Enhancing the ecotourist experience at Shongweni Reserve through the use of appropriate interpretive strategies

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Declaration by student

The work described in this dissertation was carried out under the auspices of the Durban University of Technology under the supervision of Prof H. Baijnath and Ms R. Ramsingh from the period 2008 – 2010.

The study represents original work by the author and has not otherwise been submitted in any form for any degree or diploma to any University. Where use has been made of the work of others it is duly acknowledged in the text.

Abstract

The current biodiversity and extinction crisis has ignited global concern for human and planetary well-being, culminating in the declaration by the United Nations of 2010 as the International Year of Biodiversity. Concomitant with these developments has been the steady ascent of the ecotourism industry, a subset of the travel and tourism industry that holds some promise for the conservation and enhancement of natural areas. A third strand that may be added that weaves them all together for mutual benefit, is the use of interpretation as a communication strategy that enhances the travel experience for the visitor, stimulating interest and enriching their knowledge of local natural resources.

This study examines the role of interpretation within one of the largest protected areas in the Durban area, Shongweni Reserve. Rich in faunal and floral diversity, the reserve hosts a range of active and passive recreational pursuits for local and international visitors. This study examines the range of natural, historic and cultural resources within the Shongweni Reserve and then develops appropriate themes for interpretive print material to effectively provoke and stimulate visitor interest in local biodiversity. Print samples were attractively designed to showcase interesting facets of plant and animal wildlife in the reserve. The samples integrated aspects of floral and faunal conservation status together with Zulu cultural use in the narrative and text. Findings from the survey revealed that most visitors were interested in learning more about local biodiversity and found the interpretation material to have a high degree of personal relevance. This has significance in terms of encouraging reserve management to communicate effectively with their visitors using interpretive media as a vehicle and stimulus for biodiversity conservation.

Dedication and acknowledgements

With gratitude in my heart to Almighty God for sparing my life and giving me the grace and ability to complete this work. Secondly, for my loving wife Claudia and my two sons Francis and David may you always look to creation for nurture and inspiration.

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BGCI	Botanic Gardens Conservation International
CBD	Convention on Biological Diversity
CCP	Cities for Climate Protection
CDI	Centre for Design and Interpretation
CITES	Convention on International Trade in Endangered Species
DEAT	Department of Environment and Tourism
DMOSS	Durban Metropolitan Open Space System
EESMP	eThekwini Environmental Services Management Plan
EKZNWCS	Ezimvhelo KwaZulu-Natal Wildlife and Conservation Services
EMA	eThekwini Municipal Area
EMD	Environmental Management Department
EMEMP	eThekwini Municipality's Environmental Management Policy
EMS	Environmental Management System
EPLC	eThekwini Parks, Leisure and Cemeteries
GSPC	Global Strategy for Plant Conservation
GIS	Geographical Information System
GISP	Global Invasive Species Program
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
IYOB	International Year of Biodiversity
MORI	Market and Opinion Research International
MINTEL	Market Intelligence
MTBG	Mount Tomah Botanic Garden
NBT	Nature Based Tourism
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act (Act 107 of 1998)
NEM: BA	National Environmental Management: Biodiversity Act
NSBA	National Spatial Biodiversity Assessment
NPAES	National Protected Areas Expansion Policy
PA	Protected Area
RBG	Royal Botanic Gardens (A prefix for a range of gardens world-wide)
SADC	Southern African Development Community
SANBI	South African National Biodiversity Institute
SR	Shongweni Reserve
TIES	The International Ecotourist Society
TRAFFIC	Convention on International Trade in Endangered Species
UCLA	University of California and Los Angeles
UNEP	United Nations Environmental Program
UNWTO	United Nations World Tourist Organisation
WCED	World Commission on Environment and Development
WCPA	World Congress on Protected Areas
WTO	World Tourism Organisation
WWF	World Wide Fund for Nature

CHAPTER ONE INTRODUCTION

1.1 International and local context of ecotourism, biodiversity and interpretation

Ecotourism and the conservation of biodiversity are intertwined entities that have leapt to the fore in recent years, both in terms of international profile and economic growth (Epler-Wood, 2010; Tourism KwaZulu-Natal, 2007; Fennell, 1999). Ecotourism is a subset of the travel and tourism industry that holds some promise for the conservation and enhancement of natural areas (Weaver, 2008; TIES, 2007).

Biodiversity is defined as the species richness of life on earth (Global Biodiversity Outlook 3, 2010; Willis, 2006). Human health, development and well-being are entirely dependent on this finite and limited resource (Millennium Ecosystem Assessment, 2005).

It has been publically acknowledged that global twenty year targets aimed at reducing biodiversity impacts have not been met and that habitat loss and species extinctions are accelerating, not subsiding (Global Biodiversity Outlook 3, 2010). The adverse effects of simultaneous climate change are predicted to exacerbate the situation (Global Biodiversity Outlook 3, 2010).

A third strand that binds ecotourism and biodiversity together is the use of interpretation as a visitor communication strategy. This has the twin benefits of enhancing the ecotourist experience and stimulating an interest in local biodiversity conservation (TIES, 2007).

The need to develop interpretation has been validated by the targets set by the Oslo Declaration on Ecotourism 2007. These are:

> *To establish sound environmental and cultural interpretation as a key component of high quality, authentic ecotourism by increasing innovation and funding for education centers and training programs, whose effectiveness should be assessed based on visitor numbers and desired experience.*
>
> (TIES, 2007:5)

Furthermore, the Convention on Biodiversity (CBD) and the Global Strategy for Plant Conservation (GSPC) have endorsed the need for clear interpretation strategies as “The importance of plant diversity and the need for its conservation is incorporated into communication, educational and public awareness programmes” (Willis, 2006:57).

Within the local context it becomes apparent that not enough people visit Nature Reserves in the eThekwini Municipal Area (EMA) and those who do often have little conception about what they are viewing, particularly with regard to the variety and scope of the natural resources (Petterson pers. comm.). The aim is to make local biodiversity knowledge interesting and accessible; hence the role of interpretation (Davison, 2008; Ham, 2007). Interpretation is now a major visitor service on many recreational sites, museums and parks involving the narration of thematic information to visitors using appropriate media (Centre for Design and Interpretation, 2008a; Chang et al., 2008). A certain degree of success has been achieved through demonstrating linkages between plants and everyday life using storytelling and visual narrative as a vehicle (Eden Project, 2007). Darwin-Edwards (2000:37) calls this 'Education by Stealth' or 'educating people who don't particularly want to learn'.

1.2 Purpose and scope of this research

1.2.1 Rationale for the study

The purpose of this research is to determine the current extent of interest regarding biodiversity interpretation at Shongweni Reserve (SR) amongst visitors and staff and to provide recommendations on how the natural resources of the reserve may be best interpreted to enhance the visitor's ecotourist experience thus contributing to stated objectives within the Oslo Declaration on Ecotourism (2007).

1.2.2 Objectives of the study

- To survey relevant literature in terms of ecotourism, biodiversity and interpretation;
- To synthesize and integrate relevant biophysical data concerning the natural resources of the area;
- To ascertain the current extent of existing biodiversity or natural heritage interpretation at SR;
- To evaluate the depth of interest regarding incorporation of natural heritage interpretation into the reserve amongst the various stakeholders such as visitors, reserve staff and tour operators; and
- To provide recommendations as to the nature and type of natural and cultural heritage interpretation material required for inclusion as part of the ecotourist package offered to visitors.

1.3 Study area

Shongweni Reserve (SR) is some 1 700 ha in extent and has been declared to be “The largest single piece of protected natural bush and virtually unspoilt natural scenery in the metropolitan area of Durban” (Nichols and Fairall, 1992:75). The reserve has been recognised as a key core area within the Durban Metropolitan Open Space System (DMOSS) with significance in terms of river catchment management, as a wildlife habitat, and as a source of genetic material particularly medicinal plants (Boon, 2007; Patrick, 1998). A number of Red data and Priority plant species are found in the reserve. These include cycads, bulbous plants, perennials, orchids and succulents (Patrick, 1998).

Faunal diversity at SR is equally impressive. A popular venue for ornithologists, the reserve boasts over 240 species of birds including four resident eagle species as well as the endangered Black Stork that breeds on the cliffs (Cowgill and Davis, 1998). Rich in mammalian life the reserve stocks large game in the form of Giraffe*,* Kudu*,* Buffalo and Square-lipped White Rhinoceros as well as a range of bats including Wahlberg’s Epauletted fruit bat and the tiny Sundevall’s leaf nosed bat (Msinsi Profile, 2008, Taylor pers. comm.). In terms of invertebrate life local enthusiasts have identified 132 species of butterflies and 39 species of dragonflies and damsel flies (Norman pers. comm.).

Furthermore the reserve has attractive scenery, visual amenity value and tourist potential (Msinsi Report, 2008; Patrick, 1998). These include activities such as game drives, fishing, picnicking, rock climbing, action adventure and team building and canoeing (Msinsi Report, 2008).

1.4 Overview of chapter content

Following the introduction, the literature review (Chapters 2 to 4) examines the nature, scope and background of a triad of topics namely ecotourism, biodiversity and interpretation thus providing a contextual framework for the study area. These topics are multifaceted and require adequate exploration before undertaking the investigation at Shongweni Reserve. Each of these chapters reviews recent findings both internationally and on a local level and present the working definitions used in this research.

The research methodology component (Chapter 5) is then presented which has a five step approach. First, an inventory gathering phase of the biophysical, cultural and tourist attractions at SR. Second, an interpretive strategy and themes are developed from these resources. Thirdly, sample interpretive materials following these themes are produced for visitor evaluation. Fourth, an appropriate visitor questionnaire or survey instrument was developed which includes these interpretive print samples. Finally, visitor responses are analysed using appropriate statistical analysis. Research results (Chapter 6) are then discussed followed by recommendations for implementing interpretation at SR as well as suggestions for further research (Chapter 7).

CHAPTER TWO ECOTOURISM

2. 1 Introduction to ecotourism

The purpose of this section is to provide a conceptual framework for an understanding of the ecotourist phenomena. Firstly, the **nature and characteristics of ecotourism** are described and core principals and definitions from the literature are examined. Ecotourism is described in this work as a subset or component of the global travel industry that emerged as a form of sustainable tourism wholly dependent on natural resources. The concept evolved with a strong conservation ethic placing the emphasis on local community involvement and the positive economic multiplier effects the industry could have on its host country. The rise of the 'green consumer' is noted developing in parallel with various international protocols and conventions.

Secondly, **demographic and sociographic profiles of ecotourists** and target markets are investigated. Four distinct visitor categories emerge that have relevance for the study area of Shongweni Reserve. The nature of the potential target market is then explained in terms of foreign and local visitors and an overview of the aesthetic value of protected areas to these groups is provided. An understanding of visitor motivation to natural areas stresses the intrinsic relationship of man to nature for its restorative and psychological effects. An awareness of environmental psychology informs the careful design of interpretation material which can enhance the visitor experience. The hypothesis is central to this research.

Thirdly, **ecotourist destinations and market spend** are examined within the context of the study area. Current statistics serve to highlight the growing demand for ecotourist and nature based packages within the national**,** regional and local ambit.

2.2 Nature and characteristics of ecotourism

2.2.1 Ecotourism as a vibrant component or subset of the global travel industry

The ever increasing economic importance of the global tourist industry has been grasped by both developed and developing countries. The World Tourism Organisation (WTO) noted that tourism was one of the most important economic, social, cultural and political phenomena of the twentieth century (Mintel Report, 2004; Roe et al., 1997).

Observations between 1950 to 2007 indicate a sustained growth of over 4% a year, in spite of the stagnation between 2001 and 2003 due to terrorism, avian flu and the international economic downturn (UNWTO, 2008). International tourist receipts exceeded US$1 trillion in 2009, or almost US$3 billion a day (UNWTO, 2010). Worldwide, international tourist arrivals in foreign destinations reached 903 million in 2007, up 6.6% on 2006 (UNWTO, 2008). International arrivals declined, however, in 2009 by 4.2% to 880 million visitors (UNWTO, 2010). Despite the uncertainties posed by the global economy affecting consumer confidence and constraining disposable income international arrivals worldwide are expected to reach 1 billion by 2010 and 1.6 billion by 2020 (UNWTO, 2010).

Ecotourism, a unique sector of the travel industry, has been defined as "Responsible travel to natural areas that conserves the environment and improves the welfare of local people" (TIES, 2007). Originating in the 1990s, ecotourism has been growing at 20%-34% per year (Mastny, 2001). In 2004, ecotourism/nature tourism was growing globally three times faster than the tourism industry as a whole (WTO, 2004). Ecotourism is thus part of a broader based nature tourism which is itself a subset of mass tourism (Weaver, 2008). Its close companion Nature tourism, defined as "Any form of tourism that relies primarily on the natural environment for its attractions or settings" (TIES 2007) is growing at 10%-12% per annum in the international market (Mintel Report 2004). The United Nations Environment Programme (UNEP) and Conservation International (CI) have indicated that most of tourism's expansion is occurring in and around the world's remaining natural areas (Costas, 2005).

A range of authors (Weaver, 2008; Fennel, 2003; Ceballos-Lascurain, 1996; Preece et al., 1995; Cater and Lowman, 1994; Lindberg and Hawkins, 1993; and Boo, 1990) have sought to define the recent travel phenomenon of ecotourism. Weaver (2008) selected eleven definitions to illustrate the absence of consensus on the precise meaning of ecotourism. While the pursuit of precise definitions may be of limited value never the less the better known statements are represented here to serve as a platform for debate. Many of them contain the common thread of learning about nature, the key theme of this particular work.

2.2.2 Origins, definitions and debate

2.2.2.1 The shift from mass tourism to alternative tourism

Ceballos-Lascurain (1996) noted that mass tourism had its origins in the industrialised affluent nations of the West and Asian Pacific regions in the post war years. The industry was boosted largely by advanced transport technology (Pearce, 1981) and an increase in disposable income and leisure time (Cochrane, 1994).

Global concern for environmental issues during the decade of “Green consumerism" in the eighties highlighted the adverse impacts of mass tourism on both the biophysical and cultural environments (Roe et al., 1997; Hunter and Green,1995; Wall, 1994). The concept of sustainable development as described in the Brundtland Report (WCED, 1987) rapidly evolved into “sustainable tourism”, “alternative tourism”, “ecotourism” and “nature based tourism”.

Fennel (2003) observes that there is a “critical absence of focus” in defining the tourist industry and notes that tourism has been both praised and vilified for its ability to transform regions. Critical reviews of tourism and sustainability include the work of Goodall and Cater (1996) who believed that sustainable tourism will probably not be achieved despite the most committed environmental efforts (cited in Fennel, 1999:24). Both Weaver (2008) and Fennel (2003, 1999) provide a comprehensive discussion on prevailing paradigms of mass tourism, sustainable tourism and alternative tourism and conclude that ecotourism has evolved as a subset of alternative tourism which itself was a product of the need for mass tourism to move toward more sustainable tourism practices. These relationships are depicted in Figure 1.1 along with the evolving relationship between the three common alternative tourism products (ecotourism, adventure tourism and cultural tourism).

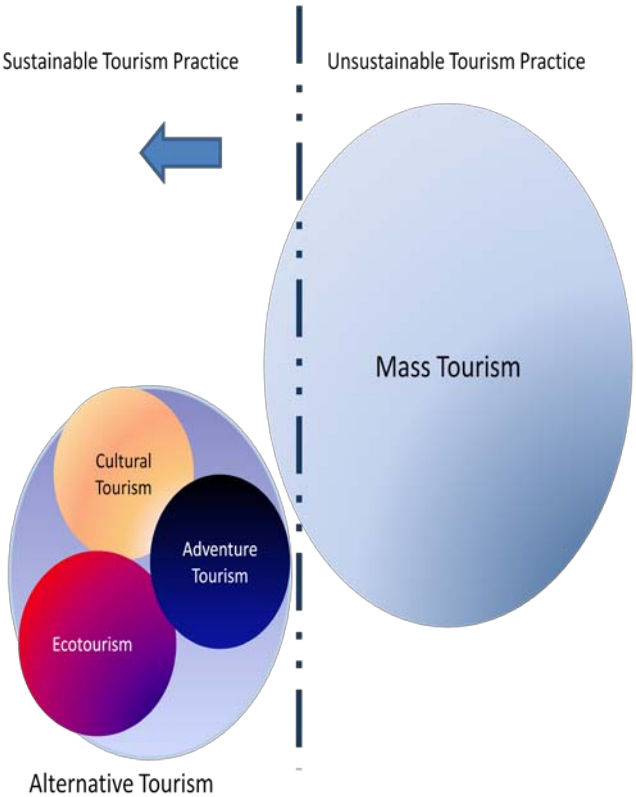

Figure 1.1: Ecotourism as a subset of alternative and mass tourism

Source: Adapted from Fennell (2003)

2.2.2.2 Sustainable tourism and the evolution of the term “ecotourism”

Fennel (2003) observes that consensus has been reached in the literature that the Spanish term ‘ecotourismo’ was coined by the Mexican ecologist Ceballos-Lascurein in the early eighties. Weaver (2008) notes that the hyphenated term “eco-tourism’ first appeared in English academic literature in an article by Romeril in 1985.

Fennel (1999:31) points out that ecotourist principles can be traced back to Hertzer in 1965 who related four fundamental pillars of responsible tourism. These included: Minimum environmental and social impacts, maximum economic benefit to the host communities and an enhanced travel experience for the visitor. Weaver (2008) noted that the Canadian Government had already developed “ecotours” as early as 1973 on the basis of different ecological zones found along the course of the highway.

Fennel describes a “convergent evolution” where “many places and people responded independently to the need for more nature travel opportunities in line with society's efforts to become more ecologically minded” (Fennel, 1999:234). He continues this reasoning noting that ecotourism was viable long before the 1980s in “practice if not in name” (Fennel 1999:32). Nash (1982) noted that many North American wilderness travellers during the 19th century were European and that “the intellectual revolutions of the time inspired the belief that unmodified nature could serve as a deep spiritual and psychological tonic” (cited in Fennel 1999:33).

2.2.2.3 Comparative definitions of the ecotourist concept

Laarman and Durst (1987) believed that ecotourism was a form of nature tourism which combined elements such as education, recreation and adventure. In later writings nature tourism was described as “Tourism focused principally on natural resources such has relatively undisturbed parks and natural areas, wildlife reserves and other areas of protected flora, fauna and habitats” (Laarman and Durst, 1993:2). The most widely accepted definition from The Ecotourism Society (TES) includes the concept of economic empowerment for the host communities: “Ecotourism is responsible travel that conserves the natural environment and sustains the well being of the local people” (TES in Lindburgh and Hawkins, 1993:8).

Further definitions broaden the scope to include the aspects of learning and enjoyment of the natural and cultural resources: “Tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals as well as any cultural aspects both past and present found in these areas” (Ceballos-Lascurain in Boo, 1990:2).

The Australian National Ecotourist society defines ecotourism as “Nature Based Tourism (NBT) that involves education and interpretation of the natural environment and is managed to be ecologically sustainable” (CDoT, 1994:7). Ecotourism *per se* remains notoriously difficult to define. It has been asserted that the concept of ecotourism developed far beyond the original definitive boundaries and that elements of NBT and ecotourism may enter all segments of the tourist market as the industry evolves in a dynamic and fluid manner (Preece et al., 1995).

Fennel (1999) conducted a comparative study of 15 current definitions and felt the need to preserve an element of homogeneity. This definition encapsulates the basic principals underpinning the ecotourist concept: “Ecotourism is a sustainable form of natural resource based tourism that focuses primarily on experiencing and learning about nature, and which is ethically managed to be low impact, non consumptive and locally orientated. It typically occurs in natural areas, and should contribute to the conservation and preservation of such areas.” Fennel (1999:43). Fennel (1999) maintains that activities formerly grouped under the term nature tourism (adventure tourism, fishing and ecotourism) might best be labelled natural resource based tourism. This latter categorization includes the twin elements of conservation (saving *for* use) and preservation (saving *from* use). The researcher has made use of these concepts in approaching the present study, namely that ecotourism is one aspect of nature orientated tourism which includes many other types of tourism and outdoor recreation, both consumptive and non consumptive. This particular study endorses Fennel’s definition of ecotourism as being the most appropriate.

Weaver (2008) in seeking consensus distils four core criteria for ecotourism. First it is a subset of the tourist industry; second, attractions are primarily nature based but can include associate cultural resources and influence; third, education and learning outcomes are fostered; fourth, environmental and socio cultural sustainability is achieved together with financial viability. Now that an understanding of the term ecotourism has been established the following section provides perspectives on historical and current paradigms relating to ecotourism.

2.2.2.4 Old century-new century: fresh paradigms and challenges

Changing world views

Ecotourism evolved within the framework of changing world views or paradigms. Weaver (2008) cites Jafaris’s model of four phases of tourist growth. According to Jafari (2001) the 1950s and 60s were the advocacy platform where the revenue generating aspects of tourism were praised and the negative consequences minimized. The advocacy phase developed into the cautionary phase in the 1970s and the need for regulatory behaviour was

emphasized particularly in third world developing countries. The 'adaptancy' platform followed in the 1980s grouped under the banner 'alternative tourism' which distanced itself from the negative 'mass tourist' approach. In the 1990s there was a realization that these ideologically separate approaches should be super ceded by a more objective knowledge based platform advocating a measured growth approach considering the unique attributes of each tourist destination (Weaver, 2008).

New paradigms and challenges - the rise of the green traveller

Green issues now dominate world headlines as climate change, environmental disasters, food security and the need for renewable energy sources come to the fore (Time, 2008). The so called 'Green consumer' has emerged from surveys in North America, Western Europe and Australia. In the United States 73% of adults surveyed felt that global warming was a serious problem (Polling Report.com2006). The need to protect the environment was cited by the Australians as the biggest single issue to be addressed by world leaders (Angus Reid Global Monitor, 2006). Weaver (2008) groups Western societies in the 21st century into three groups namely: Non environmentalists, opportunistic or 'veneer environmentalists' and true environmentalists. He argues that these groupings are mirrored in the profiles of visitors citing conceptual and empirical evidence displayed in variations of the hard- soft environmental spectrum (Weaver, 2008). According to Weaver, (2008:44) the hard ecotourist ideal has a strongly bio centric belief and a desire for deep and meaningful interaction with the natural environment. So called soft ecotourists are dominated by the 'veneer environmentalist' segment engaging in ecotourism as only one facet of their multi-purpose trip. To the extent they wish to interact with nature, they prefer mediation in the form of guided tours and interpretive centres (Weaver, 2008).

Corporate Social Responsibility as evidenced by sustainable protected environments, a strong code of ethics and support of local communities is now viewed as a travel imperative by Western society. More than two-thirds of United States of America and Australian travellers, and 90% of British tourists, consider active protection of the environment and support of local communities to be part of a hotel's responsibility (TIES, 2007).

In a United Kingdom survey commissioned by the Association of British Travel Agents, 87% of travellers said their holiday should not damage the environment (Market and Opinion Research International, 2002). In Germany, 65% (39 million) of travellers stated that environmental quality was an important travel consideration (Ecotrans, 2004).

Converging global concerns and conventions

Green attitudes, practice and policies are supported, defined and adopted by high profile conservation and travel organizations. Protocols include *inter alia:*

- Agenda 21 for the Travel and Tourism Industry. World Tourism Organisation (WTO, 1997);
- Guidelines on Tourism in Vulnerable Ecosystems. Convention of Biodiversity (CBD, 2008); and
- Sustainable Tourism in Protected Areas: Guidelines for Planning and Management Fifth World Congress on Protected Areas (WCPA, 2003).

The significance and nature of ecotourism has been endorsed internationally by the United Nations Environmental Programme (UNEP, 2001) who in partnership with the World Tourism Organisation (WTO) designated 2002 as the International Year of Ecotourism (IYE), the peak event being the World Ecotourism Summit held in Quebec, Canada. Emerging from this was the *Quebec Declaration on Ecotourism 2002* which built commitment to policies and actions to strengthen the unique contribution of ecotourism to conservation, and sustainable development (TIES 2007; Buckley, 2003). The declared intent of the Quebec Declaration (2002) to interpret the natural and cultural heritage of the destination for the visitor is of particular relevance to this study. Five years later the Global Ecotourism Conference 2007 (GEC07) was held in Oslo, Norway.

The Oslo Declaration on Ecotourism 2007 outlined recent challenges and changes within ecotourism and formulated a structured response. Concern was expressed over so called “green washing” within the tourism industry and although visitor interest in natural areas was on the rise, these opportunities also brought pressures and the need for best practice management (TIES, 2007). Further challenges that were recognised included the reduction of the carbon footprint, control of multiple transport emissions particularly in the light of climate change and the inclusion of local communities into the ecotourist milieu in an innovative and socially appropriate manner (TIES, 2007).

2.2.3 Ecotourism and its dependency on natural resources

Tourist facilities and services exist in a continuum, some are dependent on natural resources for their operation, others are not. The Ecologically Sustainable Development Working group (ESDWG, 1991) suggested that ecotourism is a situation where the idea of a symbiotic relationship between tourism and the environment becomes most apparent.

This interdependent relationship between ecotourism and natural resources has been recognised by a range of authors (Hunter and Green 1995, Preece et al., 1995, and Weaver, 2008) and is a central topic for discussion in this research. Debate whether the relationship is beneficial or destructive continues with certain evidence suggesting that the natural resource base on which the industry depends is being rapidly eroded (Fennel, 2003; Cater and Lowman, 1994). Ecotourism and NBT may form parts of the varied tourist experience ranging from an hour long guided walk and talk by a local ranger to a sophisticated month long ornithological tour of a Rondonian Rain forest.

Tourism has also been recognised as a progressive tool for the Conservation of Protected Areas (PA's) by the IUCN World Commission on Protected Areas' (WCPA, 2003) and the Convention on Biological Diversity (CBD, 2008). The world's tourism and recreation sector potentially provides significant benefits to PA's and associated communities including acquisition of land, greater appreciation of cultural and natural heritage, and increased interest in and commitment to the conservation of natural and cultural values. Visitation, recreation and tourism are critical components of fostering support for parks and the conservation of biological and cultural heritage (WCPA, 2003).

2.2.4 Summary of key ecotourism principles

In summation then from the literature surveyed the key principals underpinning the concept of ecotourism are the following:

- It should not degrade the resource but provide long term benefits to both the community and the tourist industry. These benefits may be scientific, conservation orientated, social, cultural or economic in nature;
- It should provide first hand enlightening and participatory travel experiences;
- It should involve education amongst all stakeholders;
- It should recognize the limitations and constraints of the resource; the industry should be supply orientated as opposed to demand driven; and
- It should promote the formation of partnerships between the stakeholders and promote ethical behaviour towards the natural and cultural environments.

The section that follows provides a description of ecotourist profiles and explains how detailed market segmentation provides a deeper understanding of how to address visitor needs.

2.3 Ecotourists: demographics and sociographic profiles

2.3.1 Identification and segmentation of the target market

Market segmentation is useful for focusing management efforts on a particular group of people that share similar traits and characteristics (Weaver, 2008). This serves both existing customers and enables operators to identify under-represented markets for potential recruitment (Weaver and Lawton, 2006). Seymour (2008:2) lists seven methods of market segmentation relevant to this study :

- Purpose of visit – holiday/leisure, business or visiting friends and relatives;
- Geographic location – place of residence;
- Socio-economic / demographic – age group, gender, income etc.;
- Channel of distribution – whether or not they use travel agents or tour operators to book a tourism trip;
- Product-related – type of tourism experience or product that appeals to tourists;
- User frequency / seasonality – how often they travel; and
- Psychographic – values, attitudes, preferred and actual tourism activities.

Market segmentation within the ecotourist sector may take place at two levels; firstly to determine how ecotourists differ from conventional tourists, and secondly, to identify distinct ecotourist subgroups (Weaver, 2008). Characteristics that define ecotourists from the mass (unsustainable tourism) market have already been discussed. Ecotourist subgroups relevant to the study area are described in Section 6.2.3.

Potential complications are inherent in any typology given the extremely diverse natures of individuals and ecotourist products. Fennel (2003) maintains that ecotourist profiles mirror the changing dynamics of the ecotourist industry and its diverse product offerings. He rejects the notion that ecotourists are one homogeneous group and that they may be differentiated on the basis of many variables.

Fennel (2003) maintains that a correct understanding of motivation or the drive to satisfy inner physiological and psychological needs is fundamental to research. This links user profiles with the “why” of tourist travel and focuses on the desires, wants and needs of the visitor. This is corroborated by Weaver (2008) who states that motivation and attitude influence behaviour and that together they underpin the dynamics of the hard and soft ecotourist visitor as described in Section 2.2.2.4.

This hard-soft ecotourist continuum has extensive support from the literature. Laarman and Durst (1987), Weaver and Lawton (2002) and Weaver (2008) argue that an understanding of this concept is vital in attracting the desired clientele to a particular destination. Some authors such as Iso-Ahola (1983) have suggested that travel motivation is purely psychological and not sociological in nature and that people travel to either escape their everyday environments or for novelty (in Fennel, 1999:56).

Lindbergh identified four basic categories of ecotourism (in Fennel, 1999:57):

1. Hardcore nature tourists. Scientific researchers or members of dedicated educational tours;

2. Dedicated nature tourists. People who take trips to protected areas specifically to understand the natural and cultural history;

3. Mainstream nature tourists. People who visit foreign and exotic locations for their novelty value; and

4. Casual nature tourists. People who experience nature incidentally as part of a broader trip.

These themes are explored later and relate to the visitor survey in Chapter 5 and 6. Many of the respondents could be categorised as casual nature tourists (Category 4). Dedicated nature tourists (Category 2) appeared to be only a small segment of the total visitor market to the reserves surveyed by this researcher.

Segmentation can also take place according to geography and socio-demographic criteria which will be examined forthwith.

2.3.2 Foreign ecotourists: North American and European travellers

Any discussion of foreign ecotourists should take cognizance of the fact that these visitors originate in the developed world and as such enjoy high levels of education, time and disposable income (UNWTO, 2008; Weaver, 2008; UNEP, 2001). The rise of the green consumer has been previously described and environmental concerns are of prime importance to the sensitized and affluent traveller.

North American ecotourists

The extensive and established network of national parks and forest in both Canada and the United States of America (USA) encourage outdoor recreational opportunities such as hiking and camping, an appreciation for wilderness and natural areas and a desire for quality

travelling experiences (Fennel, 2003). This is coupled with a rich tradition of romantic literature including philosophers such as Ralph Waldo Emerson, Henry David Thoreau and the naturalist John Muir (Primack, 1993). Interpretation tools in North America include dedicated environmental centres, the frequent display of sophisticated signage and highly trained interpretive guides (CDI, 2007).

According to Weaver, (2008) the USA provides the greatest number of international ecotourists as well as sustaining an enormous domestic industry. The term ecotourism is often replaced with terms such as 'outdoor recreation', 'outdoor education' and 'nature based tourism' (Weaver, 2008). National Parks, the flagship for ecotourist activities are buffered by vast tracts of National Forests which offer an array of outdoor experiences and learning environments (Weaver, 2008; CDI, 2007).

A comprehensive overview of the travel motivations of Canadian ecotourists was undertaken by Eagles (1995) who demonstrated distinct differences between ecotourists and general travellers in terms of trip related needs and focus. Ecotourism places a strong emphasis on learning and discovering nature; high levels of sophisticated information and careful study were seen as key attributes differentiating the two groups (Eagles, l995). In an Australian survey of foreign ecotourists, a comparative study was carried out of American, German and British long haul travellers. Americans emerged as active information seekers, reliant on the Internet to research destinations (55%) as well as magazines and word of mouth (57%) (Tourism Queensland, 2006). The results relating to European tourists follow in the next section. For American ecotourists, the top three activities for holiday visits are "history/ historical sites" (79%), "nature/ecological/environmental activities/ wilderness" (74%), and "sightseeing tours" (62%) (Tourism Queensland, 2006). For South Africa, Seymour (2008) noted that Americans comprise the third most important overseas market to KwaZulu-Natal tourism.

European ecotourists

A love and appreciation of nature is evident amongst German travellers. The Australian study conducted by Data Management Association (DAMA) on behalf of Tourism Queensland showed that when Germans ranked their top ten holiday activities, 78% indicated walking and hiking as a reason for travel while 55% of respondents listed visiting gardens and enjoying wildflowers as important to them (Tourism Queensland, 2006). Germans prefer to take foreign rather than domestic vacations as they enjoy an average of six weeks holiday per annum. According to Seymour (2008), Germany is the second largest source of foreign visitors to KwaZulu-Natal and South African Tourism (SAT) has segmented this group into 'Young Wanderlusters' and the 'Next Stop South Africa' group, where appreciation of natural beauty, wildlife viewing and hiking are the most desired pursuits.

United Kingdom

The British market is KwaZulu-Natal's top overseas market, increasingly inclined to seek out unexplored destinations (Seymour, 2008). They are experienced, discerning travellers often using the Internet to make travel arrangements (Seymour, 2008). The British desire for gardening, plant collection and botanizing is legendary and there is potential to attract these visitors to nature reserves through linkages with local botanical gardens (Clement pers. comm.).

2.3.3 The functional and aesthetic value of protected areas and nature reserves to visitors and various user groups

This current section explores some of the aesthetic and spiritual needs humans wish to satisfy by establishing contact with nature via nature reserves and open spaces systems. The tangible benefits of nature reserves and open space systems regarding conservation and the preservation of floral and faunal biodiversity have been extensively recorded by Boon (2007), Boitani et al., (2008) and Weaver (2008) and are described in detail in Chapter 3.

