannot be over emphasized. But it would be of great benefit to the fishing industry to

> operate on quotas linked to maximum sustainable yields. At present quotas are generally totally dependent upon recruitment of stocks and are therefore liable to move from high peaks to low troughs, which obviously is very bad news for Namibian fleet operators.

Emphasising the issue of a link between quotas and sustainable yields, Crean & Symes, 1996:5) elaborated: "Built on assumptions that most fish stocks are inherently stable, behave predictably under moderate levels of exploitation and tend towards an equilibrium state, fisheries management became, in principle, a relatively straightforward scientific exercise. For a given equilibrium, it was simply necessary to calculate the proportion of the adult stock that could be extracted through fishing without endangering its sustainability - in other words, the total allowable catch (TAC). The concept of maximum sustainable yield (MSY) thus became a key reference point for fisheries management".

Two of the six participants cautioned against the introduction of TACs and quotas. One key decision-maker admitted that:

> Quotas and TACs are matters that have to be agreed upon at the regional level, with due regard to local dependence on fishing, but quotas should not be set at too high levels if you want to achieve sustainable development.

According to Churchill (1993), a fishing industry should accept the need for controlling rates of use of resources by means of quotas. Otherwise it will be very difficult to maintain the sustainable use of a fisheries resources.

Another key decision-maker felt that, and asked also the question: Would fishermen prefer to fish to a competitive TAC or to operate under regulations? He further adds and claims that there are divided opinions about TACs and quotas and a growing number of fishermen are now beginning to doubt whether quotas are the best way of running fisheries. TACs and the quota allocation system are widely recognised to be necessary, but many feel that it is a mistake to rely too much upon them, that there needs to be, along with them, a system that restricts effort exerted on the stocks.

The next section will deal with effort limitation alongside a TAC and quota allocation system.

5.3.2 Technical conservation measures

These tools for the maintenance of sustainable use of fisheries resources include the minimising of mesh sizes, fishing gear restriction, minimising fish sizes, closed seasons and closed areas. The main purpose of these measures, according to Crean & Symes, (1996), is to protect immature fish and spawning and nursery grounds.

Four participants expressed the belief that technical conservation measures are a step in the right direction. They expressed strongly positive feelings towards technical conservation measures as a tool of maintaining sustainable use of fisheries resources. These four key decision-makers suggested that it is widely accepted that there is a need for improving the selectivity of fishing gear, not only by increasing mesh sizes, but also by adjusting the configuration of fishing gear to bring to an irreducible minimum the discarding of immature or juvenile fish.

On this point, one participant had this to say:

> I look forward to increasingly close cooperation between scientists, government, managers and fishermen. I think it is important that the views of fishermen are taken heed of by those who are responsible for legislating on such matters.

Another participant argued that fisheries advisory bodies may limit fishing seasons and regulate the type of fishing gear that can be used to harvest a particular species. He further commended that fishing techniques such as dynamiting and poisoning, for example, be outlawed.

Although most of the participants were in favour of technical conservation measures, two participants held the view that once you have already depleted a resource, the technical measures won't work. The participants claimed that depleted resources increase the tendency to use destructive fishing methods such as dynamite or the use of small mesh sizes. One of these participants expressed negative feeling such as:

> You know, often we can determine "sustainable" after its gone, which is very sad. We realise that we overdid it.

The continual monitoring, control and surveillance of fisheries resources is the ultimate answer to a solution and that will also be our final discussion on the operationalisation of the "sustainability" concept.

Technical conservation measures comply with one of the guidelines of "Responsible Fishing", namely:

> "States in the design and subsequent introduction of new fishing gear and practices, should take into account qualified assessments of impacts on the sustainability of fisheries, giving due consideration to the specific characteristics and biodiversity of different fishing areas "(Harwood, 1992:35).

5.3.3 Monitoring, control and surveillance

The monitoring, control and surveillance unit of the Namibian fisheries management is based on the need to monitor and to control fishing activities in order to verify that industry practices and behaviour are consistent with the regulations established to implement the government's fishery policy objectives, and to correct behaviour and practices which are not.

The control of access to the exploitation of marine resources is vested in the Ministry of Fisheries and Marine Resources (MFMR) (Chapter 3). It is exercised by enforcing catch control (TACs), effort control, technical control measures (e.g. closed seasons, closed areas, minimum mesh size) and other appropriate means.

According to McCay (1996), regulatory measures have little effect unless they are implemented and enforced. However, monitoring, control and surveillance tend to be costly activities, because it means large capital investments in the elimination of, for example, overfishing.

All the key decision-makers identified the importance of the enforcement capacity and it has been underlined with regard to the Namibian Fishing Industry.

A negative attitude which emerged from one of the participants was that enforcement is difficult in areas being fished by several nations, such as Namibia, Angola and South Africa. He felt that regional agreements should be formed to decide upon the rate of exploitation of particular species in the Benguela system, and by whom. This participant also added that legal systems must be harmonious between the mentioned countries.

Another participant stated that:

> Managing fisheries is also in effect managing human resources development. I think that management measures and restriction are not likely to be successful if they are not found reasonable by fishermen who are supposed to follow them.

Some fisheries economists misinterpret human nature, according to this key decision-maker. Fisheries economists, sociologists, biologists, fisheries policy analysts, etcetera, assume that the fishermen are going to be environmentally rational. To make his point this key decision-maker elaborated:

> Some fishermen are predatory and they will continue to be predatory for quite a while. This brings up the whole problem of enforcement, because they cheat. A lot of them cheat. They'll bring in undersize fish and, sure, you can intercept the fish at the docks, but we just don't have enough enforcers to watch the fishermen doing it. Some of the fishermen go as far as to bribe the enforcers with alcohol.

To explain the complex nature of enforcement one participant goes further and claims that fishermen are going to be doing inadmissible practices out at sea unless there is shipboard inspection. This participant adds that the fishermen are going to use smaller mesh size, they are going to throw a tremendous amount of the catch away, but if you can get them to be rational, which is really a psychological as well as an economy problem, perhaps this will not happen.

Another participant had, however, a positive view about the fishermen. He commented thus when probed:

> We should recognise that fishermen are entrepreneurs, they pursue their self interest. The trick is to steer that self interest in a constructive direction, so that they begin to fish efficiently.

Another key decision-maker, when probed on the issue of enforcement, has this to say:

> Yes, most fishermen I have met believe in conservation, as long as it is for other fishermen and not for them.

Monitoring, control and surveillance comply with one of the guidelines of "Responsible Fishing", namely:

> "International co-operation should include the financial support required by development countries to enhance their capacity to exercise their sovereign rights by improving their systems for marine scientific research and fisheries management, including surveillance and enforcement" (Harwood, 1992:36).

When one looks at the key ideas which emerged from these themes (in the categories column), and the frequencies of occurrences in the responses of the key decision-makers, it is obvious that there is some agreement in terms of the perceptions of the key decision-makers in the Fishing Industry of Namibia about the maintenance of the sustainable utilisation of fisheries resources.

On the whole, the data shows that it is possible to maintain sustainable utilisation of fisheries resources, though most management tools for maintaining sustainable utilisation were not thoroughly explored or understood in-depth.

The participants linked the tools of fisheries management with how to maintain sustainable utilisation. The results indicated that there is a general awareness of limitations in the operationalisation of the "sustainability" concept. However, this challenge can contribute towards the generation of sound policies that recognise the intersectoral nature of the problems in the Sea Fisheries of Namibia. Information on how to maintain "sustainability" for decision making is going to be critical in policy formulation processes in fishing industries.

The questions remain:

- Can one maintain sustainable utilisation of fisheries in Namibia, where you don't have a congruency of ideas in terms of the maintenance of sustainable utilisation?

- To what extent should the framework for the future development of education programmes that I am looking at, perhaps close the gap between the key decision-makers' perceptions of the operationalisation of the "sustainability" concept in the Fishing Industry of Namibia?

5.4 FOCUS AREA 3: THE ROLE OF EDUCATION IN HELPING THE IDEA OF "SUSTAINABILITY"

The question (Appendix 7, question 6), "To what extent do you think education can play a role in helping the idea of "sustainability" and what sort of role"? was based on the premise that awareness (education), environment and "sustainability" are intimately interconnected. The question was therefore asked specifically to explore with these key decision-makers, the link between education, environment and "sustainability".

Since the fate of man and the sea are bound in more than one way, their harmonious co-existence relies on the fine balance between give and take and on man's knowledge, wise management, and wise utilisation of this infinitely valuable natural treasure.

The mere fact that Namibia's marine environment provides millions of Namibian dollars worth of fish and other resources each year, one realises the important role of this natural assets in the lives of all Namibians. Whether the Namibian marine environment is considered as a job creator, tourist attraction, climate determiner, source of food, transport medium, playground or spiritual inspiration, all Namibians directly or indirectly benefit from it.

Therefore, education for sustainable development of this valued marine environment is necessary to pass this natural gifts on to generations to come. It must be noted that the question of marine environmental education towards sustainable development did not generate spontaneous responses.

A brief explanation of each of the categories which comes out of this focus area (Table 5.4), in relation to Chapter 4, is as follows:

The ethical guidelines that shape people's wordviews vary greatly. Some people believe that certain ethical rules apply to all peoples and cultures. Other people believe that ethical rules are not fixed and may change with particular situations, individuals, species or societies. At its core, "conservation ethics" involves a respect for all life and for the processes that sustain it. Such respect implies limits on our actions: There are things we should not do, not because they cannot be done, but because doing them shows a disrespect for life. There is nothing wrong with humans exploiting their environment, because every living thing must get resources from its environment to survive. The problem is knowing how far we should go. Developing a conservation ethic for putting beliefs into action is a controversial undertaking, but many people believe it is a necessary one if our species is to survive (Miller, 1996; Environmentalism - Chapter 4).

Most environmentalists believe that learning how to work with the marine environment requires a foundation of marine environmental education and a lifelong commitment to such education. Among the most important goals of such an education is the notion of understanding and "knowledge" about how the marine environment works and sustains itself, and using that knowledge to guide our lives, communities and societies (Fortner & Mayer, 1989).

Knowledge by itself about the marine environment, divorced from values and "attitudes", can be quite meaningless, which is why the development of values and attitudes is of such importance to marine environmental education that it should be a major consideration in the choice of teaching approaches. Right values and attitudes towards the marine environment will produce right thoughts, and right thoughts will lead to right action and "behaviour" (Radbone, 1990; Environmentalism - Chapter 4).

