THE IMPACT OF SUBSISTENCE FARMING AND INFORMAL SETTLEMENT ON DUKUDUKU FOREST AS A TOURIST RESOURCE.

BY

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A dissertation of limited scope submitted to the Faculty of Arts in partial fulfilment of the requirements for the course-work degree of Masters of Recreation and Tourism in the Centre for Recreation and Tourism at the University of Zululand

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DECLARATION

I declare that this research study: *The Impact of Subsistence Farming and Informal Settlement on Dukuduku Forest as a Tourist Resource,* except where specifically indicated to the contrary in the text, is my own work both in conception and execution. All the sources that have been used or quoted has been duly acknowledged by means of complete references.

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- (a) Vezobala Secondary School
- (b) Khiphinkunzi Primary School
- (c) Umzabalazo Primary School
- (d) Inkombane Primary School
- (e) KwaNyamazane Primary School

iv

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DEDICATION

This work is written and expressly dedicated to Nonhlanhla Poppy, my loving wife, who encouraged me to work all day long, and also to my children: Sinqobile, Celimpilo and Sibongakonke whose endless prayers have always carried me through all my endeavours.

ABSTRACT [

Dukuduku forest is one of the largest remaining stretches of coastal sand forest in South Africa. More than 10 000 illegal squatters have invaded the forest and chopped down the trees and undergrowth in the area. This has created many problems such as extinction of some plant and animal species. The cleared areas have become breeding grounds for mosquitoes, which in turn scares off the tourists from the area. The invasion of this indigenous forest has led to it being excluded from being part of St. Lucia Wetland Park, which has recently acquired the status of being a World heritage site.

Pursuant to problems associated with St Lucia Wetland Park and the neighbouring natural forest, the objectives of this study include the following:

- To discover the impact of subsistence farming and informal settlement on the Dukuduku Forest as a tourist resource.
- To identify activities the Dukuduku Forest dwellers are engaged in which may be a direct cause of the destruction of the natural forest. S
- To reveal forest management options that may be taken to save the natural forest from devastation.
- To distinguish tourism related benefits, which are associated with the Dukuduku Forest reserve.
- To indicate the extent to which the local community participates in the management of the forest.

The collection of data was achieved through the survey questionnaires and field observations in the study area. Residents of the forest and principals of five schools in the forest were interviewed. Person-to-person interviews were conducted with the resettlement project manager.

vii

The study revealed that more and more people still invade the forest. They include fugitives who have committed a number of illegal acts, refugees from violence-ridden areas, immigrants from Mozambique and many unemployed and homeless folk. Attempts to resettle the Dukuduku forest dwellers have so far not been a success, but the government is still trying to resolve the issue. Loosing Dukuduku natural forest will be a huge blow to South African tourism since the forest is a natural resource for leisure and an aesthetic potential to attract tourists.

TABLE OF CONTENTS

<u>CH</u> /	PTER		PAGE
APPROVAL		(ii)	
DECLARATION			(iii)
ACKNOWLEDGEMENTS			(iv)
DEDICATION			(vi)
ABS	TRACT	•	(vii)
	0 B 1 B 3		
1.	ORIEN	NTATION OF THE STUDY	
1.1	Introdu	uction	1
1.2	Statem	nent of the problem	2
1.3	Backg	round to the study	3
1.4	Aims o	of the study	4
1.5	Hypot	hesis	6
1.6	Delim	itation of the study	7
1.7	Defini	tion of terms	10
	1.7.1	Subsistence farming	10
	1.7.2	Natural forest	10
	1.7.3	Informal settlement	11
	1.7.4	Tourism	11
	1.7.5	Tourism resource	12
	1.7 .7	Eco-tourism	13
1.8	Metho	odology	14
	1.8.1	Sample design	15
	1.8.2	the instrument	15

1.8.3 Method of data collection

	1.8.4	Method of data analysis	16
1.8	Interna	l structure of the Dissertation	17
1.10	Conclu	ision	18
2.	THEO	RETICAL BACKGROUND	
2.1	Introdu	iction	19
2.2	The sig	20	
2.3	The us	es of forest resources	22
	2.3.1	Traditional uses	23
	2.3.2	Industrial uses of forest resources	25
	4	2.3.2.1 Wood production	25
÷		2.3.2.2 Fuel wood	26
	2.3.3	Non-consumptive use	28
2.4	The im	pact of farming on natural environment	28
	2.4.1	Deterioration in soil structure	29
	2.4.2	Loss of soil nutrients	30
	2.4.3	Extinction of plant and animal species	30
2.5	Defore	station	32
2.6	Measu	res to save the environment	34
	2.6.1	Grazing management on natural veld	34
	2.6.2	Utilisation of arable land	36
	-	2.6.2.1 Crop rotation	37
		2.6.2.2 Maintenance of soil humus	38
		2.6.2.3 Green manure	39
2.7	Environmental implications: a summary 40		
2.8	Conclu	40	

.

3.	DESCRIPTION OF THE STUDY AREA	
3.1	Introduction	43
3.2	Location of the study area	44
3.3	Physical features of the study area	45
3.4	The legal status of the study area	46
3.5	The history of the forest and its residents	48
3.6	Resettlement of Dukuduku residents	
3.7	Conclusion	
4.	ANALYSIS AND INTEPRETATION OF DATA	
4.1	Introduction	55
4.2	Restatement of objectives and hypotheses	55
4.3	Personal particulars of respondents	57
	4.3.1 Gender of respondents	57
	4.3.2 Age of respondents	58
	4.3.3 Marital status of respondents	59
	4.3.4 Respondents' place of birth	61
	4.3.5 Period of stay of respondents in the Dukuduku forest.	62
	4.3.6 Respondents' means of earning a living	63
	4.3.7 Place of employment of respondents	65
4.4	Farming activities	66
	4.4.1 Stock farming activities of respondents	67
	4.4.1.1 Cattle farming activities	68
	4.4.1.2 Reasons for rearing cattle	70
	4.4.2 Crop farming activities	71
4.5	Informal settlement at Dukuduku forest	73
	4.5.1 Type of building material used by respondents	74

•

	4.5.2	Tree usage by respondents	75
	4.5.3	Responses on natural environmental destruction	76
4.6	Touris	m-related activities	78
	4.6.1	Tourist visit awareness	78
	4.6.2	Future tourist attractions to Dukuduku forest	79
	4.6.3	Market for local produce	80
	4.6.4	Responses on relocation to a new area	82
4.6	Conch	usion	83
5.	СО	NCLUSION AND RECOMMENDATIONS	
5.1	Introd	uction	84
5.2	Conch	usion on subsistence farming activities	84
5.3	Conclu	usion on human settlement	86
5.4	Conch	usion on tourism-related activities	88
5.5	The in	npact of settlement on Dukuduku forest	90
5.6	Recommendations		92
5.7	Concl	usion	94
6.	BIBLI	IOGRAPHY	96
7.	APPE	NDICES	106
	Ap	pendix A: Questionnaire to Principals	
	Ap	pendix B: Questionnaire to Dukuduku Residents	
	Appendix C: Forest Farm		
	Ap	pendix D: Open space serving as a classroom	
	Ap	pendix E: Minutes of Dukuduku Committee	
	Ap	pendix F: Transmittal letter	

xii

.

FIGURES

<u>FIGI</u>	JRE DESCRIPTION	PAGE
4.1	Age of respondents in years	59
4.2	Marital status of respondents	60
4.3	Period of stay in years	62
4.4	Means of earning a living	63
4.5	Respondents' place of employment	65
4.6	Stock farming activities of respondents	68
4.7	Number of cattle owned by respondents	69
4.8	Crops cultivated by respondents	73
4.9	Building material used by respondents	75
4.10	Tree usage by respondents	76
4.11	Responses on whether human activities destroy environment	77
4.12	Reasons for future tourist visits to Dukuduku forest	80
4.13	Market for local products	81

۰.

23

-

TABLES

TABLE DESCRIPTION		PAGE
2.1	Uses of the forest resources	22
4.1	Gender of respondents	58
4.2	Birthplace of respondents	61
4.3	Farming activities of respondents	66
4.4	Reasons for rearing cattle	71
4.5	Cropping systems used by respondents	72
4.6	Responses regarding tourist visit awareness	79
4.7	Responses regarding relocation of Dukuduku residents	82

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ORIENTATION OF THE STUDY

1.1 INTRODUCTION

Wetlands and indigenous forests play a vital role in animal and plant life. Throughout the world, wetlands have long been recognised as key habitats for territorial and marine plants and animals. In South Africa the most commonly used term to describe a wetland is a 'vlei'. Together with allied terms such as 'marsh', 'bog' and 'swamp', 'vlei' denotes areas where the soil is waterlogged. Wetlands are not wastelands, particularly because they play a very important role in the lives of people and in the ecosystems generally. Some of these roles are water storage, stream flow regulation and drought relief, flood damage protection and provision of recreation opportunities. The well-known system of wetlands in South Africa is the Greater St Lucia Wetland Park, which has recently been declared. The investigation looks at the impact of subsistence farming and informal settlement at Dukuduku forest, which has been part of the Greater St Lucia Wetland Park.

The inhabitants of Dukuduku forest claim to have occupied the area since 1954. The then apartheid government is alleged to have forcefully removed these people from this magnificent forest, as a result the residents returned to their rightful land. The present government tried unsuccessfully to negotiate with the Dukuduku forest dwellers to relocate from the forest. The resistance came to light during the meeting between Dukuduku forest

residents and government officials. An old man with thirty-five children who claimed to have supported his family through farming in the forest gave an eloquent account of the community suffering at the hands of the former government (*Daily News*, 24 December, 1998).

In tourism, which is the world's largest industry, the physical environment takes centre stage. Tourism is a factor in the enhancement of the physical environment because it directly and indirectly promotes conservation, preservation as well as the protection of natural and socio-cultural environments. Dukuduku forest as a potential tourist resource can offer many tourism and recreation experiences. Tourist adventures may include amongst others the scenic beauty of the forest with its pristine wild character. Dukuduku forest is associated with a remarkable environmental heterogeneity and diversity of the natural biota. Natural tourism resources such as Dukuduku forest need protection from destruction; hence this study investigates the impact of subsistence and informal settlement on Dukuduku natural forest.

1.2 STATEMENT OF THE PROBLEM

Traditionally, natural forests and wetlands have been regarded as wastelands, that is, areas that are good-for-nothing except to be cleared for settlement or for agriculture. For example, many years ago the government encouraged wetlands such as the Umfolozi swamps to be drained and converted to other purposes considered more useful. An example of the wholesale drainage of wetlands for urban and industrial development was done on the outskirts of Durban, Pietermaritzburg and Richards Bay, which

were developed and subsidised by the government. The same fate had befallen the Dukuduku natural forest, which had been invaded by people previously removed from the eastern shores of St.Lucia. Dukuduku Forest therefore became a place for agriculture and other economic activities. This study investigates the impact of such farming and settlement activities on the Dukuduku Natural Forest, which was once a pristine wilderness.

1.3 BACKGROUND TO THE PROBLEM

Dukuduku Natural Forest is located within the Greater St.Lucia Wetland Park, which has been declared a World Heritage Site. Due to the nature of land use practices within the forest, it was excluded from receiving the status as the rest of the Greater St. Lucia Wetland Park. Dukuduku forest is a natural habitat for many plant and animal species that gives the area a unique character. Some of the elders who lived in Dukuduku forest were removed from the proposed mining site on the Eastern Shores in the mid 1950s. Around the 1980s some of these people got pressured yet again from the Government and conservation authorities to move out of the forest and settle somewhere else, in return for proper housing sites and a promise of the development of services and infrastructure. (Mail & Guardian, 22 March 1998). Those who agreed to move out of the forest were resettled in the area opposite their former settlement, on the northern side of the road to St. Lucia, in an area called Dukuduku 2 or Khayelisha. Those who refused to move out of the forest are the ones who are said to have "invaded" the forest. For subsistence, these people grow bananas and sweet potatoes and fish illegally in the St. Lucia estuary. In the process they clear and burn the indigenous trees of the forest. The concern for many people is the

devastation that occurs in the forest, which is part of the World Heritage Site. The concern is mainly on the rate of influx of people and the rapid rate of deforestation.

In an attempt to address the problem and achieve a balance in its social obligations and protection of the natural environment, the government bought two farms to resettle the squatters (*Independent News*, 30 October 1998). Negotiations between the government and the settlers of Dukuduku forest had not had many successes, as the obstacles seem to revolve around alleged intimidation among the forest dwellers themselves. Some who are willing to resettle out of the forest were threatened and intimidated by those who do not want to move.

The then Minister of Forestry and Water Affairs, Kader Asmal made it clear that Dukuduku residents had occupied the forest illegally, therefore they should move out of the forest. Soon thereafter the Minister issued a statement called the Dukuduku Declaration, which emphasised the illegal occupation of Dukuduku Forest. Despite the call by the Minister to vacate, Dukuduku residents cemented their stay by establishing schools in the forest, four primary schools and one secondary school.

In view of the above brief historical background the researcher decided to investigate the impact of subsistence farming and informal settlement on Dukuduku forest as a tourist resource.

1.4 AIMS OF THE STUDY

A lot of disagreement and confusion has arisen among the public regarding the issue of human settlements in the Dukuduku forest. Two camps have since come into being: one that emphasizes social and human needs, which favours settlements and farming above the need to preserve and protect the natural environment, and the other whose wishes are that the forest be preserved for conservation and tourism. In an attempt to look for a possibility of a compromise between the two positions as well as propose new solutions to the existing problems, this study therefore seeks:

- To discover the impact of subsistence farming and informal settlement on the Dukuduku forest as a potential tourist resource;
- To identify the activities the Dukuduku Forest dwellers are engaged in which may be a direct cause of the destruction of the forest;
- To reveal forest management options that may be taken to save the natural forest from devastation;
- To distinguish tourism related benefits, which are associated with the Dukuduku Forest reserve;
- To indicate the extent to which the local community participates in the management of the forest.

Conclusions, generalisations and recommendations made on the study were tested against the objectives and hypotheses postulated for the study in the forthcoming chapters.

Since Dukuduku forest is one of the few pristine natural areas in the world, it can provide a great experience to tourists especially those who seek

emotional satisfaction and solitude in serene surroundings. A survey commissioned by the Democratic Party in 1998 estimated that there are more than 5400 informal structures in the forest. An estimated population was between 22000 and 27000: from four to five people per dwelling (*Independent Newspaper*, 30 October 1998). The current rate of influx of people to the Dukuduku forest is alarming and this seems to lead to a seemingly rapid rate of deforestation.

This study gives a bird's eye view of the complexity of the Dukuduku issue. It also shows that there is a great need to find a quick solution to the problems posed by the human settlement in the forest. Failure to come to a solution will result in a heavy blow to the tourism industry, which seems to be booming around the area. The Democratic Party raised the same view when it lamented the fact that the forest might be totally destroyed within a very short space of time if the more than 20000 squatters in the forest are not moved.

1.5 HYPOTHESES

Any empirical research becomes valid if educated guesses are tested and proven true or rejected. This study also has educated guesses, some of which will be proven correct or rejected; therefore the study seeks to describe the complex situation at Dukuduku Forest. The study attempts to find ways of reversing the extent of damage that might have already occurred in this natural forest. The following hypotheses are postulated in the study:

- Hypothesis 1: That subsistence farming and settlement have a negative impact on Dukuduku Forest as a tourist resource.
- Hypothesis 2: That residents and subsistence activities of Dukuduku Forest dwellers are a direct cause of the destruction of the natural forest.
- Hypothesis 3: That the introduction of good forest management systems will result in saving the forest from devastation.
- Hypothesis 4: That the Dukuduku Forest residents are not aware of the tourism related benefits associated with the forest resource.
- Hypothesis 5: That the local community does not participate in the management of the forest reserve.
- Hypothesis 6: That the authorities responsible for managing Dukuduku
 Forest do not have adequate and sound forest management policies.