Satisfaction of innate needs

The role and range of sensory and mental perceptions as experienced by the user of natural areas and parks has been documented by a range of authors (Eagles, 1995; Roggenbuck and Lucas, 1987; Abbott, 1977; Leopold, 1972 and Shaffer, 1969). Man has been proposed to be an aesthetic being who finds meaning and inspiration in nature dancing to its "primal beat" (Butler Adams, 1977). The "primordial bond" with nature was described by Schneider (1981) and Wilson (1975) went on to coin the term "Sociobiology" to describe man's link with nature. Nature reserves within the urban context have an intrinsic value for the user that includes psychological rewards that the user may be unable to articulate (Biccard Seppe, 1977). Visitors to nature reserves and open space systems have indicated that they visit such areas in order to experience "A sense of timelessness", "balance" and "harmony with nature" (Biccard Seppe, 1977). It has been stated that "Nature affects our minds as light affects the photographic emulsion on a film. Some films are more sensitive than others; some minds more receptive" (Shaffer, 1969:75).

The restorative effects of nature

Explanations as to the restorative effects of nature have been proposed by Kaplan (1995) who developed the Attention Restoration Theory (ART). Kaplan (1995) suggests that natural environments provide a rest from the mental fatigue that arises from prolonged directed attention. Four components were identified in order for these environments to be restorative.

First, the act of *being away* frees up mental space from directed attention. Second, the new environment must have *extent*, providing a coherent other world to allow for rest. Thirdly, there must be an element of *fascination or* involuntary effortless attention. Finally, there must be *compatibility* between the types of activities available and the individual's own purposes and inclinations (Kaplan, 1995).

These principles have direct application for ecotourist research in the design of satisfying nature destinations and products. The theory has further relevance in the design and development of interpretive material where sensitivity is vital to avoid thrusting unwanted and unsolicited information onto the visitor (Chapter 4, for instance, examines the benefits and limitations of signage and labelling).

An alternative viewpoint put forward by Wilson (1984) is the biophilia hypothesis which describes the innate attraction that humans have for habitats, activities and objects in their natural surroundings. The term "biophilia" literally means "love of life or living systems" (Wilson, 1984). It was first used by Fromm (1964) to describe a psychological association of being attracted to all that is alive and vital. Wilson uses the term in a similar fashion proposing that the deep affiliations humans have with nature are rooted in our biology (Kellert and Wilson, 1993; Wilson, 1984). Evolutionary biology explores further the universal connections that individuals make with natural environments. These concepts are examined in some detail below.

Relevance and significance of environmental psychology to this study

The literature has relevance to this work in the following three areas:

- Understanding the motivations of modern gardeners and the *increasing trend of high visitor counts at Botanic gardens* worldwide has significance for *protected areas.* Both destinations offer natural attractions and both require skilled and sensitive interpretation;
- Understanding *human response to natural environments* can enrich the design of the outdoor ecotourist experience in the areas of trail design, signage and interpretation methods and techniques; and
- Understanding *human response to biodiversity* is key to designing interpretation that is interesting and enjoyable and that communicates conservation imperatives in a clear manner for a large spectrum of visitors.

The themes are dealt with sequentially herewith.

Visitor motivation to botanical gardens and protected areas

Private garden ownership in Britain comprises some 20 million gardens with a Market Intelligence (MINTEL) 2003 report stating that gardening was the most popular practical hobby in the UK (Gross and Lane, 2007). These authors examined individuals' concepts of connecting with nature through the act of gardening in the domestic context and found that universal themes of escapism, ownership and identity were significant. This study interviewed respondents from the age of 18-85 in the UK and the findings indicated a greater affinity for the garden and nature amongst adults and mature adults. Young adults under 30, however, placed greater emphasis on other outdoor and social experiences (Gross and Lane, 2007).

Connell (2004) found substantial increases in garden visitation by tourists and attributes this growth to the diversity of attractions ranging from heritage gardens to the dynamics of the Eden project and the Chelsea flower show. Connell (2004) reinforces the concept of gardens as quiet reflective environments with 546 visitor surveys confirming that elements of tranquillity were rated as the most important motivating factor by all ages and income groups. Clayton (2007) surveyed American gardeners and noted that appreciation for nature, aesthetic enjoyment and peacefulness led to stress relief and was of key importance. These findings confirm research by Kaplan and Kaplan (1989) who surveyed over 4 000 members of the American Horticultural Society confirming that sensory benefits, peacefulness and the tranquillity of nature were rated as the most important benefits of gardening (Kaplan and Kaplan, 2007). Research conducted at Mt Coot-tha Botanic Gardens in Queensland by Ballantyne, Packer and Hughes (2008) showed that botanic gardens visitors were similar to those of national parks in that both groups placed greater importance on the restorative aspects of nature above the activities of learning and discovery. This reiterates the previous findings of Darwin–Edwards (2000) and Crilley and Price (2005) that most visitors want simply to absorb and enjoy the surroundings and care little in learning about plants and ecosystems. McLoughlin (1998) suggests that the outdoor sensory experience itself is the key attraction for visitors cited in Ballantyne, Packer and Hughes (2008).

These four studies are consistent with the predictions of the biophilia hypothesis, namely man's innate link to nature, and therefore have serious implications for designing appropriate interpretation experiences (See Chapter 4).

Understanding human response to the natural environment and landscape

Differing human responses to the natural environment have been examined in an attempt to define and quantify visitor satisfaction (Appleton, 1975; Arrowsmith et al., 2004). Tracking human response to landscapes within the natural environments was originally wholly dependent on self administered visitor questionnaires which led to individualistic and

subjective interpretation (Arrowsmith et al., 2004). Hull and Stewart (1995) proposed the term ‘experienced landscape’ that comprise three key elements, namely, encountered landscape, sequence and feelings.

Encountered landscape incorporates the views, the people and/or the physical objects in a landscape. Sequence refers to the order in which these scenes or objects were encountered. Feelings and thoughts are those subjective qualities experienced concurrently within each of these views (Hull and Stewart, 1995).

A study by Arrowsmith et al., (2004) monitored hikers within the Grampians National Park in Australia who walked a selected trail completing a series of questions every 20 minutes that related to the biophysical nature of the landscape around them. The questionnaire was designed to capture information relating to the so called ‘primitive’ effects of joy, anger, sadness and fear. Not only did the hikers record their feelings at different points and times along the trail, they also fixed their coordinates on the given topographical map with GPS thus creating a biophysical experience of the different landscape features (Arrowsmith et al., 2004).

The **recreational trail** is a core feature of most protected areas allowing pedestrian or vehicular access through natural environments (Enting, 2005). Trapp et al. (1994), as well as Price and Stoneham (2001), provide practical guidelines for trail design including the need to design for beauty, mystery and variety. Kaplan and Kaplan (1989) translated the psychological benefits of the natural environment into a suite of landscape patterns based on observation of people’s preferences. According to Kaplan and Kaplan, (1989) people are able to ‘read’ various landscape patterns including landmarks, points of interest, change of ambience, path layout and the use of compatible materials. These authors maintain that the most basic restorative experience in natural environments is relief from mental fatigue. Visitors derive well-being and value from open space settings that are physically and psychologically comfortable and that exhibit variety and sensory richness (Price and Stoneham, 2001). According to Enting (2005) good trail design should protect the ecological integrity of the environment, provide features of interest and create pockets of different sensory experience. Finally, the element of choice should be present allowing visitors time to respond. These principles are applicable in the Shongweni Reserve study area and the Ntini Trail in particular which is described in Chapter 6.

Understanding human response to biodiversity

This research presents the case study of Shongweni Reserve as being rich in diversity and yet the author postulates that these natural resources are somewhat undervalued by the casual visitor and only appreciated by the dedicated plant or animal interest group. The

reason behind these attitudes and perceptions by the average visitor are numerous and complex and the following brief evaluation of the literature provides some context to the problem of a clear understanding of the term 'biodiversity', which appears to be a universal one. The mental concepts regarding biodiversity held by individuals are complex constructs informed by cultural background, personal experiences and both rational and emotional evaluations (Fischer and Young, 2007). Through the hosting of focus groups in protected areas in Scotland that involved tourists, farmers and foresters, Fischer and Young (2007: 277) documented a range of viewpoints toward biodiversity underpinned by widely diverging strong value judgements:

"*Biodiversity is just a fancy word for nature"*

"*Biodiversity should be preserved under all circumstances. To keep the equilibrium the natural balance"*

"Without it [biodiversity] we are nothing"

"But it's [biodiversity] not fragile, it's extremely robust"

According to this study three clear viewpoints emerged. The first view put forward generally by birdwatchers and mountain climbers advocated biodiversity as the highest priority, seeing natural systems as fragile and humans as generally harmful. The second view propounded by tourists saw man as a user of nature, while the third group of farmers and foresters perceived man as the manager of nature (Fischer and Young, 2007).

These diverse ideas reflect in part the current discourse of conservation biologists and social scientists and are seen by Harmon (2007) as a vital step in the conservation of both biological and cultural heritage diversity. According to Castree, (2005) ideas of nature can be expressed and explained in a variety of collateral concepts. Davison (2008) conducted 90 semi-structured interviews with university educated environmentalists throughout Australia's major cities, examining their attitude and personal response to nature. A variety of passions were evoked including a longing for the purity of untouched wilderness, a disaffection with humanity (man as destroyer), a challenge of finding the self in nature whilst living in the city, and a recognition of the difficulty of connecting scientific thought with personal realities (Davison, 2008).

In conclusion it becomes evident that while in general man feels an innate urge to connect with natural areas and parks, the individual motivations, cultural contexts and personal mental constructs differ widely. An awareness of these factors is pertinent to the design of ecotourist experiences and the development of appropriate site centred interpretation.

2.4 Ecotourism destinations and market spend within the regional context

Individual ecotourist endeavours within the study area of SR are inextricably linked to, and influenced by, the greater global markets. Statistics, while of limited value (as they date quickly), are indicators of broad trends and signposts as to the size, sustainability and composition of potential ecotourist markets. Available statistics do not differentiate between mass tourists and ecotourists but some indication can be gleaned from the type of nature activities included in the suite of options. Tourism receipts are substantial and promise economic multiplier benefits as indicated by the rand values illustrated in the following section.

2.4.1 South Africa

According to South African Tourism (2010) 9.9 million foreign visitors arrived in South Africa in 2009. Of these total visitor arrivals 6 802 720 foreign visitors entered the country for holiday and leisure purposes in 2009, the bulk of these visitors originated from the SADC countries (4 815 046) while Europe and the UK contributed 1 198 158 visitors and North America (USA and Canada) contributed 267 225 of the total. Most SADC visitors arrived by road (4 608 352) and their arrivals were spread fairly evenly throughout the year (Statistics South Africa, 2009).

Strategic planning by the South African government indicates that there is ample opportunity to grow the domestic holiday travel market which accounted for 16% of volume and contributed 39% of tourist revenue in 2008 (Parliamentary Working Group, 2009). Reports indicated that 46.5% of South Africans undertake travel each year taking an average of 2.4 trips per year and spending R25.8 billion, compared to a total direct spend of R74.2 billion spent in 2008 by foreign tourists (Parliamentary Working Group, 2009).

2.4.2 KwaZulu-Natal

International travellers

Approximately 1.2 million foreign visitors arrived in KwaZulu-Natal in 2009 generating market revenues of some R8.75 billion for the province, with the average spend per trip of R7 215.00 (Tourism KwaZulu-Natal, 2010). Core activities these foreign air arrivals participated in included Wildlife and game viewing in a reserve (55%) and visiting natural scenic attractions and parks (66%) (Tourism KwaZulu-Natal, 2010). It is interesting to note that 45% of KwaZulu-Natal's foreign travellers are from Swaziland and Lesotho with only 8% originating in the UK and a smaller percentage from USA (less than 4%). The relevance of these findings is discussed in Chapter 6.

Domestic travel

Domestic travel originates from Gauteng and KZN with an estimated 8 million trips being taken in 2009 generating a direct value to the province of R6.34 billion (TKZN, 2010). In examining the *extent of nature activities* the following data is pertinent. In 2007 some 498 000 (16.2%) domestic travellers visited a nature or game reserve, 280 000 (9.1%) went hiking or mountain climbing, 245 000 (8%) were involved with bird watching and 85 000 (2.8%) mountain bikers or cyclists were recorded (TKZN, 2008).

Nature reserves compete with other tourist attractions (primarily the beach and night life) and only 2% of domestic visitors have cited nature reserves as a *preferred reason* to visit Durban (Tourism KwaZulu-Natal, 2003). Recent figures from 2009 indicate that 15% of domestic tourists claim to have visited a nature or game reserve and bird watching scored nearly 5%. Another interesting development is the growth in cultural and township tours to nearly 20% in 2009 (Tourism KwaZulu-Natal, 2010). KwaZulu-Natal's Nature Based Tourism Product is varied, with two World Heritage Sites, five major game/nature reserves, and 165 other reserves which are privately owned or belong to municipal authorities (Tourism KwaZulu-Natal, 2003).

2.4.3 Assessing the effects of the World Cup 2010 on local tourism

South Africa gained valuable positive press during the run up to and the hosting of the FIFA Soccer World Cup. This showcased the country as a desirable tourist destination in the international arena. These positive gains were off-set by depressed visitor levels at local nature reserves in the Durban area (Nagaran pers. comm.). Fans tended to follow their team around closely, some choosing to camp outside the stadium rather than staying in more expensive accommodation (Tiflin pers. comm.). While foreign visitors did not travel within the province as widely as expected, local visitors tended to remain at home, enthralled by the unfolding soccer spectacle on their television screens (Nagaran, pers. comm.).

2.4.4 Summary

Ecotourism is a multifaceted phenomenon with potential for high end growth in South Africa and within the province of KwaZulu–Natal. It appears from the statistics and the findings in Chapter 6 that the benefits to nature reserves within the province and the city are trickling down somewhat slowly. Protected areas and nature reserves need to be more intimately involved with strategic marketing and planning endeavours at a national level in order to boost their profile.

CHAPTER THREE BIODIVERSITY

3.1 Introduction

The purpose of this chapter is to lay a conceptual framework for a baseline understanding of defining principles of biodiversity while highlighting the richness and distribution of biodiversity on a global, national, provincial and local government level. Threats to biodiversity and global, national and local responses are briefly discussed as applicable to the Shongweni study area. The strategic importance of biodiversity as a key resource base for ecotourism is then emphasized and the protection and utilization of biodiversity within protected areas and reserves is examined. Finally strategies to communicate the value of biodiversity through interpretation are explored.

3.2 Biodiversity defining principles

3.2.1 Defining biodiversity

Biodiversity is simply the number and variety of living organisms on the earth. It refers to the life support systems and natural resources on which we depend (CBD, 2009). The word biodiversity, or 'biological diversity', is defined by the Convention on Biological Diversity (CBD) as 'the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems' (Global Biodiversity Outlook 3, 2010:15).

3.2.2 The nature and value of biodiversity

Quantifying and classifying nature

The exact number of species of plants and animals on the earth remains unquantified (IUCN, 2008c; CBD, 2000; Huntley, 1994; Primack, 1993). Entomologists such as Erwin (1982) astounded the scientific world by setting the total insect species count at 30 million (cited in Dobson, 1996). Critics have pointed out shortcomings in both his methods and results and some conservationists would argue that the exact number of living species is unimportant

(Huntley, 1994). Leading environmentalists such as Wilson estimate the actual number to be in excess of 10 million (Pogue, 2008). Working estimates of life forms range from 8 to 14 million (IUCN, 2008c). Biodiversity is often best understood in terms of the wide variety of plants, animals and microorganisms with 1.8 million species being formally identified (IUCN, 2008c). The most successful group are the invertebrates (1.232 million) with largest kingdom being the insects (950 000) (IUCN, 2008c). The vertebrates including mammals, birds, reptiles, amphibian and fishes account for only 61 258 species with the plant kingdom accounting for 298, 508 species (IUCN, 2008c). Of the known species of plants on earth only 2.5% or 44, 838 plants have been assessed (IUCN, 2008c).

Effective methods of measuring biodiversity are urgently needed to monitor changes in the state of the living world and to measure progress towards the target, set by the World Summit on Sustainable Development (WSSD), of achieving "a significant reduction in the current rate of biodiversity loss by 2010" (Royal Society, 2003:3). The Global Strategy for Plant Conservation (GSPC) believes that a working list of known plant species is a fundamental requirement for plant conservation. This target is said to be attainable by 2010 and is limited to *known* plants currently about 270,000 (GSPC, 2002).

The value of biodiversity

The concept of the inherent usefulness of all species has been described by Elrich and Elrich (1981) in their famed analogy of "the rivet poppers" whereby the planet earth is likened to an aircraft and the biodiversity the rivets which hold the structure together. Removal of the rivets will fatally damage the craft (cited in Huntley, 1994). Biodiversity is crucial to human survival in the areas of agriculture, science and medicine, industrial materials, ecological services, in leisure, and in cultural, aesthetic and intellectual value (Global Biodiversity Outlook 3, 2010). The total value added to South Africa's economy by provisioning, regulating and cultural ecosystem services in South Africa, excluding the marine environment, is estimated to be in the order of R73 billion per annum, which is in the region of 7% of the country's annual Gross Domestic Product. This does not include the value generated by the extraction of water and mineral resources (DEAT, 2009). Further detailed discussion of these global issues is not undertaken in this work as the focus is on biodiversity at a local level and its value to ecotourism as resource base.

Local value of biodiversity to the city of Durban and the Shongweni study area

The city (eThekwini Muncipal Area or EMA) has a dedicated environmental management division that has been instrumental in devising metropolitan open space systems for the city and placing an economic value on local biodiversity and ecosystem benefits (State of

Environment Durban, 2007). These open spaces within the EMA contribute four vital benefits. These include direct benefits, indirect benefits, option benefits and existence benefits (Boon, 2007). Table 3.1 details the variety of services offered by local biodiversity to the city.

Table 3.1: Summation of benefits provided by functional ecosystems within protected areas and open spaces

Services	Ecosystem Function	Examples
Gas and Climatic regulation	Regulation of chemical composition of atmosphere. Regulation of temperature	**Carbon sequestration, oxygen and ozone production. Amelioration of heat build up, wind and noise abatement. Precipitation patterns.**
Water regulation and supply	Regulation of water flow and storage of water	**Supply of water from river catchment areas for agricultural, industrial and domestic consumption**
Nutrient cycling	Storage, recycling , capture and processing of nutrients	**Nitrogen fixation and cycling through food chains**
Waste treatment	Recovery of nutrients and breakdown of excess nutrients	**Filtering effect of aquatic vegetation**
Erosion control	Retention of top soils	**Vegetation cover prevents soil loss** **Soil capture in wetlands**
Soil Formation	Soil formation processes	**Weathering of rock by physical, chemical and biological means**
Disturbance regulation	Regulation of episodic environmental fluctuations	**Flood control and drought recovery**
Pollination	Movement of floral gametes (sex cells)	**Supply of pollinators including insects, birds and rodents**
Biological control	Regulation of plant and animal communities	**Plant succession** **Predator -prey relationships**
Refugia (Habitat shelters)	Habitats for resident and migrant populations	**Nurseries and habitats for migratory birds**
Services	Ecosystem Function	**Examples**
Production of raw resources	Primary production of raw materials	**Food production**
Genetic resources	Unique biological materials and products	**Genes for resistance for crop disease, medicinal and horticulturally significant plants**
Recreation	Opportunities for passive and active recreation	**Ecotourism and nature based tourism**
Cultural	Opportunities for educational and scientific use Intrinsic Spiritual and aesthetic qualities	**Environmental education, scientific research, attractive tourist and visitor destinations**

Source: Adapted from Boon (2007) and D'MOSS Framework Document (1999:4)

An estimate undertaken in 2006 of the value of the environmental goods and services supplied by natural areas included in DMOSS, suggests that they are worth in excess of R3 billion per annum which makes the preservation of this resource a priority. This excludes the value of natural environments to the tourism sector which was estimated to have a turnover

of R3.3 billion per annum in 2001 (State of Environment Durban, 2007). The economic value of biodiversity in terms of medicinal plants has been well documented. A range of researchers; Crouch and Hutchings (1998), Mander (1998), and Von Ahlefeldt et al., (2003) have provided empirical evidence of the economic value of medicinal floral resources in the province and the need to work closely with local practitioners to protect biodiversity both as a provincial and national priority. The national trade in medicinal plants is estimated to be worth approximately R270 million per year (Von Ahlefeldt et al., 2003) with approximately 3000 plant species estimated to be used medicinally within the region (Van Wyk et al., 1997).

3.3 Richness of Biodiversity and distribution within South Africa, KwaZulu-Natal and the eThekweni Municipal Area

3.3.1 South Africa

South Africa is considered to be one of the most biologically diverse countries in the world due to its species diversity and endemism as well as its diversity of ecosystems (DEAT, 2009). The country occupies only 2% of the world's land surface area yet is home to 10% of the world's plant species and 7% of the reptile, bird and mammal species (DEAT, 2009; Willis 2006). Sixty-five percent of its 23 000 plant species are endemic to South Africa (DEAT, 2009; Mucina and Rutherford, 2006). In terms of the number of endemic species of mammals, birds, reptiles and amphibians, South Africa ranks as the fifth richest country in Africa and the 24th in the world (DEAT, 2009).

The Cape Floral Kingdom is the smallest, richest and most threatened of the world's six floral kingdoms, and is home to 9 000 plant species, or 38% of South Africa's plant species, of which 1850 (over 20%) are threatened with extinction (Mucina and Rutherford, 2006). Globally recognised biodiversity hotspots (areas with especially high concentrations of biodiversity which are under serious threat) in South Africa include the Cape Floristic Region; the Succulent Karoo, and the Maputaland-Pondoland-Albany hotspot which is relevant to this study (DEAT, 2009; Boon, 2007). Entire sectors depend on the conservation of this country's biodiversity, amongst them the tourist industry and the wild flower industry (DEAT, 2009).

3.3.2 KwaZulu-Natal

The province is composed of four discrete biome types and is host to some 6141 different species of plants, 177 mammals, 462 birds, 68 amphibians and 86 reptiles (Scott-Shaw, 1999; Government Gazette, 1997). A rich diversity of plant life is exhibited within the four

biomes (Forest biome, Grassland biome, Savannah biome and Thicket biome) which contain 18 distinct veld types (Scott-Shaw, 1999; State of Environment Report KZN, 1998,). Studies by Scott-Shaw (1999) compared the conservation status of these veld types from 1974 to 1996 and have noted an overall increase in the surface area of proclaimed nature reserves within the province (State of Environment Report KZN, 1998). Certain types, however, are critically under represented with only four types having more than 10 % of their areas represented in proclaimed nature reserves (State of Environment Report KZN, 1998).

3.3.3 eThekwini Municipal Area (EMA) and species diversity

Nature and significance of the area

The eThekwini Municipal Area or EMA covers an area of 2 297 square kilometres and is home to an estimated 3 million people (State of Environment Report Durban, 2007). A biodiversity report for the city was completed in 2007 by the Environmental Management Unit of the city with support from the IUCN, the Local Area Biodiversity (LAB) network, SANBI and the eThekwini Parks, Leisure and Cemeteries (EPLC) unit.

The variety of landforms and climatic conditions in the eThekwini Municipal Area (EMA) as well as its unique bio geographical position, have resulted in a wide range of terrestrial and aquatic ecosystems that are home to a rich diversity of organisms (Boon, 2007:20). The EMA contains three of South Africa's eight terrestrial biomes, namely savannah, forest and grassland, and over 2000 plant species (Boon, 2007; State of Environment Report KZN, 2007; Mucina and Rutherford, 2006). The aquatic biomes are represented by both freshwater and marine habitats and include 18 major river catchments, 16 estuaries and 97 km of coastline (Boon, 2007). Shongweni Dam is located within the uMlaas river catchment area (Patrick, 1998).

Boon (2007) points out the national significance of Durban's biodiversity by observing the city's inclusion into the Maputaland-Pondoland-Albany Region, an area identified by Conservation International as a 'biodiversity hotspot' of global importance. The region is also recognized as one of nine priority terrestrial areas for conservation action by South Africa's National Spatial Biodiversity Assessment (NSBA) and ranked second in terms of vulnerability resulting from future pressures on biodiversity (e.g. an increase in population density and habitat fragmentation (Boon, 2007).

Terrestrial diversity: vegetation resources

Boon (2007) integrated current spatial vegetation maps from SANBI authors (Mucina and Rutherford, 2006) with the EMA boundaries and catchment areas to depict the distribution of the eight terrestrial vegetation types found in the EMA.

Of particular interest to this study are the Ngongoni veld and the Eastern Valley Bushveld vegetation types that make up the vegetation of Shongweni Reserve. The characteristics of these floristic types and their relation to the EMA are briefly considered in Chapter 6.

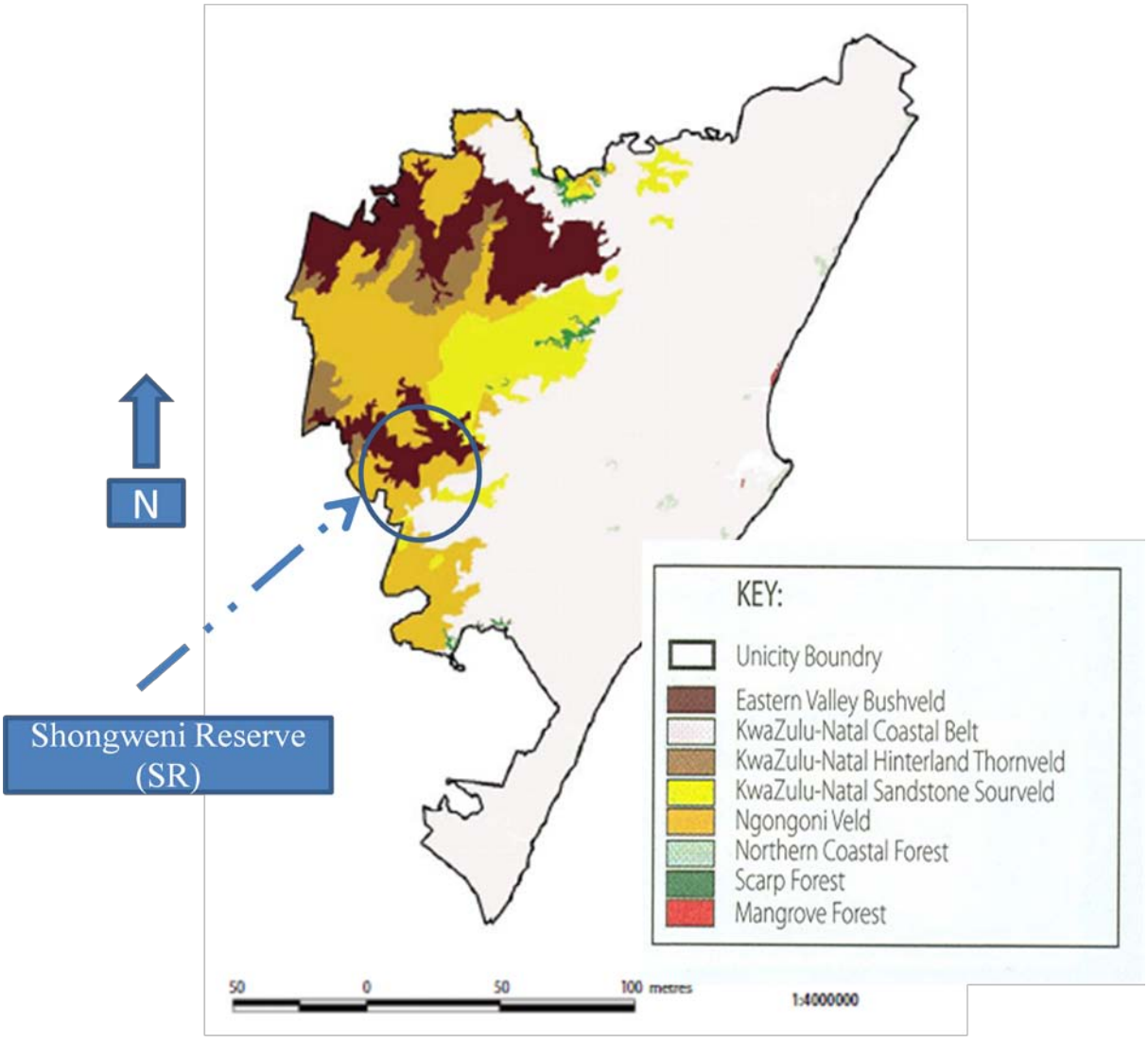

Figure 3.1: Position of Shongweni Reserve (SR) in relation to SANBI vegetation types within the EMA. Adapted from Mucina & Rutherford (2007) cited in Boon 2007:15.

Red Data Plants

Boon (2007) notes that the EMA is situated within the second richest floristic region in southern Africa: the Maputaland/Pondoland Region. The SANBI database indicates that the EMA contains a total of 73 Red Data species. These constitute 11% of the total number (682) of rare and threatened plant species in KwaZulu-Natal, whereas the EMA covers only 1.4% of the area of KwaZulu-Natal (Boon, 2007; Scott Shaw, 1999). Endangered plants within the Shongweni study area according to Patrick, (1998) are listed in Appendix 4.

Mammals

Boon (2007) records eighty-two terrestrial mammal species within the EMA, of which three species are introduced aliens. Five species of large mammal have been reintroduced into the EMA. Of the 77 extant indigenous species, twenty-six are Red Data species. Ten of the Red Data species are bats, ten are shrews, two are antelope, two are mice, and the remaining two are the Striped Weasel and the Water Rat (Boon, 2007).

Birds

Approximately 380 different species of birds are recorded regularly in the EMA. This represents about half (51%) of the approximately 740 bird species found regularly in South Africa (Boon, 2007). The EMA also contains 40 species listed as threatened or near-threatened in the avian Red Data book of South Africa. This represents a significant 33% of the 122 bird species included in the South African Red Data book (Boon, 2007).

Reptiles and Amphibians

Sixty-nine species of indigenous reptiles are thought to occur within the EMA. Forty-one of these are snakes, twenty-six are lizards, and two are terrapins (Boon, 2007). Currently, only two species of reptiles (the Burrowing Skink and the Black-headed Dwarf Chameleon) that occur in the EMA are officially Red Listed but this low number reflects the urgent need for a comprehensive re-evaluation of the conservation status of South Africa's reptiles (Boon, 2007; Willis and Morkel 2007).

A total of 37 species of frogs are thought to occur within the EMA. Four of these are Red Listed and one is categorised as Data Deficient (Boon, 2007). All species of threatened frogs in the EMA have very restricted distributions (Boon, 2007). The city has produced a range of colour posters of frogs and snakes which can be used to develop interpretive material (Marais and Nichols, undated).

Invertebrates

Invertebrates make up 77% of all named species on earth (IUCN, 2008c). They form a complex and highly diverse group of organisms that, when compared to vertebrates, have been relatively under studied (Boon, 2007). Consequently, most information on invertebrates has come from selected groups of organisms for example butterflies (Boon, 2007). Twenty-five invertebrate species endemic to KwaZulu-Natal have been recorded within the EMA. Boon (2007) notes that these include beetles (1), flies (10), cicadas (2), scorpion flies (1), butterflies (3), grasshoppers (2), millipedes (3) and slugs (2). Efforts to incorporate invertebrates into ecotourism activities have been documented by Huntly et al., (2005) and are described in section 3.7.2.

In summation then, the EMA has a rich biodiversity of floral and faunal resources which require conservation attention and public exposure through the medium of interpretation.
This present work does not represent an exhaustive analysis of biodiversity for Shongweni Dam (which lies within the EMA), rather, it seeks to highlight relevant examples of floral and faunal resources which have inherent ecotourist potential.

3.4 Biodiversity under threat

According to a poll conducted by the American Museum of Natural History, seven out of ten scientists believe that the world is now in the midst of the fastest mass extinction of living organisms in the 4.5 billion year history of the planet. This has been termed the "**sixth extinction**", the previous five "extinction spasms" being induced through violent or gradual climatic change over geological time (Ayres, 1998; National Geographic, 1998; Nebel and Wright, 1998). Noted biologist E.O. Wilson, who popularised the term biodiversity, warned "We are in the midst of one of the greatest extinction spasms of geological history" (National Geographic 1998:94). Recent estimates are that 130 species of life forms are becoming extinct each day (International Year of Biodiversity, 2010). In a global synthesis of biodiversity data gathered from 110 nations' findings indicate a continuing decline in biodiversity in all three of the main components — genes, species and ecosystems (Global Biodiversity Outlook 3, 2010). The main points from this report are summarised herewith:

- **Species loss** - species which have been assessed for extinction risk are on average moving closer to extinction. Amphibians face the greatest risk and coral species are deteriorating most rapidly in status. Nearly a quarter of plant species are estimated to be threatened with extinction;
- The abundance of vertebrate species continues to fall globally, with nearly one in four mammals facing extinction. Avian fauna is also loosing species richness with one out of seven birds being threatened with extinction;
- **Natural habitats** in most parts of the world continue to decline in extent and integrity, It is quite possible that by 2050 most of the world's coral reefs could be lost due to high levels of acidity in the ocean;
- Extensive fragmentation and degradation of forests, rivers and other ecosystems have also led to **loss of biodiversity and ecosystem services**; and
- **Loss of genetic diversity** amongst agricultural crops.

An examination of the extent of threats to biodiversity is pertinent. The **Red List Indices** (RLI's) is used to measure and conserve biodiversity. While scientists debate how many species exist, there are growing concerns about the rising tide of extinctions of both described and undescribed species due to human activities (IUCN, 2008a). Although only 2.5% of the world's described species have been assessed so far, the IUCN Red List provides a useful snapshot of what is happening to species today and highlights the urgent need for conservation action (IUCN, 2008a).