Table 5.4: Categories occurring in the role of education in helping the idea of "sustainability"

Categories	Examples of Responses	Frequency of Occurrence
Conservation ethic	"Our beliefs about what is right or wrong behaviour with regard to the conservation of fisheries resources".	2
Knowledge	"Knowledge about the marine ecosystem of Namibia is of paramount important in order to help us progress along the pathway to sustainability".	2
Education on attitudes and behaviour	"The need to change human attitudes and actions towards the marine environment through educational institutions".	6

The next sections analysis each of the sub-themes in the categories column in more detail.

5.4.1 Conservation ethic

Illustrating the need for the cultivation of a fish conservation ethic, Little, Jr. (1996) explained that some environmentalists urge us to recognise that each species, as a unique and irreplaceable product of millions of years of evolution, has an inherent right to play its role in the ongoing evolution of life on Earth without interference by humans. Little adds that those environmentalists believe that we have an ethical obligation to protect species from premature extinction because of human activities.

Two participants reported that the cultivation of a fish conservation ethic for Namibia is important, but that there are issues to take cognisance of. One interviewee was of the opinion that one can cultivate a fish conservation ethic among the Namibian public at large. She stated it this way:

> A fish conservation ethic is something that can be done in a country like Namibia. Exactly how one can get it there, I do think its largely education. It is not only biological and ecological facts that influences the way we use our marine system, but the social interactions and response to the marine environment which are determined by our cultures, contribute a great deal. What might be a relevant issue to one society is often totally rejected by another.

Culture determines everything we do, including our beliefs, knowledge, art, morals, law, customs and habits (Bowlby et al., 1992). Furthermore, Bowlby et al. noted that until recently, with economic and social change, culture has never been taken into account as a factor which might influence peoples behaviour towards the marine environment.

Past strategies, for example, through the rise of environmentalism (Chapter 4), attempted to increase awareness in order to convert persons to perceive the importance of conservation. Unfortunately, humans do not reach to environmental programmes in such a simple way. They might hear the message but this does not necessarily mean that they need it or that their behaviour will change.

Another key decision-maker expressed strongly negative feelings towards cultural influences. He asserts that:

> There are too many other cultural influences in the Namibian Fishing Industry, that will prohibit an automatic change in habits. Europeans, for example, have been taught to strive for material and economic wealth, often at the expense of their marine environments. Third World populations, on the other hand, have learned to become dependent on First World values and systems. In an effort to achieve better living standards for Namibians, almost all the marine resources have to be exported at low cost which, at some time or other, will have to be imported by the very same Namibians as a manufactured item. So, you can see that they are thus forced to over-utilise their resources at the expense of their natural heritage.

According to a economist, Pearse (1996), the debt burden forces some governments to encourage the production of commodities, such as fisheries products, that can earn foreign exchange.

The cultivation of a fish conservation ethic is possible in Namibia if the Namibians go along with the perception and strategy of their Honourable Prime Minister.

Namibians can realise the goals of the strategy if conservation initiatives are practised and manifested in their everyday behaviour and if they realise that their marine environmental systems are finite. This can be achieved through formal education processes in schools, colleges and the University, informal education at home and with friends, and non-formal education through agencies concerned with various aspects of the Namibian marine environments.

In addition, the World Conservation Strategy - Caring for the Earth (1991) and Agenda 21 (UNCED, 1992) stated that we exist as individuals within cultures that interact with our environment in positive and negative ways. We are decision-makers, politicians, consumers and developers and that all of us make decisions that affect local and even global environments in some way or other.

According to Tolba (1991); Hardoy et al., (1995); "Limits to Growth" (1972) and Ward & Dubos, (1972), we have seen, for too long, development and conservation as forces at either end of the spectrum. They argued that we have to reconcile human needs and the capacity of the environment to cope with the consequences of economic systems. We are all responsible. We can all be conservationists. It is unrealistic to sit back hoping that government, industry, scientists and private organisations have things under control.

The work of Sauvé (1996) may be a source to be looked at, where she refer to the environment-as-nature. She argues that environmentalists or educators today see the environment-as-nature as something to be appreciated, respected, preserved and handled in a sustainable manner.

5.4.2 Knowledge

Fien (1993) argues that the well-being of all future generations depends on the skills and effectiveness with which we inform and inspire the knowledge base of those currently in our schools and colleges.

Two participants expressed the belief that knowledge about the Namibian marine environment is important, because "knowledge" is one of the basic requirements for an understanding of an environment.

This belief is also stipulated in the principles and guidelines on environmental education from the Belgrade Workshop (1975) and the Tbilisi Conference (1977). Accordingly, knowledge of a marine environment should not simply be a new discipline, but rather a means of deepening, and enriching with its environmental knowledge a variety of disciplines, at all educational levels.

One key decision-maker admitted that:

> You need to understand the marine and coastal ecosystem along our Namibian coast, in order to formulate ideas on how to exploit that ecosystem on a sustainable manner.

Another participant stated that the Namibian education system should incorporate marine courses into its school curriculum. He added that the children would become more familiar with the local marine life and that this would form the basis for extended enquiry into the topic. We must encourage children to participate in marine oriented class projects, because it will help young people to progress along the pathway to "sustainability".

One of the basic principles of knowledge in helping the idea of "sustainability" is to understand as much as we can about connections and interactions in the marine environment. A basic problem of life in modern industrial societies, is that formal education, including information provided by the media, is concerned mostly with dividing things into packets of information - with the pursuit of relatively unimportant "facts" at the expense of important knowledge.

We need to replace this atomistic approach to education with a holistic one devoted to integrating knowledge by learning about how things are connected and interact. This is a view of environmental education, nurtured by the Belgrade Workshop (1975) and the Tbilisi Conference (1977).

5.4.3 Education on attitudes and behaviour

In Caring for the Earth, IUCN - The World Conservation Union, the United Nations Environment Programme (UNEP) and the World Wide Fund for Nature (WWF), stated that environmental education and training can be important in effecting social change towards a sustainable society.

All key decision-makers in the Sea Fisheries of Namibia identified the concepts "attitudes" and "behaviour" of all the stakeholders in the fishing industry, that should be changed, if possible, in order to bring about "sustainable" fisheries.

At the moment there are some marine environmental education programmes that attempt to provide citizens with the appropriate values, knowledge, skills and incentives, but many of the programmes fall short of influencing positive change in attitudes and behaviour. These programmes are offered at the aquarium in Swakopmund, which forms part of the National Marine Information and Research Centre, financed and operated by the Ministry of Fisheries and Marine Resources.

The general view of the participants was that they, as well as the neighbouring schools and community, regularly received information from the aquarium that increased public awareness and appreciation of marine resources.

But Blanchard (1995) argues that when perceived simply as a channel for information, education often is given less importance than habitat management and enforcement for conserving marine resources.

Agenda 21 states that there is larger, more important role for education in helping societies change their behaviour towards practices that are consistent with "sustainability" (United Nations, 1992). Blanchard (1995) further adds that information materials are often used as a substitute for education.

She claims that just because information is printed in a brochure or displayed on a poster does not mean that the target audience will read, understand and follow what is being asked, particularly if the messages goes against traditions, local norms, or conflicts with personal ethics.

The participants tended to confirm each others' beliefs when probed about the role of education in helping awareness and understanding. One participant had more to say about awareness and understanding. She held the opinion that:

> Education about our marine environment must do more than simply increase awareness and understanding. It must develop responsible attitudes against the marine environment, a commitment to work for sustainable development.

Attitudes are also considered in the Belgrade Workshop (1995) and the Tbilisi Conference (1977) of environmental education objectives. According to these two important events, the correct attitudes must be achieved by, for example, stakeholders in the Fishing Industry of Namibia and the attainment of this will incorporate the promotion of strong feelings of concern for the marine environment.

If possible emotions towards sustainable marine life are generated in the Namibian public at large through education, the success story of effective fisheries management (Thomson, 1994) in Namibia will go a long way together with the "right knowledge" and "right attitudes" which will ultimately leads to "right behaviour".

Marine environmental education complies with one of the guidelines of Responsible Fishing", namely:

> "States should promote educational programmes and dissemination of knowledge about responsible fishing" (Harwood, 1992:36).

Solutions were suggested by the participants for dealing with 'sustainability' and the sort of role education can play in this regard. While many appropriate solutions were raised, there was no thorough discussion on how to go about implementing the solutions.

Almost all the participants admitted that a lasting sustainable development of fisheries resources called for short- and long- term education strategies, and that sustainable development is not only dependent on enforcement of regulations. The educational goal of a sustained changed in behaviour, involved teaching practical knowledge, developing a conservation ethic and allowing participation.

Marine environmental educators as transformative intellectuals should pay attention to the processes of curriculum planning and teaching. Attaining the full range of knowledge, skills and values objectives of marine environmental education requires approaches to teaching very different form those of the traditional classroom.

The question which I want to raise to which marine environmental educators might aspire is:

To what extent do they maintain a balance between knowledge, attitudes, skills and values objectives, especially so that the development of important attitudes, skills and values are not subsumed by an over - emphasis on content?

An important role which can be played by education was highlighted in the Brundtland Report (1987). This report of the World Commission on Environment and Development called for a common endeavour and for new norms of behaviour at all levels and in the interests of all. Furthermore, the report urged that the changes in attitudes, in social values, and in aspirations would depend on vast campaigns of education, debate and public participation.

The need for a new social and environmental ethic has also been recognised by The World Conservation Strategy (IUCN, 1980). Educational programmes aimed at developing positive environmental attitudes, knowledge and skills needed to act to change environmentally destructive behaviour, can assist people to pursue social, economic and political reform. These reforms are needed before an ecologically sustainable society which does not threaten, for example, the marine environment can evolve.

The important role of education in helping their idea of "sustainability" was considered to be paramount to the future well-being of the species and the planet as a whole by a considerable number of environmental movements of the 1960s and important "landmarks" of the 1980s which were part of the political rhetoric (Chapter 4).

5.5 DRAWING THE THREADS TO GETHER AND A LOOK AT THE "BIG PICTURE"

The discussion of the result dealing with "sustainability" revealed the often cited statement that despite the fact that "sustainability" receives extensive support from all sectors around the world, there is no consensus as to its definition. Efforts have been made by key decision-makers, in the Fishing Industry of Namibia, to define the term "sustainability" although it is by no means easy to define the term precisely. Discussion on the definition of this term and how to make developments in the fishing industry sustainable will undoubtedly continue over this decade and into the next century.