The above hypotheses as educated guesses will be either accepted or rejected on the basis of the findings of the study. This will of course be achieved by relating the findings to both the objectives and hypotheses of the study.

1.6 DELIMITATION OF THE STUDY AREA

This study is geographically limited to the Dukuduku natural forest in the northeastern coast of KwaZulu-Natal. The study area lies on the east of Monzi, west of St. Lucia Estuary. The south and north boundaries are the Umfolozi River and Road R618 respectively. The study area is geographically located at 28.44 degrees south and 32.25 degrees east longitude. Dukuduku Forest is about three kilometres west of St. Lucia and

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twenty kilometres east of Mtubatuba, approximately 300 kilometres from the Durban Metropolitan area and 89 kilometres from Richards Bay.

In the east of the study area lays the town of St.Lucia, which, attracts thousands of tourist annually. The study area is adjacent to the famous Hluhluwe-Umfolozi Game Park. Dukuduku Forest is about 200 kilometres from the Mpumalanga Province and not very far from the Swaziland and Mozambique borders.

Dukuduku Forest is an indigenous forest and supposed to be a protected area by law. Figure 1.1 on the next page is a map, which shows the location of Dukuduku Forest and its environs. The prominent features on the map are the town of St. Lucia, Monzi private farms, the provincial road between Mtubatuba town and St. Lucia, Umfolozi River and Dukuduku Forest.

St.Lucia is the town nearest to the Dukuduku Forest, and boast of many tourism attractions such as accommodation facilities. Accommodation facilities available at St.Lucia include hotels, motels, inns, chalets, bed and breakfast facilities, camping and caravanning. St.Lucia boasts of its natural lake with lots of crocodiles and hippopotami. Other recreation facilities include water-based activities such as canoeing and ski boating.

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1.7 DEFINITION OF TERMS

To avoid misinterpretation and misconception of certain terms, it is necessary to define the terms, which will be used throughout the study. Possible terms to be defined are subsistence farming, natural forest, tourism, tourism-resource, eco-tourism and informal settlement.

1.7.1 Subsistence farming

Subsistence farming or agriculture, as defined by Webster (1999: 66) refers to a system of farming designed to provide all or essentially all the goods required by the farm family, usually without any significant surplus for sale. It is farming or a system of farming that produces a minimum and ofteninadequate return to the farm operator. This definition fits well with the type of farming that takes place at the Dukuduku natural forest. Farming practiced by Dukuduku residents provides them with enough to eat and an insignificant surplus to sell to the market and to the tourists.

1.7.2 Natural Forest

A broad understanding of a natural forest is necessary since it is the object of this study. Webster (1999:81) defines a natural forest as "a dense growth of trees and an underbrush covering a large tract of land. It is an extensive plant community of shrubs and trees in all stages of growth and decay with a closed canopy which has the quality of self perpetuation and development into an ecological climax". In KwaZulu-Natal, examples of natural forests are Ngoye, Nkandla and Dukuduku forests. In simple terms, a natural forest



in this case means an indigenous forest. Dukuduku forest provides a habitat for many forest bound mammals and other forest faunal species. In Dukuduku forest, trees are a mixture of tropical climate. Best- developed strands may reach 30m in height. Characteristic species are strychmos, decusatta, S. grrraridii, hymenoeadia ulmoides, conthim mernne, scolopia, zeyhen, ekerbergia capensis and the liaries monathokaxis caffra, Dalbegia armata and uvaria cabbra. The area has a notable number of endemics species. Four regional endemic genera, the Branchychloa, ephippioarpa, helichrysopsis and inhamabanella, can all be found at the Dukuduku forest.

1.7.3 Informal settlement

Hindson & McCarthy (1994:97) define informal settlements as dense settlements, comprising of communities housed in self-constructed shelters under conditions of informal or traditional land tenure. Informal settlements are sometimes referred to as squatter settlements. In this study the concept will be used to mean haphazard settlements or crudely built shelters. Most houses of Dukuduku residents are temporary structures built of mud and timber and not well constructed.

1.7.4 Tourism

The definition of tourism is based on the worldview of various authors who reflect their own perceptions and interests (Pearce, 1987:68); (Ryel, 1990:77); (De van Minaar, 1992:63); (McIntosh et al, 1995:298); (Webster, 1999:44). The White Paper on Tourism (DEAT, 1996) defines tourism as all travels for whatever purpose, that result in one or more nights being often

away from home. The role of tourism on the socio-economic status of any country is enormous. Matheisen & Wall (1982:98) define tourism as a multifaceted phenomenon, which involves the movement to and a stay in destinations outside the normal place of residence. Other authors like Pearce (1987:17) views tourism as the relationships and phenomena arising out of the journeys and temporary stays of people travelling primarily for leisure and recreation purposes. The above definitions view tourism in terms of who is a tourist. Such definitions omit the fact that tourism is an industry, which provides goods and services but instead define the characteristics of the consumer actions.

In this study, tourism is viewed as an industry that responds to people's needs and of the impacts that both humans and industry have on the host's socio-cultural, economic and physical environment. The above definitions fit well in with what has been put on record by the White Paper on Tourism (1996), that tourism has the potential to achieve the objectives of the reconstruction and development programme. It is well noted that tourism creates opportunities for the small entrepreneur; promotes awareness and understanding among different cultures; breeds a unique informal sector; helps to save the environment; creates economic linkages with agriculture, light manufacturing and curios. Preserving the pristine nature of the Dukuduku forest will undoubtedly enhance tourism and promote development in the area.

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1.7.5 <u>Tourism-resource</u>

Fowler & Fowler (1991:1025) define a resource as the means available to achieve an end. Basically the concept resource refers to a natural or human - made element recognised as being able to satisfy cognised needs. It can be described only in terms of human needs and people's ability to use it (Mwandla, 2002:97).

The above definition implies that Dukuduku forest can be used as a means to attract tourists, in that the forest is a tourism resource since it has a potential to attract tourists. A tourism resource can be anything that an area has for the use and enjoyment of visitors. The basic elements of such resource can be air, climate, landforms, terrain, flora, fauna, bodies of water, beaches, natural beauty and many others. In this paper a tourism resource is defined as a feature, area, or facility, which can provide a constructive tourism activity.

1.7.6 <u>Eco-tourism</u>

The White Paper on Tourism (DEAT, 1996) defines eco-tourism as an environmentally and socially responsible travel to natural areas that promote conservation, has low impact and provides for beneficial socio-economic involvement of local people. McIntosh *et al.* (1995:445) define eco-tourism as responsible travel to natural areas that conserves the environment and sustains the well being of local people. Ryel (1990:102) defines eco-tourism as a purposeful travel to a natural habitat, to create an understanding of the cultural and natural history pertaining to that environment, emphasising care

not to alter the integrity of the eco-system while producing economic benefits to local people and governments that encourage the preservation of the inherent resources of the environment there and elsewhere.

The last two definitions have more or less common features such as: conservation of the environment, friendliness to the environment, respect of the culture of local people and socio-economic benefits to local people. Activities of tourists have a measurable negative impact on the environment especially if such activities are not monitored. In a natural forest like Dukuduku where a diversity of animal and plant life occurs, uncontrolled human settlement should not be allowed. The settlement and clearing of the forest is a direct intervention and interference of the humans in the ecosystem, which results in the extinction of some rare plants and animals.

McIntosh *et al.* (1995:598) describe eco-tourism by using many concepts such as nature tourism, environmental preservation and symbiotic development, sustainable tourism, soft tourism, and quality tourism. All the above concepts suggest sustainability of natural resources, which people enjoy. Since the occupation of Dukuduku forest is still continuing to take place, it is advisable that the inhabitants should be educated on how to sustain the forest and use it responsibly as a tourism resource.

1.8 METHODOLOGY

In any research investigation describing the method of acquiring, analysing and interpreting data is important for better understanding of empirical procedures followed. The research methods used when conducting this study include sample design, research instrument and data analysis.

1.8.1 Sample design

A sample of 120 parents of school going children was envisaged but only 100 were finally interviewed. Parents were selected because they were representatives of adults occupying the forest. Also interviewed were principals of schools in the Dukuduku forest area in order to determine whether the material obtained from the forest was used to build the schools in the area. Since these schools are in an area prohibited to human settlement, their development, particularly in physical infrastructure is severely curtailed. Mr. Jerry Mngomezulu, the resettlement officer from the Department of Forestry and Water Affairs, was also interviewed in order to get the government's view on the matter.

1.8.2 The instrument

Information from all respondents was obtained by using questionnaires that were administered person to person. Two types of questionnaires were formulated, one for Dukuduku residents and the other for principals of schools situated in the forest. Person to person interviews with certain individuals was also conducted.

1.8.3 Method of data collection

Because of the sensitivity of the forest issue five principals of schools within the forest were asked to conduct the interviews with residents who

came to attend school meetings as parents of learners and those parents living around the schools. Information from residents was obtained through questionnaires by five principals of schools situated in the Dukuduku Forest (Appendix B). Information regarding schools was collected from principals through a short questionnaire (Appendix A). Information from the Department of Forestry and Water Affairs was obtained through person- toperson interviews.

Questions in the Dukuduku dwellers' questionnaire were mostly closedended. Very few were open-ended questions. This was done in order to facilitate objectivity and avoid ambiguous answers. All questionnaires were written in English, as the principals who conducted interviews were able to give Zulu translation whenever the need arose. Field observation was undertaken in order to obtain primary evidence. During field observation photographs were taken.

1.8.4 Method of data analysis

Data analysis was accomplished by utilizing the Statistical Package for Social Science (SPSS) computer programme. This programme was used to generate frequency tables and graphs, and is available within the Centre for Recreation and Tourism at the University of Zululand. Responses on each questionnaire were assigned numbers, which tallied with questions, and then coded into the computer programme, which generated frequencies of each response in the form of a printout. The frequencies of responses for each question made it possible for the formulation of graphs and tables. Graphs and tables formulated from this process made analysis and interpretation of

data collected possible. Field observation and interviews were also utilised in the analysis and interpretation of data. Most importantly data was presented in the form of graphs, which are then discussed and explained using qualitative and secondary data.

1.9 INTERNAL STRUCTURE OF THE DISSERTATION

The broad structure of this dissertation is modeled in such a way that it addresses the conceptual sources of data and the empirical presentation of information. Chapter one of this study is a prelude presenting the problem scenario against which the study was conducted. It provides the aims and specific objectives and hypotheses, definitions and significance of the study. It also outlines the methodology followed in conducting this research.

Chapter two gives a review of literature pertaining to related aspects of tourism associated with Dukuduku Forest. For this study great emphasis is placed on the tourism components of Dukuduku Forest as a tourist resource. It also reviews the impact of subsistence farming and informal settlement on Dukuduku Forest as a tourist resource.

Chapter three is a bridging point in the dissertation where theoretical work in the dissertation is combined with some empirical investigation on the ground, the actual physical setting of the study area.

Chapter four is the empirical core of the study, engaging in the analysis and interpretation of data collected. In this section answers to research questions and research objectives are provided.

Chapter five is the final section, which summarises, concludes and makes recommendations on the information collected, analysed and interpreted. This chapter also attempts to make generalisations on some of the findings, as well as propose a way forward for research in this area of study.

1.10 CONCLUSION

The discussion in this chapter aimed at revealing the impact of the human settlement and the destruction of the indigenous forest at Dukuduku Forest by human activities. The discussion also attempted to provide critical overview of the reasons behind the Dukuduku residents' resistance to resettlement. The next chapter will provide an overview of relevant literature on the subject.

CHAPTER 2

THEORETICAL BACKGROUND

2.1 INTRODUCTION

The White Paper on Development and Promotion of Tourism (DEAT, 1996) commits this country to mandatory responsible environmental practices in ecological sensitive areas such as coastal zones, natural forests, river catchments and wetlands. Human impacts on the Dukuduku Forest have increased in such a way that the forest has been seriously and adversely exploited and cleared. Cropland has increased in extent and its use has intensified. Increased domestic livestock and grazing pressures have devastated the once magnificent scenery. As human activities exert increasing pressures on the Dukuduku vegetation, biological diversity declines, habitats are transformed and some species dwindle to the point of extinction (Mather & Chapman, 1995:32).

The ongoing damage to the Dukuduku Forest Estate has prompted the government to decide to relocate Dukuduku people to two farms, adjacent to the forest. The occupation of the forest by illegal invaders and the consequential deforestation that takes place does not only affect the plants and trees but also affects the animals and insects in the forest. This is unfortunate because until recently Dukuduku Forest has been regarded as the largest and the best-preserved remnant of the lowland coastal forests in South Africa. According to the Department of Water Affairs and Forestry (1999), this forest is of inestimable value as some of its fauna and flora, including the gaboon adder, found only at

Dukuduku Forest, are on the list of endangered or species threatened with extinction.

Tourism, South Africa's potential economic booster will definitely be negatively affected if such destructive activities occuring at the Dukuduku Forest are not controlled. South Africa is one of the African countries endowed with impressive scenery and unspoiled wilderness areas such as the Dukuduku forest, which has the potential of attracting many tourists to this country. This chapter discusses the theoretical background of the impact of human activities such as farming and settlement on this potential tourist resource. A brief discussion of the general uses of forest resources will be discussed but some of these uses will be specific to the Dukuduku Forest. How these uses impact on the forest as a tourist resource will also be looked at.

2.2 THE SIGNIFICANCE OF DUKUDUKU FOREST

Dukuduku Forest is one of the largest South African natural lowland forests. According to a term paper written by a University of Westville student (1999), this forest constitutes more than 40% of the province's coastal forests. To Porter & Blackmore (1998:106) Dukuduku Forest is an outstanding example of the few possibly remaining, coastal subtropical areas. It has a mix of subtropical climax plant communities, which provide habitat for many forest birds, mammals and other forest faunal species. From a nature conservationist's perspective, Dukuduku Forest is irreplaceable. It is an accepted fact that should Dukuduku Forest be destroyed, it will have a devastating effect on tourism in the area. St Lucia, of which Dukuduku Forest is a part, is the core of an ambitious development project known as the Lubombo Spatial Development Initiative that
is said to be the largest of its kind in the region (*Sunday Times*, 21 November 1999). The Lubombo Spatial Development Initiative project would bring together Mozambique, South Africa and Swaziland in an effort to build a tourism and agricultural belt along their common borders.

The Lubombo Spatial Development Initiative seeks to identify economic opportunities in an area of stunning, unspoiled coastlines, game reserves and rich cultural traditions. Dukuduku Forest, according to the *Sunday Times* (21 November, 1999) is a core element of the World Heritage site nomination, which has put the region in the league of just over 100 natural habitats around the globe, amongst which is the Grand Canyon in the U.S.A.

The land use at Dukuduku Forest is nature conservation together with naturebased tourism. Porter & Blackmore (1998:136) point out that Dukuduku Forest has been identified as a core node where anchor tourism development projects can be located. Porter & Blackmore (1998:139) emphasize that projects to be undertaken in the St. Lucia area are of critical importance for the generation of employment, the local economy and the social upliftment of rural people in the area. Projects will be undertaken as part of a strategy to alleviate poverty in the region and conserve the natural resource base. To ensure that decisions regarding land use are complementary and environmentally sustainable, an integrated planning and development process convened by KwaZulu-Natal Wildlife has been undertaken. As part of St. Lucia Wetland Park, Dukuduku Forest has a potential of serving as a recreation site for fishing, especially in the Umfolozi River and St. Lucia estuary. Dukuduku Forest can also promote educational and scientific studies since it is a habitat for endangered animal species, like the Dermochelys corlaced also known as leatherback turtle.