The **IUCN Red List** is a comprehensive information source on the global conservation status of plant and animal species based on an objective system of assessing the risk of extinction for a species (IUCN, 2008a). It is a rich compendium of information on the threats facing species, their ecological requirements, and distribution along with data on conservation actions that can be used to reduce or prevent extinctions (IUCN, 2008a). Species listed as Critically Endangered, Endangered or Vulnerable are collectively described as 'threatened'. The IUCN has developed a new approach that takes a large random sample selected of particular species groups – just as when forecasting election results, a poll of voters is taken (IUCN, 2008c). This allows the determination of overall conservation status for a group, the broad-scale mapping of patterns of threat, the identification of the main drivers of threat, and shows what key actions are required to address decline in the group (IUCN, 2008c). Since large groups such as insects and plants cannot be fully assessed, lists are developed based on a sample of 1,500 species randomly selected with the same system being applied to vertebrates, invertebrates, fungi and algae (IUCN, 2008c).

Current research for the 2008 IUCN Red List includes a total of 44,838 species which have been assessed, of which 38% (16,928) have been classified as threatened (IUCN, 2008a). Comprehensive assessments of every known species of mammal, bird, amphibian, shark, reef building coral, cycad and conifer have been conducted and there are ongoing efforts to complete the assessment of all reptiles, all fishes, and selected groups of plants and invertebrates (IUCN, 2008b). In short, one-quarter (22%) of mammal species are globally threatened or extinct while the extinction crisis faced by amphibians deepens with nearly one-third (31%) being threatened or extinct. A complete reassessment of the world's birds indicates that one in seven (14%) birds are threatened or extinct. The Red List Index for birds shows a steady and continuing deterioration in the status of the world's birds between 1988 and 2008 (IUCN, 2008a). Current National Red List assessments of the status of South Africa's species indicate that 10% of South Africa's birds and frogs, 20% of its mammals and 13% of its plants are threatened (DEAT, 2009). Having discussed the extent of threats to biodiversity, it is now pertinent to look at the root causes of biodiversity loss.

Loss of biodiversity may be attributed to several factors. These include *inter alia* anthropogenic causes, habitat destruction, fragmentation and degradation, alien species invasions and, more recently, climate change (Global Biodiversity Outlook 3, 2010; CBD, 2007; Willis, 2006). The brief discussion that follows explains the topic in general and, where possible, its relevance to the study area in particular.

Anthropogenic causes, which relate to man induced activities that alter natural ecosystems. Activities such as agriculture, deforestation and the use of fire have cumulative impacts on vegetation composition and the distribution of plant communities. This in turn influences the type of fauna that populates such habitats (Mucina and Rutherford 2006). Writers generally concur that the scale of disturbance taking place in the twenty-first century is unprecedented and that cultivation and urbanisation pressures are primary threats to biodiversity (Global Biodiversity Outlook 3, 2010; Boon, 2007; Willis, 2006; Mucina and Rutherford, 2006). The cumulative effects of anthropogenic causes have lead to the demise of functioning ecosystems on an unprecedented scale with attendant risks to human well being and health (Global Biodiversity Outlook 3, 2010).

Habitat destruction

The United Nations Environment Programme (UNEP) has reviewed global perspectives at the start of the third millennium and has identified two disturbing trends that relate directly to habitat destruction. First a skewed distribution in economic wealth and second that environmental stewardship lags behind economic and social development (CBD, 2000). Ehrlich blames habitat destruction as the primary cause of biodiversity loss while the IUCN notes that Old World tropical countries such as Africa and Asia have lost more than 50 % of their original wildlife habitat (cited in Primack, 1993). Habitat loss is largely accounted for by the conversion of wild lands to agriculture which accounts for some 30% of land globally (Global Biodiversity Outlook 3, 2010).

The Global Biodiversity Outlook 3 (2010) further warns that nearly half of the world's terrestrial eco regions fall below the recommended 10% protection with many of the most crucial sites for biodiversity falling outside of protection. The imperative to conserve local biodiversity at sites such as Shongweni then becomes urgent, relevant and significant.

Habitat fragmentation is the process whereby large continuous areas of habitat are reduced in area and divided into two or more fragments, often isolated from each other by modified or degraded habitats (Primack, 1993). This leads to the rapid decline in species since normal methods of dispersal such as migration, colonisation and pollination are inhibited and prevented. Fragments may lack resources to maintain populations and are under intense pressure due to urbanisation (Primack, 1993). The shape of

reserves/fragments is also an important consideration as habitat fragments have a greater amount of edge in relation to the total area and the centre of each habitat fragment may be closer to an edge (Primack, 1993). In the study area of Shongweni “Edge effects” include contact with altered landscapes and the attendant problems of alien plant invasions, dumping, squatting and vandalism (Patrick, 1998).

Habitat Degradation

The condition of terrestrial habitats continues to decline with the Global Analysis of Land Degradation and Improvement estimating that nearly one quarter (24%) of the world’s land area was undergoing degradation, over the period 1980-2003. Degraded areas included around 30% of all forests, 20% of cultivated areas and 10% of grasslands (Global Biodiversity Outlook 3, 2010). Habitats may become degraded through disturbance and pollution. Original plant communities become disturbed through the effects of fire, cultivation and overgrazing or herbivory (MacDonald, 1989).

This leads to secondary plant succession and the land remains vulnerable to alien plant invaders which inhibit the growth of the indigenous plant species. This has become a major problem in the study area (Tredger; Petterson pers. comm.). Water and air quality may also be compromised resulting in the demise of species. The water quality of the Hammarsdale dam and Sterkspruit river within the study area has declined due to the effects of industrialisation further upstream and faecal contamination from widespread sources poses a direct health threat (Fennemore et al., 2006). Increased siltation loads have altered both the hydrology and species composition of plant and bird communities at Shongweni Dam (Patrick, 1998). Each of these factors has negative implications both in terms of biodiversity loss and ecotourist potential.

Invasive alien species continue to be a major threat to all types of ecosystems and species with no signs of a significant reduction of this pressure on biodiversity (Global Biodiversity Outlook 3, 2010). In a sample of 57 countries, more than 542 alien species, including vascular plants, marine and freshwater fish, mammals, birds and amphibians, with a demonstrated impact on biodiversity have been found, with an average of over 50 such species per country (Global Biodiversity Outlook 3, 2010). Some estimates report that Alien Invasive Species may be costing the global economy US$1.4 trillion or more per annum (Global Biodiversity Outlook 3, 2010). Alien plant invasions are a serious problem in South Africa resulting in the suppression and exclusion of indigenous plant communities (DEAT, 2009). In the study area Patrick (1998) documented numerous such invasive species such as Syringa *(Melia azedarach*), Bugweed *(Solanum mauritianum)* and Lantana *(Lantana camara).*

Climate change

Climate change is a significant cause of biodiversity loss. The most recent models based on a temperature rise of 2-3ºC over the next 100 years suggest that up to 50% of the 400,000 or so higher plant species will be threatened with extinction (Bramwell, 2007; CBD, 2007). A recent study of six biodiversity-rich regions of the world covering 20% of the land area indicates that up to 37% of all species in these regions will be extinct by 2050 including for example up to 40% of South Africa's Proteaceae (Bramwell, 2007). Professor Stephen Hopper, the Director of the Royal Botanic Gardens, Kew; has pointed out that conserving the world's natural vegetation will reduce carbon emissions by an amount more than equivalent to those generated by the world's combined transport systems (Bramwell, 2007). Bramwell (2007) concludes that the world's botanic gardens are ideally placed to conduct research on how climate change will affect plant species. Leading plant research in terms of climate change is being conducted by the Royal Botanic Gardens at Kew, UK; the Botanic Gardens Trust in Sydney, Australia and the Missouri Botanical Gardens, USA. The contribution of these particular gardens both to conservation efforts and innovative educational outreach through interpretation are used as examples in this text (Section 4.4). Having discussed the root causes of biodiversity loss, **global interventions** including **conventions** and **responses** are now investigated.

Convention on Biological Diversity (CBD): Several global and local strategies have been devised to ameliorate the current crisis regarding the loss of biodiversity. Growing recognition that biological diversity is a global asset of tremendous value to present and future generations led the United Nations Environment Programme (UNEP) to explore the need to create an international legal instrument for the conservation and sustainable use of biological diversity. The Convention on Biological Diversity (CBD) was developed and opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (UNCED) during the Rio "Earth Summit", a meeting of the world's heads of state convened to discuss the current environmental crisis (Global Biodiversity Outlook 3, 2010). The CBD has the threefold objective of conserving biodiversity, encouraging the sustainable use of biological resources and ensuring the equitable distribution of benefits arising from genetic resources (CBD, 2010). Through a series of iterations and meetings the conference of parties or COP's (which are the official organs of the CBD) finalized the **2010 Biodiversity Targets** at their sixth meeting at the Hague in April 2002. The chief objective reads as follows:

to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth (CBD, 2003:1)

This target was subsequently endorsed by the World Summit on Sustainable Development (the "Rio + 10" summit) in Johannesburg, 2002, and by the United Nations General Assembly (Global Biodiversity Outlook 3, 2010). It was also incorporated as a new target under one of the Millennium Development Goals – Ensure Environmental Sustainability. The 2010 biodiversity target is therefore a commitment from all governments, including those not party to the CBD (Global Biodiversity Outlook 3, 2010). In evaluating the global progress of the International Year of Biodiversity 2010 (IYOB) at the New York Biodiversity Summit, the Secretary General of the United Nations, Ban- Ki Moon acknowledged that the agreed targets for substantially reducing the rate of biodiversity loss would not be met. Furthermore the Millennium Development Goals crucial to food security, poverty eradication and a healthier population were dependent on functional ecosystems and were similarly imperilled (UN, 2010). Findings published in the Global Biodiversity Outlook 3 (2010) indicate the following positive and adverse effects.

Table 3.2: Summary of 2010 Global Biodiversity Score card

2010 Biodiversity Targets	
Positive effects	**Negative effects**
The creation of more protected areas and initiatives to tackle pollution and alien species invasions	Projections of the impact of global change on biodiversity show continuing and often accelerating species extinctions, loss of natural habitat, and changes in the distribution and abundance of species, species groups and biomes over the 21st century
Some 170 countries now have national biodiversity strategies and action plans in place	Combined scenario exercises conducted for the Millennium Ecosystem Assessment, the Intergovernmental Panel on Climate Change (IPCC) and the Global Environment Outlook revealed potential "tipping points" that could lead to large, rapid and potentially irreversible changes. These adversely affect human health and well being especially the poor in developing countries
Most countries are undertaking activities related to communication, education and public awareness of biodiversity including the monitoring, research and the development of databases	These "tipping points", or abrupt shifts in the state of biodiversity and ecosystems makes the impacts of global change on biodiversity hard to predict, difficult to control and slow, expensive or impossible to reverse once they have occurred
At the international level, financial resources have been mobilized and progress has been made in developing mechanisms for research, monitoring and scientific assessment of biodiversity	Biodiversity and ecosystem changes could be prevented, significantly reduced or even reversed and mitigated if strong international and local corrective action is applied in time

Global Biodiversity Outlook 3 (2010)

The recent Tenth Conference of Parties (COP10) to the CBD held in Nagoya, Japan in October 2010 set detailed plans for 2011-2020, including a 2020 biodiversity target and a

2050 biodiversity vision (UN, 2010). A discussion of pertinent and **key global responses** to these various conferences and interventions now follows, looking at floral and faunal conservation issues as they pertain to interpretation within botanic gardens and protected areas. Firstly, **floral conservation**. Recognizing the value of plants as the basis of all life on earth the CBD drafted the **Global Strategy on Plant Conservation (GSPC)** which has five main objectives:

1. Understanding and documenting plant diversity;
2. Conserving plant diversity;
3. Using plant diversity sustainably;
4. Promoting awareness about plant diversity; and
5. Building capacity for the conservation of plant diversity.

(Willis, 2006:2)

These five objectives find further definition in a set of sixteen targets. The main thrust of this dissertation finds expression in Objective number four (promoting awareness about plant diversity) and target fourteen (the importance of plant diversity and the need for its conservation incorporated into communication, educational and public awareness programmes). The lead agent identified was the Botanic Gardens Conservation International (BGCI) which consists of a unique international network of over 2 500 plant-orientated institutions linking botanical gardens, protected areas and natural science museums (BGCI, 2008). Botanic gardens are not only repositories of plant collections, knowledge and displays but also act as centres of environmental education, upliftment and capacity building (BGCI, 2008; Ballantyne et al., 2008).

The term “conservation through cultivation” applies to typical *ex situ* conservation strategies which include the maintenance of plant material in botanic gardens, arboreta and seed banks (Primack, 1993). *In situ* conservation strategies relate to the protection of natural areas, parks and nature reserves and are discussed in detail in Section 3.6.

Secondly, **faunal conservation**. In addition to the preparation and implementation of National Biodiversity Strategies and Action Plans (NBSAP’s) within 170 individual countries (including South Africa) several global organizations stand out regarding excellence in faunal conservation including the IUCN, WWF and more recently the Alliance for Zero Extinction (AZE). According to the Global Biodiversity Outlook 3 (2010) the Alliance for Zero Extinction (AZE) has identified 595 sites worldwide whose protection is critical to the survival of hundreds of species. The sites contain the entire global population of 794 critically endangered or endangered species of mammals, birds, selected reptiles, amphibians and conifers. These species are considered likely to become extinct unless direct and urgent

action is taken. Concentrated in tropical forests, islands and mountainous ecosystems, most of the sites are small and vulnerable as they are surrounded by intensive human development. More than half of AZE sites (53%) lack any legal protection (Global Biodiversity Outlook 3, 2010). Having discussed global initiatives and responses, it is now germane to look at South African issues.

South Africa became a signatory to the CBD in November 1995. In response to the treaty, Green and White Papers on Biodiversity were published in 1996 and 1997 respectively, outlining policy and strategy to implement the convention. The Government has further ratified the CITES convention (Convention on International Trade in Endangered Species) and the TRAFFIC (Trade Records Analysis of Flora and Fauna in Commerce) network, an international research organisation which monitors, controls and records the harvesting of endangered floral and faunal resources (SANBI, 2008b; Willis, 2006). The network is supported by the International Union for Conservation of Nature (IUCN) and the WWF (World Wide Fund for Nature).

Nationally, the Department of Environmental Affairs and Tourism (DEAT) is responsible for the protection and management of South Africa's unique biodiversity asset. In 2004 the South African National Biodiversity Institute (SANBI) released South Africa's first National Spatial Biodiversity Assessment (NSBA) as part of a National Biodiversity Strategy and Action Plan (NBSAP) (Boon, 2007; Willis, 2006). This is a positive indication of the commitment of the South African Government towards conserving, utilising and managing South Africa's biodiversity assets in a sustainable manner. SANBI is also active in monitoring climate change contributing directly to the International Panel for Climate Change (IPCC) resulting in the IPCC being awarded the Nobel Peace Prize for 2007 alongside former US Vice President Al Gore.

A nationwide survey commissioned by DEAT in 2009 confirmed the biodiversity sector as one of the sectors most adversely influenced by climate change (DEAT, 2009). This supports the projections that the terrestrial area suitable for inhabitation is expected to be reduced by 40% by 2050, and 44% of plant species and 80% of animal species are expected to undergo shifts in their distribution ranges, predominantly in an easterly direction (DEAT, 2006).

Provincial responses relevant to the study area include the Biodiversity Conservation Sub-programme developed by eZimvelo KwaZulu-Natal Wildlife (EKZNW) which aims to "Slow or stop the biotic impoverishment at each level of biodiversity by identifying priorities for conservation action in KwaZulu-Natal" (State of Environment KZN, 1998:B82).

An excellent field guide popularizing the biodiversity of the province has been published primarily for the tourist market detailing the protected areas and floral and faunal resources (KwaZulu-Natal. A celebration of biodiversity, 2001). Excerpts from this guide will be used in developing interpretation at Shongweni Reserve.

At a **local government level**, Durban was the first city in South Africa to accept the Local Agenda 21 mandate as a corporate responsibility, in 1994. Local Agenda 21 was the global agenda for local authorities for socially, economically and environmentally sustainable development adopted at the 1992 Earth Summit (State of Environment Durban, 2007). Similarly, Durban became the first city in South Africa to accept the Local Action 21 mandate, which emerged from the World Summit on Sustainable Development in 2002 (State of Environment Durban, 2007). This mandate tasked local authorities worldwide to move from agenda to action and to ensure accelerated implementation of sustainable development (Boon, 2007). Environmental management, reporting and planning takes place concurrently with the Municipality's Integrated Development Plan (IDP) of 2006-2011 (State of Environment Durban, 2007).

The **Durban Metropolitan Open Space System (DMOSS)** is the footprint which defines the environmentally significant land in the City (State of Environment Durban, 2007). By definition the term "open space" refers to any vegetated area or green area within an urban environment such as parks, nature reserves, public and private gardens, sports and recreational areas and cultivated, derelict and underdeveloped land including road and rail verges and transmission line servitudes (Boon, 2007).

This open space system of 76 000ha represents almost one-third of Durban's total area and includes river catchment areas and nature reserves (Boon, 2007). Almost 9.5% of this land is under protection (State of Environment Durban, 2007). The system has created a series of green corridors or lungs throughout the city and a number of self-guided trails linking natural areas were established for members of the public to enjoy the natural fauna and flora of the Durban area (Boon, 2007). Biodiversity response planning and the DMOSS in the EMA has been through various iterations evolving from the initial proposal by the Wildlife Society in 1979 to its present form to date under the eThekwini Environmental Services Management Plan or EESMP (State of Environment Durban, 2007).

Section 3.4 has looked in depth at biodiversity under threat, including descriptions of global, national, provincial and local initiatives and responses to this issue. The next section proposes biodiversity as a key resource for ecotourism

3.5 Biodiversity as a key resource base for ecotourism

Natural resources in all their diverse forms provide a baseline foundation for all tourist activities. As ecotourism is intimately connected with biodiversity it is the natural resources that provide both the setting and the attraction; it is the unique combination of environmental elements that structure the tourist experience. Emerging sciences such as conservation and environmental management, human ecology and ecosystems management all play a role in maintaining and enhancing the ecotourist product. Epler-Wood, founder of the International Ecotourist Society (TIES) argues that it was no coincidence that concepts of ecotourism and biodiversity evolved simultaneously. Ecotourism arose as a natural reaction to unsustainable mass tourism which was perceived to be a major cause of environmental degradation (Weaver 2008; Fennel, 2003). Biodiversity is currently under threat (as documented previously) and the spread of the conservationist ethic has influenced the choice of tourist destinations (Preece et al., 1995). Foreign visitors are now wanting to support the conservation of highly threatened areas through the vehicle of ecotourism (TIES, 2007).

The relationship between biodiversity and nature based tourism/ecotourism should be mutually reinforcing; the public promotion of ecosystems and biodiversity acts as a strong attraction for the tourist trade with its positive economic multiplier effects while there are opportunities and obligations for the industry to contribute to conservation. There are, however, limits as to how this is to be practically achieved; clearly ecotourism is not a panacea for conservation (Preece et al., 1995).

The Australian Department of the Environment points out that narrow distinctions between tourists and ecotourists are of little concern and that the entire tourism industry has a stake in biodiversity conservation (Preece et al., 1995). In line with this thinking a South African firm of environmental consultants announced close partnerships with a top travel agency to promote the “seamless fusion” between tourism and the environment (Graham, 1998).

Biodiversity as a key economic resource base for ecotourism

Biodiversity is the foundation of a growing recreation and ecotourist industry and as such provides three key values. The first is direct economic value or consumptive benefit, the second indirect or non consumptive use value and third ethical value (WTO, 2010; Primack, 1993). These are discussed individually:

Direct economic value involves consumptive use value where resources such as plant products, firewood, local medicines and building material are consumed locally (Global

Biodiversity Outlook 3, 2010; DEAT, 2009; Primack, 1993). There is a high demand for medicinal plants within the study area and various species have been identified by Patrick (1998). Should these products be rendered extinct in the wild through over exploitation it would adversely affect the living standards of the local population (Global Biodiversity Outlook 3, 2010).

Productive use value is assigned to plant or animal products that are harvested from the wild and sold on local and international markets (DEAT, 2009; Primack, 1993). Studies by Von Ahlefeldt et al., (2003) have verified that many traditional medical practitioners (TMP's) within KwaZulu-Natal have themselves noted a scarcity of plants due to unsustainable harvesting. Linkages between traditional plant use and ecotourism are described in Chapter 7 (Recommendations). Other examples of productive use value within the study area that relate to ecotourism include the production of curios and woodcarving and the growth and production of *ncema* reed matting (Patrick, 1998). Fishing and subsistence hunting are further examples of consumptive benefit provided by Shongweni Reserve. The **indirect values** of the **ecological services** provided by natural areas and open space areas were discussed in section 3.2.2 and summarized in Table 3.1 earlier in this chapter. A brief discussion of the amenity value, the educational and scientific values, and the ethical and cultural values, follows.

One of the primary benefits relevant to this study is the **amenity value** of resources. The major focus of this study relates to nature based tourism and a visitor survey was conducted at the Shongweni Reserve to determine activity preferences and interest in biodiversity (Chapter 5 and 6). Examples of the non consumptive use of natural resources within protected areas include bird watching, hiking, game viewing, picnic and photography as well as active outdoor recreational pursuits such as mountain biking, water sports, horse riding and corporate team building exercises (Weaver 2008; Fennel, 2003). Globally, the United Nations Environment Programme (UNEP) and Conservation International have indicated that most of tourism's expansion is occurring in and around the world's remaining natural areas (Costas, 2005). Travel weekly (2006) predicted that sustainable tourism could grow to 25% of the world's travel market within six years, taking the value of the sector to £250 billion (US$473.6 billion) a year while nature tourism is growing at the rate of 20% per year (cited in TIES, 2007). South Africa has a vibrant tourism industry, which makes the second-largest contribution to GDP of all sectors of the economy (DEAT, 2009). Much of the tourism to South Africa is to experience its unique natural beauty and wildlife and thus this industry is heavily dependent on biodiversity; a loss of biodiversity could thus detrimentally affect the industry (DEAT, 2006). Nature-based tourism in South Africa is estimated to be worth in the order of R21 billion per year (DEAT, 2009).

Locally nature reserves compete with other tourist attractions and only 2% of domestic visitors cite nature reserves as a preferred reason to visit Durban (Tourism KwaZulu-Natal Occasional Paper No. 12, 2003). Recent statistics for foreign tourists visiting natural attractions are more encouraging. Approximately 1.4 million foreign visitors came to KwaZulu-Natal in 2006 of which 527 000 were air arrivals. In terms of the activities they engaged in while in KwaZulu-Natal 68% of air arrival visitors went to natural attractions (Tourism KwaZulu-Natal, 2007). Natural areas also have inherent **educational and scientific value** as they provide a natural display of floral and faunal resources to the wider public which presents an ideal opportunity for interpretation to take place (Ballantyne, et al., 2008). A detailed analysis of interpretation, which is an important facet of the educational and scientific value, is provided in Chapter 4.

Biodiversity within natural areas has **option value,** that is, its potential to provide economic benefit to human society at a future point (Primack, 1993). Various suggestions for maximising the economic value of biodiversity within the study area include *inter alia* the harvesting of *Aloe ferox* and the planting of indigenous medicinal plants in the green belts of D'MOSS (Patrick, 1998). Although economic arguments are often used to justify the protection of biodiversity strong **ethical** arguments have also been put forward. The value systems of most world religions, philosophies and cultures advocate the protection of species and ecosystems, emphasizing the role of man's stewardship of the planet (Fennel, 2003). These values were explored in detail in section 2.3.

In summary, it has been stated that the environment is to tourism what soil is to crop farming (Graham 1998). Strong evidence exists that biodiversity has inherent economic value, the full potential of which has yet to be realised**.** Nature based tourism or ecotourism may act as a means to release this latent potential provided this is not done at the expense of the environmental resource base on which the industry is dependent. There is significant growth potential for nature based tourism in South Africa and this plays an important role in strengthening the economic and social support base for conservation (Tourism KwaZulu-Natal, 2007).

3.6 Utilising and managing biodiversity effectively within the context of natural resources, protected areas and reserves

This discussion is divided into two components, the first examines international thinking regarding biodiversity protection under the theme of ecosystem management and the second describes some of the current accepted models of visitor management as applicable to the Shongweni study area.

3.6.1 Ecosystem management

Protected areas (PA's) are currently defined by the IUCN as:

> *… an area of land and /or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources and managed through legal or other effective means*
>
> Weaver (2008:61)

The world's first formally recognized protected area, Yellowstone National Park, was established in 1872 as a wilderness area used for recreational purposes (Weaver 2008). Protected Areas are now recognized as essential to biodiversity conservation and as irreplaceable tools for species and habitat management and recovery (Boitani et al., 2008). Today, over 100,000 sites (11.5% of the Earth's land surface) are listed on the data base of the World Commission on Protected Areas (2006).

The IUCN category system was established in 1994 to reduce the confusion that had arisen from the adoption of many different terms (national parks, nature reserves, wildlife reserve) which differed in meaning in individual countries (Weaver, 2008). The system was initiated to describe different kinds of PA's, to provide international standards for global and regional accounting and comparisons, and to provide a framework for collecting, handling, and disseminating data about PA's (IUCN, 1994). Table 3.3 reflects the current IUCN categories of Protected Areas.

Table 3.3: Categories of Protected Areas and their main management intents

Category	Management Intent
Ia	Strict Nature Reserve: managed mainly for science
Ib	Wilderness Area: managed mainly for wilderness protection
II	National Park: managed mainly for ecosystem protection and recreation
III	Natural Monument: managed mainly for conservation of specific natural features
IV	Habitat/Species Management Area managed mainly for conservation through management intervention
V	Protected Landscape/Seascape: managed mainly for landscape/seascape protection and recreation
VI	Managed Resource Protected Area: managed mainly for the sustainable use of natural ecosystems

Source: Boitani et al. (2008:0436)

Despite these advances in defining protected areas, recent thinking is that the PA category system retains a fundamental flaw: its strong focus on management intent is often unrelated to the basic goal of promoting the persistence of biodiversity and that categories do not therefore reflect the role of PA's in biodiversity conservation (Boitani et al., 2008). These researchers argue that the current IUCN categories of PA's need to be more directly linked to biodiversity planning rather than management objectives and that specific outcomes for species and habitat types should be the primary objectives. These outcomes could be measured explicitly through attributes such as phyllogenetic uniqueness, vulnerability, irreplaceability, richness, and ecological integrity. This could not only give substance and precision to the PA category objectives, but also allow their effectiveness to be monitored (Boitani et al., 2008). The IUCN categories are defined by broad management approaches such as regulating visitors, educating the public, controlling the utilization of natural resources, and restoring degraded biological communities. The higher the category number, the lower the acceptable amount of human intervention (Boitani, et al., 2008; Weaver, 2008; Fennel, 2003).

Category One is reserved for scientific research and monitoring and therefore unsuited for soft ecotourism while Category Two protected areas or the National Parks are the 'workhorses' of the ecotourist sector (Weaver, 2008). Category Two and Three areas accommodate both conservation and recreational components which are defined by internal park zoning. This allows for diverse activities such as interpretation centres (soft ecotourism) and wilderness bush walking (hard ecotourism) to take place (Weaver, 2008; Fennel, 2003). These iconic 'must see' destinations are typified by Yosemite and Grand Canyon in the USA, Canada's Banff and Jasper Parks, South Africa's Kruger National Park and Blue Mountains National Park in Australia (Weaver, 2008; Fennel, 2003).

The lower order categories are modified landscapes that are not as sensitive to ecological impacts and offer the ecotourist a wide range of experiences. These include Category Four Forest reserves in Australia and the Category Five National Forests adjacent to the National Parks in the USA (Weaver 2008). The awarding of World Heritage site status (for example Kirstenbosch National Botanic Gardens) may result in increased visitor levels and the focus of these destinations is adequate site interpretation to fulfil the education and learning criteria of ecotourism (Weaver, 2008). In South Africa, the National Spatial Biodiversity Assessment (NSBA) indicated that of the 440 vegetation types of South Africa 5% are critically endangered, 12% are endangered and 16% are vulnerable (Rouget et al., 2004). Currently, only 6.5% of the country's surface area is included in protected areas (DEAT and SANBI, 2008). A National Protected Areas Expansion Strategy (NPAES) has been drafted that aims to increase the area under protection to 8.8% by 2013 and eventually to 12% in the next twenty years (DEAT, 2009).

Privately owned protected areas, according to Weaver (2008), are excluded from the IUCN protocols, but nevertheless are experiencing rapid growth. Shongweni Reserve is something of a hybrid – the land is owned by the Umgeni Water Board, an instrument of local government, and the area is leased, developed and managed by Msinsi Resorts, a private commercial firm. A third party, the eThekwini Municipality must also be considered as a management agent as Shongweni Dam and its surrounds forms a significant component of the DMOSS complex whose ecological functioning is key to biodiversity conservation (Boon, 2007; State of Environment Durban, 2007).

Shongweni Dam and Reserve comprises the largest land mass (1700 ha) of all the other listed nature reserves in the EMA (Boon, 2007). According to Boon (2007), the municipality, Msinsi Resorts and Ezimvelo KwaZulu-Natal Wildlife (EKZNW) manage the most land within the city's boundaries and are responsible for 1 410 ha, 2 085 ha and 1 036 ha respectively (or 83% of the EMA's conservation estate). There are about 46 'nature reserves' in the EMA with a total area of approximately 5 430 ha. However, this represents only 2.3% of the entire EMA (Boon, 2007). According to Boon the provincial conservation authority (EKZNW) historically was responsible for the proclamation of nature reserves under the Natal Nature Conservation Ordinance 15 of 1974 or the KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No. 9 of 1997).

Management plans in general may follow the IUCN objectives for that particular category of protected area. The Category Two (National park) objectives are cited here as a guiding framework:

(a) to protect natural and scenic areas for spiritual, scientific, recreational, and tourist purposes;

(b) to perpetuate, in as natural a state as possible, representative examples of biotic communities and species; and

(c) to manage visitor use for inspirational, educational, and recreational purposes.

(Boitani et al., 2008:0436-0437)

Direct ecotourist management strategies include zoning, procurement of required guides, law enforcement and fines, campsite designation, limitation of visit duration, reservation systems, and visitor number limits.

Indirect ecotourist management techniques include developing and monitoring signs, patrols, tour operators, introductory talks, written material, and displays. These management approaches can also be tracked as part of an evaluation framework, to understand how well natural areas are using information to educate visitors (Epler-Wood, 2004). Msinsi Holdings and Resorts have created a set of operating guidelines known as the Msinsi Operating Manual. This operating manual covers procedures such as community liaison, wildlife and vegetation management, resort and visitor management in order to maintain best practice techniques in the reserve (Msinsi Company Profile, 2008).

3.6.2 Visitor management and their impacts

The nature and measurement of visitor impacts on protected areas has been documented generally by a range of authors (Roe et al., 1997; Eddington and Eddington, 1996; Hunter and Green, 1995). However, current thinking by Boitani et al. (2008) indicates that biodiversity preservation is a complex issue and impact measurement requires careful research. Fennel (2003) points out that researchers and practitioners have recognised the inherent dangers of accommodating an increasing number and diversity of experiences for a growing consumer based society. A broad range of user groups visit parks, nature reserves and open space areas for non recreational and recreational purposes which may include both consumptive and non consumptive activities (Fennel, 2003).

In the context of the Shongweni study area consumptive activities would be fishing while non consumptive activities would include bird watching, hiking, biking, rock climbing and game viewing. Roe et al. (1997) write that all natural areas have limited ecological, physical and aesthetic carrying capacities and that the idea of tourist carrying capacity assumes there is a level of development and a maximum number of visitors that a protected area can tolerate without adverse effects on the environment. Ecological carrying capacity is reached when the number of visitors and their activities start to affect wildlife and degrade the ecosystem. Physical carrying capacity is reached when all available facilities and infrastructure is saturated while aesthetic carrying capacity is reached when visitor levels of enjoyment of the site is diminished due to overcrowding, littering and poor wildlife viewing (Roe et al., 1997).

Establishing visitor limits and balancing the three elements (ecological, physical and aesthetic) is a complex task. The Canadian National Parks developed a system called VAMP (Visitor Activity Management Process) which involves gaining an understanding of who comes into the park, why they come, what they do when they are there and what their needs

are (Giongo et al., 1993). The process includes a systematic identification of visitors, the evaluation of their market potential and the identification of interpretive opportunities for the public to enjoy and appreciate nature (Giongo et al., 1993). According to them, VAMP adds to the overall concept of visitor management by considering activities, facilities and services in the surrounding region. The model has application in this present study whereby visitor surveys were conducted at Shongweni in accordance with the VAMP principals outlined. Full particulars of the visitor study and associated methodology is found in Chapter 5 and 6.

3.7 Communicating the value of biodiversity through interpretation

The importance and relevance of biodiversity in public thinking needs to be underscored and interpretation (public communication) is a helpful tool to achieve this objective (CBD, 2008). Farrior (2005) stresses that the public is deluged with information, yet there is a lack of understanding of basic ecological principles. People fail to make the connection to their everyday lives and often feel a sense of hopelessness about the issue. Farrior (2005) and Johns (2010) both believe that part of this problem is a lack of consistent messages about biodiversity among environmental organizations, zoos and museums, educational institutions, and scientific academies. These conflicting reports result in public confusion about what biodiversity is and why they should care about it.