The lack of a definition of "sustainability" is not, and should not, be an excuse for inaction. "Sustainability" is not an academic question; rather, it is a question of survival. The Fishing Industry of Namibia is by no means an exception in this matter.

The roles of education in helping the idea of "sustainability" were pointed out. The lack of conservation ethic, appropriate practical and experiential knowledge, and attitudes and behaviour were generally viewed as obstacles to promoting "sustainability". The inclusion of education towards sustainable development in the curriculum was seen as critical, though no clear strategies to achieve this were given. There was a suggestion that the Namibian education system needs to support the inclusion of marine environmental education in the curriculum. There was an emphasis on non-formal marine environmental education among all sectors of the Namibian society, particularly among the adults.

The role of marine environmental education in improving skills, knowledge and values was acknowledged by some participants. The general view was that for marine environmental education to take off, it had to be supported by the Ministry of Fisheries and Marine Resources. The need for effective and sound marine environmental policies was proposed, with the emphasis on co-management, which will ultimate leads towards participation by all stakeholders in the fishing industry.

The key decision-makers perceptions of "sustainability" and the role of education does differ to a certain extent as can be seen from the frequencies of occurrences column.

The questions remain:

- How do we get a shared vision of "sustainability" and the role of education, because only with a shared vision can we actually apply "Responsible Fishing"?

- How do we actually produce an education programme that will address these issues that are raised by the key decision-makers?

While these questions may not be answered through a definitive recipe, at the end of this study, they have raised an awareness of the problems, issues and factors that have to be addressed by any education programme. The fact that I have not at this stage been able to find answers is not important. I will find all those answers only when I go through more research. In chapter 6 I provide tentative suggestions and ideas for further research and a provisional framework that is going to be needed before an education for sustainable development programme can be finalised.

CHAPTER 6

THE WAY FORWARD AND CONCLUSION

6.1 INTRODUCTION

This chapter to my mind is unique, since it is concerned with future marine education in Namibia. Education constitutes the very foundation for progress and the way forward for sustainable development in any sector. Furthermore, education is the development of human resources and is a major facet of sustainable fisheries development (Chapter 5).

The Namibian Sea Fisheries Industry, like any other, depends for its efficiency on the skills and motivation of its workforce. Education is a prerequisite for the development of these skills, and this applies for all levels of staff from policy makers and managers to the lowest grades (Namibia Brief, 1994).

This study pointed out that individuals, different authors and groups, a considerable number of key decision-makers in the Sea Fisheries Industry of Namibia, international bodies, and international aid agencies are growing increasingly concerned over the state of the (marine) environment and are aware that many of their current choices and actions will have lasting impacts on (marine) environmental health.

Proponents of sustainable fishery practices recognise that education must play a prominent role if such practices are to be successfully introduced and implemented in Namibia. The guidelines given for "Responsible Fishing" make provision for the role education should play to bring about environmentally sustainable development in the fisheries sectors (Chapters 4 and 5).

However, current educational efforts in Namibia are generally limited to information transfer among marine scientists, fishermen and women, the government, and other members of the sea fisheries community (Namibia Brief, 1994). In other words, maritime education is provided, to some extent, outside of the national education system of Namibia. It is critical that educational efforts be expanded to include the largest segment of Namibian society -- the non fishing public. A reason for the educational expansion of knowledge about the Namibian marine environment is because this marine environment and its resources are by definition a national asset and the heritage of all Namibian citizens.

My view is that the life of virtually every human being is affected by the sea. Hence there is a need for general marine education, the scale and content depending on the context of the targeted learner or student groups. Moreover, some of the young people today will ultimately become the leaders, marine scientists or fisheries managers of tomorrow. Agenda 21 also calls for the education in environmental management and sustainable development of a wide range of people, including the youth.

There are two main reasons why it is important that all Namibian citizens have a basic understanding of the concepts and issues in sustainable fisheries.

Firstly, the public influences government policies, with regard to sea fisheries, through its choice of representatives and through communications (for example, letter to the press, regional authority meetings, and municipal meetings) with elected and nonelected officials.

Much has been written in this study about the importance of government policies in the development of the Sea Fisheries Industry of Namibia (Chapter 3). Sea fisheries policies, for example, influence the types and numbers of fish to harvest, the fishing gear to be used, right to fish laws, and other aspects of sea fisheries related to sustainability. Although the influence of some sea fisheries policies on fisheries practices may be overestimated (Chapter 3), fisheries policies will have an important influence on the direction of Namibia's sea fishery practices.

Secondly, individuals in Namibia make choices. As consumers (young and old), fishermen and women, investors, managers, developers, environmentalists, scientists, tourists or recreationists, individual choices will affect the direction of the sea fisheries. These individuals need to make choices that not only enhance their own welfare and health, but that will also contribute to the protection of the marine environment, and to the development of a sustainable sea fisheries industry of Namibia.

Much can also be learned from observations of the wider domain of citizen involvement in marine environmental issues as described by McCay (1996) when bringing in citizens into the decision-making process as members of advisory and planning committees.

Proponents of sustainable fisheries must recognise that marine environmental education (which could bring about "Responsible Fishing") is an essential place to begin disseminating information that will allow individuals to understand the implications of different fisheries practices in terms of their own welfare, the health of their marine environment and the country's economy.

If "Responsible Fishing" (and therefore sustainable development) in the Sea Fisheries Industry of Namibia is a goal, then education towards that goal is important.

The education system in Namibia is currently undergoing reform, providing an excellent opportunity to use sustainable fisheries as a theme in existing curricula. Efforts are underway to make Namibian curricula more relevant to real world situations through the establishment of partnerships between subject matter experts and educators (Ministry of Education and Culture, Namibia, 1993). All the stakeholders in the Sea Fisheries Industry of Namibia can form alliances that will enhance young peoples', and indeed adults' knowledge of both sustainable fisheries and marine science.

The timing is optimal for developing educational programmes that address sustainable fisheries for all Namibian citizens, because "sustainability" is emerging as a central theme in resource use and management (Chapter 4), and that there is currently a search for societal relevance in curriculum materials in the Namibian Educational Reform process.

Therefore, this chapter will briefly attempts to illustrate some recommendations in order to lay a basis for a framework for environmental education in the sea fisheries sector of Namibia.

What is been highlighted is the need to focus on:

- Marine environmental education as a vital component of "Responsible Fishing", and

- Education for "Responsible Fishing".

6.2 MARINE ENVIRONMENTAL EDUCATION FOR "RESPONSIBLE FISHING"

The development of marine environmental education programmes in Namibia is vitally important towards making education for "Responsible Fishing" a reality and therefore sustaining this fishing industry for future generations.

The Sea Fisheries Industry of Namibia and its associated infrastructure has, especially after Independence in 1990, provided training as a means of developing and retaining skills in the sector (Namibia Brief, 1994). However, policy developments should offer a means of affirming training,

and even marine environmental education, as a crucial element of the future Namibian fishing industry.

Training in fishing and maritime techniques is available on a formal basis in Namibia at the Maritime Institute at Walvis Bay and the Maritime Training Centre at Luderitz (Chapter 4). But marine education should be offered to an even broader section of the Namibian community, not just to the active labour force. This will contribute towards capacity building in the fisheries sectors of Namibia.

Marine environmental education, according to McCay (1996), must be carried out in several contexts if the marine scientist - regulatory manager (usually the government) - user system is to function effectively. The necessary marine knowledge must be imparted to individuals to:

- carry out their responsibilities with respect to their marine environment and marine resources (The achievement of this goal requires efforts to introduce relevant curricula into formal and informal education systems, and

- sensitise the public, and indeed the decision-makers to marine environmental issues of relevance to socio-economic development.

This section identifies three (3) types of marine education:

- Formal approaches (for example, in schools and the University of Namibia);

- Informal approaches (for example, awareness campaigns and life long learning); and

- Education for "Responsible Fishing".

Marine training by doing (for example, on-the-job training) is an important element of sustainable fisheries and it is already offered at the Maritime Institute and Maritime Training Centre in Namibia.

Research should be a component of the above marine education and training types. Indigenous people in Namibia should be supported to maintain and apply their traditional knowledge of the marine resources. Marine environmental education is relatively new to academics in southern Africa

(Chapter 1), but its ability to enlighten and enliven standard curricula in Namibia is recommended in this study.

I am concerned with the notion of marine environmental education, not simply because it represents yet another curricular niche to be explored, but because we, as Namibians, are increasingly recognising that our general welfare is also associated with the Sea Fisheries Industry of Namibia, which is a crucial area of the Namibian economy.

Education, whether formal or informal, is a powerful means of promoting changes in awareness and attitudes with respect to the marine environment (Chapter 5). This idea brings us to the following sections which deal with formal and informal approaches to marine environmental education.

6.2.1 Formal approaches in marine environmental education

The existing time pressures and subject requirements in most schools in Namibia make it almost impossible to add new courses (Ministry of Basic Education and Culture, 1996). In the light of this, integrating marine environmental education concepts into existing courses is a more viable alternative to pursue (Belgrade Workshop, 1975, and Tbilisi Conference, 1977, on the notion of multidisciplinary approach). Marine environmental education (that will contribute towards "Responsible Fishing") can be taught within a number of school subjects including all science subjects, social studies and economics.

Programmes developed for marine environmental education should include both classroom instruction and field trips. Vivid experiences obtained from field trips enhance learning and provide excellent reinforcement of lessons presented (about certain kinds of marine ecological concepts) previously in class (Disinger, 1986). Disinger claims that concept retention is high, because learners learn by direct participation.

Inland schools in Namibia (with their landlocked classrooms), are not excluded from marine education because of their geography, however, inland schools, as well as schools at the coastal towns in Namibia could teach and sensitise learners, *inter alia*:

- marine ecological principles;
- international Law of the Sea (UNCLOS, 1982);
- waste disposal management;
- marine pollution;

- environmentalism;
- climate moderations;
- fisheries regulatory practices;
- environmental assessment and protection;
- coastal and ocean administration;
- traditional knowledge of coastal communities; and
- marine resource and environment economics.

These above-mentioned marine studies make the marine environment important to all, regardless of proximity to the coast. These marine courses could also include role - playing and simulation techniques which could make learners aware of decision-making realities and the interrelationships involved in social and economic issues.

Because of budgetary constraints to take learners to the marine environment, and the general level of demands of instructor / lecturer / teacher time, some subject matter experts, educators or trainers on marine education could develop instructional modules or additional educational materials by using topics for marine environmental education.

Such curriculum infusion models allow marine environmental education to become a topic for any discipline, from language to home economics and from physical science to agriculture. Furthermore, stakeholders in the education system of Namibia could sponsor programmes on children's literature and the sea.