2.3 THE USES OF FOREST RESOURCES

A forest is a resource base from which a variety of useful goods and services may be obtained. The range and mixture of goods and services vary from place to place depending on the type of forest and its socio-economic setting. Mather & Chapman (1995:141) identify three categories of forest resource use as being the traditional use of minor products, industrial use and services. The table below represents these three categories of the uses of the forest:

TRADITIONAL USE AND MINOR PRODUCTS	INDUSTRIAL USE	SERVICE
Fodder, grazing, shifting	Saw logs	Soil conservation
Cultivation	Pulpwood	Water conservation
Food-fruit, seeds, nuts, honey	Fuel wood &	And watershed
Game	Charcoal	Protection
Medicines	Charcoal	Nature conservation
Fibres	Cork and	And bio-diversity
Gums, dyes, oils, waxes, and raisins	Turpentine	Recreation and
Building materials		Tourism
Wood for domestic use and furniture		

TABLE 2.1: USES OF FOREST RESOURCE

Source: Mather and Chapman (1995: 97)

The forest resource utility undergoes three stages, namely: pre-industrial, industrial and post-industrial. According to Mather & Chapman (1995; 142), at the pre-industrial stage, a variety of products are obtained, including various

foodstuffs and fodder for livestock, medicinal products, wood for domestic utensils, timber for construction and wood for fuel. A pre-industrial use of a forest resource is usually associated with subsistence activities. Most of the above uses of the forest resource are typical of what happens at Dukuduku forest.

At the industrial stage the emphasis is on the production of timber for industrial purposes. At the post-industrial stage, the primacy of wood production weakens. Mather & Chapman (1995:146) see this stage as the stage of service provision. Services such as recreation and wildlife conservation become increasingly valued as an amenity resource and not just as a source of industrial raw materials. Dukuduku Forest provides nearly most of the categories of forests resource use.

2.3.1 <u>Traditional uses</u>

At this initial stage, the forest becomes useful in a variety of ways. It is a setting for shifting cultivation. It is also a source of medicinal products, alcohol beverages, berries, fruits, nuts, honey and game. At the Dukuduku Forest many activities for subsistence occur as some families and individuals living in the forest slash the forest for their social needs such as the building of structures, or shelters and growing different vegetables and fruit.

During forest clearing, the vegetation, soil and the whole ecosystem is disturbed. If properly managed the forest can be a source of useful medicines. Co-operation of all stakeholders in this respect is important in order to sustain the forest. Positive steps have been taken by the Nature Conservation Services

and *izinyanga* (traditional healers) from the region by establishing the Dukuduku Forest Medicinal Nursery.

The Dukuduku Forest Medicinal Nursery was formed in November 1996 at a meeting between the representative of the Nature Conservation Services, Mr. Leslie Walter and ten *izinyanga* (traditional healers) from Dukuduku. The aim of the meeting was to explain the project proposal to traditional healers. The proposal for a medicinal and indigenous nursery had been approved by the then Joint Services Board for funding. The Joint Services Board obtained its funding from a levy that was raised against St. Lucia business establishments. At that meeting it was decided to elect a new committee to manage the project. Nine members were elected. One office and four pergolas had to be built, three for the medicinal nursery, and one for *ncema* grass (Scientific Botanic name) storage. A bank account was opened and named the Amandla Ezinyanga Club. The main aim of the nursery was to plant trees for medicine and fruit. A list of plants identified for planting by *izinyanga* included the following:

- UMkhanyakude
- Isibhaha (pepperbark)
- Nukani
- Umzanelo
- Maguqu
- Abangqongqozi
- Umganu (*marsela*)
- Umgandankawu ((*haripephyllum*)
- Indlulamithemhlophe (*balannites*)
- Mkhuhlu (mahogany)

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Goba spikili

The indigenous nursery at Dukuduku is nothing else but a step forward towards eco-tourism. The presence of an indigenous nursery will enable the *izinyanga* to exploit the resource while preserving it at the same time. The indigenous nursery will not only save certain plant species from extinction but will also provide scientists and researchers from medicinal tourism with a laboratory from which to experiment. This initiative will go a long way to provide and secure ecotourism to Dukuduku Natural Forest.

2.3.2 Industrial uses of forest resource

A forest can industrially be exploited for various purposes such as saw logs, pulpwood, fuel wood, charcoal cork, and turpentine. For the purpose of this study wood production and fuel wood will be discussed.

2.3.2.1 Wood Production

Mather & Chapman (1995:153) state that growing stock of the world's forest is estimated at around 300 and 400 billion m³. Not all forests can supply the necessary wood as some are in remote and inaccessible areas protected for purposes of conservation.

According to a report on the Dukuduku community profile prepared by the Department of Water Affairs and Forestry in April 1999 a lucrative charcoal industry is thriving in the forest and is based on felling and burning of trees. However the continuous exploitation of the forest may result in a shortage of trees. Similar situations where forests have been exploited to the point of extinction have occurred in the world. An example is the biblical cedars of

Lebanon, which were exported throughout Palestine and the surrounding areas, and are now extinct (Mather & Chapman, 1995:158). Industrial use should not be practiced in a forest like Dukuduku.

The majority of people all over the world would like a forest such as Dukuduku to be conserved. If wood has to be obtained from Dukuduku Forest, a small portion of the forest may be put aside for such purpose. Wood collection in the forest thus calls for proper management. Mather & Chapman (1995:159) insist that the use of silvi-culture techniques have made it possible to produce more wood on a sustainable basis.

Other industrial uses of forest resources include wood for construction, wood panes, pulp and paper and construction timber for pit pops in the mining industry. Based on field observation and the community profile report on Dukuduku Forest, the only industrial use of the forest resource at Dukuduku is charcoal production.

2.3.2.2 Fuel wood

A great contrast exists between industrial wood and fuel wood in spatial patterns, types and wood and economic systems. According to Mather & Chapman (1995:160) fuel wood is produced normally in the developing world and from hard wood sources, whereas the production of industrial wood is largely from coniferous sources in the developed world. Most industrial wood is obtained through the market and most fuel wood in both developed and developing worlds has traditionally been obtained by self-collection. Storage of fuel wood occurs in some parts of the world. Mather & Chapman (1995:162) cite an example of the 1980's when more than 100 million people faced an acute

wood shortage in Asian and some Latin American countries. This was thought to be caused by the increasing demand, especially in urban areas, and the breakdown of traditional resource systems from free goods to a commercial commodity.

In most cases, especially in rural areas including the Dukuduku Forest, wood is a non-market commodity gathered locally. In urban areas it is a market commodity. In the Dukuduku Forest fuel wood is gathered from around the houses and from dead trees and branches. Grazing pastures that have increased, hindering natural regeneration of woodland especially in drier areas, cause a scarcity of fuel wood in most areas. Another reason for a shortage of wood is related to population growth and hence the growth in demand for fuel wood.

In most countries where supplies of fuel wood have been diminished, the problem has been addressed by the creation of commercially managed fuel wood plantations. Mather & Chapman (1995:164) cite an example of Addis Ababa and other Ethiopian cities where successes in establishing fuel wood plantations have been achieved. Fuel wood scarcity not only poses hardship on those depending on it, but also exacerbates other resource problems.

Usually when wood is scarce, cow dung is used instead of fuel, and hence become unavailable to fertilize cropland, and so land degradation and scarcity of food become more likely. Collection of fuel wood is one of the activities that have the potential to destroy and degrade Dukuduku Forest, which will result in the decline of its potential as a tourist resource.

2.3.3 Non consumptive use

Apart from yielding wood and other forest products the forest also fulfils other important service functions. These include environmental protection, protection of slopes and river catchments against soil erosion whilst wild life protection relates to the conservation of particular species and their habitants. Service functions of the forest resources also include various forms of recreation. These functions, which are provided by the forest resource, are very difficult to quantify in terms of areas and extent. An example is that of recreation which may be high intensity primary use in some areas of the forest but low intensity subsidiary use, requiring no management in other areas. Types of recreation activities provide by indigenous forests such as Dukuduku range from lowintensity hunting or hiking to high-intensity walking and picnicking (Department of Water Affairs and Forestry).

The main objective for the protection of the Dukuduku Forest should be the conservation of particular species, which are only found in this forest. Dukuduku Forest serves both service function and tourism function since it attracts many overseas tourists who visit St. Lucia Wetland Park.

2.4 THE IMPACT OF FARMING ON NATURAL ENVIRONMENT

Farming, whether crop or stock farming, for commercial purpose or subsistence has an enormous impact on the natural environment where it is being practiced. The major impact of farming is on the soil and its effects have been to reduce soil fertility and inhibit yields. Loss of organic matter from soil under continuous cultivation leads to reduced aggregate stability and increased risk of soil erosion. Changes on vegetation and landscape caused by the intensification of agriculture, reduce the scenic quality of the natural environment of Dukuduku forest.

2.4.1 <u>Deterioration in soil structure</u>

According to Steila (1976:28) soil structure implies the arrangement of soil particles into larger secondary units called peds. Soil structure is the result of many factors such as the chemical nature of clay, the amount of clay, organic material, the soil and the nature of microorganisms. Wetting and drying of the soil structure is important because it influences the texture of the soil which in turn influences infiltration of moisture, aeration, ability of plant roots to penetrate the soil nutrients supplies and soil resistance to soil erosion.

Compaction resulting from pressure exerted by the hooves of cattle directly reduces the infiltration capacity of the soil. Low infiltration results in high run off which affects the ecosystem of the area. Briggs & Courtney (1985:98) regard pasturelands as less vulnerable to compaction compared to arable lands because pasturelands have a relatively high potential for self-regeneration due to abundant and active soil fauna. Dukuduku Forest could be a sure candidate for soil structure deterioration if farming and settlement activities are not stopped or properly controlled. Deterioration of soil structure at Dukuduku Forest will render the forest a wasteland, incapable of attracting tourists. A well-preserved natural forest reserve goes a long way in sustaining various animal and plant species, which become the mainstay of ecotourism and natural recreation activities.

2.4.2 Loss of soil nutrients

Soil nutrients to plants are like food to humans. Shortage of food to humans leads to starvation and eventually to death and so is lack of soil nutrients to plants. Overgrazing and continuous cultivation of arable soil undoubtedly leads to the decline of soil nutrients. Within the natural system, the transfer of nutrients is from the soil to the vegetation and eventually to the livestock and from both back to the soil. Nutrients are crucial for the healthy growth of plants. Bayliss-Smith (1985:77) points out that mostly nutrients are returned to the soil through the decomposition of dead plant matter caused by bacteria and fungi. It is further mentioned that even in the forming of manure, soil nutrients are not easily replaced by the ecosystem if incorrect methods of farming and mismanagement of the grazing land are practiced (Steila, 1976:36).

Mismanagement of arable land and farmland causes the soil to be unproductive and useless. Mismanagement may lead to the extinction of indigenous plant species and to the invasion of alien species that totally destroy the once flourishing grazing or arable land. Therefore mismanagement of the Dukuduku veld and arable land will render the soil useless and this would affect the biodiversity that once flourished in this magnificent forest. Soil destruction at Dukuduku Forest will destroy the vegetation that makes Dukuduku Forest a natural beauty and tourist resource.

2.4.3 Extinction of plant and animal species

Extinction of certain grass species is directly or indirectly attributable to farming systems carried out on grazing and arable land. Overgrazing, for instance,

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destroys the natural grass and scrub cover over waste plains and mountains, exposing the soil to removal by wind or water. At Dukuduku Forest livestock is let loose to graze along the Umfolozi River without any supervision or monitoring, as a result overgrazing takes place. Direct removal of vegetation through deforestation had degraded some ancient forests to ragged covers of scrub, as previously quoted in a classic and well-documented example of the extinction of the legendary cedars of Lebanon. Deforestation on a large scale such as the one that occurred in Lebanon affects the habitat of various animal and plant species. Wild animals and small insects living in the forest loose their habitat when the vegetation is removed.

Mismanagement of the veld, arable lands and farmland totally destroys vegetation. Cordmington & Scott (1989:164) emphasize the very important point that the stock grazing and clearing of land, leave the soil bare and dry, exposing it to soil erosion. Fuggle & Rabie (1994:392) note that in South Africa every ecosystem has been modified or transformed by human activities and this has led to intensive degradation of plant resources. Grazing induced vegetation changes at Dukuduku Forest resulted in partial destruction of indigenous plant resources. McDonald *et al.* (1985:99) reveal that grazing in South Africa resulted in:

- Encroachment of Kara shrubs into the drier portion of the grassland biome.
- Reduction of grass cover in the Nama-Karoo Biome into Eastern Cape grass lands.
- Replacement of palatable grasses by unpalatable ones, throughout the grass biome.
- An increase in the density of trees in the savanna biome.

Invasion of cropland, grazing land and forests by alien species poses serious problems for certain areas in South Africa. Fuggle and Rabbie (1994) are of the opinion that 800 km² of the lowland biome of KwaZulu-Natal has been invaded by *chromolaema oderata*. *Optutumia spp* is another alien plant that has invaded extensive areas of arid savanna and dry areas in the Eastern Cape. Nama-Karoo and desert biomes in the Northern Cape and Namibia are invaded by *Prosopis spp, Nicotiana glanca* and *Datura spp*. Other transformations which pose a threat to indigenous plant life in South Africa are river impoundment, mining and transportation networks. Extinction of certain plant species leads to the extinction of other animal species. Once there is transformation on the environment the whole ecosystem is disturbed, resulting in natural resources such as Dukuduku Forest disappearing.

2.5 DEFORESTATION

Deforestation is sometimes associated with agricultural expansion. Most agricultural activities are geared not to feed local populations, but rather for providing exports to developed countries. Pressure to produce more beef for export has been the causal factor in the deforestation of the Amazon forest in Central America and Brazil (Kiley-Worthington, 1993:79). Activities of small-scale farming are considered to be the biggest single cause of deforestation. At Dukuduku forest patches where vegetation has been cleared for cultivation are cleared visible. Mather & Chapman (1995:199) mention that in Jamaica during the 1980's, peasant agriculture was identified as being responsible for about half of deforestation. In most areas in Asia and Africa commercial plantations of tree crop has replaced indigenous vegetation.

Human activities at Dukuduku forest seem to degrade the indigenous forest rapidly. Mather & Chapman (1995:201) view deforestation as caused by many factors such as the Malthusian view that population pressure is responsible. More and more human activities related to food production and the satisfaction of other human needs occur and that puts pressure on the environment, which is the foundation of all resources necessary to human survival or well being. Another cause of deforestation as suggested by Mather & Chapman (1995:202) is the advancement of capitalism and the modern debt crisis suffered by many developing countries.

Many forests are cleared for the production of cash crops, for an example: tea in Assam, rice in Burma and cotton around Bombay. The need to service national debt is to blame as it puts pressure on most third world countries to clear indigenous forests and natural vegetation for the production of cash crops. Mather & Chapman (1995:202) blame government policies as hastening deforestation by encouraging commercial farming. A suitable example is that of Brazil where the government has subsidized and encouraged the creation of cattle ranches and thereby encouraging deforestation. Deforestation, if it has to occur, should be properly controlled to avoid future environmental catastrophe. Deforestation at Dukuduku natural forest will not only destroy the resource as a tourist attraction, but will also jeopardise the status of the Greater St Lucia Wetland Park as a World Heritage Site.