We now examine some recent thinking from conservation biologists and communicators on how to increase public awareness of biodiversity. The executive director of UNEP (United Nations Environment Programme) has emphasized that raising levels of public awareness is a key conservation challenge and that terms such as biodiversity and ecosystems need to be de-mystified (Global Biodiversity Outlook 3, 2010). In a similar vein Johns (2010) contends that conservationists need to speak to the audience in way they can understand and that crafting messages and stories that resonate with the public is vital.
Novacek (2008) too points out that despite growing public concern biodiversity issues still rank below other significant issues such as the economy, job losses, terrorism, health care and the loss of family values. He argues that while certain conservation issues such as climate change have been popularized by the media, the link and interplay with biodiversity has not been effectively demonstrated.

Addressing public misconceptions Novacek (2008) notes that the immediate obstacle is the use of the term biodiversity, which is not used in common parlance. The word itself suggests

only the richness of life but not its significance and connection of these forms to functioning ecosystems. Novacek (2008) notes that the word requires repeated and vigilant explanations to be heard in today's modern media. A recent European Union survey presented evidence that while most Europeans claimed to have heard the term; barely one third of those questioned said they knew what it meant (The Gallup Organisation Hungary, 2007). Interpretations of biodiversity remain varied and elusive, a dilemma aptly described by Reed Noss in the following way... "a definition of biodiversity that is altogether simple, comprehensible and fully operational …is unlikely to be found" (Roots 2009:3).

The second misconception relates to the notion that the current rate of extinction is merely part of the normal 'turn over' of life. After all, the extinction of dinosaurs some millennia past did not stop life functioning on earth (Novacek, 2008). Data relating to species extinction therefore becomes more 'back ground noise' to an overloaded society and thus loses its urgency and power. Generally a greater importance is placed on the charismatic mammals rather than recognizing the importance of all species, even insects worms and microbes in living ecosystems (Wilson, 1993). Novacek (2008:11572) advocates a threefold strategy for biodiversity communication. First, develop an improved understanding of the diverse public audience. Second, craft the message suitable for this diverse audience and third, enhance mechanisms for delivering these messages and eliciting engagement.

Attitudes are multivariate depending on culture and context. The Biodiversity Project Poll in 2002 surveyed North American attitudes and awareness of biodiversity, finding that when given the definition of the word, 47% of respondents stated that stemming species loss was important to them personally. High levels of patriarchal and religious values also motivated a sense of stewardship toward the earth with 71% regarding protection of the earth as 'extremely important' (Biodiversity Project, 2002). Farrior (2005), however, noted difficulties in reaching an affluent audience whose attention tended toward individual self-interest, an attitude often at odds with the altruistic self-sacrifice for the greater good, the message so often implied by the environmental movement. In positive terms, however, celebrity champion of biodiversity E.O. Wilson has launched the Encyclopaedia of Life, an electronic page for each species of organism on Earth, a complete bio census and compendium of life forms to ignite public and scientific interest and action (Pogue, 2008; Wilson, 2003).

Novacek (2008) has already pointed out that the public interest is naturally biased toward the mega fauna and that attention should be focused on a wider range of life forms. Some practical local research by Huntly et al. (2005) proposes giving increased value to invertebrates through ecotourism. Huntly et al. (2005) argue that while invertebrates comprise an estimated 73.5% of life on earth their inclusion in ecotourism activities is rare. Globally, exceptions include the annual migrations of millions of Monarch butterflies (*Daneus*

plexippus) (Huntly et al., 2005). Locally, attention on invertebrates has focused on damsel flies and dragon flies with trails and guided walks being developed at the Pietermaritzburg Botanical Gardens by University of KwaZulu-Natal students and SANBI staff (Willis and Morkel, 2007). The author has noted that some guided walks featuring butterflies and other lepidopterans have taken place at Shongweni reserve (Norman pers. comm.).

The findings of Huntly et al. (2005), based on visitor surveys of 121 ecotourists, was carried out at Hluhluwe–Umfolozi Park and Ndumu Game Reserve and indicated that 95% of visitors are interested in learning more about invertebrates (Huntly et al*.,* 2005). This, however, would play a secondary role to Big Five game viewing which remained the primary purpose of visits. Huntly et al. (2005) developed a list of common invertebrates for inclusion in ecotourist activities, ranging from lepidopterans such as leopard moths and green banded swallow tails to Coleopterans such as the dung beetle and Dipterans such as blow flies. These species were selected on the basis of their high visibility on game drives and guided trails (Huntly et al., 2005). Proposed activities included short guided walks making use of light traps at night and baited traps during the day. A positive interest was displayed by respondents (80%) regarding indigenous knowledge about invertebrates such as uses, legends and names (Huntly et al., 2005).

The relevance of Huntly's work to this research is that a high percentage of visitors profess an interest in learning about other life forms and that the ecotourist focus can indeed be broadened from its current narrow focus on large mammals to include birds, plants and insects. Another key fact emerging from Huntly's research is the willingness of trail guides and tour companies to integrate indigenous knowledge of local biodiversity into ecotourist activities. The writer has embedded these concepts into the interpretive material used in the visitor survey at Shongweni Reserve.

In summation then, Interpretation offers a partial solution to this communication challenge and the results from this research can contribute in a small way to raising local visitor awareness of biodiversity within one of Durban's largest nature reserves. The next chapter focuses on interpretation in more depth.

CHAPTER FOUR INTERPRETATION

4.1 Introduction

The purpose of this chapter and final portion of the literature review chapter is to demonstrate the richness of interpretation as a communication tool to enhance the ecotourist experience. The section also provides a frame of reference for the dissertation proper, which is an unfolding and testing of local biodiversity interpretation in action. Firstly, defining and historical principals of interpretation are outlined. Secondly, the use of natural heritage interpretation in Protected Areas, Parks and Botanic Gardens is discussed drawing attention to international examples of best practice. Thirdly, the focus shifts to examining best interpretation practice in developing Third World countries often rich in floral and faunal diversity. Local examples of best practice within South African Parks and National Gardens are discussed in this context. Fourthly, models of interpretive strategies are then critiqued and scrutinised and finally effective tools and techniques of interpretation in practise are examined.

4.2 Defining principles of interpretation

4.2.1 Nature and origins

Interpretation is an effective communication strategy that is practised worldwide in botanical gardens, national parks and protected areas, museums and cultural heritage sites (Ballantyne et al., 2008; Chang et al., 2008; Veverka, 1994). Boosted by naturalist and educator Freeman Tilden's publication *Interpreting our Heritage* in 1957 and rooted in the mission of United States National Park Service (NPS) the goal of interpretation was not merely to provide information, but to convey a legacy, inspire visitors of the majesty and grandeur of nature and to convince them of the need to preserve these natural areas (Pond, 1993). Pond (1993) also points out that 'tour guides' or 'explainers'*(exegetai)* who delivered interpretation actually were active in Greek times and cited by Cicero, who is commonly regarded as the first travel writer.

Today interpretation employs a range of modern media tools (interactive web sites, outdoor signage panels, trail labelling, pamphlets and brochures), displays (demonstration gardens, dioramas and discovery centres) and personnel (interpretive guides) to link the visitor with the natural or cultural resources of the site (National Association for Interpretation, and Interpretation Association Australia). The planning strategy is interdisciplinary, blending elements of journalism, marketing and psychology with non-formal and adult education theory and presentations. These are underpinned with sound recreation and tourism planning principles and exhibited through excellence in media planning and design (Veverka, 1994).

The modern origins of both ecotourism and interpretation are derived from the Canadian parks and the mostly widely accepted definition was devised by Interpretation Canada:

> *Interpretation is a communication process, designed to reveal meanings and relationships of our cultural and natural heritage, through involvement with objects, artifacts, landscapes and sites.*
>
> (Veverka, 1994: 94)

Currently interpretation has been defined as

> *A mission-based communication process that forges intellectual and emotional connections between the interests of the audience and the inherent meanings of the resource.*
>
> (National Association for Interpretation, 2007:6)

William Everhart, director of the NPS Interpretation program describes the evolution of term aptly in his work *Tourism: The Good, the Bad and the Ugly.*

> *Interpretation seemed a better term to describe the functions dealing with subjects that most people were unfamiliar with - geology, biology, botany… It was almost like learning a new language. The process of translating this language, the language of the earth, suggested the term 'interpretation'.*
>
> (Pond 1993:71)

Tilden (1977:6) defined interpretation as

> *An educational activity which aims to reveal meanings and relationships through the use of original objects, by first hand experience, and by illustrative media, rather than to communicate factual information.*

Tilden, widely revered in the literature, put forward six guiding principles that should govern any interpretation.

Tilden's principles are cited here from Pond (1993: 72) as they continue to be the foundation on which modern interpretation is built:

I. Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.
II. Information, as such, is not interpretation. Interpretation is revelation based upon information. But they are entirely different things. However, all interpretation includes information.
III. Interpretation is an art, which combines many arts, whether the materials presented are scientific, historical, or architectural. Any art is in some degree teachable.
IV. The chief aim of interpretation is not instruction, but provocation.
V. Interpretation should aim to present a whole rather than a part and must address itself to the whole man rather than any phase.
VI. Interpretation addressed to children (say, up to the age of twelve) should not be a dilution of the presentation to adults, but should follow a fundamentally different approach.

To be at its best, it will require a separate programme.

In summation then, interpretation should provoke interest, be enjoyable, relate to the visitor and reveal new insights within the context of a thematic approach.

4.2.2 Key differences between information, environmental education and interpretation

A number of authors (Ballantyne et al., 2008; Darwin-Edwards, 2000; Veverka, 1994; Ham, 1992) are emphatic that information in the form of bald cold facts and statistics has little interest to the visitor while effective interpretation hinges around the need to create strong linkages between the resource and the visitor. For example, a field guide to birds, plants or snakes may provide "information" but usually no interpretation. All interpretation, however, should contain valid and relevant information presented in a pleasurable, relevant, organized and thematic manner (Ham, 1992).

John Muir, the American naturalist, aptly notes "In drying plants botanists often dry themselves. Dry words and dry facts will not fire hearts" (Association for Heritage Interpretation website). Interpretation differs from environmental education in that the latter usually consists of enforced learning with structured experiences, often to a captive target audience of a specific age group and aligned to meet national and state educational standards (CDI, 2008a). The visitor to the park or botanic garden usually

engages voluntarily with the material or guide as it appeals to his emotional, sensory and intellectual experience (Ballantyne et al., 2008; Darwin-Edwards, 2000; Pond, 1993). Interpretation and environmental education may take place at the same site concurrently; they are not mutually exclusive, the important distinction is that the latter has a homogenous target audience and a structured curriculum while the former involves a diverse range of ages, attitudes and expectations (CDI, 2008a).

4.2.3 Multiple benefits generated from interpretation

Interpretation is a service provided to enhance visitors' experiences and to provoke and motivate additional learning and discovery. It can also act as a management tool that can be used to increase visitors' appreciation for, and sensitivity to, the natural and cultural resources of the area (CDI, 2008a; Staiff and Bushell, 2004).

According to Carter (2001:8) interpretation has multiple purposes at a tourist destination *inter alia:*

- Visitor orientation: Site maps are useful displaying the location of various activities, roads and trails as well as facilities (reception, shops, restrooms etc.);
- Inform: Bird lovers at a hide would like to know what the local species are, game watchers will want to know the current location of rhino or other megafauna;
- Entertain: Interpretation should be enjoyable, visitors are at leisure, material should be accessible, rather than hard work;
- Persuade and influence behaviour: the host organization may have objectives they want the visitor to be aware of, for example, the US Parks service wants to assist visitors to develop a keen appreciation and awareness of the site they are viewing and encourage thoughtful behaviour that minimizes impacts on site; and
- Promotion: Visitors need to know the agency responsible for maintaining and developing the facility, for example Msinsi Holdings manages the large dams and catchment areas in the eThekwini Municipal Area (EMA) for the Umgeni Water Board.

4.3 The use of natural heritage interpretation in Parks, Botanic Gardens and Museums

Plant interpretation is under scrutiny in botanic gardens and much of the principles and findings are also applicable to protected areas. The design and delivery of effective conservation learning experiences requires managers and interpreters to have a clear understanding of visitor interest and motivation in order to design messages that enable visitors to make the linkages and connections between previous experiences and their immediate surroundings (Ballantyne et al., 2008). Environmental education specialists are devising new strategies to increase public awareness of biodiversity in protected areas and botanical gardens as they realize that they are competing for visitor attention (Eden Project, 2007). Visitor surveys to botanical gardens indicate that most visitors arrive for recreational purposes and that only a small fraction of visitors to botanical gardens engage consciously in education (Burbridge, 1990 and Oikawa, 2000). Continuing in this vein Darwin-Edwards (2000) argues that when visitors are relaxed they may be more receptive to overt or subtle interpretation messages.

Interpreters have a fundamental role to play in addressing the current ecological crisis (Ballantyne et al., 2008; Curthoys et al., 2004). This transcends generalizations to the real and specific as Snyder (1990:18) observed “It is not enough to just ‘love nature’ . . . Our relation to the natural world takes place in a place, and it must be grounded in information and experience.” (cited in Curthoys et al., 2004). Declines in attendance at American National Parks of over 20 % since 1988 have been blamed on increasing use of electronic media such as internet, gaming and movies and rising oil prices (Pergrams and Zaradic, 2006). Sadly surveys of American children by Lukas (1996) reveal that the average child could identify 1,300 corporate logos but only 10 plant and animals native to the bioregion (cited in Curthoys et al., 2004). The term Nature Deficit Disorder was coined by Richard Louv in his 2005 book *Last Child in the Woods,* and refers to the alleged trend that children are spending less time outdoors, resulting in a wide range of behavioral problem. Louv (2005) claims that causes for the phenomenon include parental fears, restricted access to natural areas, and the lure of the electronic screen. The following section details some of the interpretive programs being run by botanical gardens, parks and protected areas around the world which seek to address the issues of lifelong learning starting with the very young.

4.4 International benchmarks of best interpretative practise in developed countries

The national parks and botanical gardens selected for this study are included on the basis of their reputations as world ecotourist destinations, their contribution to conservation and commitment to public outreach and education through interpretation strategies. Their relevance to interpretation planning at Shongweni is highlighted and the appropriate interpretive associations are mentioned.

United States of America

National parks and forests in the USA include world class scenic attractions and iconic national parks such as Yosemite, Yellowstone and the Grand Canyon, which attract large numbers of foreign visitors; some 65 million recreation visits to the nature based portion of the parks system were recorded in 2005 (NPS, 2006). The USA has 57 national parks which enjoy an IUCN protection rating of Category II. This protection rating accommodates both environmental preservation and compatible recreational activities and ecotourism through internal zoning (Weaver, 2008). Established in 1905, the Forest Service is an agency of the U.S. Department of Agriculture that manages public lands in national forests and grasslands. These areas encompass 193 million acres of land, which is an area equivalent to the size of Texas (USDA Forestry Service, 2008).

The motto of the USDA Forest Service is “Caring for the Land and Serving People” (ANF, 2002) while the unofficial motto for interpretative guides is: “through interpretation understanding, through understanding appreciation; through appreciation, protection (Pond, 2003: 71). A strong element of stewardship for nature is evident throughout.

High standards are set for interpretation by the National Park Service (NPS) and the USDA Forest Service for the parks and forests under their control. This includes structured curriculum and training for the certification of interpretive guides (known as rangers) and the production of style manuals for parks and road signage and interpretation centres (CDI, 2008a; Edwards, 1994). Policy guidelines and templates for interpretation material are developed and control thereof is centralized. In this manner close federal integration between the two bodies is achieved while protected areas are encouraged to develop their own site specific master interpretation plans within this framework (ANF, 2002). For purposes of this research the author examined one such plan for a large state forest on the eastern seaboard.

The Allegheny National Forest (ANF) located in Pennsylvania covers some 513 000 acres of public land and comprises 20 campgrounds and 171 miles of hiking trails. The area is the largest protected forest in the region and lies within one day's drive of one-third of US residents (ANF, 2002). The master interpretation plan was developed to coordinate efforts between the different sites and to establish interpretive goals, objectives, themes, program recommendations and design guidelines for interpretive efforts within the Forest. The plan was developed in conjunction with the USDA Forest Service, the Pennsylvanian Tourist authority, local communities and the Eastern National Forest Interpretation Association (ANF, 2002).

The significance of Allegheny National Forest to this study is that the interpretive master plan provides detail of the planning and participatory process that was followed and templates that can be adapted for use in South Africa. Shongweni Reserve (SR) shares similar characteristics to ANF in that it is the largest protected reserve within reach of a large city population - eThekwini Muncipal Area (EMA), it has extensive unique natural resources and offers a like range of ecotourist activities. These competitive advantages can be substantially enhanced through the development of a master interpretation plan. These concepts are developed in Chapter 5.

Some specific examples of interpretation material developed for the National Park Service (NPS) and the USDA Forest Service are found in Appendix 2.

A number of botanical gardens in the United States were reviewed for this study; the first is the **Fairchild Tropical Botanic Garden** (FBG), located on 83 acres in South Florida. Fairchild is one of the premier research and education-based gardens in the world and is a recognized international leader in conservation with the world's greatest living collection of palms (FBG, 2008). Their education program reaches more than 25,000 school children per year and adult horticultural education takes place through the University of Miami. The gardens are a tourist destination hosting a range of cultural events (FBG, 2008). Podcasts and video downloads of these and other horticultural and conservation activities are available on their websites and can serve as modern examples of web based interpretation.

Longwood Botanical Gardens (LBG) has been described as a horticultural showstopper where the gardening arts are encased in classic forms and enhanced by modern technology (LBG, 2008). Developed by Pierre S. du Pont in 1906 on 1,050 acres of former Quaker owned farmland Longwood gardens combines the elegance of the great gardens of Italy and France with technology to create a major tourist destination (LBG,

2008). In addition to the public spectacle of the gardens, Longwood's influence on American horticulture through its educational programs has had global impact over the last three decades with 5 000 students a year have attending classes designed for both amateur and professional gardeners and nurserymen (LBG, 2008). The gardens are directly linked with the University of Delaware where some horticultural research has centred around interpretation and labelling (Wise, 1979).

Yet another botanical garden is the **Missouri Botanical Gardens** (MBG), the focus of which is the conservation and utilization of medicinal plants which are showcased under controlled growing conditions in the Climatron a large glass geodesic dome. The Missouri Botanical Garden founded Shaw Nature Reserve (SNR), in 1925 when coal smoke in St Louis threatened the living plant collections at the Garden. This reserve offers 14 miles of hiking trails and restoration of its diverse habitats provides the Reserve's visitors a uniquely varied experience of Missouri's rich biological heritage (MBG, 2008). The reserve also features the Whitmire Wildflower Garden, a five-acre demonstration garden which provides information and examples of the American Midwest's hardiest and most attractive native wildflowers, shrubs and trees. Another relevant destination is Bascom House displaying an exhibit entitled "People on the Land," which illustrates the interaction between humans and the land in eastern Missouri over the last 12,000 years and interprets the resulting, complex environmental issues. The reserve's stated aim is to inspire responsible stewardship of the environment through education, protection and restoration of natural habitats, and public enjoyment of the natural world (MBG, 2008). This example demonstrates the close linkages between protected areas and botanical gardens, a mutually beneficial association as it offers a richer ecotourist destination. In the international examples selected for this work interpretation strategies for both entities is treated holistically.

Still in the United States of America, the National Association for Interpretation (NAI) is dedicated to advancing the profession of heritage interpretation, currently serving about 5,000 members in the United States, Canada, and over thirty other nations. Individual members include those who work at parks, museums, nature centres, zoos, botanical gardens, aquariums, commercial tour companies, and theme parks. The mission of the NAI is to inspire leadership and excellence to advance heritage interpretation as a profession (NAI, 2010). Other linked societies include the Eastern National Forest Interpretation Association and the Professional Guides Association of America (PGAA).

Weaver (2008: 287) argues that while the USA is the world's largest ecotourist market, there is no one federal agency or non-governmental organisation coordinating the activity. He suggests that the International Ecotourist Society (TIES) is the *de facto* national

organization. Their contribution to the development and definition of the industry has been significant in terms of both the *Quebec Declaration on Ecotourism 2002* and the *Oslo Declaration on Ecotourism 2007* (Weaver, 2008).

Canada

The Canadian system of 38 national parks received more than 11 million visitors during the period 2004-05 (Parks Canada, 2005). The top two parks of Jasper and Banff together with Yoho and Kootenay comprise the Rocky Mountains World heritage site of 21 000km^2, the largest protected mountain park in the world (Environment Canada Parks Service, 1993). These sites were visited by this researcher who witnessed high levels of visitor service. Interpretive material was freely available at visitor centres located at Banff and Lake Louise and brochures regarding plant identification were informative, accurate and easy to use.

A number of organisations exist supporting the vision and objectives of Parks Canada regarding interpretation encouraging environmental literacy and stewardship. These include *inter alia*:

- Interpretation Canada, a volunteer-run professional association;
- Interpretive Guides Association, a non-profit organization that started as the Mountain Parks Heritage Interpretation Association (MPHIA); and
- The Canadian Network for Environmental Education and Communication (EECOM) develops teaching resources for learners and instructors.

Europe

Europe is notable for its high population densities and as an attractive tourist destination, receiving 484 million visitors in 2007, amounting to a world market share of 53% (WTO, 2008). Examples of horticultural excellence and interpretation are briefly described and their relevance to the study highlighted.

The **Royal Botanic Garden Edinburgh** (RBGE) in Scotland is both a scientific institution and a tourist attraction. Originally founded as a physic garden in 1670 to grow medicinal plants, it now occupies four sites across Scotland: Edinburgh, Dawyck, Logan and Benmore, each with their own specialist collections (RBGE, 2008). The Edinburgh garden, popularly called the 'Botanics' contributes substantially to both biodiversity conservation and public education containing 34 000 plants that represent nearly 17 000 different species from all over the world or about 7% of all known plant species (RBGE, 2008). An active education division has developed interpretive material that is currently

used by the Durban Botanic Gardens (Clement pers. comm.). The Scottish Interpretation Network has developed a comprehensive interpretation planning manual outlining methods and practises for developing strategic and detailed interpretive plans that can be applied across a range of sectors including historical sites, protected areas, parks and botanical gardens (Carter, 2001).

England

Conell (2004) emphasizes the tourist value of British gardens with some 16 million visitors per year. According to the English Tourism Council there are 378 gardens that form 6% of the attractions sector (Conell, 2004).

One of the most well-known gardens is possibly **Kew Gardens**. Kew Gardens established its position as the global headquarters of botanical exploration in the Victorian era (Connell, 2004). As a World Heritage site Kew Gardens remains a centre of excellence in horticultural research and education as it brings People, Plants and Possibilities together (RBG Kew, 2006). The 120 hectare gardens attract 1.5 million tourists per year (RBG Kew, 2006). Recent interpretive innovations include the Kew Ranger, a rentable handheld GPS system that helps the visitor navigate paths for seasonal walks and aids the discovery of key attractions according to limited time schedules. Visitors are also able to view 100 film clips on the history and horticulture of the gardens (Kew, 2008). Learning at Kew is divided logically into 3 divisions: Higher Education, Public Education and Schools Education (RBG Kew, 2007).

Visited by over 90 000 school children per year Kew pioneered Britain's first interactive botanical play zone entitled 'Climbers and Creepers' where children from 3- 9 years old may climb into a plant to learn about pollination and get 'eaten' by a giant pitcher plant (RBG Kew, 2007). Comprehensive websites and brochures interpret the key features of the garden which include *inter alia* the Pagoda House, Evolution House, Palm House and the Prince of Wales Conservatory. Linked attractions include Wakehurst Place, Loder Valley Nature Reserve and the Millennium Seed Bank which aims to protect some 24 000 plant species within its vaults (RBG Kew, 2007).

The **Eden Project** in Cornwall is also noteworthy as a tourist attraction with excellent interpretation (Clement pers. comm.). Completed in 2001 after two years construction in a former kaolin pit mine its key attraction is the world's largest green house, plastic covered geodesic domes that emulate two biomes, the Rainforest (3.9 acres) and the Mediterranean region (1.6 acres) (Eden Project, 2007). An uncovered temperate biome displays plants such as tea, lavender, hops, hemp and sunflowers. Numerous creative displays using outdoor sculpture link plants with products, for example: cordage from

plant fibres, eco engineering demonstrated by a large hemp fence and hops poles. Themed based displays include topics such as ‘Plants for tomorrow’s industries’; ‘Plants for fuel’ and ‘Plants in Myth and Folklore’ (Eden, 2007). The newest addition entitled “The Core” comprises an education facility, classrooms and exhibition spaces designed to help communicate Eden's central message about the relationship between people and plants (Eden, 2007).

Australia

Sustained tourist growth and high levels of biodiversity are also evident in Australia which has an excellent ecotourist product and a high level of sector organization (Weaver, 2008). Well known and accessible natural attractions include the Great Barrier Reef, the Wet Tropical Rainforests and Uluru and Kakadu National Parks (Weaver, 2008; Fennel, 1999). These high profile nature attractions are often in close proximity to cities, resorts and international gateways. Weaver (2008) notes that these examples include Cairns (Great Barrier Reef and Wet tropics), Sydney (Blue Mountains) and Melbourne (Grampians). This benefits both domestic visitors and international arrivals. Australia is recognized as a world leader within the ecotourism industry and receives extensive government support in terms of the National Ecotourism strategy, and the EcoCertification and Ecoguide Australia programs (Weaver 2008).

Queensland has the highest concentration of ecotourist activities due to the Gold Coast and wet forest tropics while New South Wales benefits from its mountain regions and temperate forests (Weaver, 2008). In Western Australia wild flower viewing is popular and seasonal, not unlike South African floral displays in Namaqualand. Of particular relevance to this study is the close proximity and associations between large protected areas and botanic gardens. This enables holistic and seamless interpretation practice. Two examples have been singled out, firstly the Mount Tomah Botanic Garden (MTBG) and secondly, the Royal Botanical Gardens in Cranbourne, Victoria.

The **MTBG i**s a satellite garden of the Royal Botanic Gardens Sydney. The garden covers 28 hectares on the summit of a basalt-capped peak 1000 metres above sea level in the world heritage listed Greater Blue Mountains. The theme of this Garden emphasizes cool-climate plants from around the world, especially those from the southern hemisphere (RBG Sydney, 2008).The conservation area of the Greater Blue Mountains World Heritage site adjoins the gardens and consists of 187 hectares supporting nature based tourist activities such as bush walking, climbing and mountain biking (Worsman, 2007). A range of ecosystems include temperate rainforest, hanging swamp and heath, represent some 700 plant species (Worsman, 2007). Worsman (2007) notes that Botanic gardens often have the edge in developing interpretive material and that ecotours can be used as

a vehicle to transform the 'wow' factor of a horticultural display into a better understanding of the conservation and factors involved in species preservation. Interpretive Audio trails are available as podcasts or downloads and include thematic learning and catchy titles such as "Tomah - a story of rock, fire, fern and gum", "Gondwana - the original ark", "Live fast, die young - the triumph of the flowering plants" (RBG Sydney, 2008). Outdoor signage utilizes anodized aluminium with line drawings (Roots, 1993).

The **Royal Botanic Gardens Cranbourne (RBGC),** a division of the Melbourne RBG offers ecotourists the chance to explore 363 hectares of heathlands, wetlands and woodlands (RBG Melbourne, 2008). The 26 hectare newly designed Australian garden was specifically designed to enhance the interpretive experience of Australian flora. Winners of the 2006 Australian tourism award, the Gardens showcase plants utilizing cultural stories as pathways to explore nature (RBG Melbourne, 2008; Saffigna et al., 2005). Public program staff utilized three strategies to achieve their aim of creating the botanic equivalent of the "Profound wildlife experience". These were the Volunteer Master gardener program, Aboriginal storytelling and the use of historic fine art to interpret the Australian landscape (Saffigna et al., 2005). The Volunteer Master gardener programs allow visitors to interact with trained volunteers while the Aboriginal program interprets the landscape and flora of the RBGC through the eyes of the Boonerwrung peoples, the traditional custodians of the land the Garden now occupies (Saffigna et al., 2005).The fine art program in contrast interprets the relationship between the colonial settlers and the Australian bush by examining the rich history of Australian landscape painting highlighting conservation issues such as logging, fire and alien weed invasions. Saffigna et al. (2005) point out that this multi–interpretational approach sparks visitor curiosity, noting that parks and gardens visitors also frequent museums and art galleries, a view confirmed by Ballantyne et al. (2008) who conducted empirical visitor research at Mt Coot-tha Botanical Gardens in Brisbane.

These concepts have potential for application and adaptation at Shongweni Reserve particularly the use of cultural linkages and the Zulu tradition of storytelling.

4.5 Best interpretation practise in developing Third World countries

In contrast to the graphically slick, packaged and formulaic interpretive design of the developed countries we now assess some examples of interpretation practice of key protected areas and botanic gardens within developing third world countries. Common challenges and innovations regarding biodiversity conservation, visitor involvement and interpretation are examined and their relevance to the study area of SR is demonstrated.

Africa and Madagascar

Africa is a highly diverse continent comprising some 51 countries which are home to 810 million people who speak over 800 languages (BGCI, 2010). Covering over 29 million square kilometres; Africa is rich in diversity of habitats, species and cultures. Vegetation types include true desert, dry bushland, wooded grassland, rain forest and alpine desert. It is estimated that Africa has approximately between 40-45 000 species of plants, with a high level of endemism (77-87%), many of which have global importance for their medicinal, food and horticultural value (BGCI, 2010).

Over 130 botanic gardens are thought to be in Africa today, from the oldest in Durban established in 1849, to new gardens being established in Egypt, from the largest and best known such as Kirstenbosch to smaller underfunded enterprises in Uganda (BGCI, 2010). In 2002, Botanical Gardens Conservation International helped establish the **African Botanic Gardens Network (ABGN)** to support and strengthen Africa's botanic gardens, many of which are extensions of protected areas.

Centred around understanding, documenting and communicating plant diversity 2010 action plans and targets of the ABGN include:

- Completion of an African programme with models and protocols for education, plant conservation and sustainable use, based on research and practical experience;
- All botanical gardens to have adequate access to electronic information in order for them to function in support of education, conservation and sustainable use programmes;
- Botanical gardens should contribute to the development of national lists of threatened plant species in all countries of Africa;
- All botanical gardens to promote at least one local culture and its plant-related knowledge, innovations and practices; and
- Botanical gardens to act as *ex situ* sites, growing and conserving endangered local flora

(BGCI, 2010).

Local content related to plants, indigenous culture and knowledge and a sense of place is emphasized. Another common thread is the utilization of local plants for medicine and food, issues that are explored herewith.

A recent report from America's National Research Council noted that Africa's own fruits are a largely untapped resource that could combat malnutrition and boost environmental stability and rural development in Africa (BGCI, 2008). Most commercial African food sources and crops are largely Asian and American in origin and this research encourages African science institutes, policymakers, nongovernmental organizations, and individuals to use modern horticultural knowledge and scientific research to bring these "lost African crops" - such as baobab (*Adansonia digitata*) and marula (*Sclerocarya birrea*) - to their full potential (National Research Council, 2008). A number of the fruits mentioned in the report are prevalent at SR and can be used as a source of local nutrition. Furthermore, traditional African use of these 'veld foods' has fascinating potential for visitor interpretation. Plants here include the Kei Apple (*Dovyalis caffra*) prized for its golden apple fruits, Carissa (*Carrissa macrocarpa*) whose plump red fruit is used in jam making, the naturalised Indian Tamarind tree (*Tamarindus indica*) whose pulpy seeds are rich in vitamin B, phosphorus, potassium, and calcium and finally the fruits of the marula (*Sclerocarya birrea)* whose vitamin C content is said to surpass the flesh of oranges, grapefruit, and lemon (National Research Council, 2008; Van Wyk and Gericke, 2000; Fox and Norwood Young, 1982).

Traditional African use of grains is also well documented in the literature (National Research Council, 2006; Van Wyk and Gericke, 2000; Norwood Young and Fox, 1982) and mentioned later in this text in relation to archeological excavations at Shongweni caves where San hunter gatherers used African Millet and Tsamma melons (Davies and Gordon-Gray, 1977). Similarly the gathering of leafy plants as vegetables and spinach (*imifino*), an almost universal African practice, takes place at Shongweni utilizing locally available herbaceous plants and weeds such as Black jacks *(Bidens pilosa),* Wild spinach *(Rumex lanceolatus*) and Pig weeds (*Amaranthus spp*.) (Patrick, 1998).

In **Aburi Botanic Gardens**, Ghana, a 50 acre Medicinal Plant Garden has been established while the ABGN reports that a number of Egypt's threatened medicinal plants are now under protection following the creation of a Medicinal Plant Centre in St Katherine's Protectorate on the Sinai Peninsula and the establishment of the Medicinal Plants Association (ABGN, 2006). In the Congo (former Zaire) the 200 ha **Jardin Botanique de Kisantu**, originally founded by Jesuit priests in 1901, has recently been renovated with an emphasis on conserving medicinal plants (BGCI, 2008). A joint collaborative between the WWF and the Institut des Jardins Zoologiques et Botaniques du Congo (IJZBC), the arboretum contains a collection of 200 indigenous African trees.

Interpretive solutions in an African context

A novel outreach programme initiated by the National Museums of Kenya (NMK) and the Nairobi Botanic Garden has formed partnerships with local secondary schools to help them to transform their grounds into sites for environmental learning (Atiti, 2008). Instead of viewing interpretation and environmental education as separate fields, Atiti (2008) has drawn in formal environmental educators and teachers together with interpreters from the National Museum, Botanical Gardens, and Kenya Wildlife Services to share their knowledge and experiences with the teachers (Atiti, 2008). Sharing and mobilizing what Atiti terms 'interpretive capital' the teachers, learners and interpreters designed, built and interpreted a themed demonstration garden within the precincts of the school grounds. This garden reflected in part elements of the NMK–Nairobi Botanic Garden: medicinal plants, succulents, wetlands, a rare plants area, a memorial area, a recreation corner, a butterfly corner and an orchard. Interpretive material for use amongst learners was developed in a participatory and collaborative process and included a publicity brochure, a trail leaflet, worksheets, interpretive signage and interpretive labels (Atiti, 2008).