It will not be enough for experts in marine education to develop teaching materials or programmes and "give" them to teachers, lecturers or instructors for implementation. The development of partnerships between active proponents of sustainable fisheries and educators will be crucial to successful integration of sustainable fishery curricula and activities into classrooms.

Educational research clearly shows that a lack of teacher input is the primary barrier to the successful implementation of curricula (Carr & Kemmis, 1993), when curricula are developed by marine educators and then given to the teachers or instructors, then these curricula are not nearly as likely to be used as when true partnerships among marine educators and teachers are formed to capitalise on the expertise of each. When the teachers or instructors develop "ownership" of the eventual product (i.e. curriculum), the programme has a better guarantee of success (Carr & Kemmis, 1993).

Marine scientists and marine educators should bring to the partnership their knowledge and understanding of sustainable fisheries systems and marine environmental issues.

Partnerships, shared responsibility and collaborations are considered vital in the Namibian education policy (Ministry of Education and Culture, Namibia, 1993) to the success of educational reform. The following recommendations should be considered in the formation of partnership for the purpose of future development of education programmes that focus on sustainability in the sea fisheries sector of Namibia:

- Fishers and teachers should identify ways to develop joint programmes. Successful educational programmes should include representatives of all interested parties at the outset of the project. Marine scientists, for example, should not tell educators or instructors what they need to know or how to teach. Marine scientists have a responsibility to articulate their results in a way that can be applied and understood by teachers or instructors.

- Develop all teaching materials with the goal of encouraging critical thinking.

- "Hands-on" activities should be emphasised whenever possible.

- Provide opportunities for teachers or instructors to work at fisheries research institutes during holidays.

- When teaching materials have been developed, use innovative ways to disseminate them. For example, the instructors or advisory teachers directly involved in the development of the teaching materials could hold demonstrations or workshops for other instructors or teachers, allowing new instructors or teachers the opportunity to be trained in the use of the newly developed materials.

- Establish an informational network that will allow the exchange of ideas between, for example, marine scientists, fishermen and women, marine educators and trainers.

- Finally, for the future development of marine environmental education programmes, the educators or instructors of marine studies could make use of the various conceptions of the environment [suggested by Sauvé, (1996): Chapter 4] separately or as one package during teaching or training situations.

Lemons (1996) claims that universities need to do a better job of educating students about environmental ethics and to become better institutional role models for sustainable environmental behaviour. By using these ideas Lemons (1996) has suggested that there is a definite moral obligation on the part of universities and those who people them to also foster marine environmental awareness.

The University of Namibia (UNAM) is fortunate in having a number of ways in which it could fulfill this obligation. It could cultivate an understanding of marine environmental problems in the public at large, and could provide knowledge about, and urge commitment to, the marine environment on the part of students enrolled at UNAM. The University of Namibia could foster marine environmental awareness by creating courses, developing curricula, inaugurating marine programmes, establishing marine centres, and conducting research focused on the Namibian marine environment. Courses which UNAM could offer are, *inter alia*:

- marine biology;
- oceanography;
- oceanology;
- the living ocean;
- technology and the ocean;
- maritime education & training;
- maritime administration;
- shipping and port management;
- fisheries management;

- environmental impact assessment;

- marine law;

- fishery economics; and

- other themes of the fluid earth.

The materials of these courses should be modular in nature so that they may be either inserted into existing course sequences or selectively combined to produce a complete course. Each module should contains background information, laboratory activities to illustrate topics, and supplementary activities that extend the marine concept into nonscience disciplines. In offering these courses, UNAM would contribute to the common good and the welfare of the Namibian society with respect to the Namibian marine environment and the role it plays in the countries economy.

6.2.2 Informal approaches in marine environmental education

Education activities in informal settings typically aimed at the education of the general public:

- By definition marine environmental education, which could lead to "Responsible Fishing" might also be acquired without the aid of schools, universities and maritime schools or centres (Fortner & Mayer, 1989, Chapter 4).

- The Sea World Education Centre in South Africa, Durban, could encourage marine awareness through different activities for a wide range of audiences, ranging from children to teachers and for the general public (Appendix 1).

- The Marine Information and Education Centre, which is the aquarium in Swakopmund could offer to the general public of Namibia the opportunity to see the marine environment - as - nature, as something to be appreciated, respected and preserved (Sauve, 1996). This aquarium is not purely recreational in nature, but also caters to many Namibians" fascination with the living things of the sea.

- The exposure of thousands of Namibians to the wonders, dangers and problems of the sea could be accomplished through the creation of television documentaries and new media coverage of marine topics, with respect to the Namibian marine environment. This could be most influential in the development of knowledge levels on marine issues for the Namibian public at large.

- Informal approaches to marine environmental education could cater to many Namibians" ideal of lifelong learning. The elements for successful lifelong learning strategies are many, but Namibians could benefit from some types, such as, directed reading of marine materials, and from random input of marine materials through, for example, the television.

- The exposure of all Namibians to marine issues is important, because the general populace needs basic knowledge about their marine environment to make informed electoral and consumer decisions regarding alternative forms of sea fisheries.

6.3 EDUCATION FOR "RESPONSIBLE FISHING"

There has been an attempt to promote "Responsible Fishing" internationally (Chapter 4), though much of the thinking behind these guidelines for "Responsible Fishing" reflects the values of sustainable fisheries.

The realisation of the problems facing the fishing industry world-wide has resulted in a global and integrated approach to fishing issues, namely "Responsible Fishing". Education for "Responsible Fishing" is thus important, but it should not only create an awareness of the global crisis (Thomson, 1994), but should place it at the heart of the curriculum. Education for "Responsible Fishing" should be "ecological" and "environmental", encouraging broad holistic thinking, teaching the need for behavioural and attitudinal change towards the marine environment (Chapter 5).

Education for "Responsible Fishing" should not only change the behaviour and attitudes of fishers or the general public at large, but should alert individuals to the feasibilities of alternative sustainable fisheries practices. More important, it should not only inform fishers and other stakeholders about sustainable fisheries practices, but allow them to participate in the processes that promote change (Belgrade, 1975; Tbilisi, 1977). Education for "Responsible Fishing" should not only teach fishermen and other stakeholders about holism but require them to think holistically.

It should also not only aquaint fishers and other stakeholders with others' visions, but stimulate them to formulate their own.

Fishers and other stakeholders should be encouraged to debate and negotiate the guidelines for "Responsible Fishing" with a view to reducing wastes, protecting endangered species, reducing pollution from fishing, and improving fishing gear efficiency and selectivity. Fishers and others should be encouraged to explore the United Nations Convention on the Law of the Sea (UNCLOS, 1982) in order to understand the meaning and significance of these laws.

Education for "Responsible Fishing" should not only teach fishers and other stakeholders about empowerment, but should enable them to fulfill their aspirations by helping them develop their full range of abilities. This education should also initiate a process of lifelong learning and growth in awareness of knowledge which involves the Namibian marine environment.

An individual's readiness to participate in future marine education or education for "Responsible Fishing" programmes, at however lowly or rudimentary a level, will be more important than acquiring impressive qualifications in, for example, marine sciences, for as Freire (1972) pointed out we are all "unfinished" human beings with a commitment to improve "unfinished" reality. Therefore, marine educators and trainers should attempt to break down knowledge about "Responsible Fishing" to suite the various levels of literacy and qualifications of fishers and other stakeholders. Without the opportunity to develop the potential of fishers and others, it will happen that these individuals cannot participate fully in discussions and initiatives on which progress to sustainable fisheries depends.

Apart from the fact that fishers, at the Walvis Bay Maritime Institute and Luderitz Maritime Training Centre, undergo training at vocational level in elementary seamanship (which is also important for sustainable fisheries), it is necessary to introduce courses which are in step with the guidelines for "Responsible Fishing". Courses with themes and topics in the areas, such as:

- Bycatch and waste management;
- The inclusion of selective fishing practices that will reduce unnecessary mortality;
- The need for international co-operation;
- Maximum sustainable yields;

- Surveillance and enforcement;
- Protection of endangered marine species;
- Pollution from fishing;
- Participation of fishers in fisheries management;
- Ecological and socio-economic aspects;
- Fishing rights and fishing policy;
- Environmentalism and the fishing industry;
- The Law of the Sea (UNCLOS, 1982); and
- Food processing, food technology, and other disciplines of sea food.

These courses could be accompanied by a teacher or instructor reference guide (Instructor's Guide / Teacher's Guide) which provides background information on the various marine themes and topics chosen.

Too many Namibians have not had the benefit of good schooling (Namibia Brief, 1994), therefore many would not have the foundation to immediately take up some of the opportunities which education for 'Responsible Fishing" offer. Therefore, the Ministry of Fisheries and Marine Resources (MFMR) should take actions to bolster education development for fishers. Such actions should include the provision of bridging courses, where potential fishers could be provided with the opportunity to strengthen their basic education in subjects, such as, mathematics, science and technical skills and thus provide the platform for them to enter education for "Responsible Fishing" programmes.

Finally, properly resourced and directed education for "Responsible Fishing" would ensure that all fishers and other stakeholders become the beneficiaries of the care, concern and skills of others, whether this care comes from the Ministry of Fisheries and Marine Resources or from the financial assistance of countries with developed industries (which is also a principle of "Responsible Fishing").

6.4 EVALUATION OF THE STUDY

I have to admit that the topic chosen for this study caused me some hard thinking on how to draw its elements together.

When I looked at the heading of this research, namely "Key decision-makers' Perceptions of Sustainable Sea Fisheries in Namibia and the Implications for Environmental Education Programmes", I thought it might have been better for me if I had been either a marine resource manager or a fortune teller.

Having no special claim to fame in either of these specialisations however, in the course of my work as a curriculum developer for Biology [at the National Institute for Educational Development (NIED), Namibia.], I thought about two (2) reasons of conducting this research:

Firstly, I asked myself the following questions - which aspects of science should the science curriculum concentrate on? Should the emphasis be on the development of science - related fields, or the inculcation of attitudes.

Science, through its knowledge and techniques, has a major role to play in helping to find solutions for most of the social issues, such as, (marine) environmental issues, population growth, birth control, and waste disposal. These concerns ought to receive attention in science education. Educational institutions need to find ways to help learners and trainees recognise the connection of science to these issues and to understand the science necessary of dealing with them intelligently.

Secondly, I became aware of a lack of information about the marine environment in the Namibian education system. As the fishing industry of Namibia is a crucial area of the Namibian economy, this study will have relevance to broader curriculum issues in Namibia.