2.6 MEASURES TO SAVE THE ENVIRONMENT

To prevent a total destruction of the environment, precautions are necessary to control human activities on environmentally sensitive areas such as Dukuduku Natural Forest. Stability of soil, vegetation and climate provide a conducive environment for plant and animal species to remain in existence. It is clear therefore that sound methods and practices of land use should be followed.

Grazing and cultivation are major human induced activities at Dukuduku Forest that need to be controlled and eventually discarded. The process of achieving success definitely involves on the one hand consideration of the methods of grazing management of a natural veld and on the other, the methods of arable land utilization.

2.6.1 Grazing management on natural veld

The problem usually associated with grazing management of the natural veld is the failure to maintain vegetation cover in a condition that will ensure maximum yield of palatable nutritious grazing from year to year without exposing the soil to erosion. To maintain the veld with its growth and vigor, regular rest periods are necessary. Ross (1963:38) confirms that no veld type can permanently withstand continuous grazing. Periodic resting should be allowed during critical growth periods of the most desired pasture species.

Another grazing management strategy is veld burning. Controlled veld burning pays off dividends to the yield by allowing fresh young grass to emerge. Veld burning as Ross (1963:41) puts it, should be restricted to a minimum, and carried out at the right time. The burning of the veld mountain catchments should be discouraged. Haphazard burning of highly vulnerable areas often leads to the drying up of local water sources. Ross (1963:42) points out that haphazard burning is usually the main cause of disastrous floods experienced

with increasing frequency along the lower reaches of rivers fed from such abused areas.

Apart from veld destruction through erosion and the drying up of the natural veld, a further problem is the encroachment of useless and noxious plants on grazing areas. Ross (1963:43) lists common invaders such as thorn bush (*acaccia spp*), prickly pear (*opunita spp*), jointed cactus (*opuntia aurantiaca*), silver wattle (*ocacia decurrens*), rhenoster bush (*elybopappus rhinocenotis*), and several others.

Invasion by alien species has led to a severe reduction of the carrying capacity of the veld. Another consequence of the invasion of such obnoxious plant species is heavy losses of livestock each year. Ross (1963:45) suggests that proper grazing management can control plants. Where encroachment is already dense, direct methods of mechanical, chemical or biological controls have been employed. As an addition to good grazing management of the veld, Ross (1963:47) suggests the provision of perennial trees and shrubs as a supplement to natural grazing. The spineless cactus (opuntia app) fodder quality is poor, It is an invaluable fodder, but the other perennial trees and shrubs are saltbushes (attriplex spp), mesquite (prospisjuliftose), honey locust (gledisia biecantios) and carob (ceratonia siqua); all of which bear heavy crops of highly nutritional pods that are eagerly eaten by animals. The extinction of plant species endemic to Dukuduku Natural Forest will result in the destruction of its biodiversity, which makes it one of the important tourist related resources. It should also be born in mind that the Dukuduku Natural Forest is part and parcel of the Greater St Lucia Wetland Park pristine environment, which has made St Lucia to become a highly preferred tourist destination.

2.6.2 Utilisation of arable land

As is the case in the grazing management of the natural veld, the problem with the cultivation of soil lies in the failure to maintain the soil in a condition of permanent stability. This implies that both productivity and resistance to soil is primarily dependent on its humus content. Healthy soil produces healthy crops and hence healthy animals and healthy human beings. The natural balance between the inflow and outflow of organic matter should be maintained at a constant high level. When land is first brought under cultivation it is normally highly productive and has a good resistance to erosion. Cultivation breaks the natural cycle of organic migration to and from the soil, which results in rapid destruction of the accumulated humus by oxidation.

Continued cultivation inevitably results in depletion of the humus content unless the replenishing of the organic matter supplies of the soil is carried out. The depletion of the humus content results in structural deterioration of the soil thereby exposing it to erosion. Another important agent of humus depletion in the soil is cultural operations. Ross (1963:54) cites the fact that cultivation disturbs the surface soil, consequently allowing the air to penetrate more rapidly and eventually exposing a fresh layer of soil to the action of wind, rain and sun. Problems of this nature can be overcome by good cropping practice and maintenance of the soil. Good cropping practice continuously keep an undercover of some sort. An adequate supply of humus guarantees the full nutrition of plants and production of healthy crops. There is a strong belief that crops grown on soils deficient in humus, are not only of inferior quality as a foodstuff, but also show an increased susceptibility to disease and also to attack by insect pests. To maintain soil in a condition of permanent stability, good cropping practice is necessary. The destruction of soil structure due to poor farming methods, which are practised by residents at Dukuduku Forest, destroys the natural set-up of the forest as a tourist resource.

2.6.2.1 Crop rotation

Crop rotation implies the growing of different crops in succession on the same land over a cycle of years. Crop rotation is the opposite of monoculture where the same crop is grown on the same land, year after year. Crop rotation provides the necessary resting period for the soil especially when soil-depleting cash crops are replaced with soil improving fodder crops.

Briggs & Courtney (1985:221) emphasize the role of break crops in pest and disease control. Break crops provide time for the host material in the soil to decompose before the next serial crop is planted, so that the cycle of disease is interrupted. Maize and other annual crops are depletive while perennial legumes are restorative crops. Crop rotation checks humus depletion and builds up the humus content of the soil (Briggs & Courtney, 1985:221). Dukuduku Forest residents practice monoculture (cultivation of a single crop), which tends to exhaust the soil and thus leads to extinction of some plant and animal species, which depend on the fertility of the soil for their survival. It therefore goes without saying that a well-managed agricultural environment helps to sustain not only the natural habitat, but also the animals and humans living within a sensitive forest area, which is regarded as a prime tourist attraction.

2.6.2.2. Maintenance of soil humus

Soil humus is very important since it provides nutrients for plants. Sources of humus according to Ross (1963:65) are plant and animal wastes, green manure and grass. Plant and animal wastes include both farm and urban wastes. Farm wastes consist mainly of dung and urine of animals, crop residues, weeds and old veld grass. Urban wastes include household garbage, sewage, market refuse and many others. As far as farm waste is concerned, untreated crop residues and kraal manure are ploughed directly into the soil. Dry, fibrous plant residues do not decompose readily in the soil except under favourable condition with moisture and high temperatures. Burning, burying and dumping are usually used to destroy vast quantities of urban waste. The return of the wastes, suitably processed, to the producing area would restore organic matter and contribute materially to the maintenance of soil productivity.

Losing humus from the soil tends to break the natural cycle and deprive the natural decomposers of their food on which they feed (Kiley-Worthington, 1993:115). Humus acts as a buffer for extremes in soil conditions, making heavy soils light and retaining moisture in light soils, as well as providing material for the decomposers to feed on.

The loss of humus undoubtedly leads to reduced fertility and decline in the natural balance. Kiley-Worthington (1993:115) warns that once the soil has become impoverished in this way it takes a long time for reconstruction to take place. Farming at Dukuduku forest seem undoubtedly to lead to the loss of soil nutrients as most subsistence farmers in the area lack advice or education regarding the maintenance of the soil. The change of soil structure at Dukuduku

Forest may attract alien plant species that will destroy it totally as a tourist resource.

2.6.2.3 Green manure

According to Ross (1963:66), green manure implies the growing of a crop, usually a legume, for the specific purpose of ploughing it under while it is still succulent enough to decompose readily, thereby enriching the soil in humus.

In South Africa, this practice has found favour in wheat production in the winter rainfall region. Where legumes are used, the soil is enriched with nitrogen. During the process of decomposition, the mineral nutrients taken up from the soil are set free again from the crops that follow. Another method of humus replacement is the grass lea. It is believed that the most efficient way of preventing humus depletion is by checking or retarding the osculation process. To Ross (1963) the only way of achieving this is by resting the soil from cultivation for a period of years under perennial crops, preferable a grass or grass legume mixture. Under grass cover, the tied up nutrients in the humus become available to plants.

Applying the new methods as discussed previously will undoubtedly ensure the natural and traditional replacement of the humus in the soil. Education regarding the use of green manure would be necessary if the Dukuduku residents are to continue occupying the forest. If this is not undertaken, the animal species living in the Dukuduku Forest may become extinct, consequently rendering the Dukuduku Forest useless as a tourist resource.

2.7 THE ENVIRONMENTAL IMPLICATIONS: A SUMMARY

Forest resource use has environmental implications with regard to its future productivity and usefulness. Many uses, whether traditional or industrial have strong environmental impacts. Logging, for instance, when carried out in clear felling mode, results in erosion of exposed ground and in turn impoverishes the soil within the affected area and cause silting down stream. In selective logging mode the removal of a few commercial valuable species can cause damage to other parts of the forest ecosystem. The spaces left by individual trees removed from the soil is taken up by less valuable species and the forest resource become less valuable. Replacement of indigenous trees by plantations in the Dukuduku Natural Forest has significant environmental effects and degrades the area as a tourist resource.

Ecological changes resulting from monoculture and ground preparations such as ploughing trigger episodes of accelerated erosion and silting. According to Mather & Chapman (1995:205), the effects associated with logging can be minimized by appropriate management techniques of the atmospheric concentration of green house gases such as carbon dioxide. Deforestation and combustion of fossil fuel is identified as the main cause of atmospheric concentration of green house gases.

To minimize atmospheric concentration of carbon dioxide, reforestation is seen as a practical means of overcoming climatic warming which is thought to result from atmospheric concentration of carbon dioxide. Destruction of Dukuduku Forest will be a disaster not only for plants and animals but also for the humans. The whole Dukuduku issue jeopardises the Greater St Lucia Wetland Park as the area that has been granted a World Heritage status. The Dukuduku Forest has all the potential for recreation and tourism; therefore the Dukuduku issue needs an urgent solution.

2.8 CONCLUSION

Nowadays, the economic value of wildlife and scenery in tourism and recreation is enormous, but unfortunately the impact of human activities on the environment is profound. It depreciates the forest resources and renders it a wasteland and a valueless tourist resource.

Three main aspects of biological diversity, that is, the ecosystem, species and genetic material are all lost through human activities on the environment. The immediate causes of such losses include the expansion of agriculture, forestry and over-cropping. The growth of human population and its requirements for food, wood and other resource products have also contributed significantly to the depletion of forest resources.

The case of Dukuduku Forest should therefore be a worrying concern for the government and conservationists since it is a national asset. Dukuduku Forest is both a natural and a tourism resource that need to be protected at all cost for generations to come. In this chapter it has been observed that this forest it is a habitat for many forest birds, mammals and other endangered plant and animal species, suitable for conservation and tourism. Dukuduku Forest serves other purposes such as a watershed, grazing, wood production and a source for

building material. To preserve this precious natural resource precautions should be taken to prevent the deterioration in soil structure, loss of nutrients. To achieve this proper management of the forest should the goal for all stakeholders, ranging from government, local authorities and all its residents.

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CHAPTER 3

DESCRIPTION OF THE STUDY AREA

3.1 INTRODUCTION

Dukuduku Forest is one of the largest South African coastal lowland natural forests covering an area of approximately 10 000 hectares. The Dukuduku forest stretches between Mtubatuba and St. Lucia estuary in Northern KwaZulu Natal. Sineke (1999:2) agrees that it is one of the best-preserved remnants of lowland coastal forests in Southern Africa. Apart from its significance as a natural forest, it is also an ecotourism resource. However, the past few years thousands of people have "invaded" the Dukuduku Forest and are destroying its vegetation.

The conservationists, government and other community organisations are very concerned about the current deteriorating state of Dukuduku Forest. The daily activities of Dukuduku Forest residents are set to destroy the forest completely. Activities in the Dukuduku Forest range from clearing the forest through slash-and- burn methods for building houses, and crop cultivation, to a lucrative charcoal industry by felling and burning of trees. Heavy livestock grazing has taken its toll on the vegetation. Badly constructed roads are said to be the main culprit that cause rapid soil erosion within the Dukuduku Forest. An amicable solution that will strike a balance between the preservation of the forest and the social needs of the Dukuduku Forest residents is necessary and important in order to preserve the forest as a tourist attraction.

Drastic steps to preserve this natural forest will enhance tourism in the area and prevent putting the Greater St.Lucia Wetland Park in jeopardy. The Department of Water Affairs and Forestry is taking the initiative by resettling the forest dwellers to another piece of land. The government for the purchase of two farms for the purpose of resettling these forest dwellers has spent a big sum of money. The great problem to the initiative by the government of resettling Dukuduku residents to an alternative area is the slow process of registration by the residents. The government officials have singled out intimidation of some residents by others who do not want to move out of the forest, as the main reason for the slow move forward Loosing Dukuduku Forest to illegal settlers will not only be a blow to local tourism but to South African tourism as a whole.

3.2 LOCATION OF THE STUDY AREA

Dukuduku Forest is one of the largest remaining stretches of coastal sand forest in South Africa. It lies at the entrance to the greater St. Lucia Wetlands Park. The whole area is earmarked for the development of eco-tourism, which is the anchor project for regional development right up to Mozambique. Dukuduku forest has been part of the Greater St Lucia Wetland Park but its occupation by illegal squatters led to its exclusion as part of a World Heritage Site. The forest lies in the KwaZulu-Natal northern region, which was once richly endowed with dense lowland forests. Dukuduku Forest is still a protected indigenous area but a large part of it has been rapidly degraded over the years, firstly by commercial sugar farming and later by deforestation which has led to more and more indigenous vegetation being destroyed and replaced by commercial crops, trees and alien vegetation. Dukuduku Forest comprise about 10 000 hectares and lies south of the R618 road to St. Lucia. It lies on the east coast of northern KwaZulu-Natal. The adjacent village of St. Lucia is approximately 200 km north of the port of Durban. The road from Mtubatuba to St. Lucia (R618) borders the study area in the north. The distance between Mtubatuba and Dukuduku Forest is about twenty kilometers.

In the west the Monzi farming area borders Dukuduku Forest. The farms at Monzi are private farms belonging to Whites. To the south west of the forest lie two farms, the Sturwig and Spurwig farms. These two farms have been bought by the government and are earmarked for resettling the Dukuduku dwellers. Resettlement of Dukuduku residents to these farms may be dealt a heavy blow because some farmers who view such a move as contravening their rights by putting a squatter camp at the doorstep to their farms.

On the far south lies the Umfolozi River, along which most of the farming activities are carried out by Dukuduku residents In the east of the forest lies St. Lucia village and St. Lucia estuary. Most of the Dukuduku residents' produce in the form of vegetables and fruit are sold to tourists at St Lucia. Other Dukuduku residents fish illegally in the St Lucia estuary. Figure 1.1 in Chapter one indicates some of these details.

3.3 PHYSICAL FEATURES OF THE STUDY AREA

The study area has a subtropical climate with warm, moist summers and mild winters. Porter & Blackmore (1998:33) estimate a mean annual average temperature exceeding 21°C. Rainfall occurs in summer between November

and March and in winter between May and September. Tropical cyclones moving down the Mozambique Channel sometimes cause floods in the area.

The geology within the study area comprises cretaceous sedimentary rocks of the St. Lucia formation. Sedimentary rock of the St. Lucia formation is known for its richness in fossil remains. Dukuduku Forest is a mixed, subtropical climax community. Developed stands may reach 30m in height. Appendix C is shows a cleared area for cultivation at the Dukuduku Forest. Some of the subtropical plant species removed from clearings are endemic to Dukuduku Forest and as a result may become extinct, resulting in the forest's potential as a tourist resource being badly damaged.