These interpretive collaborations are an encouraging aspect and can serve as inspiration for local endeavours at Shongweni where members of the Durban Botanic Garden have already been active establishing permaculture food gardens at local schools in the area (Clement pers. comm.).

Limbe Botanic Garden (LBG) in Cameroon was originally founded by a group of Germans in 1892. Like many botanical gardens in Africa it served as a trials and acclimatization centre for the introduction of exotic crop species such as coffee, cocoa, rubber, oil palm, banana, teak and sugar-cane for distribution within "Kamerun" and other German colonies (Roots, 1994). In its heyday the Limbe Botanic Garden was said to be one of the most important tropical botanic gardens in the world. The Garden possessed a herbarium, laboratories, classrooms, museum, library and staff accommodation (Roots, 1994).

In 1988, a British-Cameroonian partnership was developed which led to the renovation and development of the garden. With redefined boundaries LBG now covers an area of about 48 hectares and ranks as a key tourist destination along with Mount Cameroon and the national parks. The role of the garden has shifted from an agricultural focus to one of conservation, education, science, tourism and recreation. According to BGCI the Cameroon Government and the British Overseas Development Administration (ODA) are collaborating to encourage the conservation of Cameroonian forests by the local people for sustainable use. Other goals include the promotion of ecotourism and the

communication of biodiversity benefits to the local populace (Roots, 1994). Following the formation of the African Botanic Gardens Network in 2002, the Limbe Botanic Garden established the Central African Botanic Gardens and Arboreta Network (CABGAN) to support gardens within the region (BGC1, 2008). The case of Limbe gardens is instructive to SR as it reflects the multifaceted challenge that gardens and protected areas face in developing African countries, namely underfunding, scarcity of local scientific expertise and a local impoverished populace living within a richly diverse yet oft fragmented and threatened ecosystem.

Madagascar

Isolated from mainland Africa is the island of Madagascar. Madagascar's plants and animals inhabit a unique world; it is a renowned hotspot of global biodiversity. Plants total at least 13,000 species of which about 90 percent are unique to the island. Madagascar has seven of the world's eight baobab tree species, six of them endemic to the island (Conservation International, 2010a). The avenue of the baobabs at Morondowa, on the west coast of Madagascar, is a world famous tourist attraction (Packenham, 2002). Another icon is the Traveller's palm *(Ravenala madagascariensis)* whose emblem has been adopted by Botanic Gardens Conservation International (BGCI) and the International Ecotourist Society (TIES, 2007).

Madagascar is also home to 72 different lemurs making the region a world leader in primate endemism. These range in size from the tiny Madame Berthe's mouse lemur, which, at only 30 grams, is the world's smallest primate, to the indri which leaps from tree to tree similar to the airborne kangaroo (Conservation International, 2010a). Conservation International (2010a) reports that Madagascar is a main centre of diversity for chameleons worldwide, harbouring such magnificent species as the giant chameleon. Sadly only about 2.7 percent of Madagascar's land area (16,131 km^2) is officially protected. Madagascar remains a magnet for ecotourists and conservation scientists alike in the race to document and preserve an increasingly threatened and isolated portion of global biodiversity. The **Antsokay Arboretum** conserves plants from the southwest region of Madagascar and works in close collaboration with the Royal Botanic Gardens Kew, Fairchild Tropical Botanic Garden and the WWF (Antsokay Arboretum, 2010). This privately owned botanic garden of four hectares is open to the public and showcases 900 different plant species including a large number of endangered medicinal plant species (Antsokay Arboretum, 2010). Some 90% of the collection is endemic to the region representing a typical sub-arid spiny thicket vegetation with a canopy of towering baobab trees (Antsokay Arboretum, 2010).

South Africa, too, boasts high levels of floral and faunal endemism and unique biodiversity coupled with a vibrant tourist industry (DEAT, 2009). Conservation and ecotourist challenges are similar to those in Madagascar, and a collaborative approach involving support from established international scientific and aid agencies could well be utilized at a local level at SR. Practical examples of best interpretive practice in Madagascar include the use of 'ecology trunks' to communicate local biodiversity issues, the use of jigsaw puzzle pieces to represent Gondwanaland and the linking of environmental concepts with the school curriculum (Domroese and Sterling, 1999). At Ranomafana National Park in eastern Madagascar, ecology trunks designed by park staff and US Peace Corps volunteers offer relevant portable environmental education materials in a single box that includes:

- Written curriculum materials with Malagasy and English translations;
- Malagasy lore relating to rainforests and their inhabitants;
- Objects such as animal skulls and teeth;
- Photographs and identification cards with pictures and descriptions of Madagascar's unique flora and fauna; and
- Research tools, such as a magnifying glass, inexpensive binoculars, maps.

(Domroese and Sterling, 1999)

Learning activities in the ecology trunks are designed specifically to introduce environmental concepts and to help people learn about the park project and scientific research.. The use of ecology trunks extends beyond environmental programs into basic education and the teaching of English as a Foreign-Language program (Domroese and Sterling, 1999). Again there are valid and pertinent parallels for developing locally based environmental content at SR for use with the local community and schools. Education Centre staff at the Ivoloina Zoological Park in eastern Madagascar developed an after-school program for elementary school learners to increase students' awareness of local environmental issues. The program achieved great success in both readying learners for secondary school education and sensitizing them to local biodiversity issues (Domroese and Sterling, 1999). These latter two examples hold promise for interpretation activities at SR and the need for an Interpretive and education centre is reiterated in Chapter 7.

South Africa

The South African Biodiversity Institute (SANBI) is the official custodian of South African flora and fauna and has been given the legal mandate in terms of the National Environmental Management Biodiversity Act (NEMBA) in 2004 to protect the country's biodiversity of both floral and faunal resources (SANBI, 2008a). Willis and Morkel (2007) argue that the accepted definition by Botanic Gardens Conservation International of botanic gardens as 'institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education' is too limiting and that all NBG'S include an area of natural indigenous vegetation with its associated wealth of biodiversity and biological interactions.

Willis and Morkel (2007) observe that although there is a fairly comprehensive understanding of the avian diversity in the National gardens but that knowledge of the lesser known, less visible, groups such as insects, reptiles, amphibians and even mammals is still very restricted. As director of Conservation and Horticulture at SANBI, Willis points out that historically the NBG's have been describing the interactions and dependencies between plants, people and animals through interpretive signage displayed in the gardens. This has been extended to general visitors through guided tours and to learners through formal educational programmes held in the gardens by the SANBI Environmental Education section (Fullard, 2007; Willis and Morkel, 2007).

SANBI acknowledges the role that interpretation can play in making South African plants and their stories accessible and exciting for garden visitors (SANBI, 2008b). Each garden has a staff member responsible for interpretation, and their duties include conducting guided tours, designing interpretive brochures and signs, setting up touch tables and interactive displays, informal visitor liaison and giving talks on specific subjects (SANBI, 2008b). Marike Honig, former interpretation officer at Kirstenbosch, developed a comprehensive interpretation handbook for South African public gardens and reserves whose principles are applied in this work (Honig, 2000). Honig has pioneered the development of the interpretive story board in this country. Examples of plant interpretation at the various SANBI gardens are found in Appendix 1.

Conservation and ecotourist objectives combine in South Africa's eight national botanical gardens (NBG'S). These conservation gardens are currently spread across five provinces, and include over 1 300 ha of natural vegetation, ranging from savannah bushveld, highveld grassland to subtropical forest, mountain and coastal fynbos to arid karroid vegetation (Willis and Morkel, 2007).

A ninth garden has just been established in 2008 outside the town of Nieuwoudtville in the Northern Cape covering an area of some 6200 ha of renosterveld, succulent Karoo and Cape Fynbos vegetation (SANBI, 2008a). Over one million (1 2405 809) visitors were recorded at the eight gardens during 2007 with Kirstenbosch alone receiving 764 913 visitors (SANBI, 2008a). Kirstenbosch, the best known of all the gardens was rated by Travel and leisure as one of the top ten botanic gardens in the world and rates as one of the top six attractions for the international visitor to the Cape (SANBI, 2008a; Fullard, 2007). As part of the Table Mountain National Park, Kirstenbosch was recognized in 2005 as South Africa's fifth World Heritage site. Fullard (2007) notes the gardens are perceived to be the gateway to the Cape Florisitic region and are ideally suited as a tourist destination and as a vehicle to promote ecotourism. Smaller reserves that are managed by Kirstenbosch include the Edith Stephens Wetland Park on the Cape Flats and the Tinie Versfeld Flower Reserve (SANBI, 2008a).

A new interpretative feature has been developed at Kirstenbosch, namely the Useful Plants Garden Project (UPGP) which combines centuries of plant use knowledge from all the peoples and cultures of South Africa while conserving the rich variety of indigenous plants (SANBI, 2008b). Linked with the former medicinal plants trail, the centrepiece is a traditional wattle and daub Xhosa/Mpondo hut surrounded by twenty diverse irregular beds each displaying its own theme on topics as diverse and provocative as 'Plants used for sexually related problems', 'Plants used for insect and snake bites' and 'Headache remedy plants' (SANBI, 2008b). Labelling and interpretation are an intrinsic part of this educational garden's success. Dividing the garden into plant-use sections allows a coherent and cohesive interpretation system. At the main entrance a map displays all plant use sections and larger storyboard signage expands the theme with relevant illustrations and multilingual text (SANBI, 2008b). Interpretive samples from the UPGP are found in Appendix 1. Another innovative feature is the garden of extinction where representative plants for each IUCN category (as discussed in section 3.4) are displayed.

Other noteworthy gardens relevant to this study include the Free State NBG which houses a Basotho hut and the Hartbeeshuis (a traditional Afrikaner home) which showcase traditional Afrikaner and Basotho medicinal plant use (SANBI, 2008b). A traditional Zulu medicinal garden was created at the KwaZulu-Natal NBG complete with beehive hut and in the Pretoria NBG the medicinal garden was create around a central colourful Ndebele hut surrounded by labelled plantings representing plants commonly used by the traditional healers within the communities (SANBI, 2008b). The Walter Sisulu NBG in Johannesburg boasts a unique geology garden developed in collaboration with the Geological Society of South Africa that takes the visitor back in geological time

(SANBI, 2008b). Clear, easily understood storyboards, with time-lines indicating significant events in the earth's history are combined in association with the large boulders of different rock types arranged according to their age (SANBI, 2008). The final example of creative interpretation is the Karoo NBG which includes a dedicated Namaqualand area, complete with a Khoi Khoi herb garden and Khoi Khoi “kookskerm” or cooking screen (SANBI, 2008b).

All NBG gardens relate to a uniform web page format with a virtual garden tour. These, however, are not as sophisticated or developed as the American and Australian gardens examined in this study. SANBI, however, have excelled in popularizing indigenous flora to the Internet user via their innovative Plantzafrica website and the Plants of South Africa (POSA) site which displays over 6 000 images covering 2 500 taxa (SANBI, 2008a). The role of SANBI staff in developing and publishing popular and scientific texts on floral and faunal resources is considerable contributing directly to their stated aim of “making plants relevant to real life”. This relates directly to Target 14 of the Global Strategy for Plant Conservation which is to promote communication, education and public awareness about plant biodiversity (Willis, 2006:83).

South and Central America - Interpretive solutions to Biodiversity challenges

Brazil

Faced with immense conservation challenges Brazilian Botanic Gardens and Protected areas are finding new ways to communicate using novel interpretive methods. Interactive trails developed by the Botanic Garden of Porto Alegre, use a learning resource called 'Find your Card' to support activities conducted on their interpretive trails (Haigh, 2003). Photo cards were prepared for this activity, illustrating some of the natural phenomena to be found along the trails, such as trees, lichens, animals, habitats and ecosystems. The reverse side of each card carried relevant information (Haigh, 2003). On receipt of their cards, participants walked the trails in the company of a guide, referring to the written information only when they found a match for their photograph. According to Haigh (2003), the response from children who engaged in this activity was extremely positive. It was noted that children who matched their cards early in the exercise enthusiastically collaborated with their fellow pupils in completing the outstanding challenge (Haigh, 2003). Similar activities are indeed practised by the interpretive team at Ushaka Water World Aquarium, Durban, in their outreach programmes and have potential for application to young visitors walking the Ntini trail in Shongweni reserve.

The other interpretive example selected for this study is the Belo Horizonte Zoo-Botanic Foundation Natural Reserve, Brazil. Situated 850m above sea level in Belo Horizonte in the state of Minas Gerais, the reserve comprises some 1 450 hectares of cerrado vegetation and consists of an integrated Botanic Garden, Zoological Garden and an Environmental Education Service (Rego, 2003). Occupying 20% of Brazil's land surface (about 1.8 million km2) the cerrado or Brazilian savannah is the largest vegetation type in Brazil after the Amazonian rainforest and contains open and forest savannah, grassland and patches of dense deciduous woodland (Rego, 2003). As a biodiversity site for the display and ex situ conservation of local plant material the Botanical Gardens have extensive collections representing the caatinga or semi-arid region, the Atlantic forest and the campo rupestre or rocky montane region (Rego, 2003). The Belo Horizonte Zoo-Botanic Foundation (FZB-BH) has attracted world interest and considerable funding attention – some 3 276 million USD (Fernandes, 2001). Site architecture is modern and impressive with Brazilian architect Oscar Niemeyer developing curvilinear shapes to create a metallic structure which is light and transparent. The Zoological gardens include a veterinarian hospital, a reptile house and a mammal and primate house integrated with the nature reserve. The Centre for Environmental Education is integrated into the complex and some 600 000 visitors are received annually (Fernandes, 2001).

This example has relevance to SR in that it displays a seamless integration of activities bringing together live specimens of threatened local flora and fauna within the framework of a large protected area. Biodiversity and conservation are showcased to visitors of all ages in an attractive and modern setting. It also is instructive for SR in terms of bringing together multiple talents, organizations and international funding to achieve a common goal.

Costa Rica

A fine Central American example of the integration of interpretation, ecotourism and biodiversity conservation that can serve as a model for SR comes from the Las Cruces Biological Station in Costa Rica (LCBS). Located near the Panamanian border on Costa Rica's southern Pacific coastal mountain range the station encompasses 266 hectares of lower montane rain forest. Las Cruces forms part of the La Amistad Biosphere Reserve that encompasses 472,000 hectares of parkland and buffer zones centred in the southern mountain ranges of Costa Rica. LCBS is owned and operated by the Organization for Tropical Studies (OTS) in Costa Rica (LCBS, 2010). The Station is home to the Wilson Botanical Garden representing rare and endangered plants from Costa Rica including ferns, aroids, bromeliads, gingers, heliconias, marantas, and palms (LCBS, 2010). More than 1,000 genera in 212 plant families can be seen along trails that are open to

ecotourist visitors, scientists and interns from Universities worldwide. Las Cruces serves as the principal centre in the region for teaching, research, and on-site public education. The rain forest at Las Cruces is rugged with elevation ranging from 1 000 – 1 350 m allowing for very high floral diversity and is home to over 2 000 plant species (LCBS, 2010). There are over 100 species of mammals at LCBS, of which 43 are bats and an impressive diversity of birds with both montane and lowland species represented. Over 400 bird species have been recorded at Las Cruces and a number of them are endemic to the region. Reptiles are less diverse but an estimated 70 species have been reported together with high levels of invertebrate diversity (LCBS, 2010). The diverse range of endangered flora and fauna at LCBS coupled with associated scientific research into the adjacent parkland and the integration of gardens with interpretive ecotourist trails have parallels which could be emulated in part at SR.

Asia and Indian Centres of Biodiversity

India has a vast and unique assemblage of plants and animals living in a range of diverse habitats from tropical rainforests to alpine vegetation and from temperate forests to coastal wetlands. With a land mass of over two percent of the world's area, India accounts for over seven percent of the global faunal total with 89 451 recorded species (The Indian analyst, 2007). India contains globally important populations of some of Asia's rarest animals, including icons such as the Bengal Tiger, Asiatic Cheetah, Asiatic Lion, Indian Elephant, Indian Rhinoceros and Gaur (Conservation International, 2010b). According to Botanic Gardens Conservation International India is home to an estimated 16 000 vascular plants, 5 000 endemic species and 140 endemic genera (BGCI News, 1994). Conservation International (2010b) notes that India has two key hotpots of global significance: the Western Ghats and the north-western and eastern Himalayas.

Most of India's natural vegetation has been greatly modified by agriculture, forestry and urbanization. Over 50% of the land area is cultivated and all forests, particularly moist forest types, are rapidly being degraded as a result of population pressure and shifting cultivation (BGCI News, 1994). Famous as a hub for Asian agriculture, India is one of the 12 primary centres of origin of cultivated plants and domesticated animals (Babu and Arora, 2010). India is considered to be the homeland of 167 important plant species of cereals, millets, fruits, condiments, vegetables, pulses, fibre crops and oilseeds, and 114 breeds of domesticated animals (Babu and Arora, 2010).

Given these immense natural resources the protection of wildlife has a long tradition in India, with establishment of forest reserves and sanctuaries (Walker et al., 2004). Princely menageries and gardens in the 18th and 19th centuries were maintained at great

expense for aesthetic and intellectual pleasure or scientific inquiry. It has been argued that these estates laid many of the foundational principals of modern botanical gardens (Walker et al., 2004). It was the colonial naturalists, however, with their passion for collection and cataloguing the myriad of animal species they discovered, who stimulated the development of Zoological gardens. These estates were then used as holding areas for shipping specimens back to Britain (Walker et al., 2004). In the 20th century, a unique 'zoo form' developed by the Indian Forest Service called a 'biological park', emerged reminiscent of the early royal parks times (Walker et al., 2004). The biological park is neither a botanical garden nor a zoo but replication of a site specific natural area. Typically they are large moated enclosures of 30 – 60 acres and including rejuvenated forest, the best natural features of the land, labelled trees, and a focus on indigenous Indian fauna. Examples include: Assam State Zoo, Guwahati; Indira Gandhi Biological Park, Vizak and Tirupati Zoo, Andra Pradesh (Walker et al., 2004).

Indian conservation efforts are largely government driven, positioning zoological, botanic gardens and protected areas to conserve endemic and indigenous species with a strong focus on the promotion of biodiversity education to a range of target groups such as politicians, school and college students, and communities living in and around protected areas (BGCI News, 1994). Parallels exist with South Africa, another developing country rich in floral and faunal endemism whose protected areas often coexist with poor rural communities.

Two Indian examples will be examined that are relevant to this study at SR. These are the Bombay Natural History Society (BNHS) and the National Botanical Research Institute Lucknow. The **Bombay Natural History Society (BNHS)** established in1883 has a long colonial tradition of biodiversity conservation and interpretation outreach through their museum collections, education centre, projects to outlying natural areas and conservation research in cooperation with the University of Bombay (Patil, 1994). The BNHS collection includes specimens of about 60 000 insects, 7 500 amphibians and reptiles, 17 000 mammals, 26 000 birds and 8 500 herbarium specimens. The entire collection is maintained with financial help from the State Government of Maharashtra (Patil, 1994). The Conservation Education Centre was established with assistance from the United Kingdom Overseas Development Administration to educate the greater public about nature, and to create an awareness amongst the younger generation of local biodiversity issues, with the help of talks, films, slide shows, guided tours and nature rambles in the wild.

Projects have included *inter alia:*

- rediscovery of Wroughton's free-tailed bat;
- wild buffalo in Peninsular India;
- status survey of the Nilgiri langur and lion-tailed macaque in South India;
- the Nilgiri tahr in the Eravikulam Sanctuary;
- breeding colony of flamingoes in Kutch;
- the estuarine crocodiles of Bhitarkanika; and
- nature reserve potential of Kinwat, Maharashtra.

The BNHS organizes camps and nature outings for its membership, schoolteachers and students to various National Parks and Sanctuaries in India while mobile exhibitions on wildlife are arranged in the rural areas of India for those who cannot reach BNHS in Bombay (Patil, 1994). There are distinct parallels between the work being carried out at BNHS and the need to conduct similar such activities at SR enlisting the aid of the Durban Natural Science Museum whose expertise in ornithology and mammals has already been evident at the reserve (Allen and Taylor pers. comm.).

The **National Botanical Research Institute (NBRI**) Lucknow is spread over an area of 25 hectares and is located in the heart of Lucknow city, the capital of Uttar Pradesh along the southern bank of river Gomti at an altitude of 113 m (BGCI News, 2002). Originally laid out as Royal gardens around 1800 AD and named "Sikander Bagh" after a Moghul queen, the NBRI Garden at Lucknow currently serves as a national facility with three main functions namely, conservation, education and horticulture (BGCI News, 2002). A dedicated Eco–Education Centre fosters awareness of the natural and built environment and has four main sections; first, a garden for the visually impaired and physically challenged, second a model theme garden, third a children's laboratory, and finally an outreach programme with a ‘bio village concept’ (NBRI India, 2002).

The first garden is based on the senses of touch, feel and smell, and is equipped with the information about the plants in audio-Braille system. The second garden is established on the theme 'herb for all, health for all'. It consists of a nutritional garden, a medicinal herb garden and a garden for lesser-known edible fruits. Local issues relating to nutrition, ethnobotany and food security are addressed. The third division, a ‘hands on’ laboratory was developed to motivate and encourage school children within the biological sciences. Grants from the Department of Science and Technology have been instrumental in ensuring sustainability (NBRI India, 2002). Finally, scientists and volunteers from the Gardens visit schools in rural and villages communities, establishing contact with farmers, artisans and housewives to educate them on issues such as environmental conservation,

health, hygiene and nutrition. A comprehensive assessment is then made of the bio resources of the region, the social organization of the village, economic and technological capabilities of the villagers and the health and nutrition profile of the rural women and children. The particular village may then be adopted for intensive training by staff and volunteers of the garden thus extending the circle of influence to the poor (NBRI India, 2002). The example of the NBRI gardens at Lucknow has relevance to SR which is also surrounded by poor and disadvantaged communities that require empowerment regarding biodiversity conservation and food security.

Interpretive practice in developing countries: significance for the study area

These examples from third world developing countries have relevance to the study area at SR in that:

- Similar developmental challenges exist within surrounding local communities in terms of illiteracy, wide spread poverty and unemployment, lack of food security, unsustainable harvesting of natural resources, shortage of scientific skills, ignorance of local biodiversity issues and underfunding;
- All the examples presented involved poorer communities surrounded by areas of high natural biodiversity and local endemism. These natural areas are invariably under severe pressure from urban expansion, shifting agriculture and the imperatives of economic development;
- The challenge is to make biodiversity issues clear and relevant to the community and assist them in seeking to develop workable solutions within a local context;
- Interpretation is a powerful and creative communication tool that has proved effective as it can be adapted to a variety of ages and audiences. Interpretation has potential to reach multiple audiences both within and beyond the reserve boundaries;
- Ecotourism itself is an ideal opportunity to present biodiversity challenges to foreign and local visitors as they visit protected areas, parks and gardens;
- Two key ecotourist principles are pertinent. Firstly that local conservation measures are enhanced and secondly that surrounding communities should be empowered and benefit as a result of these visits (Refer to ecotourist definitions in Chapter 2); and finally
- Similar opportunities exist at SR to build on the following areas:
    - explore, research and document the richness and diversity of local floral and faunal resources;
    - unleash the interpretive power of indigenous plants and animals particularly in terms of local arts and culture, food and medicinal use;

- enlist the expert assistance of existing local institutions including Universities, Natural Science and History museums and botanical gardens; and
- establish partnerships for funding tapping into both local and overseas donors for assistance.

These concepts are examined further in Chapter 7.

4.6 Summation of best interpretation practice

The aforementioned world class and local examples have been instructive in that:

1 Protected areas and botanic gardens are recognized in their own right as significant ecotourist destinations;
2 Protected areas and botanic gardens are invariably linked platforms for conservation and public outreach where increasing numbers of visitors can enjoy observing the full spectrum of plant and animal activity;
3 Protected areas and botanic gardens have recognized the value of natural heritage interpretation as a tool to enhance the visitor's experience;
4 A range of interpretive media are used including high tech interactive electronic devices as well as the more traditional approaches of professional and volunteer guides, self guided trails, signage and pamphlets;
5 Protected areas and botanic gardens include community participation and recognize the significance of traditional cultural uses of plant and animal resources within the interpretive process;
6 Scheduled seasonal activities and events for children and adults can attract visitors to the gardens and reserves thus stimulating an ongoing relationship with the tourist destination; and
7 The value of helping children to connect with nature is crucial in developing environmental sensitivity and these connections are made within the gardens and reserves located within easy reach of highly populated urban centres.

4.7 Models of interpretive strategies

Interpretation does not take place in isolation but forms part of a cohesive strategy aimed at enhancing and deepening the quality of the ecotourist experience (Ham, 2007; Carter, 2001; Veverka, 1994). Several interpretive models have been proposed in the literature and need to be analysed before moving on to the actual practice of interpretation. First, the tradition of Master Interpretive Planning as practiced in the large parks and protected areas of the United States and Canada (CDI, 2008a; ANF, 2002) is investigated; second, the popular EROT or thematic model adopted widely in Australia and America based on a cognitive psychological approach to communication theory (Ham, 2007; Staiff and Bushell, 2004; Carter, 2001 and Veverka, 1994) is discussed, and third, the richer multi layered hermeneutic model and its application as proposed by Ablett and Dyer (2009) is examined.

Master interpretation plans for protected areas

Master Interpretive Planning guides the development and implementation of all interpretive exhibits and services. The plan establishes a framework for interpretive goals, objectives, themes, exhibit and program recommendations, as well as design guidelines for interpretive efforts within the reserve (ANF, 2002; Carter, 2001). Future development of interpretive media need to be aligned with this plan and evaluated against the stated goals and objectives. CDI (2008a) terms this an Interpretive and Education Plan that includes architectural and site issues, defining the use of media for delivering interpretation and education to a variety of audiences.

Benefits include *inter alia*:

- ensures strategic communication, integration and avoids duplication of efforts;
- ensures consistency both in terms of design approach and content;
- results in cost effective, high quality products and programmes; and
- assists in measuring outcomes rather than outputs.

CDI (2008b) emphasizes the need for the plan to be developed by a multidisciplinary team representing recreation, conservation education, and other program areas such as wildlife, vegetation management, open space and ecosystem services, invasive species, and fire, as appropriate. The design team of CDI (2008b) points out that the process is as important as the product and that each protected area site should identify its own unique objectives for the plan. Once the overarching master interpretation plan is complete an interpretive prospectus is completed detailing the specifications of the design work

required (CDI, 2008b). Detailed design and production guidelines for interpretive media are discussed in the next section. The US Forest Service (CDI, 2008a; ANF, 2002) advocates a useful eight point approach to the process of developing an interpretation master plan that will be followed in part for this study:

1 Select a core team comprising interpretation staff, resource specialists and management. Establish the overall direction in terms of reserve plans and recreation and interpretation strategy;
2 Undertake a comprehensive inventory and data collection including audience characteristics, planning parameters and natural and heritage resources;
3 The core team determines the purpose and significance of the proposed interpretation and develops planning assumptions**.** A draft plan is then prepared with measurable objectives, themes, media ideas, partnerships and design criteria;
4 Public comment is then invited including service partners and general public;
5 The plan is then analyzed, reviewed and adjusted;
6 Interpretive plan recommendations are finalized including specifications and budgets;
7 Plan is implemented using appropriate project management techniques; and
8 Monitoring and evaluation takes place to review the efficacy of the interpretation.

Primarily management centred, practical and goal orientated these protocols have been criticised as being one dimensional and time consuming to implement, often failing to factor in the multiplicity of variables involved in connecting with a diverse visitor audience (Ablett and Dyer, 2009). Practitioners such as Cole (2005) have found them to be inflexible and over detailed. Despite these drawbacks interpreters acknowledge the value of the methodology and protocol and adapt it to suit their own constraints and circumstances (Clement pers. comm.).

The EROT model based on behavioural communication theory

Using Tilden Freeman's pioneering work as a base, interpretation practitioners and academics such as Weiler and Smith (2009), Moscardo, Ballantyne and Hughes **(**2007**)**, Ham (2007), Carter (2001) and Veverka (1994) have almost universally adopted a cognitive psychological approach to communication theory characterized by information processing models (Ablett and Dyer, 2009).

These models of processing delineate the communication pathways from sender or transmitter via a medium to a receiver or listener. Positive or negative feedback and response is then elicited (Ablett and Dyer, 2009). This dominant communication paradigm has been taken up by modern cognitive psychology which addresses the way humans obtain, retain and process information (Ablett and Dyer, 2009). The model emphasizes

the efficacy of message retention and behavioural compliance. Indicators then of the success of particular interpretation are closely linked to this cognitive paradigm and whether visitor behaviour has been suitably altered (Weiler and Smith, 2009; Hill et al., 2007). Using these cognitive theories as a base, Ham (2007) propagates the widely adopted EROT model of interpretation. Simply expressed this acronym means that for any communication to be successful, it must be *enjoyable* to the audience, *relevant* to what they already know and care about, *organized* for easy processing, and it must make a compelling point (communicate a relevant *theme*) (Ham, 2007). A strong case is made for theme based interpretation where a focused theme provides an essential focal point for audience provocation, association and recall (Ham, 2007). The premise is that a provocative theme will stimulate visitor reflection and thought, alter, reinforce or create new beliefs which in turn will impact on attitudes and behaviour (Ham, 2007; Ajzen and Fishbein, 2005). With the dominant paradigm and meaning of interpretation settled by cognitive literature the attention now moves to the mechanics of the operation, the practical and technical aspects of communicating efficiently with the visitors.

Authors such as Carter (2001), Edwards (1994) and Veverka (1994) point out that the essence of effective interpretation planning involves asking and answering pertinent questions. Consensus is reached on the following broad areas to examine:

- Why do you want to communicate with visitors?
- Who are your visitors?
- What are the unique site attributes?
- How are you going to best describe and communicate these attributes?
- Where is interpretation going to take place?
- When and how is this going to take place?

Carter's model in Figure 4.4 depicts how the interpretive issues intersect.

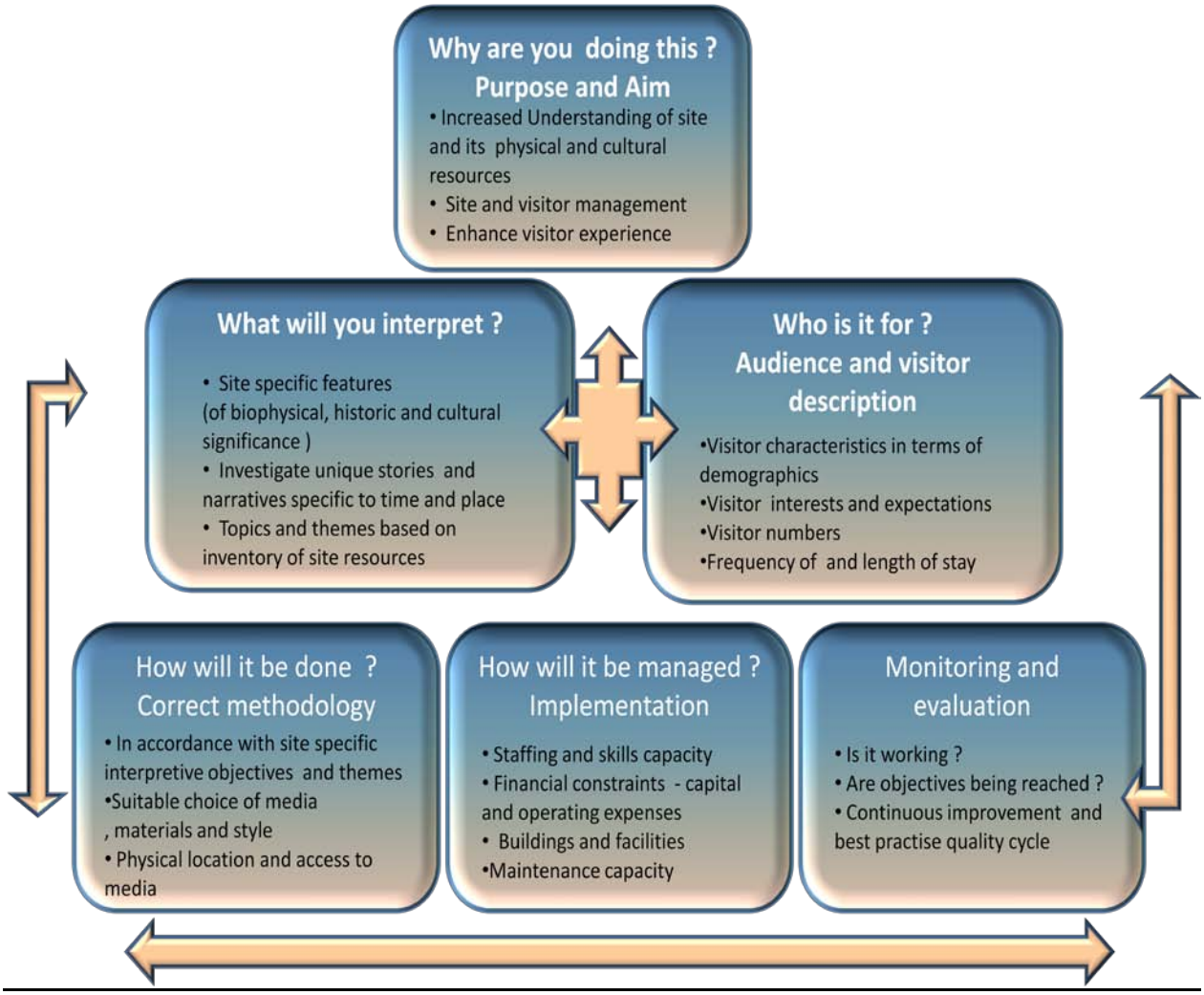

Figure 4.1: Generalised model of interpretation after Carter (2001) and Veverka (1994)

The guiding principles of this thematic model have been successfully practiced as a management tool by parks institutions throughout North America, the United Kingdom, Australia and New Zealand. Principals of the thematic approach have been used in this study (Chapter 5). While not denying the validity of the cognitive approach, Ablett and Dyer (2009) assert that the simplistic portrayal of interpretation as a function of information processing by individuals actually reduces the true multi layered vision for interpretation as originally set out by Freeman Tilden. These concepts are discussed further in the hermeneutic model of interpretation.