A limitation of the research was that not all stakeholders (more especially the fishermen and women) in the Sea Fisheries Industry of Namibia could be interviewed because of the short time frame of the study. The information aspect of the study was not completely achieved, given the broad nature of the concept of "Responsible Fishing".

Another major limitation of the study was the fact that the present education of fishers is still in its infancy in southern Africa and that the resources available pertaining to this topic are very limited.

The lack of relevant published literature on the sea fisheries sector of Namibia was a problem. On many occasions I had to use literature and documentation on, for example, forestry and agriculture in order to understand the concept of "sustainability" and its corollary, "sustainable development". The information gathered from these other disciplines was made applicable to fisheries.

The strength of the research design was that it was a learning experience for me, as I gained a number of research skills: compiling an interview schedule, conducting interviews, analysing and interpreting data, and organising and linking data to the context from which it emerged.

A limitation of the research design was that only interviews, field work, and document and literature analysis were used as data collection tools in this study. The intended workshop with some other decision-makers failed to take place because of their busy schedules. This workshop would enable me to get more perceptions on sustainable fisheries development from other decision-makers in the sea fisheries sector of Namibia.

6.5 CONCLUSION

The research process and its results indicated the need for a balanced and holistic approach in dealing with sustainable development in the Sea Fisheries Industry of Namibia. The key decision-makers in this fisheries sector acknowledged the need to protect the marine environment within the aim of sustainable development, and to strengthen marine environmental decision-making and policy formation through improving knowledge and understanding of marine environmental issues.

The key decision-makers clearly favour a socio-economic definition of sustainability - one that revolves around social and economic well-being for the present generation and retention of future options for our children.

However, this research has also indicated that if we wish to safeguard the future of fishing activities in the Sea Fisheries Industry of Namibia, we will all have to pull together and promote an early elaboration of the guidelines for "Responsible Fishing". The work which is now being done by the Food and Agriculture Organisation of the United Nations (FAO) will be of capital importance in this process. This is by no means an easy task, demanding sacrifice, challenge and awareness raising (education) at times. Sacrifice, because to achieve a rational exploitation of marine fish, to ensure that it will continue to be an source of income, employment and welfare for Namibians, and a

challenge, because to integrate this fishing activity into something that might possibly be the biggest challenge of the 21st century -- sustainable development.

As we move into a period of partnership and shared responsibility in the Sea Fisheries Industry of Namibia, the need to sensitise and educate fishers and other stakeholders has become acute. Recommendations given in this study for marine education in general are reasonable and necessary to establish a baseline for the future development of education programmes that will focus on sustainability in the Sea Fisheries Industry of Namibia. These recommendations amount to a major challenge to the Namibian Sea fisheries sector to find the resources to carry out the envisaged tasks.

Although the magnitude of the effort seems daunting, much of it is feasible, if there is the political will and individual initiative to proceed.

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Appendix 1

SOUTH AFRICAN ASSOCIATION FOR MARINE BIOLOGICAL RESEARCH

Incorporated Association not for gain -- Reg. No. 51/00002/08 • FR 06 600 993 0005

OCEANOGRAPHIC RESEARCH INSTITUTE, DURBAN

TELEPHONE : (031) 37-3536
FAX: (031) 37-2132

MARINE PARADE , DURBAN, 4001
P.O. Box 10712, MARINE PARADE, 4056
REPUBLIC OF SOUTH AFRICA

Our Ref.:

14th November 1997

Dear Ulrich,

As we discussed on the phone - here is a list of journals which may provide you with the information you require on fisheries education. At present fisheries education is still in its infancy in southern Africa. We can learn a great deal from overseas efforts in this field.

- NAGA: The ICLARM Quarterly Oct.'96, July '96.
- West Australia: Western Fisheries (West Australia's Journal of Fishing and Aquatic Environment)
- Oceanus 33. 1990
- EEASA Bulletin
- Australian Fisheries.
- FAO Fisheries Technical Paper.
- North American Fisheries Journal.

Regards,

Judy Mann-Lang.
SEA WORLD Education Centre Manager.

(P.S. I have also enclosed a copy of our activity list -- to give you an idea of the type of activities we run.)

THE SEA WORLD EDUCATION CENTRE

SYNOPSIS

BACKGROUND

The SEA WORLD Education Centre, the education wing of the South African Association for Marine Biological Research, uses the facilities of SEA WORLD, the Aquarium and Dolphinarium, and the expertise of the Oceanographic Research Institute, to encourage marine awareness in a wide range of audiences.

EDUCATION AT SEA WORLD

The Centre is a dynamic, people-centred unit, dedicated to the advancement of marine awareness amongst all communities in southem Africa. The Centre is staffed by three permanent staff members ably assisted by a group of 30 volunteer guides, trained in basic marine biology and education.

The activities of the Education Centre can be broadly divided on the basis of the target audiences, such as:

- Teachers and Scholars;
- Specific Adult Groups; and
- The General Public.

Each of these is then subdivided into more specific groups for which appropriate techniques for the dissemination of marine information have been designed, as illustrated below.

TEACHERS AND SCHOLARS

- School Visits:

The target audience for many of the activities of the Education Centre are scholars. On average 50 000 - 80 000 children visit SEA WORLD each year on educational excursions. A booklet entitled *"A teacher's guide to the aquarium"* has been developed and produced to help teachers interpret the displays in the aquarium and dolphinarium. A number of *syllabus based worksheets,* designed for specific age groups, have also been developed to assist scholars in understanding the marine environment. Specially designed *Marine Workshops for Teachers* are also available, to assist teachers' understanding and teaching of the marine environment, particularly with respect to "hard to teach" topics, such as, population dynamics.

- Guided Tours:

About 12 000 scholars are booked on guided tours each year. This labour intensive educational activity is not offered at many other zoos or aquaria, but is an excellent tool to ensure that each child learns more about the marine environment in a personal manner. Each guide takes a group of 8 to 12 children through the aquarium and discusses with them details conceming the biology, ecology and conservation of the various marine animals.

- Field Outings:

Marine education also takes place during field based trips. An average of 1 200 children are guided, in small groups, through a Rocky Shore and a Mangrove ecosystem, annually. This enables children, particularly those from inland regions, to experience 'hands-on' environmental education in the field.

- Behind-the-scenes-tours:

In order to gain a greater understanding of the activities of SEA WORLD, popular Behind-the-scenes- tours are held regularly. These tours enable school groups to learn more about such diverse subjects as fish culture and care, marine mammal rehabilitation, water purification and art and display techniques.

- Marine Life Courses:

The SEA WORLD Education Centre offers intensive one and two day Marine Life Courses to senior primary scholars. Until recently, three and four day courses were also held, however, in order to ensure that as many children as possible are exposed to the marine environment, the longer courses have been discontinued. During the courses the scholars receive a very comprehensive introduction to marine biology and conservation. Activities ranging from guided aquarium tours and dissections, through to art work and drama, quizzes and worksheets make up these popular courses. Each year about 1 300 senior primary scholars attend Marine Life Courses at SEA WORLD.

- Senior School Workshops:

Our new senior school biology syllabus based workshops have proved to be very popular. The courses assist pupils in understanding the real life applications of some of the more difficult sections of their biology syllabus. Three workshops are offered:

- Population Dynamics;
- Invertebrate Biology; and
- Ecology.

The workshops not only look at the theoretical aspects of these subjects, but also focus on their practical application and relevance.

- Holiday Workshops:

Each year, during the school holidays, over 500 children attend our popular one day Holiday Workshops. We offer seven different Holiday Workshops:

- 'Sharks and Dolphins';
- 'Fascinating Fish';
- 'Marine Careers';
- 'SEA WORLD Art';
- 'SEA WORLD Drama';
- 'Life on a Coral Reef'; and
- 'Creepy Crawly Fun'.

The aim of these workshops is to introduce the children to the marine environment in a fun-filled and relaxed atmosphere. The workshop on Marine Careers provides aspirant marine scientists with an idea of some of the realities surrounding a career in marine science.

- Conferences and Seminars:

The Education Centre is active in promoting the marine environment at many different teachers-conferences and -seminars. This ensures that teachers remain aware of current happenings in marine education at SEA WORLD.

- Outreach Programme:

The past structure of education in South Africa has denied many thousands of children the opportunity to leam and explore in different environments. This has lead to the vast majority of South Africans being unaware of the marine environment or its importance and education potential.

SEA WORLD has recognised the need for greater marine awareness and has initiated an Outreach Programme. This programme, sponsored by various companies, has enabled thousands of children from the disadvantaged community to learn more about the marine environment in a unique and exciting setting. An important aspect of the Outreach Programme involves working with teachers towards upgrading their knowledge of the marine environment. This enables them to use the marine environment more effectively when teaching. Regular workshops ensure that a good working relationship has been built up between teachers, teacher-networks and SEA WORLD. A number of Zulu speaking Outreach assistants have undergone training in marine biology at SEA WORLD. These people work as part-time guides in the Outreach Programme.

SPECIFIC ADULT GROUPS

- Divers Workshops:

Environmental Workshops for SCUBA divers are also offered.
Three workshops:

- 'Shark Secret';
- 'Fascinating Reef Fish'; and
- 'The Invisible Reef' are available to divers who would like to improve their understanding of the marine environment and enrich their underwater experiences.

- Technikon Nature Conservation Students:

A course designed to teach second year Nature Conservation students more about fisheries management is now offered. The theory and practical application of fisheries management is dealt with in a thorough and concise manner. The assistance of scientists from the Oceanographic Research Institute ensures that this course is particularly relevant.

- Conservation Bodies:

A new range of courses have been designed to assist nature conservation officials in the understanding of basic fisheries science and management. The first of these courses have been run and have proved to be very successful.

- Church Groups:

Through the Outreach Programme a number of church groups have been introduced to information on the marine environment. Many of these groups have attended mini workshops at SEA WORLD and have expressed a great deal of interest in marine matters.

- Volunteers:

Much of the work of the SEA WORLD Education Centre is made possible through the assistance of a group of trained volunteers. These volunteers undergo a rigorous selection and training programme to ensure that they are qualified to assist in the many activities of the Centre. As this group of people are not full time employees of SEA WORLD, they are often active in the promotion of marine awareness outside the SEA WORLD complex.

- Learned Society:

The Education Centre ensures that much of the work done by the department is written up and published in the joumals or newsletters of relevant societies serving both environmental education and marine communities.