3.4 LEGAL STATUS OF THE STUDY AREA

The Forest Act No. 122 of 1984 protects Dukuduku Forest as a state forest. Fuggle & Rabbie (1994:332) point out that the Forest Act (1984) provides for protection of land, vegetation and other forests. The Forest Act contains provision for setting aside state forests as protected areas for prevention and combating of soil erosion of the veld and mountains so as to prevent forest fires. Other provisions in the act relate directly to the prevention of erosion and to the control of cultivation and grazing of land situated within the forest.

The Forest Act stipulates that it is an offence to clear, break up or cultivates land without authority in or on a state or private forest. It would seem as if the Forest Act has not been fully enforced with regard to the Dukuduku Forest. Despite being a state forest, people have continued to invade the Dukuduku Forest. Such invasion of the natural forest definitely impacts negatively on it as a tourist resource.

In a meeting held by Dukuduku Committee in the offices of the KwaZulu-Natal Wildlife in St Lucia on January 8,1999, a question regarding the governance of land purchased by the government for resettlement was raised by the local *inkosi*. The question was raised because the then Minister of Water Affairs and Forestry had previously mentioned that relocated people would be under the Transitional Local Council. It was later agreed that the Hlabisa Regional Authority, Mpukunyoni Tribal Authority and Uthungulu Regional Council would play a role in the governance of the new area.

Responding to a question on how the community will benefit from the project, the Director in the Department of Water Affairs mentioned the following:

- The community will have 100% share ownership of all proceeds generated by sugar cane from the two purchased farms.
- The community and the government will jointly manage the forest as per provisions of the new Forest Act of 1994.
- Profits generated from the forest will be split evenly, with the government taking 50% and the community the other 50%.
- The government's share will be used for the maintenance of any profits generating activities whilst the community's share would be used by the community for its own benefit
- All job opportunities that will arise in the forest will be given to the community and the community will continue to have access to the forest.

Responding to a question on how to ensure maximum tourist attraction to Dukuduku, Dr Mjwara, the then Director in the Department of Water Affairs and Forestry said the issue of Dukuduku was attracting a lot of attention in the international arena and once settled, Dukuduku will become a major tourist destination (Dukuduku Committee meeting, 8 January, 1999).

3.5 THE HISTORY OF THE FOREST AND ITS RESIDENTS

The history of Dukuduku Natural Forest dates back from the days of King Shaka. Historical research suggests that Dukuduku has been inhabited since then and provided food, building materials and shelter for cattle. Dukuduku means "the sound of heartbeat" or "the place of hiding". It was so called because it was a sanctuary for both men and cattle during the Zulu succession struggle following the death of King Cetshwayo in 1884.

In 1897 the Dukuduku Forest area was annexed as state land to the Colony of Natal. People continued to live in the area known as the Eastern Shores and were forcibly removed in the mid 1950s after the area was declared a state forest. The *Mail and Guardian*, (22 March, 1998), reports that the forest was declared state property in 1956. It covered 10,125 hectares. By the 1960s the government had developed vast tracks of the forest for timber and sisal plantations, and as a result the indigenous trees in the forest were nearly halved through clearings.

The people who lived alongside the forest were the Ncube clan who were eventually squeezed into smaller areas. In the 1980s, the Ncube clan was virtually forced to invade the State Forest since it was taken from them without compensation. The population within the forest grew rapidly and as a result the Nationalist government took steps to remedy the situation by simply removing them.

Towards the late 1980s the conservationists started to raise their concerns over the forest as more and more people settled in the Dukuduku forest. Early plans to resettle the illegal dwellers on the land near Monzi were met by protests from white farmers in that area and as a result the plans were abandoned. The illegal dwellers were asked to leave the area since it formed part of a protected area but they resisted and claimed ownership of the forestland (*Sunday Times*, 16 May, 1999).

In July 1990 Dukuduku Forest hit the headlines when six men were convicted for illegal squatting. Among these men was Caiphus Mkhwanazi, who is now the leader of Dukuduku North community. Mr. Mkhwanazi claimed that his ancestors' bones were buried in the forest and therefore he had a right to live there. The convicted men were given a R1000 suspended fine each and asked to leave the forest by August 1990. In response to the court order a committee of ten people representing the squatters was formed.

Their legal representative, the late Professor E. S. Mchunu, was a member of this committee. According to Mr. Dindikazi (January 20, 2001), a field worker for KwaZulu- Natal Wildlife, there were about 3000 people living at Dukuduku forest by then. Some claimed to have been forcibly removed from the eastern shores, without compensation. Some claimed to have fled from political violence areas and settled in the forest.

The South African government decided that this was not to be another forced removal and embarked upon negotiations with community leaders for an alternative site. In 1991 the then Department of Planning and Provincial Affairs resettled forest dwellers to the Khula Agri-Village bordering the forest. After protracted and volatile negotiations about 560 families moved out of the forest but some families refused and stayed behind. This move resulted in two communities; the legal settlement on the northern edge of the forest with proper houses, electricity, schools, crèches and a clinic, and the illegal dwellers still living in Dukuduku forest.

According to one forest dweller that wished to remain anonymous, as from 1994 the number of forest dwellers has been increased by fugitives from justice and from areas affected by political violence, as well as Mozambican legal and illegal immigrants. Some had hoped that Richards Bay Minerals would be allowed to mine in the eastern shores, which would have provided them with employment.

The Department of Water Affairs and Forestry is currently engaged in efforts to save the forest. In its attempts to do so, the department is seeking an amicable solution to this impasse, which will benefit both the forest dwellers and the forest itself. Such a solution seeks to persuade those people who have illegally invaded the forest to locate and resettle on alternative land. Their evacuation will help the forest to rehabilitate to its natural state.

According to a community study by the Department of Water Affairs and Forestry a number of attempts to drive these communities out of the forest by the previous government has failed. The most notable one was in 1994 when such an attempt was met with fierce resistance, which eventually became violent. This was followed by a court order, which gave the community an interim relief to remain in the forest. This relief gave the community the feeling that their settlement in the forest was legal and permanent. The court order created a feeling among the forest residents that they had acquired some legal rights of ownership of land in the forest (*The mercury*, May 27, 1999).

3.6 RESETTLEMENT OF DUKUDUKU RESIDENTS

After numerous consultations in various meetings about the relocation process of the Dukuduku community to the alternative land, the settlement project was outlined in the Dukuduku Declaration entered into by then Minister of Water Affairs and Forestry, Prof. Kader Asmal and the M E C for Traditional and Environmental Affairs of KwaZulu-Natal, Inkosi Nyanga Ngubane in 1998 (Mail and guardian, March 22,1998). The Dukuduku implementing committee was then formed. The committee consisted of representatives from the government departments, Uthungulu Regional Council, private organisations and the community.

In its first meeting the Dukuduku Implementing Committee discussed progress on the relocation process. An overall picture of the registration process for resettlement was given to committee members. It was in this meeting that a Dukuduku Community Representative Structure was discussed. The process of forming this structure was to be monitored by a retired magistrate to ensure that the process was free and fair. The Department of Water Affairs and Forestry was tasked with the resettlement process. The Dukuduku Resettlement Project appointed the firm Participative Solution Africa to conduct a community profile of Dukuduku. Two lucrative sugar cane farms adjoining the forest were purchased for the resettlement project and were inspected by cabinet ministers and the Dukuduku Implementing Committee.

In a meeting between the Department of Water Affairs and Forestry officers and His Majesty, King Goodwill Zwelithini, Dr Mjwara told His Majesty that the Department of Agriculture would be investigating using sections of farms in the Umfolozi flood plain for alternative cropping. Despite all these efforts, some elements within the forest residents still resist the whole process. During the community study by Participative Solutions Africa the negotiating committee was intimidated by a small group of people residing in the forest and this has forced the committee to disintegrate completely.

The same group of people coerced other people in the forest to adopt a noncooperative attitude towards the whole relocation process. At present more negotiation among different stakeholders are taking place, especially since the Greater St. Lucia Wetland Park has been declared a World Heritage site. Intimidation of Dukuduku residents who opt for relocation by others is an indication that some residents are not aware of the tourism benefits that may be secured by preserving the forest.

In a Dukuduku resettlement meeting held in Durban on 21, May 1999 the benefits to be accrued to Dukuduku residents after resettlement were stated as follows:

- Jobs were to be created during the actual housing construction phase and rehabilitation of the Dukuduku Forest.
- Sustainable development was to be maintained by setting aside agricultural land as well as grazing land.
- The existing sugar cane farm was to be portioned for settlement as well as sugar cane farming.
- Eco-tourism development was to be encouraged as the area is situated within the Lubombo Spatial Development Initiative (LSDI) region.

From the minutes of the above meeting it clear that attempts are being made to save Dukuduku Forest, and Dukuduku residents are being given certain choices of benefits associated with tourism. (Sineke, 1999:56).

3.7 CONLUSION

Efforts to relocate Dukuduku residents are continuing with consultations regarding decisions on the area, taking place. The resettlement of Dukuduku Forest residents on the two commercial farms would definitely benefit the people, and the Department of Water Affairs and Forestry is anxious to complete the process over a period of two years (*daily News*, 27 May, 1999). However, people who have registered to leave the forest would only start moving across once houses, infrastructure and services have been established for them on the 500 ha cane plantation adjacent to the forest. The registration of dwellers for resettlement is very slow because some elements within the squatter community intimidate those who seek to register.

It has been noted that people who do not wish to move out of the forest, orchestrated the recent violence and road blockades on the St. Lucia road. These people are said to be involved in criminal activities such as growing dagga (*daily news*, 27 May, 1999). It was further claimed that there were allegations that Mozambicans living in the forest were involved in gunrunning. The government is prepared to clamp down on those who are delaying the Dukuduku issue so as to protect their personal dagga empires and other illegal interests.

This chapter attempted to provide an overview of the past, present and the future of Dukuduku Forest. Since this investigation was started two years ago (2002) nothing much has changed, and the people continue to clear the forest for settlement and cultivation. Patches of cleared land has actually increased on the right hand side of the road from Mtubatuba to St.Lucia.

77

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

The linkage of the theoretical aspects and empirical analysis of any research are fundamental towards reaching reasonable conclusions of the subject matter. The purpose of this chapter is to present an analysis of data that were collected through the field survey method and the interpretation thereof. The analysis is presented with a view of addressing the objectives of this research study as well as to test the hypotheses that were postulated in the first chapter. For easy analysis of the data this section is divided into personal particulars of the respondents, farming activities of respondents, settlement details of respondents and tourism related activities concerning respondents. It should be remembered that the aim of this study is to determine the impact of subsistence farming and informal settlement on the Dukuduku Forest as a potential tourist attraction.

4.2 RESTATEMENT OF THE STUDY OBJECTIVES AND HYPOTHESES

In order to place the objectives and hypotheses of this study in their proper perspective, as well as to reach reasonable and general conclusions and recommendations, it is necessary to restate the objectives and hypotheses of this research inquiry. These are stated in sequence: • To discover the impact of subsistence farming on the Dukuduku Forest as a potential tourist resource.

Hypothesis 1: That subsistence-farming activities have a negative impact on Dukuduku Forest as a tourist resource.

• To reveal the impact of establishing informal settlements on the Dukuduku Forest Reserve.

Hypothesis 2: That the establishment of informal Settlement on Dukuduku Forest has negative implications for tourism in the area.

• To identify activities the Dukuduku Forest dwellers are engaged in which may be a direct cause of the destruction of the natural forest.

Hypothesis 3: That residential and subsistence activities of Dukuduku Forest dwellers are a direct cause of the destruction of the natural environment.

 To distinguish tourism related benefits, which are associated with the Dukuduku Forest reserve.

Hypothesis 4: ... That the Dukuduku Forest residents are not aware of the tourism related benefits associated with the forest.

• To indicate the extent to which the local community participates in the management of the forest and its willingness to save the forest.

Hypothesis 5: That the local community does not participate in the management of the forest reserve.

• To bring to light some of the forest management practices upheld by the authorities in the running of Dukuduku Forest as an ecotourism resource.

56
Hypothesis 6: That the authorities responsible for Managing Dukuduku Forest has adequate management Policies.

On the whole, both the objectives and hypotheses listed above seem to reflect the complexity of the Natural Forest Reserve under study. It is therefore anticipated that the empirical analysis undertaken in this chapter will bring forth some solutions to the issues under investigation. It is also expected that the study will come up with suggestions of possible ways of reversing any damage that may already have occurred in this natural forest. Undoubtedly, failure to generate constructive suggestions and reach reasonable solutions may result in negative influences to the development of the tourism industry.

4.3 PERSONAL PARTICULARS OF RESPONDENTS

Personal details of respondents are important in order to indicate the age, sex, marital status and employment status of respondents. This kind of information is important because it gives a picture of the nature of the population residing in the forest. In addition the chapter also discusses places of birth, places of work and employment sectors of respondents. These variables are included because they have a direct bearing on the activities of respondents since they influence their day-to-day lives.

4.3.1 Gender of respondents

In this study it is important to look at the gender of respondents since it has an influence on the decrease and increase of the population at the Dukuduku

57

Forest. The more people settle in the forest, the more destruction the vegetation sustains. Table 4.1 below shows the gender of respondents:

	FREQUENCY	PERCENTAGE
Males	52	43%
Females	68	57%
TOTAL	120	100%

TABLE 4.1: GENDER OF RESPONDENTS

Table 4.1 above indicates that more females than males were interviewed. Most of female respondents were readily available at school parents' meetings where most respondents were interviewed. Most men were not able to attend these meetings as they were usually held at work during weekdays. Work commitment among men is thought as the sole reason for female dominance. The small number of adult males available during school meetings affected equal gender representativeness of respondents. This however did not jeopardise the objectives of the investigation since all respondents stay at Dukuduku Forest

4.3.2 Age distribution of respondents

The majority of respondents (42%) fell between the 36 and 45 years bracket (Figure 4.1). The second largest segment (33%) is between 15 and 25 years old and this comprises respondents sent by parents to represent them in parents' meetings. The 26-35-age bracket constitutes only 13 percent, and

Orepresents parents of primary school learners. Only 10 percent and 2 percent fall within 45 and 55 years and above respectively. The age of the last two brackets suggests parents of secondary school learners. These statistics indicate a balanced age structure of respondents.



FIGURE 4.1: AGE OF RESPONDENTS

4.3.3 Marital status of respondents

The results as indicated in Figure 4.2 show that 27 percent of respondents were never married or single parents and 40 percent of them were married. A small percentage of the respondents (19%) were either divorced or separated and 14 percent were widowed. Domination by married respondents (40%) may stem from the fact that most respondents who attended school meetings were of a mature age group (Refer to Figure 4.1). The never married respondents (27 percent) may be those who represented

single parents of learners at school meetings. Figure 4.2 indicates the distribution of the marital status of respondents.

It is very interesting to note that the majority of respondents were married (40%), which suggests a stable family life with a reasonable number of offspring. An insignificant number of respondents were never married or single parents. About 17 percent of respondents were widowed because of various reasons, either through unfortunate circumstances or political violence that had been rife in KwaZulu-Natal in the past years. Not only married couples are residents of Dukuduku Forest; this fact supports earlier allegations that people flocked to the forest for different reasons, ranging from fugitives from justice to those who sought asylum from areas affected by political violence.