The hermeneutic model and its application

Recent thinking by Ablett and Dyer (2009), however, suggests a more complex layered approach toward interpretation, a shift away from the simple cognitive psychological approach of communication theory as propounded by Ham (2007) and Ajjzen (2005). Drawing on the alternative paradigm and rich thinking of hermeneutics (the theory of interpretation), Ablett and Dyer (2009) revisit, reformulate and extend Tilden's principals

to provide a broader picture of interpretation that is more inclusive, culturally sensitive and reflective, a view supported by this writer. These views are summarized below as they bring greater meaning to the interpretation process which is not mechanistic but multifaceted, integrating science and art, activating mind and heart. As Ablett and Dyer (2009) point out Tilden's original vision was to re-experience nature in a holistic manner where the driving ethic was "love" and sense of care rather than the cognitive information processing model currently being pursued by many interpreters and academics.

The word Hermeneutics is derived from the Greek *hermeneuein,* which means "to interpret", or "to understand", and grew out of the tradition of explaining religious texts during the German enlightenment (Ablett and Dyer, 2009). Schleiermacher (1768-1834), who is credited with being the first philosopher to propose a general theory of interpretation, defined hermeneutics as the 'art of understanding' and proposed that any particular thing we wish to understand can only be understood from without the whole (cited in Ablett and Dyer, 2009). This is known as the 'hermeneutic circle' where knowledge becomes circular and meaningful. The botanical analogy is that the leaves give meaning to the tree in terms of nourishment and the tree gives meaning to the forest community and ecosystem that also includes human beings (Ablett and Dyer, 2009). These concepts echo Tilden's fifth principle "interpretation should aim to present the whole rather than just a part …" (Tilden, 1977:9).

Dilthey (1833-1911) further expanded the circle, questioning the meaning of the item to be interpreted (e.g. a tree or rare species) in relation to its broader context (the environment) (Ablett and Dyer, 2009). Dilthey's process of interpretation moves from the elementary level – knowledge about the facts to the second level of interpretive understanding, a searching for the revelation of the larger truth that lies behind any statement of fact (Ablett and Dyer, 2009). Again this relates to Tilden's second principle: Interpretation can include information but this is only the preliminary step to exploring the greater truth.

Later hermeneutic philosophers such as Heidegger suggested that science is only one of the modes of revelation and that other forms of truth can also be revealed through the arts, reflection and what is now termed ''emotional intelligence'' (Ablett and Dyer, 2009). This again confirms Tilden's fifth principle that interpretation must address the whole man or woman rather than any phase. Heidegger explores the use of poetry, lyric, narrative and song as valid modes for interpretation, mediums now being explored in modern contexts in museum, botanical gardens and protected areas (Saffigna et al., 2005 and clement pers. comm..). These 'other' ways of experiencing truth become more basic and primal, holding appeal for all cultures and ages.

As Heidegger notes “It may be our greatest mistake to think of interpretation primarily as a cognitive event.” (Heidegger, 1971:12).

Ablett and Dyer (2009) discuss how Gadamer also extends the interpretive or hermeneutic circle to include the cultural traditions that are in themselves a source of meaning. This runs contrary to the National Parks Service (2006) definition of interpretation where meaning is claimed to be inherent in each object. In Gadamer’s view everything is interpreted through the lens of tradition, context and belief (Ablett and Dyer, 2009). For example, a tree may be viewed simultaneously as a timber resource by the logger and as a sacred site by a native Aborigine. Here language and tradition “pre-form” our experience of places and things before we ever encounter a professional interpretation. The personal experience of visitors that has already been shaped by language and socio historic tradition should not be ignored by interpreters. These social dimensions and preconceptions are not viewed negatively but are rather seen as the starting point for any interpretation (Ablett and Dyer, 2009). Gadamer sees interpretative communication then, as modelled on conversation or dialogue where roles of the “sender” and “receiver” become more fluid, freely exchanging preconceptions, ideas and stories opening up possibilities for ongoing learning, a ‘fusion of horizons’ (Gadamer 1989).

These dialogues have relevance and value for interpreting biodiversity in South Africa where many prior assumptions are made about Western conservation values and norms (Grossman and Koch, 1995). Local interpretive work at the Durban Botanic Gardens and eco-literacy programmes across the cultural spectrum has repeatedly demonstrated the mutual value of fluid communication roles (Clement pers. comm., and Shaw pers. comm.). The modern interpretive tradition needs to be informed not only by science and technology but also by unique traditions, cultural diversity and alternate ways of seeing. The author is currently seeking new ways to embed some of these traditions in the interpretive material produced not only for this dissertation but for other applications in Botanic Gardens and Protected areas.

4.8 Establishing appropriate levels of onsite communication

Interpretive practitioners have long grappled with the issue of establishing appropriate levels of interpretation in protected areas (Hill, Woodland and Gough, 2007; Hughes and Morrison-Saunders, 2005 and Hughes, 2004). The interpretation spectrum can vary in intensity from guided trails (high intensity) to text based media which is more passive where visitors must ‘work’ at extracting meaning (Hughes and Morrison-Saunders, 2005).

Some sites which already provide a multi sensory visitor experience may require lower levels of on-site interpretation. Field and Gough (1998) term this 'enrichment without words' (cited in Hughes and Morrison-Saunders, 2005). On other sites a low intensity approach may result in the meaning or significance of an experience being lost to the visitor (Hughes and Morrison-Saunders, 2005). William Carr captures the concept vividly:

"Not having an interpreter in your garden is like inviting a guest to your house, opening the door and then disappearing." (Carr in Honig, 2000:1)

This current study at SR is an example where a vast array of local biodiversity attractions awaits discovery by visitors who are often unaware of its existence. The rationale behind the extensive use of signs and labels in botanic gardens, natural science museums and protected areas requires consideration before the tools and techniques of production are examined. Clearly the use of signage and labels has both benefits and limitations. Wise (1979) considered the role of labelling in public gardens and noted a conflict between 'communion and communication' whereby unsolicited information and unwanted facts are thrust on the visitor. This becomes intrusive for the visitor who often lacks the context and background for understanding (Wise, 1979). Just learning the name of a plant or animal according to McLuhan, Parker and Barzun (1969) is a "numb" that dulls the perception and closes the mind, another fact easily gained and easily forgotten (Wise, 1979). Names are useful only to a small segment of society. Most visitors do not walk around pencil and pad in hand (Darwin-Edwards, 2000; Wise, 1979). The wisdom of providing disruptive factual labels which reveal neither meaning nor relationships is therefore questioned.

Visitors travel to protected wilderness areas to experience the restorative therapeutic effects of nature (Kaplan, 1995) and as a rest from mental fatigue - not to receive information downloads or 'eco preaching' (Hughes and Morrison-Saunders 2005). In this age of sensory and factual overload the interpreter must guard against satiation and fatigue (Darwin-Edwards, 2000; Swenson, 1992; Melton, 1972). McKercher (1993) too points out that visitors to protected areas are not generally ecologists seeking intellectual enlightenment and warns against information overload and excess signage (cited in Hughes and Morrison-Saunders, 2005). A more subtle and layered approach is required catering for varied levels of interpretation for a stratified audience (Ablett and Dyer, 2009; Hughes, 2004; Wise, 1979; Clement pers. comm.). As Tom Ryan describes it:

> *Effective interpretation doesn't mean telling people what you know . . . it means using what you know to engage, provoke and motivate visitors to become active participants in their own learning.*
>
> Tom Ryan (Cited in Honig, 2000:3)

Thoughtfully designed labels and signage can, however, be powerful tools in the interpretation process as they combine illustrative media with textual concepts and connections for the visitor. The following section demonstrates how this is achieved.

4.9 Tools and techniques of interpretation in practice

In this section, relevant tools and techniques are described; however, the reader must note that this work is not a definitive source book or style manual. Various style manuals on interpretation (CDI, 2008b; Moscardo et al., 2007; Carter, 2001; Honig, 2000; Leadlay and Greene, 1998; Edwards, 1994) have been consulted during the course of this work and the sample interpretation produced in this work for Shongweni Reserve (Chapter Six) follows some of the principles described below.

CDI (2008b) points out that good interpretation makes connections between the tangible and the intangible creating portals of learning for the visitor. A linkage or connection has to be made in the mind of the visitor to what is familiar and real. This knowledge is then constructed progressively to relate to abstract and conceptual elements (CDI, 2008b; Clement pers. comm.). The practitioners at CDI use their interpretation to create portals or windows for learning and exploration encouraging the visitor to move from a position of ignorance or 'unawareness' to stewardship. Figure 4 below illustrates the process.

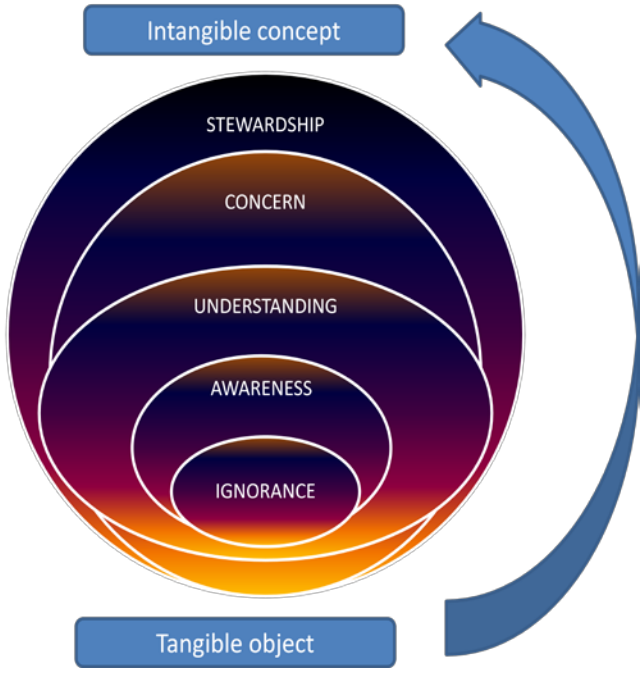

Figure 4.2: The progression from ignorance to stewardship
Adapted from CDI (2008b)

Effective narratives are constructed using the topic, theme, and story progression previously discussed (CDI, 2008b; Ham, 2007; Carter, 2001; Edwards, 1994). The following summarises the process.

A **Topics:** These are broad, general categories, such as fire ecology, mining, or water quality. They are bullet statement descriptions of what your story is about.

B **Theme:** A theme narrows the focus of a topic and is written in a complete sentence. It makes use of nouns and action verbs, and answers the question "so what?" The theme is pivotal and articulates the most important thing you want your visitor to know. Direct questions need to be asked: Why would they want to know this? Interest must be provoked and related to everyday life.

C **Storylines:** Storylines provide more information and context for a theme. There may be several storylines that tier from a single theme.

Carter (2001) recommends linking a tangible object or concept to a larger intangible and universal concept using friendly, easy-to-understand language. Narratives should be accurate and factual designed to reveal and provoke interest to the reader, not "tell" them (CDI, 2008b). As with any instructional or teaching endeavour the keynote is simplicity. Anatole France concurs, offering the following advice:

> *Do not try to satisfy your vanity by teaching a great many things. Awaken people's curiosity. It is enough to open minds; do not overload them. Put there just a spark. If there is some inflammable stuff, it will catch fire* (in ANF 2002:23).

The following practical guidelines are adapted from a 2008 workshop presented by the Centre for Design and Interpretation (CDI) in Wyoming, USA. A sign should be designed and written so that it contains three levels of text with each level conveying a feeling of the theme, thus providing all visitors with an interpretive opportunity regardless of how long they stay (CDI, 2008b). The following items are pertinent:

- Simplify the message and eliminate confusing terms and jargon. Don't overwhelm the visitor;
- Use informative paragraph titles and subtitles making sure they advance the narrative;

- These need to have meaning on their own and add up to a complete idea when read with each other. They must also stand alone if read out of order;
- Look for new metaphors and analogies;
- Strive for images that are familiar to reader;
- Eliminate jargon, clichés and slang;
- Say as much as possible visually; and
- Test the copy on family, friends, colleagues, let it rest and revise again

(CDI, 2008b)

All of this points to the need to develop effective graphics. Graphics comprise image and text presented in a colourful, clean and creative fashion. They go beyond mere decorative function and are vital elements in the communication process (Carter, 2001; Edwards, 1994). Honig (2000), former interpretation officer at NBG Kirstenbosch, points out that visuals can encapsulate a lot of detail and allow you to keep the text short and concise. Honig (2000:40) describes the role of illustration in signage as follows:

- to identify the subject of the sign (e.g. this is what an acacia looks like);
- to tell a story about the subject (e.g. acacias have a special symbiotic relationship with ants: ants live inside the thorns and protect the tree from insect predators); and
- for decorative purposes (e.g. a border of acacia thorns around the page).

Images should be carefully selected in terms of their appeal, relevance and impact to the topic at hand (CDIb, 2008). Furthermore they should be of suitable print quality (300dpi) especially when large format digital printing is envisaged. Photographs may be supplied by the client or stock photos purchased. Alternatively they can be taken by a professional photographer under direction from the designer. Finally, images may be sourced from the Internet, however, limited resolution and file size may be problematic (images are best saved in JPEG, TIF and BMP formats). The commission of suitable monochromatic line drawings or full colour illustrations by a professional artist will enhance the product and arouse curiosity (Honing, 2000; Erasmus pers. comm.). Further details on text and image development are located in Appendix 2. The range of media, together with their characteristics, is presented herewith in Table 4.1.

Table 4.1: The range of interpretive media					
Category	**Product**	**Description**	**Advantages**	**Limitations**	**Expense**
Print media	Promotional Brochure	A5 double or triple fold Single colour or full colour	Easy to design and produce to convey site specific data	Competes with other Pamphlets on the rack. Short lifespan	**Cheap**
	Booklet	Variable size from field guide pocket size to coffee table	Long lifespan, attractive, saleable	Longer to produce requires specialist input	**Moderately Expensive**
	Newspaper/ Broadside	Tabloid format with several pages on recycled paper Single colour or full colour	Eye catching, information packed moderately easy to design and produce	Short life span. Need to be regularly produced for continuity. Dated throw away value	**Cheap**
	Themed Posters	Variable size from A1- AO Single colour or full colour	Arouses attention Good lifespan for conveying single message themes using graphics and text	Requires lamination or rigid framing. Takes up space. Outdoor posters require waterproofing and mounting and need to be u/v resistant	**Moderately Expensive**
	Trail pamphlet	A5 double or triple fold	Easy to design and produce. Excellent for field interpretation	Limited use by the wider audience	**Cheap**
	Site Maps 2 D	Variable in size from A5 to AO Flat topographical maps OR Graphically modified tourist maps locating circulation and points of interest	Eye catching, allows the visitor to locate attractions easily Easily sourced from GIS data bases	Requires specialist production. Requires lamination and/ or framing. Takes up space.	**Moderately Expensive**
Visitors centre Design & Construction variable	Site Maps 3 D	Relief maps purpose built by modelling specialist according to scale using cardboard or high density foam / fibreglass. Usually the centrepiece of any visitor centre	Universally accepted method of communicating natural and geological features – can be linked to photographs and text	Requires specialist production. Takes up space.	**Expensive**
	Interactive DVD panels	Display monitors with pull down menus and touch pads linked to computer. Conveys a complete interpretive experience	Preferred Multimedia for 21st century. Allows viewer to engage in his own time and space	Requires specialist production and purchase of assets	**Expensive**

	Product	Description	Advantages	Limitations	**Expense**
	Live floral and faunal displays	Live plant material is displayed according to seasonal flowering. Display of small mammal skeletons /taxidermy birds eggs etc.	Effective interpretation appeals to all ages and develops site specific interests	Requires regular renewal and updating	**Moderate**
	DVD'S	Interpretive material is incorporated into a saleable product the promotes the reserve	Multiple purpose video product to promote branding and inform the visitor	Requires specialist input and some capital resources to initiate, plan and execute	**Expensive**
	Audio visual shows	Integrates visuals and text Into CD product for promotional use	Easily produced in house using power point technology and projector	Requires specialist IT input	**Cheap**
Outdoor	Demonstration garden	Outdoor display area featuring medicinal and indigenous plants from the reserve including labelling and signage. Outdoor closed structure such as prefab rondaval for indoor displays and posters. Fencing and shade house/ lath house provides enclosure and shade.	Excellent product allows visitor to choose depth and duration of engagement with the material, integrates with the trail and reserve Save on expense by growing plant material on site using existing labour	Requires specialist input and some capital resources to initiate, plan and execute, maintenance costs thereafter	**Cheap to Moderately Expensive**
	Outdoor Signage Display	Variable in size according to purpose. Must be professionally mounted, be waterproof and U/V and vandal resistant	Excellent product to relate unique site themes to visitor in an enjoyable manner to a wide audience	Requires specialist input and some capital resources to initiate, plan and execute,	**Moderately Expensive**
	Outdoor Signage Directional	Durable routing of vehicles and pedestrians to desired attractions	Essential for quality of visitor experience	Requires specialist input and some capital resources to initiate, plan and execute,	**Moderately Expensive**
	Outdoor trail marker	Variable – Usually incorporates a station point number and the branding of the reserve	Easy to custom produce	Degrades, requires maintenance	**Cheap**

	Product	Description	Advantages	Limitations	**Expense**
	Outdoor plant label	Standardized tree labels available from WESSA* Custom made labels either embossed, or engraved on to hard plastic. Vinyl stickers have a more limited lifespan.	May be designed with text and image for interest depending on size, application and position	Degrades, requires maintenance and renewal.	**Variable depending on size, material and production process**
	Guided trail by site guide or specialist	FGASA trained Guide or field specialist (bird, bat, reptile or plant interest group conducts tours)	Expert one on one communication develops interest and enhances visitor experience and product.	Variable in quality depending on guide	**No cost to reserve**
	Self guided Audio trail	Cassette or MP3 player that visitor hires on request – Integrates reserve points of interest with voice over. Length varies 15 - 30 minutes	Excellent product allows visitor to choose depth and duration of engagement with the material, integrates with the trail and reserve.	Requires careful planning, integrating points of interest with script and professional voice over and recordings. Time and capital intensive.	**Moderately Expensive**

Notes : *** Wild life and Environmental Society of South Africa**

Adapted from: (Carter, 2001 and Edwards, 1994)

4.10 Conclusion

It is evident from this chapter that Interpretation is a complex and multilayered process that needs to be site specific and directed or pitched carefully in an appropriate manner to the visitor. This chapter concludes the literature review section of the triad of topics; ecotourism, biodiversity and interpretation. In the following chapter we turn our attention to applying these concepts to practical field research at Shongweni reserve.

CHAPTER FIVE METHODOLOGY

5.1 Introduction

The methodology of this research is informed by the previous triad of topics covered in the literature review namely ecotourism, biodiversity and interpretation. The exploratory mixed methods design as described by Creswell and Plano Clark, 2007 in Maree (2008) was selected as the most appropriate for this study. In this approach the first phase of the study involved the collection and analysis of qualitative data; identifying and exploring themes and topics which were then used to inform and guide the development of the quantitative data collection and analysis (Creswell and Plano Clark, 2007 cited in Maree, 2008). The results from the two data sets of qualitative and quantitative information were then analysed, synthesized and discussed (Chapter 6) and are followed by the recommendations in Chapter 7.

Qualitative data gathered in inventory format (Section 5.2) concerning the biophysical, cultural and tourist attractions of the reserve were used to inform and develop the theme based interpretive strategy (Section 5.3). Four samples of interpretive print material were then developed and designed (Section 5.4) concurrently with the design of the survey instrument (Section 5.5). The surveys were then expedited and finally visitor response was evaluated and analyzed using appropriate statistical analysis to examine and discuss the results (Section 5.6). The methodology process is illustrated by the graphic of Figure 5.1 overleaf.

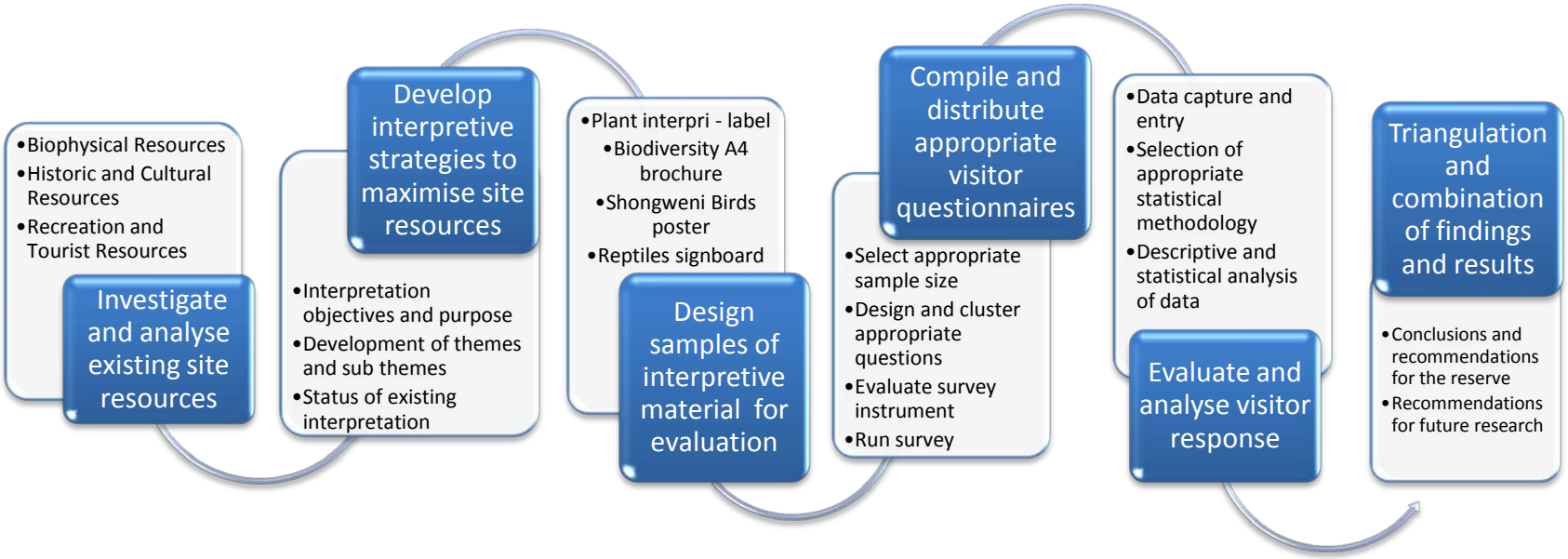

Figure 5.1: Reserach Methodology

An overview of the sequence and methodologies employed follows below.

5.2 Investigation and analysis of existing biophysical and cultural site resources and tourist attractions at Shongweni Reserve

Initial research was conducted in 1998 and 1999 when the author investigated nature based tourist activities in a range of different nature reserves located in the Outer West Local Council of the eThekweni Municipal Area (EMA). This provided some contextual framework for this present work as well a certain comparison reference (Foley, 1999). A broad spectrum of stakeholders were interviewed including Msinsi management and staff, ecotourist experts, local conservancies and conservation agencies (Coulon, Kunene, Bruighome, O'Brian, Domingo, pers. comm., 1998 in Foley, 1999). It has been interesting to observe that while the personalities may have changed over time, many of the same conservation issues and challenges persist. These are discussed further in Chapter 6 and 7. The current research presented involved the collection of primary and secondary data from leading scientists and practioners in the field. On site analysis and observations were recorded and the primary stakeholders from Msinsi management and staff were interviewed and consulted. Data was collated under the following headings:

5.2.1 The biophysical resources

Shongweni Reserve (SR) is extensive in terms of size (some 1700 ha) and a total comprehensive scientific audit of all floral and faunal resources would involve a team of diverse specialists. The expense and size of this operation was beyond the parameters of this research. It was therefore decided to investigate extant scientific work on the reserve. The chief sources that emerged were a detailed floristic investigation by Patrick (1998) who classified and described plant communities of SR and the lower Mlazi river catchment area. Primarily developed as management tool for D'MOSS planning, this work has relevance to this study in that Patrick provides insight into the nature of the floral composition of the reserve as well as descriptions of the utilisation of plant resources by the local community. These observations have significance when making selection decisions for interpretation, in order to highlight those plants that have interesting cultural associations. Elements from the work of Morris (1967) who described the flora surrounding the Ntshongweni hill also proved useful in building a picture of the floral resources of the reserve. Local biodiversity data as related to the EMA compiled by Boon (2007) contributed to this study especially in terms of listed red data and endangered species.

Primary data collection at SR took place as follows. Numerous field visits (17) by the author took place from 2008-2010 throughout the year in order to observe seasonal changes in the vegetation and landscape. These first hand 'ground truthing' exercises were beneficial in terms of collecting and verifying plant specimens, taking photographs and documenting sites. During the course of these investigations the author hiked the Ntini trail and environs several times, paddled around the entire dam and photographed rhino and other fauna on a three hour game drive. Interviews with the Officer in Charge (OIC) at SR took place between 2008 and 2010. The relevant reserve files concerning floral and faunal resources and their historic management were also accessed (Mkhize pers. comm.). Leading mammologist Dr Peter Taylor from the Durban Natural Science Museum assisted with his knowledge of local fauna (bats in particular) and helped in refining the visitor questionnaire (Taylor pers. comm.). Nature groups such as Bird Life South Africa and the Botanical Society of South Africa that visit SR on a regular basis were also consulted (Table 6.1) and this assisted in the compilation of current faunal and floral lists (Norman, Dell pers. comm.). During the compilation and synthesis of these data sets a more complete picture of the natural resources of SR emerged. This allowed the author to select the most appropriate examples for the biodiversity brochure (Figure 6.14).

5.2.2 The historic and cultural resources

Research was guided by archival evidence concerning plant use by early Iron Age inhabitants of SR as documented by Davies (1975) and Davies and Gordon-Gray (1977). Other interesting historical aspects that emerged were details concerning the original dam construction by Italian engineers (Lagezzetta del sud Africa, 2006). Evidence of local plant and animal use by members of the local surrounding communities was provided by Patrick (1998) and through personal interviews with Msinsi staff (Nagaran, Mkhize, Tredger pers. comm.).

5.2.3 The recreation and tourist resources

The author interviewed the managing director of Msini Holdings on four occasions gaining valuable insights regarding overall tourist operations at SR and the status of the current land claim at the reserve (Nagaran pers. comm.). Current data concerning tourist activities at SR was drawn from the Msinsi Company Profile (2008) and first hand discussions with the Officer in Charge (Tredger and Mkhize pers. comm.). Corporate team and adventure tourist operators active at SR were also consulted (Scott pers. comm).

5.3 Development of interpretive strategies that maximize the biophysical, cultural and tourist resources of the site

This included the development of interpretation goals and objectives as well as topics and themes appropriate to the conservation and management goals for the reserve. The existing status of interpretation facilities on site was examined and reported. This methodology followed in part some of the protocols used to develop a Master Interpretation Plan (ANF 2002) as well as the procedure outlined by Carter (2001). Not all the details required in the Master Interpretation Plan were appropriate for this study but the guiding principles have been followed. Procedures are listed below.

5.3.1 Definition of interpretation objectives and purpose

These were defined specifically for SR taking cognisance of the richness of the biophysical, cultural and tourist resources previously described and formulated in line with the mission and vision of Msini holdings (Msinsi Company Profile, 2008). The objectives were congruent with the theme of this work – enhancing the ecotourist experience at SR through the use of appropriate interpretive strategies.

5.3.2 Development of topics and themes

Guided by the current literature concerning interpretive theme development (CDI, 2008b; Ham, 2007 and Moscardo et al., 2007) and informed by the primary and secondary data gathered at SR site specific topics and themes were written for the reserve (Table 6.2). The print samples produced for the visitor survey (Figures 6.13-6.16) follow four of these themes.

5.3.3 Determination of the status of existing interpretation

This was examined and documented physically during site visits to SR during the period 2008-2010. Existing pamphlets handed out to the visitor at the gate were scrutinised as was the Ntini trail brochure available for purchase at the reception. Four main interpretive sites at SR were identified (Figure 6.6). Reporting on the current condition of these sites and the application of suitable interpretive topics and themes is found in Chapter 6.

5.4 Development of samples of interpretive material for Shongweni Reserve that can be evaluated by visitors and ecotourists

Practical methodologies of developing appropriate interpretive material have been discussed generally in Chapter 4 and in Section 4.9 in particular. Drawing on the rich diversity of biophysical resources at SR and selecting from appropriate themes developed in the previous section the author designed and compiled print samples for use in the survey. Care was taken to compile relevant text and select appropriate and striking images. The material was produced using Corel Draw v 13. These samples were numbered and integrated into the questionnaire. Methodology concerning the development of each print sample follows.

5.4.1 Samples of plant interpretive label for picnic sites and trails (Figure 6.13)

A single plant, the Naboom (*Euphorbia ingens)* was selected as it is widespread around the campsite environs, is easily recognisable by the layperson and also possesses unique physical and cultural properties. The label correlates with Table 6.2 (Theme B) - Indigenous plants of Shongweni. Image and copy were developed from the SANBI web site Plantz Afrika and Van Wyk and Gericke (2000).

5.4.2 Samples of A4 trifold brochure outlining in brief the biodiversity of the reserve (Figure 6.14)

Designed to be given to visitors on entry this interpretation provides a comprehensive picture of local biodiversity at SR. The brochure correlates with Table 6.2 (Theme D) - Shongweni offers the visitor an amazing range of life forms to be enjoyed, appreciated and cared for. Life forms selected included invertebrates such as butterflies and dragonflies, amphibians and reptiles, mammals and bats, birds and plant life. Only local specimens as listed in Appendix 5 were selected. Linked with each category is the most current applicable website which visitors can access for further detail. Images were sourced from the aforementioned web sites printed on the brochure as well as from Boon (2007). The copy was developed from the Ntini Trail Pamphlet, Boon (2007), interviews and discussions with Taylor, Mkhize and Norman (pers. comm.)

5.4.3 Sample poster of Shongweni Birds (Figure 6.15)

Designed as a large A 2 size poster for display at the visitors centre this interpretation explores the unique relationship between selected birds at Shongweni and Zulu folklore and relates to Table 6.2 (Theme F) – Local bird life has a rich variety of traditional meanings within Zulu culture. Images were sourced from www.biodiversityexplorer/org/birds. Text and copy were adapted from an unpublished article by Dr David Allen, Curator of Ornithology, Durban Natural Science Museum.

5.4.4 Sample signage of local rare and endangered reptiles (Figure 6.16)

Designed as an outdoor free standing signboard for the two picnic sites at SR this work relates to Table 6.2 (Theme E), describing a range of commonly encountered reptiles at Shongweni that need to be respected and conserved. Black mamba's are a prominent feature at SR as are Water monitors, both of which inspire fear and awe in the mind of the visitor. Endangered reptile species such as the Dwarf Durban Chameleon and the Natal Hinged Tortoise were also referred to. Images were sourced from National Geographic and Boon (2007). Text and copy was developed from Boon (2007).

5.5 Compilation and distribution of appropriate visitor questionnaires to determine visitor profiles and interest in interpretive material

5.5.1 Target population and sampling size

For the purposes of this study any visitor to Shongweni Reserve over the age of 18 was eligible to complete the survey. It was important for the researcher to obtain as broad a demographic sample as possible so that various preferences and attitudes toward biodiversity and interpretation would emerge. After consultation with various professionals in the natural and social sciences field (Taylor and Clement 2008 pers. comm.) it was decided that a minimum sample size of 131 would suffice. This particular sample is a subset of the population of visitors to the reserve.

The survey provides a "snapshot" of a particular set of visitors to the reserve at a particular time. This is possibly the only survey of its kind to be undertaken of a reserve in the eThekweni Metropolitan Area (EMA).

5.5.2 Sampling techniques

Stratified random sampling was chosen as the most effective technique to supply differentiated data from various strata within the population who are known to differ in their parameters (Meyers, 2010; Maree, 2008; Steyn et al., 1994). In this visitor study for example the demographic variations within the population surveyed reflect the diversity of the South African domestic ecotourist yet each sector may demonstrate their own preferences and interests when they visit a protected area.

5.5.3 Survey construction and design

Maree (2008) citing Schumacher (2001:62) notes that survey research is "The assessment of current status, opinions, beliefs and attitudes by questionnaires or interviews from a known population".

The purpose of this visitor survey was fourfold, namely to:

- Establish key local demographic variables from the sample population (Section A);
- Establish the purpose, duration and frequency of visit (Section B);
- Evaluate the level of visitor interest in biodiversity and their response to site specific interpretive material (Section C); and
- Evaluate the level of visitor satisfaction with existing site facilities (Section D).