THE GENERAL PUBLIC

- Public Lectures:

Staff in the Education Centre are regularly asked to deliver talks on a wide range of marine subjects. Both size and composition of audiences vary widely ensuring that many people are introduced to the marine environment and conservation in this manner.

- Public Displays:

The Education Centre participates in regular EXPOS and other public display forums. This enables the general public to come into personal contact with preserved marine creatures, with the assistance of a trained marine educator. These displays have been found to be very effective in stimulating a greater awareness of the marine environment.

- Information Distribution:

A number of information fact sheets have been developed for use by the general public. These fact sheets are usually posted to interested people in response to requests for information. The Centre also endeavours to write and publish popular articles on marine matters for use by the general public.

The work of the Education Centre is multi-faceted -- from divers to children, teachers, and to the general public. Each group requires a different approach and focus. A great deal of time is expended on ensuring that the activities we offer, reach people from many sectors of society and enable a meaningful and relevant marine experience for all.

Produced by Judy Mann-Lang
Manager: SEA WORLD EDUCATION CENTRE
February 1997

Appendix 2

RHODES UNIVERSITY
DEPARTMENT OF EDUCATION
M.ED ENVIRONMENTAL EDUCATION
1997

QUESTIONNAIRE
(To H.D.E. Geography students at Rhodes)

THE PURPOSE OF THIS QUESTIONNAIRE IS TO DO A PRELIMINARY OUTLINE OF WHAT DO PEOPLE KNOW ABOUT FISHING IN SOUTHERN AFRICA, WITH SPECIFIC REFERENCE TO NAMIBIA.

YOU ARE KINDLY REQUESTED TO COMPLETE THIS QUESTIONNAIRE.

1. How well do you consider yourself to be informed about the Namibian Fishing Industry?

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2. What has either contributed to your knowledge about the Fishing Industry in Namibia or what has prevented you from knowing about this industry?

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3. Would you be able to teach a module on the Namibian Fishing Industry? **Yes / No**

4. If the answer to (3) is **'yes'**, please give concisive details of what you will concentrate on in your teaching?

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5. What do you consider to be the key problems that the Namibian Fishing Industry faces?

---

6. What do you consider to be the key strengths of the Namibian Fishing Industry?

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7. Why do you think people ought to know about the fishing industry in Southern Africa?

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8. What negative impact do you consider fishing to have on the environment?

---

9. What do you consider to be the causes for environmental problems in the fishing industry in Southern Africa?

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10. How would you suggest the environmental problems of the fishing industry in Southern Africa should be addressed?

Appendix 3

OBJECTIVES & POLICY STATEMENTS FOR THE NAMIBIAN FISHERIES SECTOR

OBJECTIVES	POLICIES TO ACHIEVE OBJECTIVES	STRATEGIES TO IMPLEMENT POLICIES
To ensure the sustainable utilisation of marine resources. To ensure that the development of industries based on Namibian marine resources contributes to the nation's overall economic and social development goals. To ensure the productive and employment potential based on long run sustainable growth. To ensure effectiveness, efficiency and economy of the services delivered by the Ministry.	Promotion of stock recovery to long run sustainable yield level through the conservation of marine resources and the protection of the Namibian EEZ. Control of illegal fishing and fishing practices. Encouragement of onshore processing. Namibianisation of the fishing industry. Training of qualified and competent personnel in the fishing industry and the MFMR. Conservation and protection of freshwater fish. Ensuring of fair returns from the fishing industry of Government revenue.	Set TAC at levels low enough to promote recovery of depleted stocks. Establish efficient and equitable forms based on fishing rights allocation, fishing quotas and vessel licensing. Strengthen research and training capacities. Build and strengthen fisheries surveillance capacities. Create conducive environment for investment in onshore processing. Generate increasing Government revenue by quota fees and related levies. Encourage joint-ventures between Namibian companies and foreign enterprises. Establish and strengthen fisheries infrastructures. Implement legislation on fresh water fisheries.

Source: Ministry of Fisheries and Marine Resources, Annual Report, 1995:15

Appendix 4

NAMIBIAN EXPLOITATION RIGHTS, QUOTAS

NAMIBIAN fisheries are managed in terms of the Sea Fisheries Act 1992. It provides, in section 14, for the granting of rights of exploitation to utilise marine resources and, in sections 15-21, for the allocation of quotas for particular species.

Subsection 43 (4) of the Act provides that, "Any person who, at the commencement of this Act, is the holder of a licence in respect of a vessel or factory licensed in accordance with the provisions of the Sea Fisheries Act 1973, shall, for the purposes of section 14 and any other relevant provision of this Act, be deemed to have been granted a right of exploitation under section 14 (4), valid until December 31 1993 or such later date as the minister may, by notice in the Gazette, determine as the expiry date of such right of exploitation".

With nine exceptions, all rights issued since the commencement of the Act were issued only for the period to December 31 1993. All but nine holders of exploitation rights had to apply for their rights to be renewed, and new applications were also invited for fishing rights.

The exceptions were nine rights for midwater trawl and wetfish hake that were granted in May 1993. These rights were extended.

After the granting of exploitation rights from January 1994, the government plans that no further rights will generally be issued for a period of five years. This position may be reviewed if there is an unexpected change in the availability of fish, if numbers of rights are terminated for any reason, if new fisheries develop, if there are major new proposals with outstanding benefits for Namibia, or similar factors.

Criteria for granting rights and quotas

According to section 14 (6) of the Act and section 2 (2) of the regulations, the following criteria are used when the government considers applications for exploitation rights and in the allocation of quotas:

- Whether or not the applicant is a Namibian citizen;
- Where the applicant is a company, whether or not the beneficial control of the company is vested in Namibian citizens;
- The beneficial ownership of any vessel which will be used by the applicant;
- The ability of the applicant to exercise the right of exploitation in a satisfactory manner;
- The advancement of persons in Namibia who were socially or educationally disadvantaged by discriminatory laws or practices prior to independence;
- Regional development within Namibia;
- Co-operation with other countries, especially those in the Southern African Development Community; and
- The conservation and economic development of marine resources.

Ownership of vessels

Except in specified fisheries, every applicant for a right of exploitation is required to show how there will be investment in vessels within three years of the date from which the right is valid.

The exceptions are sectors where the economic viability of fishing operations is such that some level of charter arrangements may be necessary in the medium term, such as the crab and tuna fisheries and midwater trawling for horse mackerel. Even in these cases, however, priority is given to applicants prepared to make investments in vessels and/or shore processing facilities.

Namibianisation and foreign ownership

Having for many years seen its fish stocks raped by a host of foreign trawlers whose owners contributed nothing to the country's welfare, Namibia has embarked on a policy aimed at securing increasing benefits for Namibia, especially through onshore development. This approach provides increased opportunities for Namibians to participate in fishing and related businesses, but it also provides scope for foreign investment through joint ventures or wholly-owned foreign ventures.

While priority is given to Namibians in accordance with the criteria listed above, there are opportunities for rights to be granted to joint ventures or wholly foreign owned ventures where the foreign investment is shown to contribute to economic and overall development in Namibia. In general, this requires that such ventures make contributions which are beyond the capacity of the existing Namibian fishery for which rights are being sought.

Foreign investors seeking to participate in fishing ventures are expected to co-operate with Namibian businesses through joint ventures Notwithstanding this policy, rights may be granted to wholly foreign owned ventures in exceptional cases where this would be beneficial to Namibia, and where there is an appropriate plan for Namibianisation of the business.

Moreover, in new joint venture applications for exploitation rights, the right is granted to the Namibian partner in the venture.

For existing joint ventures, priority is given to applications from the Namibian partners, taking into account the extent of ownership and control of the Namibian interests. Rights may be granted to existing joint venture rights holders, rather than to the Namibian partners, with the agreement of the Namibian partners where it can be shown that the joint venture business and Namibia will benefit.

Term of rights: ten years

Ten years' tenure of rights are granted to:

- Ventures at least 90% owned by Namibians with significant investment in vessels or onshore processing facilities. For this purpose, 50% ownership by the venture of a vessel or an operational onshore processing facility in the fishery, for which rights are granted, is regarded as sufficient for a significant investment. Ten-year rights may also be granted where Namibian rights holders own a smaller share in a larger venture;

- Ventures with more substantial foreign ownership which make or have the capacity to make a major contribution to economic and overall development of Namibia. For this purpose, employment of 500 Namibians onshore in activities related to the fishery for which rights are sought is regarded as sufficient for a major contribution.

Ten-year rights may be granted to smaller joint or wholly foreign-owned ventures which make an innovative contribution to the development of the fishing industry in Namibia, such as developing new products or new export markets, and where a longer term right is necessary to secure the investment involved.

Term of rights: seven years

Seven years' tenure of rights are granted to:

- All other majority Namibian-owned ventures having at least 50% ownership in vessels or an operational onshore processing facility in the fishery for which rights are sought;

- All other ventures with less than 51% Namibian ownership with onshore investments in the fishery for which rights are sought.

Term of rights: four years

Four years' tenure of rights are granted to:

- Majority Namibian owned ventures which do not have at least 50% ownership in vessels or operational onshore processing facilities in the fishery for which rights are sought, including ventures which only operate in the fishery by chartering vessels or other similar arrangements;

- Ventures with less than 51% Namibian ownership which do not have significant onshore investments in the fishery for which rights are sought.

Term of rights: general

Rights may be granted for shorter terms in particular circumstances, such as in the early stage of development of a new fishery.

Rights granted for four or seven years may be extended if the venture fulfills the criteria for longer term rights. For example, a four-year right granted to a wholly Namibian venture without any initial investment may be extended to ten years upon a significant investment in the fishery.

Rights may be terminated or downgraded if a venture no longer fulfills the criteria under which it was granted.

Available rights and performance

Rights are granted in the following fisheries: Crab, demersal hake (both demersal trawl and longline), demersal monk and sole, linefish, rock lobster, midwater trawl, small pelagic purse seine, tuna (longline, pole, line, purse seine), collection of aquatic plants, others which applicants may specify.

Any rights granted may be subject to performance conditions on matters such as investment and employment.

Vessel quota system

It is the intention to allocate quotas to individual boats in the crab, hake, horse mackerel, rock lobster and pilchard fisheries. The objective is to keep the capacity of the fishing fleets in Namibian waters in line with the medium-term availability of the resources for each fishery. This is necessary for the following reasons:

- To avoid the situation where rights holders introduce too many vessels, resulting in vessels being tied up unproductively for long periods of the year;
- To provide stable, year-round employment for crews and those employed in fish processing;
- To reduce the cost of fish supplied to onshore processing plants enabling Namibian value-added products to be more competitive in world markets, increasing the prospects of onshore employment growth;
- To increase the profitability of the industry and thus the capacity to invest, to train, to pay taxes and levies, and to pay higher wages;
- To reduce the tendency for vessel owners to fish illegally, to dump fish or to target on by-catches in order to keep their vessels producing when their quota is insufficient.