FIGURE 4.2: MARITAL STATUS OF RESPONDENTS

4.3.4 <u>Respondent's place of birth</u>

Table 4.2 indicates that the majority of forest residents (36 %) were born at the nearby Mtubatuba, 32 percent at Hlabisa and 22 percent in other areas such as Hluhluwe, Sokhulu and even as far as Mozambique see Table 4.2. Only 10 percent of respondents indicated that they were born at Dukuduku. The respondents born at Dukuduku also stated that their parents were once forcibly removed from the forest. People not born at Dukuduku came there for various reasons. Some were fugitives from justice and others fled from violence-riddled area. The findings indicate that there is a flocking of people to the Dukuduku Forest Reserve that obviously has created an increase in the density on the forest's natural environment. Animals, which previously occupied the area, had to flee to give way to human beings and certain plants had to be removed for human settlement to take place. On the basis of these findings, the hypothesis that human settlement has led to the extinction of certain plants and animals, which negatively affected Dukuduku Forest as a tourist resource is accepted.

PLACE OF BIRTH	FREQUENCY	PERCENTAGE
Mtubatuba	40	33%
Hlabisa	35	29%
Dukuduku	15	13%
Other areas	30	25%
Total	120	100%

TABLE 4.2: BIRTH PLACE OF RESPONDENTS

Period of stay of respondents in Dukuduku Forest

Figure 4.3 shows that 30 percent of respondents have been living in the forest for a period between 6 and 10 years. This indicates that these are new comers to the forest. The majority of respondents (35%) have stayed for the period ranging between 11 and 15 years. Those who have stayed between 6 and 10 years may be those who hoped for prospects of employment when Richards Bay Minerals planned to mine in St. Lucia. A small percentage of respondents (10%) have stayed between 16 and 20 years. These may be those who fled from places affected by political disturbance of the mid 1980s. Twenty percent of respondents have stayed between 21 and 30 years. These may be those who were once removed from the forest and later came back. Only 5 percent of the respondents have stayed for more than 30 years in the forest. This indicates that the 5 percent did not move from the forest when the first removals took place. These findings suggest that no one was born in the forest; all invaded it and settled there illegally.



FIGURE 4.3: PERIOD OF STAY OF RESPONDENTS

62

4.3.6 <u>Respondent's means of earning a living</u>

Nearly half of the respondents (43%) interviewed were engaged in farming activities (Figure 4.4). No land had been set aside in the Dukuduku Forest for farming but people simply cut down trees to make way for agriculture. A small percentage (26%) of respondents interviewed indicated that they were engaged in activities such as either owning tuck shops or a taxi business. Some of the respondents sell craftwork made from wood and *ncema* grass to tourists along the road to St. Lucia and at the St. Lucia market. About 23 percent of respondents interviewed were labourers, working for KwaZulu Nature Conservation Services, tourism establishments in St. Lucia and others in shops in the St. Lucia central business district (CBD). Only 2 percent of residents interviewed indicated that they worked as either teachers or nurses.



FIGURE 4.4: RESPONDENTS' MEANS OF EARNING A LIVING

The activities of people living in Dukuduku Forest are dominated by farming (42%) especially agriculture. The reason for the dominance of farming in Dukuduku forest can be attributed to the availability of water throughout the year, a suitable climate for growing plants and the belief that people in the area can own substantial pieces of land with about the highest level of soil fertility. On the basis of these findings, one can conclude that stock farming and crop farming have led to an increase in the clearing and burning of natural vegetation. It is also suggested that there is an increase in the clearing and burning of natural vegetation, which negatively impacts on the Dukuduku Forest Reserve as a tourist resource.

4.3.6 Place of employment of respondents

Nearly half of the respondents (46%) indicated that they carry out their work activities at St. Lucia. This can be true since St. Lucia is within a walking distance from Dukuduku. Some might have chosen to live at Dukuduku Forest just to be near their places of work. The second half (43%) of the respondents indicated that they work at the nearby Mtubatuba town. These commute to Dukuduku, which is a mere 20 kilometres from Mtubatuba town. Only 8 percent of respondents work as far away as Empangeni and Richards Bay, more than 60 kilometres away. It might be that these residents could not get work either at Mtubatuba or St. Lucia. Thev preferred working as far away as Richards Bay to staying at home and not Only 3 percent work in other places not mentioned in an working. This implies that most Dukuduku residents either work at interview. Mtubatuba or at St. Lucia.

FIGURE 4.5: RESPONDENTS'PLACE OF EMPLOYMENT



Other Dukuduku residents are unemployed, homeless folk looking for a new home. Figure 4.5 indicates the places of employment of most residents at Dukuduku Forest. Most of the immigration to the forest coincided with plans by Richards Bay Minerals to mine in St. Lucia. Most people may have been lured to the area with stories of opportunities for employment. On the basis of the findings, hypothesis 3 postulated in chapter 1, that there is options that can be followed in an attempt to save the natural forest, is supported.

Resettlement of Dukuduku forest people is a very sensitive matter, which very few politicians would want to tackle. The refusal of many of many of the people to leave the forest has been shown by several protests and picketing actions.

4.4 FARMING ACTIVITIES IN DUKUDUKU FOREST

To many respondents, Dukuduku forest is one of the most fertile and convenient place, suitable for subsistence farming. The farming activities of the respondents range from agriculture to stock farming. Some of the respondents are even prepared to stake their lives to fight any attempt at removing them from the forest. Up to November 2002 the government had not been able to relocate the residents in Dukuduku to nearby farms, bought for this purpose. Farming activities of Dukuduku Forest residents are divided into crop farming and stock farming (Table 4.3).

ACTIVITY	FREQUENCY	PERCENTAGE
Crop farming	30	25%
Stock farming	17	14%
Both Crop & Stock	•72	60%
Other Related Activities	01	01%
TOTAL	120	100

TABLE 4.3: FARMING ACTIVITIES OF RESPONDENTS

Table 4.3 illustrates that there are two major types of farming the respondents are engaged in, that is, crop farming and stock farming. Respondents are either engaged in stock farming or crop farming but the majority of respondents (60%) are engaged in both crop farming and stock farming. This valid response seems to support the conclusion that subsistence farming and settlement have a negative impact on Dukuduku Forest as a tourist resource.

Between the two types of farming, crop farming is dominating (26%). Stock farming activities accounted for only 14 percent. The intensive crop and stock farming activities are bound to have an impact on Dukuduku forest. The beauty of Dukuduku Forest, which is in its pristine vegetation, will disappear and the forest will no longer be a tourist attraction. The local community, which is supposed to benefit from tourism benefits associated with the forest, will become destitute.

4.4.1 Stock Farming activities of respondents

Of the 14 percent that is engaged in stock farming activities, some respondents rear sheep (10%), goats (20%), cattle (60%) and other types of stock (10%). Most respondents (60%) are engaged in cattle farming. Sheep and goats account for only 30 percent combined. Figure 4.6 shows types of stock farming Dukuduku residents are engaged in.

Most of the animals are let loose along the banks of the Umfolozi river. This answers why other people especially from nearby Mtubatuba bring their cattle to graze along the banks of the Umfolozi River, which runs southerly along the forest. Stock farming activities alone has a massive destructive effect on the vegetation. Figure 4.6 indicates that a substantial percentage of Dukuduku residents rear cattle (60%) and goats (20%), which suggests a high rate of damage of vegetation and soil. As was mentioned in chapter two, compaction resulting from pressure exerted by hooves of cattle and goats directly reduces the infiltration capacity of the soil.

67

Reduced infiltration capacity results in runoff, hence soil erosion. From the above findings it is clear that the natural vegetation at Dukuduku natural forest is under enormous pressure not only from humans but also from domestic animals. When soil erosion occurs not only soil is lost but nutrients in it are also lost, and this make it difficult for the natural vegetation to replenish. The domestic animals destroy the environment in a dual form, by creating footpaths with their hooves and by devouring large quantities of vegetation daily.

FIGURE 4.6: STOCKFARMING ACTIVITIES OF RESPONDENTS



4.4.1.1 Cattle farming activities

As indicated in Figure 4.6, a substantial number (60%) of respondents indicated were engaged in cattle farming. One can imagine the amount of grass eaten by so many cattle on a daily basis and footpaths created by these animals on the forest. The number of cattle owned by respondents varies, depending on the

wealth status of respondents. A substantial number of respondents, about 40 percent owned between 6 and 10 head of cattle, while 10 percent of respondents owned less than 6 head of cattle.

It should be understood that ownership of cattle and other livestock is highly regarded within the study area. Many of the families living in the area are continuously hopeful that the fertility of the forest area will one day add to better living and livestock related wealth. From this argument it can be inferred that local residents do not view tourism as a beneficial activity that can bring them wealth. This statement therefore supports hypothesis 4 that the residents of Dukuduku Forest are not aware of the tourism related benefits associated with the forest. The ignorance of local people therefore suggests that the local administrative authorities have an important responsibility of marketing tourism and its benefits to the local Dukuduku community.



FIGURE 4.7: NUMBEROF CATTLE OWNED BY RESPONDENTS

69

Figure 4.7 shows that more than 40 percent of the residents rear 6 to 10 head of cattle per family, as well as that more than 50 percent of the respondents own between 11 and 35 head of cattle per household. This practice has detrimental implications for the survival of the Dukuduku Forest environment.

From the percentage of cattle reared by Dukuduku residents shown in Figure 4.7 one can conclude that the forest and its vegetation are under immense pressure not only from humans but also from the domestic animals. On the basis of these findings one can conclude that subsistence farming and settlement have a negative impact on Dukuduku Forest as a tourist resource. An increase in stock farming has led to an increase in the clearing and burning of the natural vegetation in the Dukuduku Forest.

4.4.1.2 Reasons for rearing cattle

Cattle farming are practised mainly for subsistence and minor commercial benefits. Some respondents keep cattle for either subsistence or commercial farming while others keep cattle for both reasons. Table 4.4 indicates that 56 percent of respondents kept cattle for subsistence, 28 percent kept cattle for selling and 16 percent kept them for both subsistence and selling. Respondents who kept cattle for subsistence did that in order to obtain milk, meat and hides. Sometimes cattle are used for cultivation or as beasts-of-burden, e.g. for fetching water from the Umfolozi River. Respondents who kept cattle for various reasons.

The results of this study indicate that more than half of the respondents own cattle. All these cattle graze within small pastures since stock farming competes with other types of farming. If the numbers of these herds of cattle are not controlled, the result could be compaction of the soil, which becomes evident when there is too much pressure from the hooves of cattle and other hoofed animals. Most cattle are left to roam along the banks of the Umfolozi River unattended. Table 4.4 illustrates the reasons why respondents prefer to rear cattle. Interestingly only two reasons are mentioned in the research, yet it is common knowledge among the Zulu people that having cattle has a cultural significance, and so is the case with some of the Dukuduku Forest communities.

REASONS	FREQUENCY	% FREQUENCY
Commercial	34	28
Subsistence	67	56
Both	19	16
Total	120'	100

TABLE 4.4: RESPONDENTS' REASONS FOR REARING CATTLE

4.4.2 Crop farming activities

Apart from stock farming, Dukuduku forest residents are engaged in crop farming. Types of cropping systems applied by respondents are monoculture and crop rotation. The usual monoculture crop for Dukuduku residents is maize. Crop rotation crops cultivated at Dukuduku forest are vegetables such as potatoes, sweet potatoes, tomatoes and onions. Table 4.5 indicates that 53

percent of respondents use a crop rotation system when cultivating their crops and 47 percent of them practise monoculture. Forest residents use both crop rotation and monoculture systems of farming but the correct use of these systems is doubtful since no agricultural officers are assigned to the area. Without trained agricultural officers to give advice arable land is mismanaged, thus rendering the soil unproductive and useless (Steila, 1976:77).

<u>TABLE 4.4</u> :	RESPONDENTS' PREFERRED CROPPING
	SYSTEM

CROPPING SYSTEM	FREQUENCY	% FREQUENCY
Monoculture	55	46
Crop rotation	62	52
No system	03	02
Total	120	100

Most respondents believed that Dukuduku forest is the most fertile and the most suitable area for cultivating various crops. Crops cultivated by respondents include vegetables, maize, beans, sweet potatoes and fruit. Figure 4.8 indicates that 50 percent of respondents cultivate vegetables, which include potatoes, tomatoes, onions, sweet potatoes and other vegetables. This explains why most of respondents claim to practise crop rotation, as most of these crops are seasonal. Monoculture crops include maize (10 percent), beans (12 percent) and fruit (28 percent). The common fruit types that are cultivated by respondents include bananas, mangoes and pawpaws. Figure 4.8 illustrates these details.

FIGURE 4.8: CROPS CULTIVATED BY RESPONDENTS



4.5 INFORMAL SETTLEMENT AT DUKUDUKU FOREST

The respondents have occupied Dukuduku forest illegally since the 1980's. Not a single one has legal documents justifying their land occupation. Some residents claim that they were forcibly removed from the forest by the former government. Others claim that they were born in the forest. These arguments have caused a stir especially among the conservation circles. On 12 September 2000 a contingent of Dukuduku forest dwellers picketed the Richards Bay Magistrate Court in support of their detained leader. Dukuduku dwellers are adamant that they will not vacate the forest and they have put pressure on the local magistrate that they be given title deeds for the land they occupied (Umlozi, 14 September, 2000). These dwellers threatened to boycott the polls and embark on intensive protests during the local government elections 5 November 2000.

4.5.1 Type of building material used by respondents

Houses owned by respondents in Dukuduku forest have been built using different basic building materials. The building materials used in building houses include timber (65 percent), blocks (12 percent), bricks (4 percent) and other material. Timber that is used in the building activities of the respondents are obtained from indigenous trees of the forest. One can imagine how many trees are chopped off for building purposes. Blocks and bricks account for only Other materials for building include cardboard boxes and 16 percent. corrugated iron. The reason timber is the main building material is because it is obtained from trees, which are readily available in the forest. Very few dwellers have cash to by expensive building material such as bricks and blocks since many of them are not employed. Figure 4.9 shows the type of material used by respondents and the percentage of respondents involved in each type of building material. The continuous use of indigenous trees has led to the disappearance of some of the plant species. On the basis of these findings hypothesis 2, that residential and subsistence activities of Dukuduku Forest dwellers are a direct cause of the destruction of the natural forest, is confirmed. If indigenous trees and natural vegetation disappear Dukuduku forest will cease to be a tourist attraction.

FIGURE 4.9: BUILDING MATERIAL USED BY RESPONDENTS



4.5.2 Tree usage by respondents

Trees are the main resource for various activities of respondents, Figure 4.10 Reveals that respondents use trees for building (46%), craftwork (23%) and (15%) for making medicines for various illnesses. About 16 percent of respondents use trees for all the above reasons. Approximately 300 tons of timber is used monthly for the above purposes. Craftwork made of wood has become a thriving business for the people of Dukuduku. Apart from trees, Dukuduku forest dwellers also use *ncema* grass (juncus kraussii) for various kinds of mats, which they sell to tourists. Building alone poses a threat to the forest since everything from houses, chicken runs and cattle kraals are built using trees. Figure 4.10 indicates why respondents use trees in the area.

FIGURE: 4.10 TREE USAGE BY RESPONDENTS



4.5.3 Responses on natural environment destruction

Respondents had varying responses regarding whether human activities have any negative impact on the environment. Human activities in this study include farming, making of craftwork, preparation of medicine, building and construction of roads and creation of footpaths. To most Dukuduku residents, their survival depends on the forest since it provides them with most of their needs.