The main hypothesis or premise for this thesis is that the researcher believes that visitors are interested in learning about local biodiversity from well conceived interpretive material. Evidence is then presented in the form of descriptive and quantitative statistics. Suitable questions were then developed and clustered accordingly into the appropriate sections. An item analysis was then undertaken to identify and eliminate items that were too easy or difficult as well as to eliminate ambiguities or shortcomings in the wording of questions (Maree, 2008). The internal reliability and consistency of the survey instrument was measured statistically and is described in section 6.6.

5.5.4 Survey execution

Visitor questionnaires were prepared as described and administered by the author during the periods of November and December 2008, February and August 2010. The summer and spring months were selected when traditionally higher visitor volumes were experienced. A visitor table with posters and plants was set up on the one occasion to stimulate interest. An incentive for completing the survey was provided in the form of a lucky number draw to win a game drive at SR.

5.6 Evaluate and analyze visitor responses using appropriate statistical analysis and provide appropriate discussion and recommendations

Raw data was captured on Excel spread sheets and then transferred into the Standard Package for Social Statistics (SPSS v 17) for analysis.

5.6.1 Survey reliability

This was demonstrated using Cronbach's alpha reliability scores (Table 6.3) and performing a factor analysis test for the three main clusters of questions, namely Knowledge development, Image rating and Service delivery (Table 6.4). A rotated component matrix test was then run demonstrating alignment of the variables with the question clusters (Table 6.5). Methodologies employed for these tests followed UCLA (2010) and Standard Package for Social Statistics v 17 recommendations.

5.6.2 Section Analysis and descriptive statistics

Descriptive statistics refers to the organising and summarising of quantitative data (Lind, Marchal and Mason, 2004). The method is useful as it quickly summarises results for an experiment. Descriptive data analysis aims to describe the data by investigating the distribution of scores on each variable, and by determining whether the scores on different variables are related to each other (Lind et al., 2004). Each of the four main sections of the visitor survey were then analysed using the Standard Package for Social Statistics v 17 to derive an accurate picture of visitor response. This methodology followed standard protocols as described by Lind et al. (2004). The results were depicted graphically by means of pie and bar charts (Figures 6.17-6.26) and in narrative and tables as required. Data resulting from observations made on two different related categorical variables (bivariate) can be summarised using a table, known as a two way frequency table or contingency table. The word contingency is used to determine whether there is an association between the variables (Willemse, 2009). Cross tabulation of race by age and gender (Table 6.6) then provides a comprehensive snapshot of visitor demographics to SR.

5.6.3 Hypothesis testing, P-values and statistical significance

Inferential statistical analysis is concerned with the testing of hypothesis or premise. This allows the researcher to draw conclusions about populations from sample data (Lind, Marchal and Mason (2004). The traditional approach to reporting a result requires a statement of statistical significance. A p-value is generated from a test statistic. A significant result is indicated with "$p < 0.05$" (Willemse, 2009). Correlation and regression are two techniques that enable one to determine the connection between the actual dimensions of two or more variables (Stephens, 2004). The Pearson Chi–Square test as described by Willemse (2009) was therefore performed to determine statistically significant relationships between variables (Table 6.8). Significant results are shaded and indicated with an asterisk. A discussion of these results is found in Section 6.6.3.

5.6.4 Discussion and conclusion

A critique is then provided of the visitor survey objectively analysing its strengths and shortcomings. This is followed by a detailed discussion and interpretation of the survey results as they relate to findings from the literature and the title of this research. These conclusions then provide the basis for the recommendations proposed in Chapter 7.

CHAPTER SIX RESULTS AND DISCUSSION

6.1 Introduction

This chapter implements and executes the methodology described previously. First an inventory of site resources was carried out at Shongweni Reserve (SR) and the rich biophysical, cultural and tourist resources of the reserve are described in full augmented by supplementary detail in Appendix 4. Second an interpretive strategy is developed for SR to maximise these site resources, interpretive goals are set and appropriate site specific themes are developed. Thirdly using the data developed from the first two steps interpretive print samples were developed in tandem with a visitor questionnaire as part of the survey instrument. This is included in Appendix 3. Fourthly the visitor survey was carried out and fifthly a statistical analysis and narrative on the findings included. This section concludes with a discussion and critique of the research findings.

6.2 Inventory of resources: analysis of existing biophysical and cultural site resources and tourist attractions at Shongweni Reserve

6.2.1 Biophysical resources

Location and Geographical features

The Shongweni reserve (SR) is some 1 700 ha in extent and has been declared to be “The largest single piece of protected natural bush and virtually unspoilt natural scenery in the metropolitan area of Durban” (Nichols and Fairall, 1992:75). Situated at the base of a large butte on the Mlazi river Shongweni Dam derives its name from the Zulu word 'ntshongwe' or a column of smoke possibly a reference to the mist which clothes the valleys in the early morning (Patrick, 1998). The reserve itself extends 4 km upstream from the dam along the Umlazi and Sterkspruit Rivers (Patrick, 1998). Situated 29 km from central Durban the hourglass shaped reserve, which has been declared a Natural Heritage Site, comprises both a wilderness portion and an area of high intensity tourist use. In terms of ecological value the reserve is a critical water catchment area for the eThekwini municipality.

The area was originally declared a protected area about 1920 and construction on the dam began in 1923 in order to supply potable water to the Durban area. Completed in 1927 the dam was originally named the Vernon Hooper dam (Patrick, 1998).

Administered by the Umgeni Water Board for many years, it was decided in 1992 to decommission the dam and, following negotiations with the Wilderness Leadership School, a new company Msinsi Resorts was formed which now actively manages many of the vital catchments areas in KwaZulu-Natal including *inter alia* Inanda Dam, Nagle Dam and Albert Falls Dam (Msinsi Profile, 2008). Figure 6.1 shows the position of SR in relation to the Shongweni Tourist shuffle and other scenic and tourist attractions.

The unique rugged topography of incised valleys and hills, cliff faces and rocks, dams, streams and catchment areas at SR gives rise to a range of habitat types sheltering a rich assemblage of plants and animals. The vegetation is typical of eastern valley bushveld and is rich in succulents and bulbous plants as well as flowering herbs, grassland and woodland tree species (Boon, 2007).

Cooper (1968) notes that the soils of the Shongweni Dam area are derived from their parent material of Table Mountain Sandstone and Basement Complex Granite. On the steep slopes the soils derived from both parent materials are very shallow, but on the gentle slopes the soils are deeper (Cooper, 1968). These factors significantly affect the distribution patterns of local plant communities and their animal populations. Soils derived from the Table Mountain Sandstone are grey-brown or red-brown coarse, sandy loams with low organic-matter content while a coarse, greyish-brown, gritty loam is derived from granitic parent material (Cooper, 1968).

Although SR is situated in a subtropical region climatic conditions are actually semi arid and hot due to the rain shadow effect caused by interactions with topography and wind (Patrick, 1998). Generally north facing slopes receive more sun than south facing slopes. Patrick (1998) noted that the average temperatures for 1996 ranged between a maximum of 28°C in February to a minimum of 6.5°C in June and July. Light frosts are experienced occasionally in the reserve (Morris, 1967). Mean annual rainfall for SR (703 mm) is much lower than that experienced at Hillcrest (1 000 mm) and this influences the nature of plant species found at the reserve (Patrick, 1998).

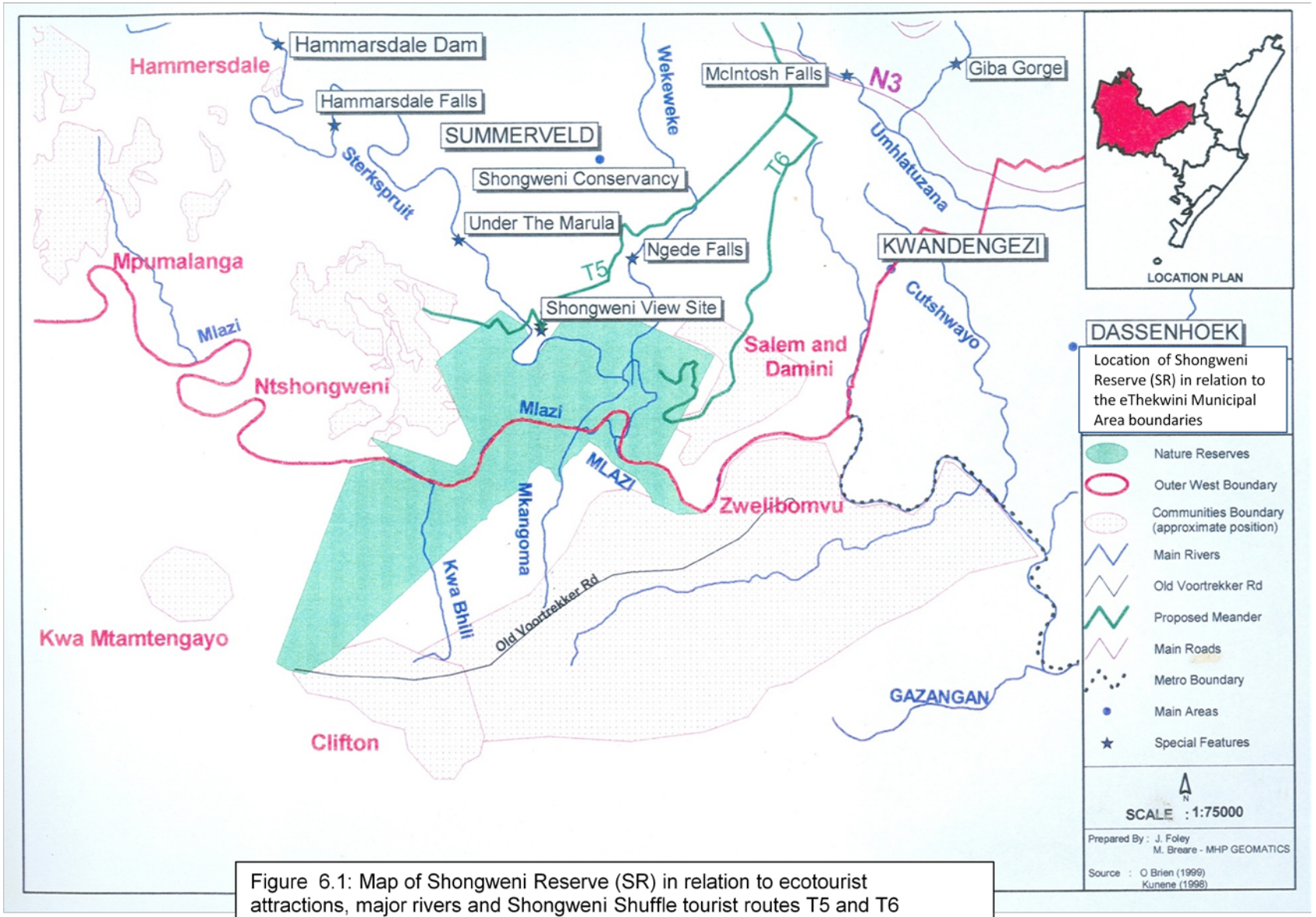

Figure 6.1: Map of Shongweni Reserve (SR) in relation to ecotourist attractions, major rivers and Shongweni Shuffle tourist routes T5 and T6

Floral Resources

In terms of its floral resources, several quantitative and qualitative vegetation studies have been conducted either within the reserve or its environs. The most significant of these include Patrick (1998) and Morris (1967). Patrick (1998) sampled, described and mapped eleven plant communities within SR and provided vegetation management guidelines for the reserve as a core conservation area within the D'MOSS programme. Patrick's work represents a more detailed quantitative analysis than Morris (1967) who only analysed a small portion of SR, namely Shongweni Hill.

Morris (1967) recognized three main plant communities namely: plateau, riverine and slope communities. These were correlated to the topography of the area. Morris (1967) noted that the plateau communities occurred on the flat summit of Ntshongweni and on the surrounding table land while the riverine communities were restricted in distribution, found only on the flood plains of the Sterkspruit and Mlazi Rivers. The slope communities were to be found on the steep valley-sides of the Reserve. Patrick (1998) noted that some 185 medicinal plants were present in the Ntshongweni and lower Mlazi catchment areas and that a large proportion of these occurred in SR. A check list of medicinal plants found at SR is included in Appendix 4. Certain plant species have been identified at SR for pharmaceutical properties that may have international significance. Active ingredients isolated from the Velvet Bushwillow (*Combretum molle)* have been used by an American researcher to develop a molluscicide that may hold a cure for Bilharzia (Tredger pers. comm.).

Geographically Shongweni Reserve falls within the region classified by Boon (2007) as Eastern Valley Bushveld. This vegetation type consists of semi-deciduous savannah woodland/thicket that has a prominent succulent component dominated by *Euphorbia* and *Aloe* species (Mucina and Rutherford, 2006). These woodland/thicket areas are characteristic of river valleys that run in a northwest to southeast direction where the plants of the steep north-facing slopes are typically xerophilous (adapted to a dry, hot environment) owing to high levels of sunlight and low levels of rain fall (Mucina and Rutherford, 2006). Boon (2007) notes that the Eastern Valley Bushveld vegetation type once occupied approximately 10% of the eThekwini Municipal area (EMA) and is found mostly in river valleys associated with the uMngeni and uMlaas river catchments.

Ngongoni Veld is one of the predominant grassland types found at SR. This veld type consists of tall *Aristida junciformis* (Ngongoni or Broom grass) dominated grasslands that are characteristically species-poor and possibly in a secondary state of succession (Mucina and Rutherford, 2006).

The woody component of this vegetation type often occurs as bush clumps associated with termite mounds (Mucina and Rutherford, 2006). The Ngongoni Veld vegetation type once occupied 14% of the EMA, of which 62% has been transformed, mostly by agricultural and peri-urban land uses (Boon, 2007).

What is the relevance of vegetation to interpretation? The compilation of detailed plant lists and ecological studies have conservation value but fall outside the scope of this research**.** What is important for this study is to recognise and select the most significant plant groups for interpretation. Particulars such as the cultural role that plants play in Zulu society as well as interesting botanical information can form a vital component of creating interpretive material. As one of the recommendations from this study, the author advocates the development of an interactive demonstration garden show casing traditional Zulu medicinal plants at SR (Chapter 7). For interpretive purposes the author selected key indicator plant species from SR to highlight for visitor interest and the reader is referred to the plant interpretive label and biodiversity brochure in Figures 6.13 and 6.14, respectively. The diverse habitats, land forms and plant communities found at SR are depicted in Figure 6.2.

Faunal Resources

In terms of its faunal resources, SR boasts an outstanding avifauna of 240 species including four eagle raptors (Cowgill and Davis, 1997). A variety of birds are found on cliff faces, open water and shoreline areas as well as grassland and woodland habitats. The reserve also stocks large game in the form of Giraffe*,* Kudu*,* Buffalo and Square-lipped White Rhinoceros (Msinsi Profile, 2008). The dam is well stocked with bass and carp and is a popular fishing destination. Fishing clinics and angling tuition has also been planned (Mkhize pers. comm.). Full and detailed check lists concerning avian, mammalian, reptilian and invertebrate fauna at SR are found in Appendix 5. A selection of faunal biodiversity observed at SR is depicted in Figure 6.3.

Top left: Flood plains of the Mlazi river bed;
Top Right: Overlooking dam – Open woodland with Natal Lavender *(Heteropyxis natalensis)*;
Bottom Left: Xeric slope communities extend to waters edge featuring Rubber tree (*Euphorbia tirucalli)* and Rock fig (Ficus ingens);
Bottom Centre: Closed woodland, Splendid acacia (*Acacia robusta)* and Velvet bushwillow *(Combretum molle);*
Bottom Right: View from Mkangoma bushcamp looking onto the rear of Ntshongweni butte with Plateau, Slope and RIverine plant communities clearly visible

Figure 6.2: Diverse habitats, landforms and plant communities at Shongweni Reserve

Figure 6.3: Faunal Biodiversity from game drive

6.2.2 Historic and cultural resources

Shongweni Reserve has a rich cultural history particularly in terms of early Iron Age inhabitants as evidenced by cave excavations and the unique design and construction of the dam wall built by Italian engineers. The reserve is also bordered by Zulu speaking communities whose indigenous knowledge systems (IKS) concerning local plant and animal use is fascinating. A knowledge of these aspects can enrich the ecotourist experience at the Reserve.

Archaeological evidence

Based on discoveries of plant cultigens and radio carbon dating techniques it is thought that the first inhabitants of the region were hunter gatherers of San origin, as Bantu speakers had not yet descended southward from the Great Lakes region in East Africa (Davies, 1975). Formal excavations of the cave took place in 1971 and revealed early iron age artifacts such as marine shells and beads made from the shells of fresh water bivalves, pointed sticks and tools and weapons made of bone and hardwood.

Various stone implements and pottery shards were also discovered (Davies, 1975). The pit excavations revealed remnants of edible seeds of Wild Banana *(Strelitzia nicolai),* Marula *(Sclerocarya birrea)* and Natal Plum *(Harpephyllum caffrum)* (Davies, 1975).

Archaeological studies in Ntshongweni South cave revealed that early agriculturists were growing and using cereal crops such as African Millet *(Eleusine corocana)* and Pearl Millet *(Pennisetum typhoides)* as early as 3 000 BC. Tsamma melons (*Citrullus lanatus*) and Calabash gourds (*Lagenaria siceraria)* were also found (Davies and Gordon-Gray, 1977). Relicts of Sorghum or Kafir corn *(Sorghum bicolor)* were found in the cave dating to more recent times. The plants are thought to be domesticated from wild Sorghum introduced from Ethiopia some 5 000 years ago. Significantly all of these plants are still used as food crops by Zulus today (van Wyk and Gericke, 2000; Norwood Young and Fox, 1982). Cereals such as African millet and pearl millet are used as a famine foods, their seed ground into porridge and used in beer making while the dried stems of sorghum are used for thatching, basket making, fish traps and as fuel (Davies and Gordon-Gray, 1977). Bantu speaking groups had domesticated cattle and iron and cultivated some cereal crops. Living in clustered villages they occasionally took shelter in caves such as those found in Shongweni Reserve.

Dam builders and engineers

The Shongweni Dam was constructed by Italian engineers from 1922-1927 to supply drinking water to Durban, then a city of some 200 000 inhabitants about 30 kilometres away. The cost of the project was 750 000 Pounds (Lagazzetta del sud Africa, 2006). The barrage dam was designed to deliver 790 million litres daily during drought periods and was constructed entirely of reinforced concrete (Lagazzetta del sud Africa, 2006). Resting on a granite foundation the barrage dam rose from the river bed to a height of 30 metres. Water was channelled from the reservoir through 4 tunnels for a total length of 6 kilometres to iron conduits. Each tunnel had a diameter from 2 to 5 metres (Lagazzetta del sud Africa, 2006). An engineering marvel, its unique fuselli gate design allowed for the controlled release of water. In recent times the soundness and structure of dam wall has been examined by professional engineers for safety purposes and found to be adequate (Knight, Hall, Hendry and Associates, 1992).

Indigenous plant use by local communities

The reserve is bounded by a number of local communities including the communities of Clifton, KwaMtamtengayo, Ntshongweni, Salem, Damini and Zwelibomvu. These Zulu communities utilize local plants and animals from the reserve for a range of functional and traditional purposes (Nagaran, Mkhize pers.comm.).

Natural resources used by members of the Salem and Zwelibomvu communities includes firewood harvested from exotic species such as *Jacaranda mimosifolia and Eucalyptus spp*. (Patrick, 1998). Patrick (1998) observed that wetland plants such as iNcema *Juncus krausii* and sedges such as *Cyperus natalensis* are popular for Zulu craft work and shortages in supply can make them a valuable resource. Culms and leaf material may be used to create sleeping and floor mats, beer strainers, baskets and twine. These products are in demand both for the tourist market and for domestic use (Patrick, 1998). Further possibilities exist for the marketing of entrepreneurial wood carving from indigenous species such as Tambotie or *Spirostachys africana* (Tredger pers. comm.).

Msinsi Holdings has developed strong links with these local communities since the inception of the Reserve and has been instrumental in securing funding for local schools at Damini and other projects (Mkhize pers. comm.). It is generally acknowledged that no natural area can be effectively managed without taking the local communities needs and aspirations into consideration (Mkhize pers. comm.). The possibilities for including traditional Zulu knowledge into local interpretation endeavours are immense.

6.2.3 Recreation and ecotourist resources

SR is on the network of established T5 and T6 tourist routes of the Shongweni Shuffle which is linked to the Valley of a Thousand Hills traditional tourist route, patronized by international air arrivals as well as domestic visitors. The reserve has inherent ecotourist potential and receives some 2 000 visitors monthly (Mkhize pers.comm.). Shongweni is not only a core area for active and passive recreation but also significant in terms of environmental education potential. The value of SR as a multiple use site becomes evident when considering the range and scope of facilities and the high level of public utilisation and participation (Patrick, 1998). A description of existing facilities and activities at SR follows:

- Three picnic sites with ablution facilities are popular with day visitors as is the Ntini self guided trail;
- The self catering hutted Mkangoma Bushcamp accommodates 8 and is hosted by a game guard and camp cook. Rigid Tented accommodation is also available at Ugede Bushcamp;
- A conference centre is available for corporate use and private functions;
- Fishing is popular in selected areas as is horse riding and non motorised boat sports with canoes available for hire;
- Game viewing is one of the main ecotourist attractions of SR and the reserve is well stocked with a variety of wildlife. Guided game and night drives are available at

reasonable cost and these are well subscribed. Detailed checklists of mammalian and invertebrate fauna are found in Appendix 5;

- SR remains a premier birding venue with ornithologists of the Natal Bird Club (NBC) and Birdlife South Africa (BLSA). The variety of bird species recorded is due in part to the size of the Reserve and the diversity of its habitats which in turn corresponds closely with the geomorphology and topography of the site. Detailed checklists of avian fauna are found in Appendix 5;
- Special interest groups include the BAT interest group which visits the Reserve for the express purpose of identifying and conserving local bat populations;
- Other special interest groups include amateur botanists and members of the KwaZulu-Natal Botanical Society (BOTSOC);
- Mountain climbers find an internationally prized destination at SR and climbs of the most strenuous order are found at locations such as the "Magnetic Wall" and the "The pleasure dome", a rock overhang which can only be traversed in a vertical fashion. This has currently been renamed the "Wave cave". Climbs graded up to 36 are unique to the area and according to a local authority "Most awe inspiring....transported from Colorado" (Tredger pers. comm.); and
- Adventure tourism is also found in the form of kayaking, rafting, abseiling and orienteering activities which are run by the Spirit of Adventure company. Specialising in developing youth leadership life skills and running camps, Spirit of Adventure hosts between 2 500 – 3 000 young people per month (Patrick, 1998). The Shongweni venue is also used regularly for corporate team building exercises by Scott Adventures (Scott pers. comm.).

In summation, Shongweni Reserve has a rich diversity of biophysical, cultural and ecotourist resources to offer the visitor. The resources are tabulated and summarized Annexure 4 (Inventory of natural resources at SR). A discussion pertaining to use of the reserve by local groups provides further context.

Local User Groups

Specialist nature interest groups

These dedicated interest groups are made up of enthusiastic amateurs and naturalists who observe, identify and record a wide range of biodiversity often contributing to the development of relevant atlases, checklists and the body of scientific literature. The groups that visited SR are detailed in Table 6.1.

Table 6.1: Local specialist groups visiting Shongweni Reserve

Nature interest	Organisation	Number of members in eThekwini Municipal Area
Bats	Bat interest group Durban Natural Science museum	**35**
Birds	Bird Life South Africa (Port Natal chapter)	**540**
Invertebrates: butterflies, dragonflies and damsel flies	Lepidopteron Society Informal walks as requested	**8-10**
Plants	Botanical Society of KwaZulu-Natal (Coastal Chapter)	**270**

Sources: (Norman, Taylor, Dell, pers. comm.)

Educational groups

Changes to the South African National Educational Curriculum through the use of the National Qualifications Framework (NQF) and the development of the outcomes based learning (OBE) programmes, provide an ideal opportunity for both schools and tertiary institutions to utilise their local reserves and open space areas on a more intensive basis. Reserves provide an ideal training ground for students to observe ecological and biological systems in action (Cottrell, 1978). The provision of signs, interpretive material and guides or talks are vital tools to educate the recreational user and to bridge the gap that exists between preservation and the short term interest of recreational exploitation (Cottrell, 1978; Clement pers. comm.).

The eThekwini Durban Parks Leisure and Cemeteries (EPLC) have produced pamphlets with tree and bird checklists for self guided trails for most of their Durban Metropolitan Open Space System (DMOSS) natural areas (Crouch pers. comm.). The South African National Biodiversity Institute (SANBI) has pioneered the development of educational material for secondary schools that directly incorporated local examples of plant and animal diversity within the curriculum (Fullard, 2007).

Repeat visitors drawn from local communities

Internationally, many visitors to parks and reserves form a loyal client base, being ‘repeat visitors” (Roggenbuck and Lucas, 1987). In the South African context this trend is also evident. A large percentage of respondents (79%) interviewed at Shongweni Reserve by this author in 1999 indicated that they had visited the Reserve within the last two years of the survey whilst 27% claim to visit the reserve on a monthly basis. The majority of visitors (69%) at the time were suburban dwellers. These visitor trends are further reinforced by findings from this study in Chapter 6 where the majority of visitors are suburbanites living in reasonably close proximity to SR.

Figure 6.4: Typical day visitor at the entrance to Shongweni Reserve
Note frieze and ceramic inlay detail of Zulu Nguni cattle (top)

Figure 6.5: Visitor activities at Shongweni Reserve

6.3 Development of interpretive strategies that maximize the biophysical, cultural and tourist resources of the site

6.3.1 Purpose of Interpretation

The richness of the various biophysical, cultural and ecotourist resources at SR have been discussed in the previous section. These statements were compiled from various interviews with the manager of Msinsi Holdings and the Officer in Charge (OIC) Shongweni Reserve. They were also informed by the literature and the data collected in the field of interpretation and horticulture.

The umbrella considerations for Interpretation at SR are as follows:

- To assist the visitor in developing a keener awareness, appreciation, and understanding of what they are viewing and so enhance the ecotourist experience;
- To draw attention to the vast array of life forms and biodiversity present at the reserve;
- To encourage the thoughtful and respectful use of natural resources;
- To make visitors aware of the rich tradition that exists regarding the utilization of plant and animal resources by the Zulu peoples within the area;
- To develop a strong connection between visitors and natural resources in wild and protected areas that reduces the current “nature deficit” experienced by many in urban areas; and
- To make visitors aware of the mission, goals and objectives of Msinsi Resorts in terms of conservation and ecotourism.

Goals for interpretation are general statements of direction applicable for all interpretive services at SR and these include the following:

- Provide orientation and information on the outstanding cultural and natural resources that are available at SR thus facilitating safe, enjoyable, and sustainable use of these facilities;
- Enhance the visitor’s experience by presenting a positive image of SR through professional interpretive services and quality facilities;
- Present a variety of quality interpretive opportunities, that are accessible to various user groups and that address a variety of learning styles;

- Develop a strong connection between visitors and natural resources in wild and protected areas;
- Elicit a lasting personal, emotional and intellectual commitment to conserve local natural resources; and
- Effectively communicate the goal of Msinsi Holdings to “manage, utilize and conserve biodiversity and encourage sustainable ecotourism”.

(Msinsi Profile, 2008)

6.3.2 Development of topics and themes

The interpretive themes for SR are derived from the interpretive goals and objectives and include a review of the findings of the natural and cultural resources of the Reserve capturing the essence and importance of the key ideas. Interpretive practitioners such as Ham (2007), Veverka (1994) and CDI (2008b) all reinforce the use of themes in interpretive planning to provide focus, continuity, and meaning to the interpretation. The central theme helps tie together the information and ideas that are presented to visitors and is the principle message about the topic that needs to be communicated to the audiences (CDI, 2008b). Themes are the ‘plot to the movie’, the ‘moral of the story’ answering the question, “So what?” or “What’s the big deal?” (CDI, 2008b). They are expressed in complete sentences, as opposed to topics that are general categories of ideas. The theme provides the foundation for all presentations, no matter what media is used (CDI, 2008b; Ham, 2007; and Veverka, 1994). The central overarching interpretive theme for the Shongweni Reserve developed for this research is “Shongweni offers the visitor an amazing range of life forms to be enjoyed, appreciated and nurtured”.

The topics and themes selected for this study are found in Table 6 below. Those items that are checked represent the themes which formed the basis for producing the sample print interpretation (Figures 6.13-6.16) used in the visitor questionnaire (Appendix 3).

Table 6.2: Interpretive topics and themes for Shongweni Reserve (SR)

Topic	Theme
Aim: Emphasizes the unique values and attributes of Shongweni	**Aim : Describes and reveals those unique values to the visitor in a meaningful and relevant way, enhancing the image of Shongweni as a desired ecotourist destination**
A Medicinal plants of Shongweni	Medicinal plants are used in a variety of ways in Zulu culture, they are under pressure and require protection
B Indigenous Plants of Shongweni	Plant products can add value to our everyday lives in a range of ways such as food, clothing, building, decorating and gardening ✓
C Catchment areas of Shongweni	Shongweni Catchment area and its rivers form a unique service to suburbia that requires special care
D Biodiversity of Shongweni	Shongweni offers the visitor an amazing range of life forms to be enjoyed, appreciated and cared for ✓
E Reptiles of Shongweni	ɔngweni has a range of unique and fascinating reptiles that need to be respected and conserved ✓
F Zulu traditions regarding animals (birds)	Local bird life has a rich variety of traditional meanings within Zulu culture forming customs and shaping behaviour ✓
G History of Shongweni reserve	Shongweni has a fascinating past and an exciting future as a protected reserve and tourist destination
H Ecology of Shongweni	Shongweni offers the nature lover the chance to view a range of different habitat types that each shelter their own unique plants and animals
I Endangered plants and animals	Visitors can appreciate the conservation value of endangered plants and animals and actively assist in their protection

Notes: ✓ Indicates print samples for inclusion in visitor survey (Figures 6.13 - 6.16)

6.3.3 Status of existing interpretation

The development of current interpretation at Shongweni appears to be *ad hoc*, dated and lacks focus and coherence. Four main interpretive sites were identified by the author for examination and review. These were based on practical issues such as accessibility, roads and frequency of visit by the majority of ecotourists. Previous zoning plans from the reserve were also considered. The site map for Shongweni Reserve in Figure 6.6 shows the location of each interpretive site.

This section examines the current condition of interpretation at each site, identifies interpretive topics and main themes, locates potential target audience and suggests appropriate goals and objectives for further development. Finally a print sample for inclusion in the visitor survey is identified.

Areas considered include:

- Reserve entrance and environs;
- Ntshonalanga Picnic site;
- Dam wall;
- Existing visitors' centre;

The location of the sites within the reserve is indicated in Figure 6.6 (overleaf).

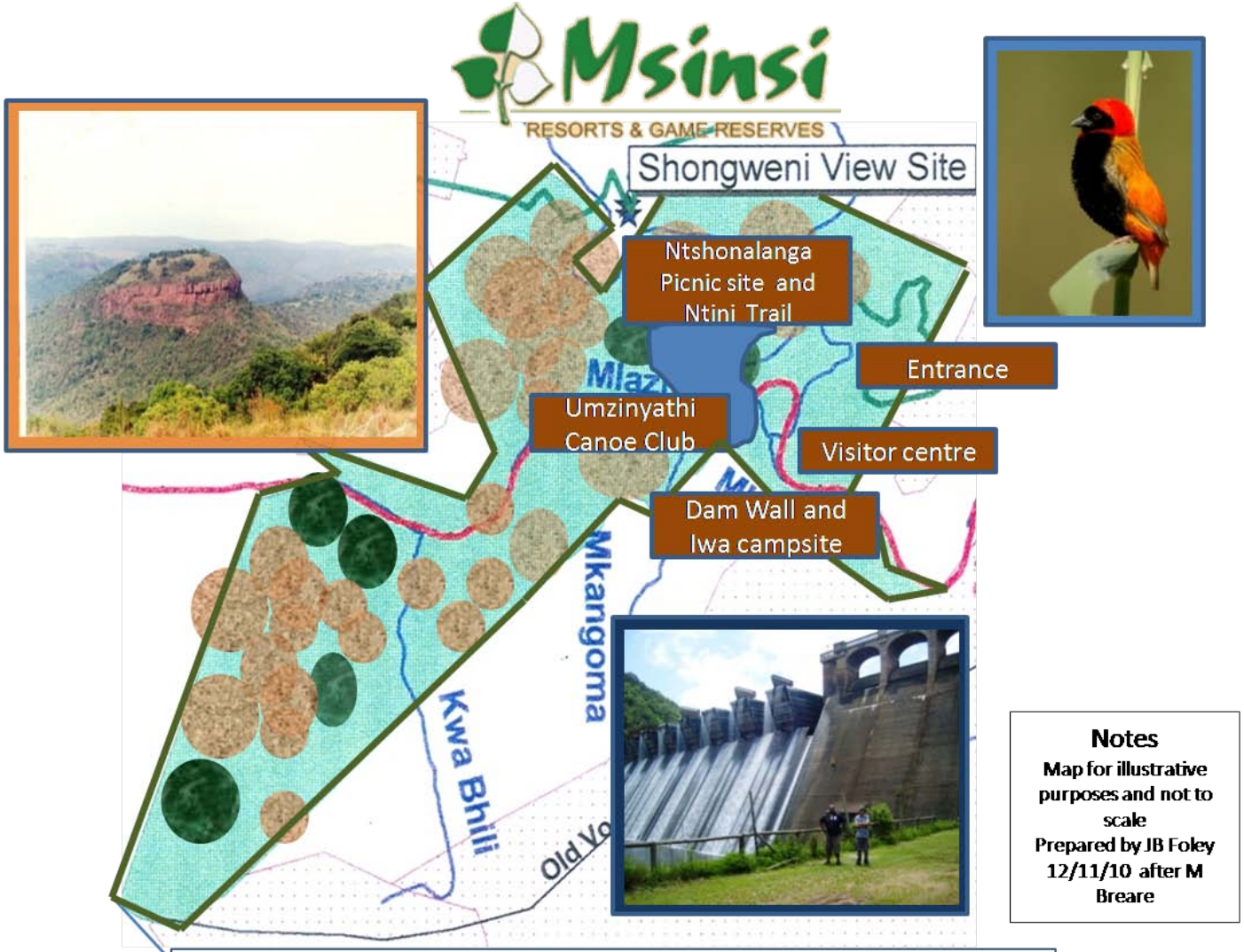

Figure 6.6 Position of interpretive sites at Shongweni Reserve (SR)

6.3.3.1 **Reserve entrance and environs** (Depicted in Figure 6.7)

A **Current condition:** The Entrance is a pleasing and well maintained introduction to the Reserve. There is no site map but a there is a prominent welcome sign indicating gate opening and closure times. Another smaller sign depicts icons of the various activities on offer. The entrance gardens require minor upgrading. A vehicle pull off zone with an outdoor directional site map is seen as essential for visitor orientation. The tariff guide currently handed out to visitors is clear.