Quota allocations

Among comments on quota allocations, the policy document states:

- In addition to considering the criteria listed above, the Ministry of Fisheries & Marine Resources will evaluate any proposal involving the concentration of quotas for any fishery in any one venture against the need to maintain broad participation and competition within each sector of the industry;
- The ministry expects to licence only the number of vessels needed to catch the total allowable catch in each fishery in the medium term, and to allocate a large enough quota to each vessel so that it will be generally fully employed throughout the year;
- In cases where there is already excess capacity in the Namibian based fleet, such as in rock lobster, pelagic and demersal freezer vessels, initial allocations may be less than the full production capacity of the vessels with the expectation that they can be increased over time;
- Depending on tac levels and allocations to other rights holders, there may also not be allocations for all vessels already owned by some ventures granted longer term rights, and some vessels now owned by such ventures may not be allocated a quota for fishing from 1994;
- Ventures which are granted rights but which do not have investments in vessels will as far as possible be initially allocated quotas to at least fully employ one larger-scale vessel, or an equivalent number of smaller vessels. Such ventures are required to identify any vessels that they would initially charter and their fishing capacities. Where it is not possible to provide a large enough quota to meet this aim, (for example, it may not be possible in the hake freezer fishery because of the high capacity of large freezer trawlers), greater flexibility will be given to rights holders in chartering vessels, and the ministry will encourage arrangements to ensure full employment of chartered vessels.

Quota adjustments over time

Quotas allocated to rights holders will vary over time with fluctuations in the tac, changes in vessels in the fleet, and changes in allocations to existing vessels.

As growth in tacs or other circumstances allow, larger quotas may be provided to rights holders to allow for replacement of vessels by others of greater catching capacity or the introduction of additional vessels. They criteria for allocation to additional fishing opportunities will include those listed above.

Quota transfers

Quotas will not be able to be transferred permanently, except in association with the sale of a vessel and with the approval of the minister.

It is planned to allow rights holders to make one transfer annually of some amount from the annual quota of vessels which they cannot fully utilise to other vessels which they own or to other rights holders for use by their vessels. These transfers will be taken into account when subsequent quota allocations are made.

Effort limitation in non-quota fisheries

Fishing effort will continue to be regulated by measures such as limits on the number of vessels to be licenced in fisheries such as linefish and tuna where there are no limitations by quota. Such measures are necessary to prevent over-exploitation.

Source: Fishing Industry Handbook (1996), by Michael Stuttaford.

Appendix 5

NAMIBIA SCORES ON EFFECTIVE MANAGEMENT

By David Thomson, cited in Namibia Brief, 1994.

A recent lead in the *Economist* focused on the global mis-management of fishery resources. It highlighted stock destruction, over-capacity and excess effort in fishing fleets and the failure of most governments to address the problem adequately.

The cod stocks off Canada and the eastern USA have been reduced to such a low level that there are doubts about their recovery. Tuna resources in the Indo-Pacific are under severe pressure. The Peruvian anchovy is only now showing signs of recovery to previous levels after two decades of depressed stocks. In Europe, dumping of fish at sea is believed to be destroying the seed stock of over a million tons of edible fish every year. Shrimp trawlers in the Gulf of Mexico, Bay of Bengal and South China Sea are destroying two tons of fin fish for each ton of shrimp caught.

The *Economist* article castigated governments for their short-sightedness and lack of political will to take the necessary actions to protect and conserve fishery resources. It stated that a few developing countries were managing their fisheries wisely - in contract to most industrialised fishing states. And of all the fishing countries it mentioned Namibia as an example of wise and effective fishery management.

Namibia's success is in sharp contrast to the weak performance of the European Community, which operates a "common pond" of member states fishing grounds and has a common fishery policy. By general consensus of the industry and the scientific community in Europe, the EC regime has resulted in stock reduction and the impoverishment of fishing communities. It is generally forecast that current measures will not halt the resource development and will concentrate harvesting control in fewer hands thus undermining, if not destroying altogether, the economic viability of scores of small scale fishing communities.

As a result of recent articles in the United Kindgom's national press and international journals, the Namibia experience has excited interest from conservation groups, academic bodies and fish industry associations. Europe is beginning to realise that Africa can teach it some valuable lessons in fishery management.

Despite decades of rapacious over-fishing in years past, the government of Namibia has, in four short years since independence, established an effective fishery management regime. It has done so while pursuing three seemingly irreconcilable goals: resource conservation, industry profitability and expansion, and wider national and socio-economic benefits from fisheries.

Resource conservation has been achieved through three major measures: prevention of illegal fishing by foreign fleets, strict setting and control of quotas and establishment of conservative Total Allowable Catches. The industry has been promoted by provision of long term rights and encouragement of shore processing activities. Wider social and economic benefits have been targeted by bringing in new indigenous local fishing companies and using carrot and stick approaches to increase employment and promotion of Namibian nationals. The latter goal is supported by a massive effort to provide professional education and training facilities.

Fishing effort is controlled by strict enforcement of quota and license provisions and absolute prohibition on dumping of fish at sea. An army of over 300 fishery inspectors is involved in monitoring control and surveillance. Of these, 200 are "special inspectors" who go to sea with commercial fishing

vessels and monitor all fishing activities. A further 70 shore based inspectors are involved in monitoring landings and compiling statistics. There are 50 surveillance inspectors to man the patrol vessels and

aircraft which regularly survey the Exclusive Economic Zone, which extends 200 miles seaward from Namibia's coast.

Namibian fish exports to the EC

As a LomÇ Convention country, Namibia enjoys free access to European markets for its fish products. Europe is a lucrative market, particularly for hake and monkfish, but also potentially for canned pilchard. Spain is the major market for Namibian hake.

FAO Infofish reports that in 1991 the European Community imported 2,7 metric tons of fish and fish product. While the imports came from 140 countries, by far the bulk, 80 per cent came from only 20 countries. So it is likely that Namibia will be one of the ten major fish exporters to Europe.

On July 22, 1991 the EC passed council directive 91/493/EC which defines "health conditions for the production and placing on the market of fishery products". The legislation was designed to harmonise practises within the community, but it also applies to imports from third world countries with a common import system applied by all EC member states. In relation to imports a key word is *equivalence*.

Article 10 of the directive states that "provisions applied to imports of fishery products from third countries shall be at least equivalent to those governing the placing on the market of community products".

The legislation aims to promote a systematic preventive approach in quality assurance. The main technical characteristic of new inspection or quality control procedures is embodied in the HACCP concept-hazard analysis critical control points. Adoption of the HACCP concept by exporters to the EC greatly assists them in quality assurance. It compels better communication and understanding between the private sector (producers and importers), the regulatory agencies, the scientific community and the general public.

Other quality control codes and recommendations are found in the Codex Alimentarius codes of practise and product standards and in the ISO 900 series. While the EC directive does not insist on full compliance with the ISO 900, many people and institutions firmly believe that it is implied in the legislation.

Quality assurance is primarily an industry responsibility. It commences as soon as fish are caught and taken on board and continues through landing, processing, storage, transport, sale and consumption. Traceability is important with each carton or can of fish so that problems detected can be traced back to the factory, the processing line and the vessel involved.

Three steps would appear to be appropriate and urgent for Namibia's fishing industry which is overwhelmingly dependent on export markets. First the industry must agree on the standards and codes of practise it is to adhere to. These should be at least adequate or preferably more than adequate for the main export markets, including the EC. Secondly the industry should establish its own quality assurance enforcement or inspectorate body. The fact that only two ports are involved and all plants are in close proximity, means that a small team of trained inspectors could police the whole industry. Thirdly there should be a comprehensive and thorough training programme in all aspects of fish handling and quality control for staff at all levels in fish plants and on fishing vessels.

Some argue that membership of the South African Bureau of Standards negates any need for fish producers to take further action to ensure quality control. This view is short-sighted and naive as has been proven in Namibia's red meat industry. EC inspectors will soon visit Namibia. If plants are found to be substandard by EC rules or practises are less than equivalent, the damage of that negative report to national fish exports could be substantial and might take years to redress.

The author: *David Thomson is a director of Inter-Ed Ltd. and has worked in the fishing sector on an international basis for over 30 years. He has in that time assisted over forty different fishing nations.*

Appendix 6

NAMIBIAN LEVIES, FEES

IN the regulations governing quotas, the definitions of fishing craft operating in Namibian waters are:

- Namibian vessel: Registered in Namibia, permanently based in Namibian waters, flies the Namibian flag, at least 51% of its beneficial ownership is held by Namibian citizens, and its crew comprises at least 80% Namibians;
- Namibian-based vessel: Registered in Namibia, permanently based in Namibian waters, flies the Namibian flag, less than 51% of its beneficial ownership is held by Namibian citizens, and less than 80% of its crew are Namibians.
- Foreign vessel: Is neither a Namibian vessel nor a Namibian-based vessel.

To qualify for rebates for processing fish ashore, "processed on land" is defined as any process taking place within Namibian borders by which the fish landed is changed by removing the head or intestines or by filleting, mincing, trimming or individually wrapping the fish, or by drying and/or salting the fish.

Except for tuna and crab, fund levies in 1995 were unchanged since they were introduced in 1991. In 1995 the levy on tuna, which was previously N$1 per ton, was increased to N$50 per ton for tuna intended for the sashimi market, and to N$25 per ton for tuna caught by the pole and line method. A fund levy on crab was imposed during 1995.

Species	N$ per ton landed
Pilchard for human consumption	25
Pilchard for reduction to meal	10
Anchovy	10
Horse mackerel taken in purse seines	10
Other pelagic fish	10
Hake whole	18
Hake headed and gutted	25
Hake fillets	45
Kingklip	25
Monk	25
Sole	25
Horse mackerel taken in trawls	10
Rock lobster	125
Tuna sashimi	50
Tuna other	25
Crab	50

Fees are imposed on Namibian quotas. In the major fisheries they are payable whether or not the fish has been caught. They are calculated on the nominal (live) weight of the fish which must be verified and certified by a fisheries inspector.

Quota fees on hake, horse mackerel and pilchard are payable in four equal installments on March 15, May 15, July 15 and before December 31 of each year.