FIGURE 4.11: RESPONSES WHETHER HUMAN ACTIVITIES DESTROY THE NATURAL ENVIRONMENT



Figure 4.11 show that an overwhelming majority of respondents (70%) deny that human activities have an adverse effect on the environment. To them the forest resource is God-given and they are solely there for their survival. This belief is proved by the massive activities in which the respondents are engaged. Very few (30%) are aware that their activities in the forest do destroy the environment in one-way or the other. Those who deny destruction of the forest see nothing wrong with their activities instead they accuse the government and conservationists of covetousness towards their land. On the basis of the above facts one can conclude that the Dukuduku residents are not aware of the tourism related benefits associated with the forest, therefore some Dukuduku residents do not realize the tourism related benefits which are associated with Dukuduku Forest Reserve.

4.6 TOURISM – RELATED ACTIVITIES

As mentioned previously, Dukuduku Forest, without necessarily being a major or massive development spectre, can become an important tourist resource. Activities relating to tourism at Dukuduku can include craftwork and Zulu culture. At present the cultural songs and dances are not about great warriors or preparing for cattle, they are about celebrating the living culture of the Zulu people. Tourists especially from abroad must know something about *ingoma*, *indlamu*, *isicathamiya*, *umbholoho* and gumboot dancing (Mtubatuba Publicity Association, 1999). Currently, tourists are unable to explore the forest owing to security reasons. Illegal occupation of the forest poses a serious threat to tourist. Medicinal tourism can become a main attraction since the forest is richly endowed with a number of plant species. Until the forest is cleared of illegal occupants the tourism potential of Dukuduku forest will never be realized.

4.6.1 <u>Tourist Visit Awareness</u>

When respondents were asked whether tourists do visit their area, they had differing responses. A substantial number of respondents (84%) indicated that they were not aware of such visits. Only 16 percent of respondents agreed that tourists do visit their area. Those who denied the visits remarked that they only see cars on the main road to St Lucia, unaware that those cars carry the tourists. It may happen that tourists are scared to enter the forest because of squatters. On the basis of this information, Hypothesis 4; that the Dukuduku Forest residents are not aware of the benefits of the tourism related benefits associated with the forest, are accepted. Table 4.6 indicates the responses received with regard to tourist visits to Dukuduku forest.

<u>TABLE 4.6</u>: <u>RESPONSES REGARDING TOURIST VISIT</u> <u>AWARENESS</u>.

RESPONSE	ABSOLUTE	% FREQUENCY
	FREQUENCY	
No	101	84
Yes	19	16
Total	120	100

Tourists are aware of Dukuduku Forest tourism potential but cannot risk their lives going into the forest since there are no security measures in place.

4.6.2 Future tourist attractions to Dukuduku Forest

Respondents were asked what could be the reason for tourists to visit Dukuduku Forest in the future. Various responses were obtained from respondents regarding attractions for prospective tourists in the area. The majority of respondents (40%) cited craftwork, 30 percent mentioned the plant species, and 14 percent saw bird sighting as the drawing card for visitors, while 10 percent of respondents cited Zulu culture as the possible attraction. It is not surprising that only 6 percent thought wild animals could attract the tourists because most animal populations in the forest have dwindled and not many animals have remained in the forest. Craftwork has been singled out as the main attraction because most dwellers are engaged in craftwork. Wood, which the Dukuduku residents use to make craft work, is freely available and that is why many respondents mentioned craftwork as the greatest attraction. These responses further indicated that respondents do not perceive the forest as a tourism resource. Figure 4.12 indicates the responses on the reasons for tourists' visits to Dukuduku Forest.



FIGURE 4.12: <u>REASONS FOR FUTURE TOURIST VISITS</u>

4.6.3 Market for local produce

Dukuduku residents are engaged in various economic activities such as selling fruit, vegetables and craftwork. Most of these products are sold along the road between Mtubatuba and St Lucia. Some respondents sell their produce at St Lucia town. When asked who buy their produce, 50 percent pointed out tourists (Figure 4.13). This is in contrast with the number of respondents who indicated that they were not aware of visits by tourists. The reason for this response could be that tourists travelling along the road to St Lucia sometimes do not go into the forest and therefore only those residents selling along the road who are the ones who see the tourists. It may also happen that Dukuduku residents sell their products to white people not knowing that those whites are tourists.

Only one fifth of the respondents (20%) indicated that they sell their products to local business in St. Lucia. A small percentage (5%) indicated that they sell their products to local people. Respondents amounting to 15 percent indicated that they sell their products to Mtubatuba business people. The last group making up only 10 percent indicated that they sell their products to other areas not mentioned above. These details show that much trade occurs between Dukuduku forest dwellers and tourists although Dukuduku residents were not aware of tourist presence in the area. The unawareness of Dukuduku residents of tourists' presence in the area is an indication of the extent to which local community participates in the management of the forest and its willingness to save the forest.



FIGURE 4.13: Market for local produce

81

4.6.4 <u>Responses on relocation to a new area</u>

Respondents were asked what their feeling was regarding relocating to a new area with infrastructure. Varying responses from respondents were obtained. The majority of respondents (70%) indicated that a move to a new area was not accepted. Only 25 percent indicated that they felt comfortable. The last 5 percent were uncertain regarding relocation, and did not therefore provide any response. Table 4.7 reveals the feelings of respondents regarding relocation.

<u>TABLE 4.7:</u>	Responses regarding residential
	Relocation

RESPONSE	ABSOLUTE FREQUENCY	% FREQUENCY
Good	30	25
Bad	84	70
Uncertain	06	5
Total	120	100

As indicated in Table: 4.7 most Dukuduku dwellers indicated that they are not willing to move out of the forest. The 5 percent of respondents that were uncertain may be those who were afraid of intimidation from those who are not prepared to move out of the forest. The refusal by Dukuduku residents to move out of the forest can be disastrous to the forest. The findings of the study have indicated that an increase in the use of the forest could lead to further damage to the natural environment. Further destruction of Dukuduku Forest will totally damage its natural vegetation, which is already in dire need of rehabilitation.

4.7 CONCLUSION

From the responses provided by respondents, it is clear that the government faces a mammoth task to relocate the Dukuduku residents to a new area. Resistance shown by these people correlate with their beliefs that:

- (i) The area is fertile and suitable for their daily needs;
- (ii) Their activities have nothing to do with the destruction of the environment; and

(iii) The land is rightfully theirs and they therefore demand legal recognition. The Dukuduku residents' beliefs with regard to relocation to another area have been shown by the Dukuduku residents' demand for the release of their leader Mr. Maphanga, who was arrested for inciting public violence. The fact remains that human activities will not help to keep the forest in its indigenous, pristine condition. The impact of subsistence farming and informal settlement on Dukuduku Forest is so enormous that half of it is gone already.

This chapter has clearly indicated that subsistence farming and informal settlement have devastated this famous indigenous forest. The continuous illegal occupation of Dukuduku forest gives little hope that the forest will still be considered as part of the World Heritage Site, as it was promised that if it is rehabilitated in time it would be reconsidered as part of the Greater St Lucia Wetland Park. Based on the findings of the study most of the objectives of the study have been achieved and most hypotheses postulated in the study have been proven correct. Finally it is evident that the future of Dukuduku Forest looks bleak in view of the findings of this study, and also because the authorities do not have full control over the forest and its illegal residents.

83

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The illegal occupation of Dukuduku Forest by squatters alarmed many people around the world. By 1998 the forest population was estimated to be between 22000 and 27000 people (*Independent News*, 30 October, 1998) The purpose of this chapter is to present an evaluation and integration of research objectives by means of a concise statement of conclusions based on the findings. The findings relate to the subsistence farming and informal settlement of Dukuduku forest by its residents. Subsistence farming in this investigation was further divided into agriculture and stock farming. The study also looked at the uses of trees for building and other usages, and investigated Dukuduku forest as a potential tourist resource. Detailed discussions and conclusions on some of the aspects of the study are presented.

5.2 CONCLUSIONS ON SUBSISTENCE FARMING ACTIVITIES

From the findings of the study most Dukuduku residents rely on farming for their survival. Most of the farming that takes place in the forest is for subsistence. Few residents practise farming for commercial purposes. Those who are subsistence farmers practise agriculture and stock farming. The cropping systems that are used are monoculture and crop rotation. Crops for monoculture are maize and sugar cane. Some farmers live by growing fruit such as papaws and bananas. Most of monoculture crops are for commercial reasons. Those who grow sugar cane sell their crop to the nearby sugar mill on a yearly basis. Fruits that are grown in the forest are sold to the passing tourists along the road between St Lucia and Mtubatuba (R618). Some of the fruit is sold to business and at stalls in St. Lucia. Most of these crops are grown on the southern part of the forest along the Umfolozi River or on the banks of the river. Vegetables form part of rotation crops grown at Dukuduku forest. Vegetables are either grown for subsistence or commercial reasons. Vegetables grown by Dukuduku residents include tomatoes, potatoes, sweet potatoes and *amadumbe*, and are also sold to tourists and to businesses at St. Lucia.

As was mentioned earlier most of these crops are grown along the Umfolozi River, with the result that they have water almost throughout the seasons. The nature of the soil and the availability of water make it possible for these crops to be grown throughout the year.

Looking at the findings of the study the objective to reveal that subsistence farming on Dukuduku Forest has a negative impact has been achieved. Apart from agriculture, Dukuduku residents are also stock farmers. Stock farming taking place at the Dukuduku forest include cattle, goats and sheep. What is noticeable is that most cattle and goats are not kept in camps or kraals but are let free to roam the forest, as was mentioned in chapter four of the study. At times, one resident may be engaged in both agriculture and stock farming. From what has been said it is obvious that the forest is negatively affected by the farming activities carried out by Dukuduku residents. It was noted during the investigation that residents in the forest do not get expert advice on how to grow their crops without damaging the environment. Forest clearing and continuous cultivation definitely result in soil exhaustion and soil erosion. It is therefore clear that the activities of the Dukuduku squatters had caused a substantial damage to the forest.

The findings of the study affirm hypothesis 1 that subsistence farming and settlement have a negative impact on Dukuduku Forest as a tourist resource and that this has resulted in substantial damage to the natural forest.

The study has been able to reveal the extent to which the local community participates in the management of the forest. Although a committee representing forest dwellers was set up, it became ineffective because of intimidation, especially from those who did not wish to move out of the forest. Conflicts between residents and authorities had resulted in substantial damage to the natural forest. If this is allowed to go on, little will be left of this indigenous forest.

5.3 CONCLUSIONS ON HUMAN SETTLEMENT

The findings of the study indicate that Dukuduku residents settled in the forest illegally. Dukuduku forest dwellers practise slash- and- burn agriculture, snare animals and birds, strip the trees and litter the forest. These activities have caused uproar among nature lovers and the government, and as a result a decision had been taken by the government to move these people out of the forest. The then Minister of Forestry and Water Affairs Kader Asmal made the National Government's position quite clear that the Dukuduku residents had occupied the forest illegally therefore they should move out of the forest. Soon after this announcement the minister issued a statement called the Dukuduku

Declaration, which forbade further occupation of the forest (*Mail and Guardian*, 22 March, 1998).

Apart from land clearing for cultivation, felling of trees for the production of low-grade charcoal also takes place. This involves burning large areas of vegetation to extract the charcoal, leaving behind a useless land. Apart from charcoal and firewood, felled trees are used for building shacks, chicken runs and for making carvings, which are in turn sold to tourists. *Ncema* grass, which grows around the estuary mouth, is harvested and highly regarded as a valued resource for weaving mats and baskets.

This study revealed that most of the houses built by Dukuduku residents are built of trees, cut within the forest. Some residents fence their houses by building tree hatches around them. It is clear from the study that trees in the forest are indispensable resource for the various needs of Dukuduku dwellers. Traditional healers also use trees for the manufacture of their medicines and consequently exert pressure on the forest vegetation, the Izinyanga Club, however, replant most trees used by traditional healers. One of the objective of the study was to reveal the forest management options that may be taken to save the natural forest from devastation, therefore, the establishment of the Izinyanga Club was a step forward to the introduction of good forest management system that will result in saving the forest from devastation.

The increase of the population within the forest has been rapid. A survey commissioned by the Democratic Party in 1998 estimated that there were more than 5400 informal structures in the forest. By then the population of forest dwellers was estimated to be between 22 000 and 27 000 with four to five

people per dwelling (*Independent Newspaper*, 30 October, 1998). The influx of so many people in the forest was encouraged by rumours that a certain induna in the area was selling patches of land for anything between R500 to R2000. These allegations confirm that the illegal population in the Dukuduku forest is continuing to grow, and that this increase is not natural but are enhanced by new arrivals to the forest. This also suggests that the authorities responsible for managing Dukuduku Forest do not have adequate and sound forest management policies to monitor and control access to the forest. The interview conducted with Mr. Mngomezulu, the Forest Manager (20 January, 2001) indicated that the authorities take no steps against residents who intimidate others not to register for resettlement.

5.4 CONCLUSIONS ON TOURISM RELATED ACTIVITIES

The massive clearing of Dukuduku forest is an indication that most people living in the forest are not aware of the magnitude of the destruction they are causing. To them the forest is a God-given resource for them to utilize. Few people in the forest are aware of the tourism potential of Dukuduku forest. A committee representing the interests of the forest dwellers had ambitious plans for a lodge, walking trails, eco-tourism excursions and agriculture. Other tourism schemes tap into the enormous potential of an international tourist trade at Lake St Lucia (*Mail & guardian*, 14 December, 1998).

Most Dukuduku forest residents apparently lack knowledge about tourism. However, although most Dukuduku residents indicate that they were not aware of tourist in their area, they sell most of their products to tourists. To them all whites and other visitors using the road between Mtubatuba and St Lucia are tourists. There seemed to be confusion regarding tourism among Dukuduku dwellers because when they were asked to indicate tourism attraction to the forest they did indicate those attractions.

The study clearly indicate the extent to which the local community participates in the management of the forest and their willingness to save the forest, but because of intimidation the success of the committee representing the forest dwellers' participation is minimal.

In order for the tourism potential of Dukuduku forest to be realised people in the forest have to be relocated. On the question of being relocated to another area most forest residents indicated their unwillingness to leave the forest. They even resisted the government order to leave. Some even said that they were prepared to die in the forest for the forest. From the look of things a pressing concern is that if they move, they will no longer have access to the many resources the forest offers. One elderly man who supports a large family through farming in the forest said he did not want his children to become criminals, which he believed could happen if his family were forced to move. The unwillingness of some forest dwellers to move out of the forest suggests that Dukuduku residents are not aware of the benefits of the tourism related benefits associated with the forest.

Basing on the findings the study succeeded in its objective to bring to light that some Dukuduku residents could not distinguish tourism related benefits, which are associated with the Dukuduku forest resource and that the authorities have not done enough to educate residents about tourism related benefits and ecotourism. The study also succeeded in indicating the tourism related benefits which are associated with the Dukuduku Forest Reserve which include recreation sites for fishing, especially along the Umfolozi River banks, walking trails and bird viewing.

5.5 THE IMPACT OF SETTLEMENT ON DUKUDUKU FOREST

The government had promised Dukuduku dwellers alternative land, which has been bought for their resettlement. Despite promises of a clinic, employment opportunities and schools, Dukuduku residents showed their unwillingness to move out of the forest. An investigation into schools in the forest shows that the schools do not have adequate classrooms, furniture, playgrounds and other infrastructure. In some schools learners were taught under trees and use stones as desks or chairs. Principals of five schools in the area also voiced their sentiments of schools not functioning properly due to the lack of infrastructure. Appendix D shows an open space, which serves as a classroom for one of the schools in the area. The main stumbling block to the development of schools at Dukuduku forest is that the schools are not recognized as legal institutions by the government. The schools in the area cannot be issued with the necessary Permission To Occupy (P.T.O). It is surprising that the government does not consider Dukuduku Forest a formal settlement area, while the Department of Education provide these schools with educators who are paid by the State.

The occupation of Dukuduku forest by illegal dwellers has a devastating effect on the forest vegetation. Squatters and illegal land invaders have forced planners to exclude Dukuduku, South Africa's largest surviving indigenous forest, from the Greater St. Lucia Wetland Park World Heritage Site (*Wild life News*, 20 October, 1999). Robert Porter, KwaZulu-Natal Wildlife regional planner, confirmed that the United Nations' experts who toured the area had warned that the entire Greater St. Lucia submission would be endangered if Dukuduku was included and as a result it was left out. The experts warned that some of the damage caused by squatters to the forest was irreparable.

If squatters had agreed to move out of the forest they would have benefited from the expected tourism boom, which would have been sparked by the forest's inclusion as part of the Greater St Lucia Wetland Park. *Wild Life News*, (20 October, 1999) quoted Porter as saying that the forest might be included in the new heritage site at a later stage if it was ever rehabilitated sufficiently to pass the United Nations' inspection. Dukuduku forest, by not being included in the heritage site, had denied not only Dukuduku forest dwellers but also all South Africans the benefits that can be obtained from tourism. Subsistence farming and informal settlement of Dukuduku forest squatters is destroying the tourism potential of the forest. If the government fails to resettle the forest dwellers to another area, not only will the natural beauty of the forest probably be lost forever, but the lives of the people will also be destroyed.

The prevalence of Malaria in the area also poses a serious health problem. Stagnant puddles of water lie on the surface of the cleared areas within the forest causing a breeding ground for mosquitoes. Malaria has now become a problem amongst both the legal and illegal communities. According to the *African eye News Report* (26 January 26, 2000) more than 40 000 illegal squatters in the indigenous forest have created this problem by chopping down trees and undergrowth in the area. The situation is so serious that the area's medical authorities are contemplating calling in the army as the nearby hospital and clinics are overflowing with malaria cases. It is estimated that 80 percent of malaria cases come from the Dukuduku squatters. It is feared that if the situation is not controlled, the spread of malaria will scare off tourists to the nearby St. Lucia Wetland Park.

The large number of illegals in the Dukuduku forest has brought to the fore the threat of pollution to the St. Lucia estuary. Pollution of the estuary is a hazard for man and wildlife alike, therefore the activities carried out at Dukuduku forest has a direct involvement in the pollution of the estuary. Pollution in the area implies the destruction of the wetland as a whole, since wetlands provide a habitat for a wide variety of plants and animal species. Certain animals are completely dependent on wetlands for their life requirements, whilst others use wetlands for only part of their lives (Weller & Spatcher, 1965:105).

The findings of the study indicate that most of the objectives have been achieved. The main outstanding issue is the challenge to establish cooperation between Dukuduku Forest residents and the authorities responsible for managing Dukuduku Forest to come out with an integrated plan to save the natural forest from extinction.

5.6 **RECOMMENDATIONS**

The recommendations that are put forward in this study are not intended to be cut and dry prescriptions but can be used as guidelines to those concerned. The following are recommendations that can be used to resolve the Dukuduku issue:

• The relocation of Dukuduku squatters is the ideal solution to keep the forest in its indigenous state and to allow for its rehabilitation. This has
proved to be difficult, as residents demand title deeds for the land they occupy. Dukuduku illegal squatters have already resisted removal by intimidating those who have registered for resettlement. Many attempts by different government departments have failed to persuade the forest dwellers to move out of the forest but it is hoped that an amicable solution to resolve the issue will soon be reached. One of the forest management options that may be taken to save the forest is to involve Dukuduku residents in all planning and management decisions. Such steps concur with Hypothesis 3: that the introduction of good forest management systems will result in saving the forest from devastation.

- Another option to address the issue could be to leave the forest dwellers as they are and educate them about the responsible and sustainable utilization of natural resources. This has already started with the traditional healers who have a nursery for certain species as mentioned in previous chapters. There should be a sector of the forest that will be reserved for settlement and farming. Another sector of the forest should be fenced and demarcated as a restricted area. The preserved sector of the forest dwellers so as to empower the residents whilst the natural forest's survival is guaranteed. Even if the residents are given part of the forest, education on natural resources utilization remains important: it is better to preserve a portion of the forest than allow the whole forest to perish.
- Lastly, tourism should be taught as one of the subjects in schools with the emphasis on natural resources preservation. Tourism awareness among all will go a long way to preserve treasures such as natural resources. Ecotourism should be included as a subject in school curricula.

5.7 CONCLUSION

The issue of Dukuduku forest is a complicated one because some of the people practice double standards. Some are not even living at Dukuduku Forest but they own plots and settlement structures in the forest. Others claim that the graves of their ancestors are in the forest, so they have legitimate ultimate right to stay in the forest. Some squatters intimidate people not to register for resettlement in order to protect their illegal activities like gunrunning and dagga cultivation. To them the forest acts as a hideout during and after their illegal activities.

It has become clear that very few people could be regarded as legitimate owners of the land in the forest. It is up to the South African government to see to it that this magnificent natural forest is saved from extinction.

It is hoped that this study has succeeded in exposing the critical condition of Dukuduku forest. Facts have been provided facts regarding the conflicting interests of the Dukuduku dwellers, government and conservationists concerning the Dukuduku forest. The bias in the study, if any, could be that some of the information given by the respondents was either incorrect or unreliable. The reason for that may be that some residents did not want to expose their living situation in the forest. It was also noted that some respondents were secretive and wanted to remain anonymous for fear of victimisation.

The latest news (29 April 2001) is that the Dukuduku forest settlers have finally agreed to move out of the forest into a housing development project but this has not been confirmed. According to the *Zululand Observer*, (April 29, 2001), the

-1

Minister of Water Affairs and Forestry, Ronnie Kasrils, announced that the Dukuduku forest dwellers resettlement project had been approved. In addition the Minister said that housing for the community would be provided before the end of the year (2001) through a R9, 2 million financial allocation by the KwaZulu Natal Department of Housing, but up to date this has not happened (2003).

According to the *Zululand observer*, (29 April, 2001) another project launched by Minister Kasrils will see weeds and alien vegetation, which has sprung up in the forest, being cleared away. This project will help to prevent further destruction of the natural forest vegetation. This will also prepare the forest for rehabilitation once the settlers who gather firewood and grass from the forest bed have relocated. It is also hoped the settlers will be employed to implement the clearing programme. This project will provide employment for 850 members of the community. The settlers, mostly women, will be employed through 37 independent contractors who will be responsible for the rehabilitation project.

News of the relocation of Dukuduku forest dwellers would give hope to the rehabilitation of this precious forest, although rumours still prevail that only few Dukuduku forest dwellers have agreed to move out of the forest Four busloads of Dukuduku dwellers went to the United Nations Racism Conference held in Durban on 31 August 2001 to demonstrate against the proposed relocation. This demonstration act by Dukuduku dwellers was an indication of the fierce resistance by them fro moving out of the forest.

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APPENDICES

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APPENDIX - A

QUESTIONNAIRE TO PRINCIPALS OF SCHOOLS AT DUKUDUKU FOREST

Kindly fill the questionnaire below. This questionnaire is for study purposes. Your co-operation is highly appreciated.

1. What is your school enrolment?

Below 100		
101-200		
201-300		
301-400	T	
Above400	 1	

2 How many classrooms does your school have?

0-5	
5-10	
Above 10	

3 Do you have enough furniture at your school

Yes	
No	

4 Does your school has playgrounds

Yes		
No		

5 Indicate sport codes available at your school

Volleyball		
Soccer	 	
Netball		
Other		

6 Do parents have problems in the paying of school fees?

Yes	
No	

7. Do you have any additional comments?

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Thank you.

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<u>APPENDIX - B</u>

A QUESTIONNAIRE TO DUKUDUKU RESIDENTS.

The impact of subsistence farming and informal settlement on Dukuduku Forest as a tourist resource is what this questionnaire is all about.

Please respond to the question by ticking the appropriate blocks to indicate the response applicable to you. The information in this questionnaire is for research purpose only. All the responses will be treated as confidential and identities are not required

Thank you in advance.

PERSONAL DETAILS

1.1

Gender	Male	1
	 Female	2

1.2

Marital status	Never Married	1
	Married	2
	Divorce	3
	Widow /Widower	4
	Separated	5

1.3

Period of stay in years	
Less than 5YRS	1
6-10YRS	2
11 – 15YRS	3
16-20YRS	4
21-30YRS	5
Above 30YRS	6

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Means of earning a living	
Business	1
Labour	2
Professional	3
Farmer	4
Other	5

1.5

Place of Work	
Mtubatuba	1
St Lucia	2
Empangeni\Richards Bay	3
Other	4

2. FARMING ACTIVITIES

2.1

Type of farming engaged in:	
Crop farming_	
Stock farming	2
Both	3

2.2

Reasons for farming	
Commercial	
Subsistence	2
Both '	3

2.3

Type of stock farming	
Sheep	1
Goats	2
Cattle	3
Other	4

2.4

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Type of cropping system	
Monoculture	1
Crop rotation	2
Both	3

Where do you graze your stock?	
Open veld	1
Camps	2
Both	3

2.6

Source of water for your crops	
Rainfall	1
Irrigation	2
Both	3

2.7

What type of crops have you cultivated? Mention as many you can.	
Potatoes	1
Tomatoes	2
Onion	3
Pumpkins	4
Sweet potatoes	5
Beans	6
Maize	7
Other	8

2.8

Do you think the soil is fertile enough for crop farming	
Yes	1
No	2

2.9

To whom do you sell your produce	
Tourist	1
Local people	2
Business people	3
,, <u></u> , <u>A</u> ,,	4

3. <u>SETTLEMENT</u>

3.1

What type of building material is	
your house made of?	
Bricks	1
Blocks	2
Timber	3
Other	4

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For what purpose do you use trees	
Building	1
Craft work	2
Medicine	3
Other	4

3.3

Do you think informal settlement destroys the environment?	
Yes	1 .
No	2

4. TOURISM – RELATED ACTIVITIES

4.1

Respond to the following questions using the following rating scale:	
Strongly agree	1
Agree	2
Disagree	3
Strongly disagree	4

4.2

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Do tourist visit this area?	
Yes	
No	

4.3

Dukuduku forest has a great potential for tourism	
Yes	1
No	2

4.4

2 1 1

People will have a better life if removed from Dukuduku	
Yes	1
No	2

I am aware of the damage on the environment caused by my activities	
Yes	1
No	2

4.6

What do you think may attract to this forest	
Wild animals	1
Plant species	2
Zulu culture	3
Birds	4

4.7 Do you have any additional comments?

Thank for your co-operation

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Appendix C: Forest Farm



PICTURE: TONY CARNIE

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FOREST FARM: Dr Jabulani Mjwara surveys part of the 500ha sugar cane plantation which the national government has bought for nearly R11 million to resettle people from the Dukuduku indigenous forest near Lake St Lucia. Part of the rare and threatened forest can be seen in the background.

Appendix D: Open space serving as a classroom



Dukuduku committee meeting held on January 08, 1999 in the St Lucia

Notes of the meeting held in the offices of KwaZulu-Natal Nature Conservation Services in St Lucia on Thursday January 8, 1999.

DWAF

DWAF

1. In Attendance:

Dr J Mjwara Mr T Khumalo Mr M Brundyn Mr SJ Rapolai Inkosi Mkhwanazi Mr M Mthembu Mr S Zungu Mr J Buthelezi Mr A Mdlalose Mr J Dube Mr R Mbokazi Mrs RT Zungu Mrs N Shandu Mr M Mthethwa Mr M Sineke

DWAF DWAF Mpukunyoni Tribal Authority Dukuduku Community Representative Facilitator

2. Opening remarks:

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The facilitator welcomed all in attendance especially the presence of Inkosi Mkhwanazi. Dr Mjwara gave a brief overview of last year's events and emphasized that the matter has to be settled as soon as possible in the new year. He expressed his gratitude for the presence of Inkosi Mkhwanazi and said he hoped the matter would now be resolved.

3. Matters discussed:

- 3.1 Dr Mjwara reported that in a community meeting held on Sunday, December 20 1998, it became evident that a big number of the community was in favour of the government's proposal. It is only a few that was against this proposal and the rest were intimated by the few. Committee members had visited the farms and we impressed with what they had seen. The community had requested that Inkosi Buthelezi and the King be requested to come and address them on this matter and Dr Mjwara had sent the invitations.
- 3.2 In response to a question on whether the committee could be provided with some copies of the Title Deeds for the newly purchased farms, Dr Mjwara responded that the Department of Land Affairs had approached him and wanted to know the name under which the farms will be registered. In view of the fact that he had not been given a name by the committee, he had requested the department of Land Affairs to provisionally register the farms under the Department of Water Affairs and Forestry until he gets a name from the community.

Dukuduku committee meeting held on January 08, 1999 in the St Lucia

3.5

3.3 Inkosi Mkhwanazi asked about legal implications for traditional authority over land purchased by the government as Minister Asmal had mentioned that people would be under a transitional local council and not under any traditional authority. It the land purchased falls under traditional authority, it should be registered under Mpukunyoni Tribal Authority.

3.4 Dr Mjwara responded that the government has no say on local governance. The land acquired would fall under the traditional authority and as far as DWAF is concerned, Hlabisa Regional Authority, Mpukunyoni Tribal Authority and Uthungulu Regional Council will play a role in the governance of the new area.

- Responding to a question on what will the community benefit from the project Dr Mjwara said the following:
 - The community has 100% share ownership of all the proceeds generated by sugar-cane form the two purchased farms
 - The community and the government will jointly manage the forest as per the provisions of the new Forest Act (copies to be sent to the facilitator for distribution)
 - Profits generated from the forest will be split evenly with the government taking 50% and the community taking the other 50% of the profits
 - The government's share will be used for the maintenance of any profit generating activity whilst the community's share would be used by the community for its own benefit
 - All job opportunities that will arise in the forest will be given to the community and the community will continue having access to the forest
- 3.6 Responding to a question on how to ensure maximum tourist attraction to Dukuduku, Dr Mjwara said the Dukuduku issue was attracting a lot of attention in the international arena and once settled, Dukuduku will become a major tourist destination.
- 3.7 Inkosi Mkhwanazi said he was satisfied that the proposal from the government was acceptable and requested that an undertaking be given to him confirming that land will be registered under Mpukunyoni Tribal Authority.

3.7 Dr Mjwara acknowledged the satisfaction of the Inkosi and requested that the Inkosi should seek a lawyer (at the cost of DWAF) who will assist Inkosi in all the proceedings with DWAF on this project.

University of Zululand:

DURBAN-UMLAZI CAMPUS



Private Bag X10
 ISIPINGO 4110
 South Africa
 031-9075055
 Fax: 031-9073011

Ref:

lm/f1/y98

25 May 1998

TO WHOM IT MAY CONCERN

This is to certify that Mr. T. E. Ntombela [810095] is a registered Masters in Recreation and Tourism [MRT] student at the Durban-Umlazi Campus of the University of Zululand. He is presently working on a research project which is part of requirements for completing his MRT programme. The title of his research project is:

The impact of subsistence farming and informal settlement on Dukuduku forest as a tourist resource.

Kindly help him with any kind of informal or assistance he may require.

He may also require some assistance regarding internship work with your organisation. Kindly give some assistance. It is the Department's policy to treat all information acquired for research purposes with the strictest confidentiality possible. We will appreciate your valued assistance in this regard.

Yours faithfully

PROF 1. M. CO-ORDINATOR & MRT VICE-RECTOR: [DUC]