Quota fees on crab and tuna are payable within 30 days of each catch being verified and certified by a fisheries inspector.

In 1995, quota fees were:

Species, vessel category	**N$ per ton nominal mass**
Hake	
allocated to Namibian vessels	400
allocated to Namibian-based vessels	600
allocated to foreign vessels	800

A rebate of N$200 per ton of wet hake landed is applicable if the fish is processed on land.

Horse mackerel (excluding purse seine catches)	
allocated to Namibian vessels	31.30
allocated to Namibian-based vessels	46.90
allocated to foreign vessels	62.55

A rebate of N$15,65 per ton is applicable if the fish is landed in Namibia.

Pilchard	
allocated to Namibian vessels	100
allocated to Namibian-based vessels	150
used for reduction to fish meal	25
Tuna	
catches for the sashimi market	1 200
catches by Namibian vessels	200
catches by Namibian-based vessels	300
catches by foreign vessels	400

A rebate of N$100 per ton is applicable if the tuna is landed at Namibian ports and processed on land.

Red crab	
sections, legs, flake, claws or round	556
Spider (stone) crab	
sections, legs, flake, claws or round	225
Bycatches	
hake caught in midwater trawls directed at horse mackerel	1 200
Kingklip	2 400
Monk	2 000
Kabeljou	2 400
Steenbras	2 400

Quota transfers

The following fees are payable if a person replaces a fishing vessel and subsequently transfers a quota or a portion of a quota.

quota vessel	10
Namibian non-quota vessel	25
foreign vessel	50

Source: Fishing Industry Handbook (1996), by Michael Stuttaford.

Appendix 7

RHODES UNIVERSITY

EDUCATION DEPARTMENT

A STUDY ON KEY DECISION-MAKERS' PERCEPTIONS OF SUSTAINABLE SEA FISHERIES IN NAMIBIA AND THE IMPLICATIONS FOR ENVIRONMENTAL EDUCATION PROGRAMMES.

INTERVIEW SCHEDULE

SECTION A:

Introduction: Re - Interviewer

1. About myself
2. What I am going to ask?
3. Why I want to do this research?
4. How much time is available for me?
5. Permission for using a tape-recorder
6. Confidentiality

SECTION B:

Personal information of participant

1. Interview no. [ ]
2. Date [ ]
3. Institution [ ]
4. Town [ ]
5. Position of participant [ ]

SECTION C:

Actual interview

1. Can you please tell me about your involvement and role in the Sea Fisheries Industry of Namibia?

2. What are the strengths of this Fishing Industry as a whole?

3. What are the problems of this Fishing Industry?

4. With reference to the Sea Fisheries Industry of Namibia how do you define sustainability in principle?

5. Do you think that one can determine and maintain sustainable utilisation of fisheries resources?

6. To what extent do you think education can play a role in helping the idea of sustainability and what sort of role?

Appendix 8

FISHERY STATISTICS 1996
SUMMARY STATISTICAL REPORT,
MINISTRY OF FISHERIES AND MARINE RESOURCES, NAMIBIA

Landings (In Mt) of Major Species By Fishing Method, 1991 - 1996

Fishing method/major species	1991	1992	1993	1994	1995	1996
Purse Seine Fishery						
Pilchard	68,854	80,784	114,812	116,429	42,979	1,171
Anchovy	17,097	38,821	63,074	25,121	48,023	1,080
Red-Eye		1,663	5,090	1,378	1,934	20,656
Gobies		86	172	19	5	552
Horse Mackerel	83,156	115,874	73,520	33,495	51,240	90,984
Other	3,328	933	2,602	431	489	1,276
Sub Total	172,436	238,161	259,270	176,873	144,488	115,718
Bottom Trawling (Hake) Fishery						
Hake	53,164	85,176	102,692	102,076	119,753	117,863
Horse Mackerel	1,245	1,086	537	688	923	1,191
Sole	277	75	529	13	42	12
Monk	4,617	8,078	9,226	3,349	3,654	3,280
Kingklip	92	110	537	1,496	3,572	3,170
Other	1,108	1,114	832	1,881	3,069	3,727
Sub Total	60,503	95,640	114,353	109,502	131,012	129,242
Bottom Longlining						
Hake	2,971	2,322	4,229	5,338	6,779	7,322
Kingklip	303	185	210	130	195	423
Snoek	31	9	7	1	4	39
Other	65	128	19	108	46	154
Sub Total	3,371	2,643	4,465	5,577	7,025	7,937
Bottom Trawling (Monk & Sole)						

Sole	..	..	..	648	420	327
Monk	..	..	..	8,809	6,476	5,956
Hake	..	..	..	4,259	464	3,564
Kingklip	..	..	..	20	86	74
Squids	..	..	..	22	16	26
Other	..	..	..	33	78	108
Sub Total	..	..	..	13,791	10,541	10,055

Small Pelagic Midwater Trawling.						
Horse Mackerel	351,323	310,413	400,554	330,618	258,673	229,147
Hake	..	90	1,181	533	366	654
Gurnards	..	..	6	156	1	26
Pnaga & Reds	..	343	717	1,226	2,664	2,755
John Dory	..	3	1	1	3	0
Angelfish	..	73	62	39	20	19
Trawl Snoek	..	48	112	147	54	187
Other	..	428	47	457	58	300
Sub Total	351,323	311,398	402,680	333,177	261,838	233,088
Large Pelagic Longlining						
Albacore	..	..	144	196	167	1
Big-Eye	..	..	..	708	136	31
Yellowfin	..	..	..	33	19	3
Other	..	..	24	67	112	17
Sub Total			168	1,005	434	52
Large Pelagic Pole & Line						
Albacore	215	2,241	3,380	2,879	1,694	1,520
Big-Eye	..	..	..	43	216	32
Skipjack	..	..	..	5	27	1
Other	..	..	..	166	261	206
Sub Total	215	2,241	3,380	3,092	2,199	1,758
Hand Line						
Snoek	684	759	820	535	798	396
Kob	60	234	664	595	496	464
Barber	11	8	..	7	13	16
Other	3	1	6	35	130	53
Sub Total	758	1,001	1,490	1,171	1,438	929
Ring Net and Trap Fishing						

Rock Lobster*	375	133	136	134	224	251
Crab	2,676	2,790	3,190	3,598	2.008	1,709
Sub Total	3,051	2,922	3,326	3,732	2,232	1,960
Deep Sea/Experimental Trawl						
Orange Roughy	..	..	..	30	6,377	13,379
Oreo Dore	..	..	..	..	6	17
Alfonsino	..	..	..	..	909	1,805
Hake	..	..	..	23	12	59
Other	..	..	..	24	124	625
Sub Total				77	7,429	15,885
Total Landings	591,658	654,006	789,133	647,996	568,634	516,625

The figures for 1996 represents the 1995/1996 fishing season.
..These figures has not been recorded
.This represents zero figures
*The Rock Lobster fishing season runs across years.

MARINE PRODUCTS EXPORT VALUE ($ MILLION) ESTIMATES

Processed Fish Export	1994	1995	1996
Pelagic			
Canned Pilchard	417.6	379.7	
Fish Meal	37.8	54.7	84.6
Fish Oil	2.2	3.6	6.6
Total Pelagic Export	457.6	428.0	91.2
Mid-Water			
Fish Meal	20.8	18.3	27.3
Dried Horse Mackerel	2.9	7.0	8.1
Total Mid-Water Export	23.7	25.3	35.3
Other			
Canned Tuna	27.3	27.3	31.4
Seals	4.1	2.2	2.1
Seaweed		0.6	2.8
Total Other	31.3	29.5	33.5
Total Processed Fish Export Val	512.6	492.8	160.0
Unprocessed Fish Export			
Demersal			
Sea Frozen Hake	161.9	251.6	353.0
Wetfish Hake	184.1	239.6	275.9
Monk	59.6	50.8	53.5
Horse Mackerel	0.6	0.9	1.3
Other	12.6	22.4	27.4
Total Demersal Export	418.8	565.4	711.1
Mid-Water			
Frozen Horse Mackerel (Ex - Wal	197.7	165.4	186.8
Horse mackerel Frozen (By Roa	34.4	44.8	53.0
Hake	0.8	0.5	1.1
Other	3.0	4.2	5.7
Total Midwater Export	235.9	215.0	246.6

Deep Sea			
Orange Roughy	0.2	32.3	153.9
Alfonsino		2.4	12.5
Other	0.1	0.4	4.8
Total Deep sea Export	0.3	35.1	171.1

Tuna			
Pole & Line	18.6	13.2	12.1
Longline	20.1	8.7	1.2
Total Tuna Export	38.7	21.9	13.3
Crustaceans			
Crab	36.0	18.1	17.7
Rock Lobster	9.4	15.7	20.2
Total Crustaceans Export	45.3	33.8	37.9
Other			
Line Fish	4.2	5.0	3.3
Oysters	0.7	1.0	2.0
Guano	3.0	3.0	3.4
Total Other Export	7.9	9.0	8.7
Total Unprocessed Fish Export	746.8	880.1	1,188.8
Total Fish Export Value	1,259.5	1,372.9	1,348.8

NOTE: The Data for 1995 & 1996 are provisional estimates, subject to review on completion of the annual fisheries statistical surveys for those years.

SUMMARY OF ESTIMATED PRODUCTION VALUE ($ MILLION)

	1994	1995	1996
SUMMARY LANDED VALUE			
Pelagic	102.8	50.8	26.0
Demersal	339.9	462.5	593.3
Midwater	254.1	229.7	275.1
Deepwater	0.2	24.4	94.2
Tuna	38.7	21.9	13.3
Linefish	4.2	5.0	3.3
Crab	36.0	18.1	17.7
Rock Lobster	6.0	10.1	13.0
Other	8.3	9.0	11.9
TOTAL LANDED VALUE	**790.2**	**831.5**	**1,047.8**
SUMMARY FINAL VALUE			
Pelagic	470.8	452.8	93.9
Demersal	423.1	570.9	718.1
Midwater	266.3	249.5	293.0
Deepwater	0.3	35.1	171.1
Tuna	65.9	49.2	44.7
Linefish	4.2	5.0	3.3
Crab	36.0	18.1	17.7
Rock Lobster	9.4	15.7	20.2
Other	8.3	9.0	11.9
TOTAL FINAL VALUE	**1,284.3**	**1,405.3**	**1,373.9**

NOTE:
- Landed value refers to the product value at the time of landing.
- Final value is the value after value addition.
- The final value less the domestic consumption provides the estimated export value as indicated in the previous table.

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