B **Proposed Topic:** Visitor orientation and selection of activities and sites

C **Main Theme:** Shongweni offers the visitor an amazing range of life forms to be enjoyed, appreciated and cared for.

D **Audience:** General public, canoe paddlers, mountain bikers, climbers, ramblers, fishermen, plant and animal interest groups (bird watchers, butterfly enthusiasts and the like)

E **Proposed Objectives** - As a result of this interpretation, a visitor will:

- Be able to select and locate the desired activity of the day without difficulty or delay;
- Be in possession of a well labelled site map and tariff guide;
- Have received an illustrated biodiversity pamphlet briefly outlining the range of plants and animals in the reserve as well as the Ntini trail guide; and
- Be aware of Msinsi's role in managing SR and take cognisance of their mission statement and vision.

F **Proposed sample media**: A4 trifold brochure show casing the biodiversity of the reserve (produced for this research and depicted in Figure 6.14).

Figure 6.7: Main Entrance signage to Shongweni Reserve

6.3.3.2 Ntshonalanga Picnic site

A Current Condition: Ntshonalanga Picnic Site (depicted in Figures 13 and14) is the main arrival point for most picnic visitors, fishermen and canoeists. Renewal in terms of site interpretation is therefore seen as key to upgrading the entire reserve. There is no interpretation at this picnic site currently with the exception of the Ntini trail which requires urgent maintenance and renewal. A duplicated four page pamphlet describing the trail is available on request from the visitor reception area however this is distantly located and people generally do not hike the full trail which largely lies unused. Station points and paths are overgrown or absent as are tree labels which are absent or in a poor condition. There are no illustrative or text signboards which could enhance the trail.

B Proposed Topic: Biodiversity of Shongweni

C Main Theme: Shongweni offers the visitor an amazing range of life forms to be enjoyed, appreciated and nurtured

D Audience: General public, canoe paddlers, fishermen, plant and animal interest groups (bird watchers, butterfly enthusiasts and the like)

E Proposed Objectives: As a result of this interpretation, a visitor will:

- Treat the Reserve and its natural resources with respect and care;
- Understand that SR offers the visitor the opportunity to view and enjoy a rich diversity of plants and animals;
- Be aware that local biodiversity at SR is under threat and support conservation efforts; and
- Support the goals of Msinsi management at the Reserve regarding biodiversity and sustainable ecotourism.

F Proposed sample media: Plant interpretation labels and a signboard portraying reptile life at the reserve (produced for this research and depicted in Figures 6.13 and 6.16).

Figure 6.8: Ntshonalanga or Bheka Picnic Site
Note: Fishing, camping, canoe and braai facilities (top) and Ugede hutted tent accommodation (bottom)

Top left :Cow pea *(Vigna unguiculata*), Bottom left :Gogodwayo stream, Centre Bottom : Buffalo tongue Berkheya (*Berkheya setifera)*, Top Right Milk wort (*Xysmalobium undulatum*), *Bottom Right : Bronze Paper bark (Commophira harveyii)*

Figure 6.9: Biodiversity along the Ntini Trail

6.3.3.3 Picnic site at Dam wall

A Current Condition: There are several large old buildings remnant from the Durban Waterworks era when the Dam was operational. These are in a derelict condition. However, the shells could be restored and the interiors refurbished as a multiple use resource that could include the following: curio shop and crafts, museum, /conference/ lecture venue, visitor interpretation centre. The dam wall is impressive both in terms of architecture and size. Access to both the tunnel and the top portion of the wall needs to be turned into a tourist feature. There is no interpretation at all and the trees are unlabelled. The picnic sites themselves require extensive refurbishment. Further recommendations regarding this site are found in Chapter 7.

B **Proposed Topic:** History of Shongweni Reserve

C **Theme:** Shongweni has a fascinating past and an exciting future as a protected reserve and tourist destination

D **Audience:** General public and picnickers

E **Proposed Objectives:** As a result of this interpretation, a visitor will:

- Develop an appreciation of the historical significance of SR both in terms of early indigenous African settlements and European colonial construction and development;
- Understand that archaeological evidence points to the existence of early San and Zulu peoples who lived in the caves of Shongweni Reserve;
- Understand some of the challenges and constraints faced by early engineers in creating the original dam wall to supply the growing city of Durban with potable water supplies;
- Understand the current and future importance of SR both as a protected nature reserve and desired ecotourist destination.

F **Proposed sample media**: Not produced for this dissertation. Refurbishment of this area is under consideration by Msinsi Management (Nagaran pers. comm.).

Figure 6.10: Iwa picnic site (top) and architectural detail of dam wall

Figure 6.11: Shongweni Dam wall and environs
Note Xeric cliffs, Naboom *(Euphoribia ingens)* and Rock Python

6.3.3.4 Visitors' centre

A Current condition: The current visitors centre needs to be made more appealing to clients both in terms of size and architecture. The existing centre is small and in the author's opinion does not serve the interpretive needs of the reserve adequately. Any capital improvements should take into account multiple use areas, the use of rustic locally available materials and linkages with outdoor space.

Currently the centre serves as a contact point with Msinsi staff for visitor queries. The glossy outdoor magazine 'Wild' is available free of charge and this is linked to advertising for the 'Wild Cards' a discounted access promotion for entry to most national and provincial nature reserves.

B Topics: A full range of interpretive topics as per Table 6.2 (see above)

C Main Theme: Shongweni offers the visitor an amazing range of activities life forms to be enjoyed, appreciated and cared for

D Audience: All visitors

E Proposed Objectives: As described in section 6.3.2

F Proposed sample media: Birds of Shongweni poster (produced for this research and depicted in Figure 6.15).

Figure 6.12: Directional and activity signage (top) and reception/visitor centre (bottom)

6.4 Goals and guiding principles for producing interpretive print samples for visitor evaluation and survey

While theme generation as described in Table 6 has value and is an intrinsic part of the interpretation process it was decided to produce no more than four samples for the survey to avoid visitor fatigue while completing the questionnaire. The following goals and guiding principles were applied:

- The formulation and design of print samples must subscribe to the overall interpretive purpose and goals of the reserve;
- Select interesting and key categories of local biodiversity for focus such as birds, reptiles and plants;
- Select appropriate print formats* for key categories of focus namely, poster (birds), signboard (reptiles) and plants (interpretation label);
- Compile an overall comprehensive picture of local biodiversity in a single brochure that showcases the different life forms at a glance;
- The overarching and guiding principle employed here is that interpretation should be enjoyable, relevant, organized and thematic;
- Material should be colourful and provocative to stimulate visual interest; and
- Facts and information displayed should be relevant and concisely presented.

(* Table 5 in Chapter 4 refers to the range and scope of interpretive media)

The production of these print samples forms an integral part of this research where the theoretical concepts reviewed in Chapter 2 were applied to communicating site specific biodiversity issues to the visitors. The four print samples were attached to the visitor questionnaire as part of Section C (20.1-20.4), levels of interest in plant, animals and ecology. Visitors were asked to examine the samples and indicate their level of interest on a 5 point scale. The print images follow below in this text as Figures 6.13 - 6.16 while the visitor questionnaire is found in Appendix 3.

Euphorbia ingens: The Tree Succulent with a serious reputation

Family: Euphorbiaceae
Common Tree Euphorbia (Eng.); Naboom, (Afr.)

This large 12 m tree succulent belongs to a large plant family that possess a milky latex and are adapted for dry conditions. Euphorbia was named after Euphorbus, a 1st century physician to King Juba of Mauritania. The species name ingens means huge. The plant hosts many fruit and berry eating birds and woodpeckers may nest in the dead sections. The light tough wood produces good quality planks suitable for boat building. The branches are used as a fish poison. The sap has been used as a cure for warts. Be warned however that the latex of this tree is extremely toxic and can cause severe skin irritations, blindness and severe illness to humans and animals if swallowed.

Shongweni Reserve - A lot more to discover, closer than you think Msinsi RESORTS & GAME RESERVES

Figure 6.13: Plant interpretation label created for visitor survey

Butterflies and dragonflies @ Shongweni

The reserve hosts a dazzling array of butterflies including the well known African Monarch that feeds off milkweeds, the Orange Natal Acraea and the Gaudy Commodore which alternates between blue in winter and red in summer. Other enchanting butterflies you can spot include the Citrus Swallow Tail with its distinctive russet and blue eye spots and the Pearl Charaxes which feeds off fruit and dung. Join the Lepidopterists' Society of Africa (LepSoc) at Http://butterflies.adu.org.za to learn more about identifying and conserving South African butterflies.

Dragon fly watching is a popular activity in Germany, while in Afrikaans they are known as naaldekokers (needle- quivers). Species you are likely to encounter at the dam would be the sapphire coloured Epaulette Skimmer and Banded Groundling. Dragon fly trails are becoming more popular and for more information contact www.odonata.org.

Reptiles, lizards and snakes @ Shongweni

Talking of **snake spotting** you may come across a timid Variegated Bush Snake, a Natal Green Snake, a docile Southern Brown Egg Eater or a common Night Adder with attitude. Very rare but venomous snakes would be the Boomslang and Black Mamba. Don't be confrontational and they will slither away quietly. Harm less Striped Skinks and the blue headed Tree Agama are common lizards and keep a sharp eye trained for the tiny Durban Dwarf Chameleon and the Natal Hinge back Tortoise. South Africa contains 5% of the world's reptile species many of which under threat. Contact the reptile conservation site at www.saherps.net/sarca/.

Amphibians, croakers and jumpers @ Shongweni

Frogs have moist and soft skins and are excellent swimmers while toads are dry and warty and more land based. Croakers include the raucous toad which utters a loud "kwaak-kwaak" while the red toad congregates in large numbers making the night hideous with sound. Jumpers at the froggie Olympic include the Common River Frog or Rana which is also prized for its fried legs in California and France. The common Platanna is used in pregnancy tests and exported worldwide while the appeal of the Painted Reed Frog is hard to resist. You will find this tiny golden and green frog perching on swamp reeds along the Shore line often snoozing in the sun. Other regulars at Shongweni include the Snoring Puddle Frog and the Bubbling Kassina. For more frog facts consult the Durban Natural Science Museum at Www.durban.gov.za/durban/discover-durban/our-durban/museums/nsm.

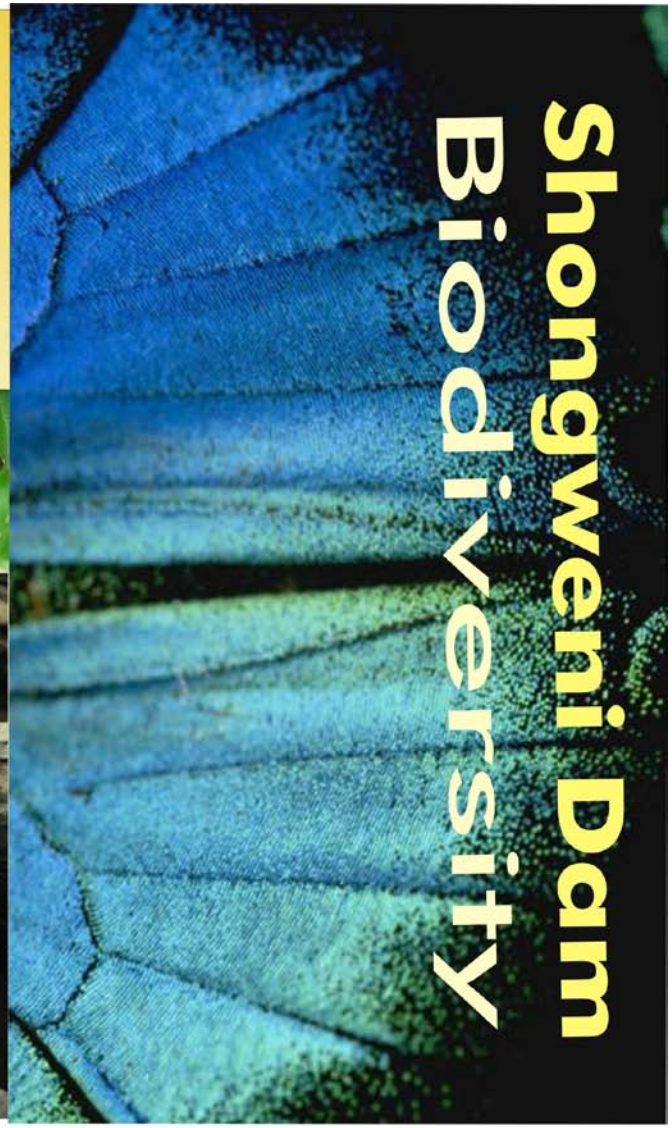

Figure 6.14a: Biodiversity brochure created for visitor survey

The Window of Life

Shongweni nature reserve offers the visitor an opportunity to view an exciting range of animal and plant life. Scientists call this Biodiversity which means the variety of life forms on planet earth. At Shongweni reserve you will be able to observe a variety of habitat types from cliff faces to open water, grassland and valley bushveld types each harbouring its own unique plant and animal species.





Plant Life @ Shongweni

.As you arrive you will be surrounded by typical **Valley bushveld** consisting of Sweet Thorn (*Acacia karroo*) with its canary yellow balls of flowers and the Robust Thorn (*Acacia robusta*). Also browsed by the herds of antelope you will find here are indigenous bunch grasses such as Ngongoni Bristle Grass (*Aristlda junciformis*) which is used for broom making. Driving down toward the **Bheka Ntshonalanga** (The place where the sun sets) campsite you will see **woodland/thicket** vegetation adapted to the hot dry slopes.

Succulent plants are found studded here including Euphorbia and Aloe species. The Naboom *(Euphorbia ingens)* has a light tough wood used for making doors and boats while the branches are used as fish poison. Winter flowering Hedging Aloes (*Aloe arborescens*) and *Aloe ferox* are common here. Sap from the latter aloe produces aloe bitters and skin cream products.

At the Bheka Ntshonalanga campsite you will find **wetland vegetation** such as Bulrushes *(Typha capensis)* and Swamp Reeds (*Phragmites australis*) home to seed eaters such as the Thick-billed Weavers and Reed Warblers.
After your braai by the dam try and hike the **Ntini trail** (the Zulu name for the Cape Clawless Otter) where you will move immediately into cool **Riverine forest**. Tree spotting here includes the beautiful Red Beech *(Protorhus longifolia)* and the Tasselberry (*Antidesma venosum)* with its richly laden scarlet fruit.
As you leave the forest and cross over the Gogodwayo stream you will encounter the broad leaf Coral Tree, the emblem for the Msinsi Resorts company. This tree *Erythrina lattissima* bears magnificent red-orange flowers in winter followed by pods of lucky bean seeds thereafter.

At Crest view site you will have magnificent views of **Ntshongweni hill** and the dam surrounded by true **valley bushveld**. Typical trees of this vegetation type include the Buffalo Thorn *(Ziziphus mucronatus)* and the Pencil Stick Tree (*Euphorbia tirucalli.* Moving on you will observe **grasslands** of Fan Love Grass *(Eragrostis plana)* and Natal Red Top *(Melinis repens)* which flower in May. You will find encroaching clumps of bush in the grasslands associated with **termitaria** or termite mounds.

The vegetation changes again to **woodland** where dominant trees include the Velvet Bushwillow *(Combretum molle)* whose leaves are browsed by Kudu and the fragrant Natal Lavender trees *(Heteropyxis natalensis)* whose crushed leaves can be used in pot pourris.

Animal life @ Shongweni

Rich in big game you can spot Giraffe, Kudu, *Burchells* Zebra, Blue Wildebeest, Buffalo and Square-lipped (White) Rhinoceros. Antelope include Reed Buck, Impala and the shy Blue and Red Duiker. Smaller mammals include Porcupines, Cape Clawless Otter, Caracal and Genet, Dassies, Slender Mongoose and Cane Rats. Enjoy our night game drive to spot these creatures.

Going batty @ Shongweni

A range of bats are to be found roosting in caves on the cliffs or feeding on fruiting fig trees at night such as Wahlberg's Epauletted Fruit bat, the Yellow Tailed House Bat and the tiny Sundevall's Leaf-nosed Bat which weighs in at only 7-8 grams. Insectivorous bats are capable of consuming in the region of 1000 mosquito sized insects per hour! Resembling a cross between a bird and a rodent bats have been misrepresented by myths and movies so remember bats need friends too! Join local bat interest group @ http://www.batskzn.co.za/


Birding @ Shongweni

A popular venue for ornithologists the reserve boasts over 240 species of birds including four resident eagle species. Soaring from the **cliff face** you may be lucky to glimpse the African Fish Eagle, Black Eagle, Crowned Eagle and Martial Eagle. Looking over **open water and shoreline** areas White Throated Swallows scud along the surface waters while along the shoreline Bittern, Crakes, Cape Dabchicks and Moorhens find shelter. Herons you can spot here include the Squacco Heron and the Night Heron.

Along the **riverine forest** Cinnamon Doves, Emerald Cuckoos and Purple Crested Loeries can be found feeding in the trees while on the forest floor the large Trumpeter Hornbills and shy Natal Robin will be foraging.
Moving into **woodland** Brown Hooded Kingfishers, Black Fly Catchers and Cardinal Wood Peckers are common while in the Plateau **grasslands** you can spot Francolin, Ground Hornbill preying on reptiles and frogs, Red-Collared Widow Bird and Pin-tailed Whydah's with their fluttering erratic flight. Join Local Bird interest group at http://www.birdlife.org.za/ or participate in the nation wide bird atlas currently being compiled at www.sabap2.org.

Figure 6.14b: Biodiversity brochure created for visitor survey

Figure 6.15: Birds of Shongweni poster created for visitor display

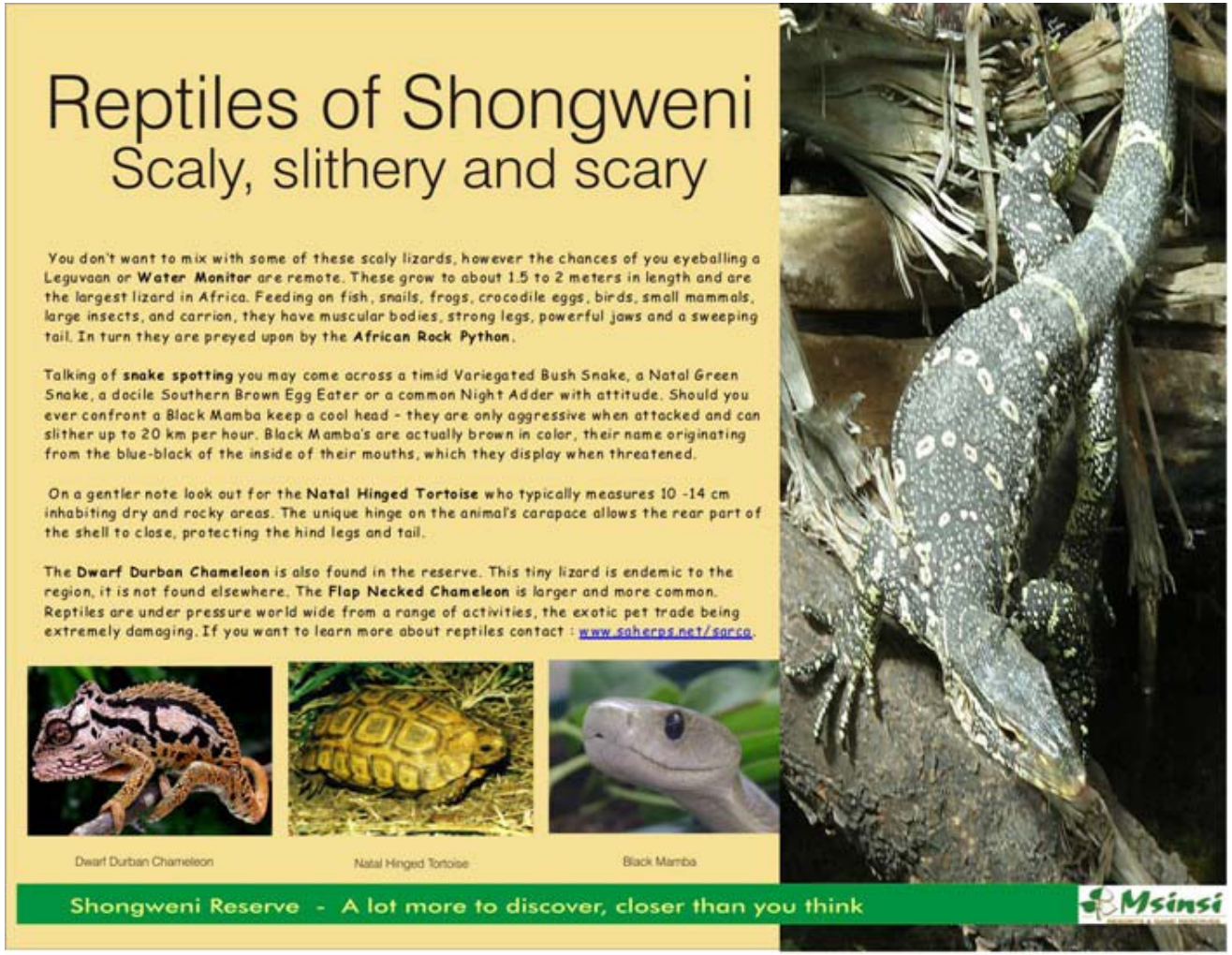

Fig 6.16: Reptiles of Shongweni Reserve

6.5 Compilation and distribution of appropriate visitor questionnaires to determine visitor profiles and interest in interpretive material

Visitor questionnaires were prepared as per Chapter 3.4 and were administered by the author during November and December 2008, and February and August 2010. The summer and spring months were selected when traditionally higher visitor volumes are experienced. A visitor table with posters and plants was set up on the one occasion to stimulate interest. Raw data was captured on Excel spreadsheets and then transferred into the SPSS V 17 package for analysis.

6.6 Evaluation and analysis of visitor responses using appropriate statistical analysis and provide appropriate discussion of results

This sections deals with, firstly, the reliability of the survey carried out, secondly, a sectoral analysis of the results and descriptive statistics related thereto, thirdly, hypothesis testing and statistical significance and, finally, discussion of results and conclusion.

6.6.1 Survey reliability

Reliability refers to the property of a measurement instrument that causes it to give similar results for similar inputs. Cronbach's alpha is a measure of that reliability (Maree, 2008). Mathematically, reliability is defined as the proportion of the variability in the responses to the survey that is the result of differences in the respondents. That is, answers to a reliable survey will differ because respondents have different opinions, not because the survey is confusing or has multiple interpretations (Maree, 2008). Technically speaking, Cronbach's alpha is not a statistical test - it is a coefficient of reliability or consistency (UCLA, 2010).

Summarised below are Cronbach's alpha reliability scores for the various categories of the research.

Table 6.3: Summary of Cronbach's alpha reliability scores

Section	Alpha value
Knowledge Development	0.836
Image Rating	0.853
Service Delivery	0.920

A reliability coefficient of 0.70 or higher is considered as “acceptable” (UCLA, 2010). All of the categories have high, acceptable reliability values. This means that there is a high degree of consistent scoring for the various sections indicated. Once reliability has been established a **factor analysis** is then run to assist in data reduction. A typical use of factor analysis is in survey research, where a researcher wishes to represent a number of questions with a small number of hypothetical factors (Maree, 2008).

6.6.2 Factor analysis

Factor analysis attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Factor analysis helps to identify a small number of factors that explain most of the variance that is observed in a much larger number of manifest variables. Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (for example, to identify colinearity prior to performing a linear regression analysis) (Maree, 2008; UCLA, 2010).

Factor analysis is typically used in survey research, where a researcher wishes to represent a number of questions with a small number of hypothetical factors. Items measured on a 5 point Likert scale are well suited to this analysis (Maree, 2008). Tables indicating commonality are presented in the next section.

Table 6.4: Extraction values for the three main question clusters

Knowledge Development	Extraction
I would like to develop knowledge of indigenous plants	.378
I would like to develop my knowledge of birds	.546
I would like to develop my knowledge of mammals	.554
I would like to develop my knowledge of frogs	.609
I would like to develop my knowledge of insects	.615
I would like to develop my knowledge of habitats	.603

Image Rating	Extraction
Image Rating - Plant sign	.567
Image Rating - Biodiversity brochure	.746
Image Rating – Birds	.755
Image rating – Reptiles	.726

Service Delivery	Extraction
Overnight accommodation	.533
Roads	.436
Ablution blocks	.557
Picnic sites	.577
Trails	.653
Access	.515
Security	.688
Signage	.445
Boating sites	.477
Staff availability and helpfulness	.588
Interpretive material – pamphlets and posters	.464
Price is reasonable and market related	.495

The rotation method used is the Varimax Method with Kaiser Normalization. This is an orthogonal rotation method that minimizes the number of variables that have high loadings on each factor. It simplifies the interpretation of the factors. Factor analysis/loading show inter-correlations between variables.

The communality for a given variable can be interpreted as the amount of variation in that variable explained by the factors that constitute the variable. In this instance for example, there are six variables that make up Knowledge Development (as indicated in the component matrix table below). The analysis is analysed similar to that for multiple regression: signage against the two common factors yields an R^2 = 0.603 (for the last variable regarding habitats), indicating that about 60% of the variation in terms of this statement is explained by the factor model. This argument can then be extended to the rest of the model as the communality values are within acceptable norms. However, some statements whose values were less than 0.500 showed the greatest degree of unexplained variation:

Table 6.5: Rotated component matrix

Knowledge Development	Component
I would like to develop knowledge of indigenous plants	.615
I would like to develop my knowledge of birds	.739
I would like to develop my knowledge of mammals	.744
I would like to develop my knowledge of frogs	.781
I would like to develop my knowledge of insects	.784
I would like to develop my knowledge of habitats	.776

Image Rating	Component
Image Rating - Plant sign	.753
Image Rating - Biodiversity brochure	.864
Image Rating – Birds	.869
Image rating – Reptiles	.852

Service Delivery	Component
Overnight accommodation	.730
Roads	.660
Ablution blocks	.746
Picnic sites	.760
Trails	.808
Access	.718
Security	.829
Signage	.667
Boating sites	.690
Staff availability and helpfulness	.767
Interpretive material – pamphlets and posters	.681
Price is reasonable and market related	.703

The table indicates that the variables for the categories align perfectly under respective components. This means that the questions measure what they set out to measure.

6.6.2 Section analysis and descriptive statistics

The tables and graphs below present a summary of the responses per section. Data is expressed as a percentage (%) with the n-value thereafter appearing in brackets.

Section A: Personal particulars

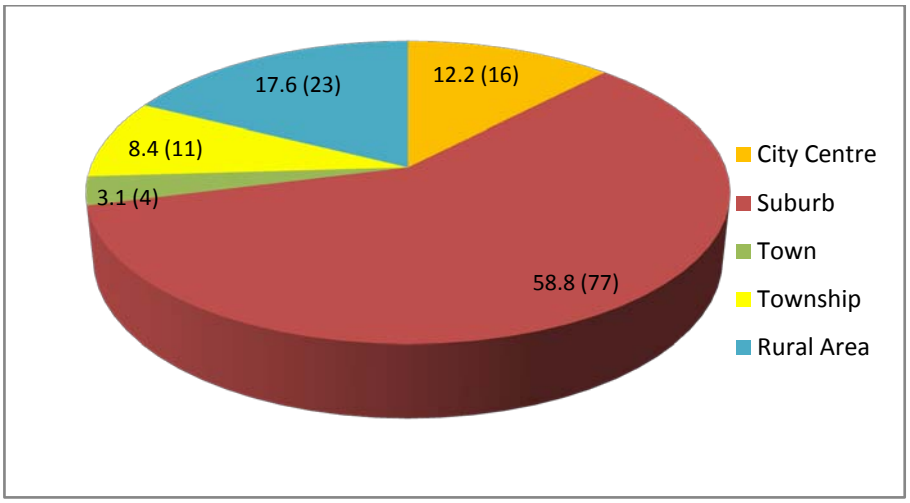

Figure 6.17: Area of visitor origin

The figure illustrates that nearly 59% of the respondents live in suburbs. The majority of the remaining respondents live in either the city centre (12.2%) or in rural areas (17.6%). As each respondent was asked to fill in where they live in terms of geographic location the following information was instructive. Five regions were recognised:

Highway area (n) 63 or 48%

Durban Central (n) 35 or 27%

Durban South (n) 11or 8%

Durban North (n) 9 or 7%

Outside of Durban (n) 13 or 10%

It is interesting to note that nearly half of the visitors came from the Highway area, in other words, Hillcrest, Assagay and Kloof regions. The overall results still present an affluent visitor target market with an encouraging rise in visitors from townships (8.4%) and rural areas (17.6%). Low volumes are being experienced from those who live in the city centre (12.2%).

Cross tabulations of race by gender and age are indicated below. There was nearly the same number of White and Black male and female respondents. More than half of the male respondents were younger than 25 years of age, with nearly 60% of females being younger than 35 years. Almost a third (30%) of the Black females was younger than 25 years. Overall

the results point to a younger and active visitor age group with an almost equal representation of Black and White visitors and an under representation of Indian and Coloureds in this particular sample. Almost 98% of the respondents in this sample were South African.

Table 6.6: Cross tabulation of race by gender and age

Gender				Race				Total
				White	Black	Indian	Coloured	
Male	Age	18 - 25	Count	11	28	2	0	41
			% within Age	26.8%	68.3%	4.9%	.0%	100.0%
			% within Race	28.9%	82.4%	25.0%	.0%	50.6%
			% of Total	13.6%	34.6%	2.5%	.0%	50.6%
		26 - 35	Count	6	6	2	0	14
			% within Age	42.9%	42.9%	14.3%	.0%	100.0%
			% within Race	15.8%	17.6%	25.0%	.0%	17.3%
			% of Total	7.4%	7.4%	2.5%	.0%	17.3%
		36 - 45	Count	11	0	3	1	15
			% within Age	73.3%	.0%	20.0%	6.7%	100.0%
			% within Race	28.9%	.0%	37.5%	100.0%	18.5%
			% of Total	13.6%	.0%	3.7%	1.2%	18.5%
		46 - 55	Count	7	0	0	0	7
			% within Age	100.0%	.0%	.0%	.0%	100.0%
			% within Race	18.4%	.0%	.0%	.0%	8.6%
			% of Total	8.6%	.0%	.0%	.0%	8.6%
		> 55	Count	3	0	1	0	4
			% within Age	75.0%	.0%	25.0%	.0%	100.0%
			% within Race	7.9%	.0%	12.5%	.0%	4.9%
			% of Total	3.7%	.0%	1.2%	.0%	4.9%
	Total		Count	38	34	8	1	81
			% within Age	46.9%	42.0%	9.9%	1.2%	100.0%
			% within Race	100.0%	100.0%	100.0%	100.0%	100.0%
			% of Total	46.9%	42.0%	9.9%	1.2%	100.0%

Female	Age	18 - 25	Count	3	15	1	0	19
			% within Age	15.8%	78.9%	5.3%	.0%	100.0%
			% within Race	13.6%	71.4%	16.7%	.0%	38.0%
			% of Total	6.0%	30.0%	2.0%	.0%	38.0%
		26 - 35	Count	3	5	3	0	11
			% within Age	27.3%	45.5%	27.3%	.0%	100.0%
			% within Race	13.6%	23.8%	50.0%	.0%	22.0%
			% of Total	6.0%	10.0%	6.0%	.0%	22.0%
		36 - 45	Count	8	1	0	1	10
			% within Age	80.0%	10.0%	.0%	10.0%	100.0%
			% within Race	36.4%	4.8%	.0%	100.0%	20.0%
			% of Total	16.0%	2.0%	.0%	2.0%	20.0%
		46 - 55	Count	7	0	1	0	8
			% within Age	87.5%	.0%	12.5%	.0%	100.0%
			% within Race	31.8%	.0%	16.7%	.0%	16.0%
			% of Total	14.0%	.0%	2.0%	.0%	16.0%
		> 55	Count	1	0	1	0	2
			% within Age	50.0%	.0%	50.0%	.0%	100.0%
			% within Race	4.5%	.0%	16.7%	.0%	4.0%
			% of Total	2.0%	.0%	2.0%	.0%	4.0%
	Total		Count	22	21	6	1	50
			% within Age	44.0%	42.0%	12.0%	2.0%	100.0%
			% within Race	100.0%	100.0%	100.0%	100.0%	100.0%
			% of Total	44.0%	42.0%	12.0%	2.0%	100.0%

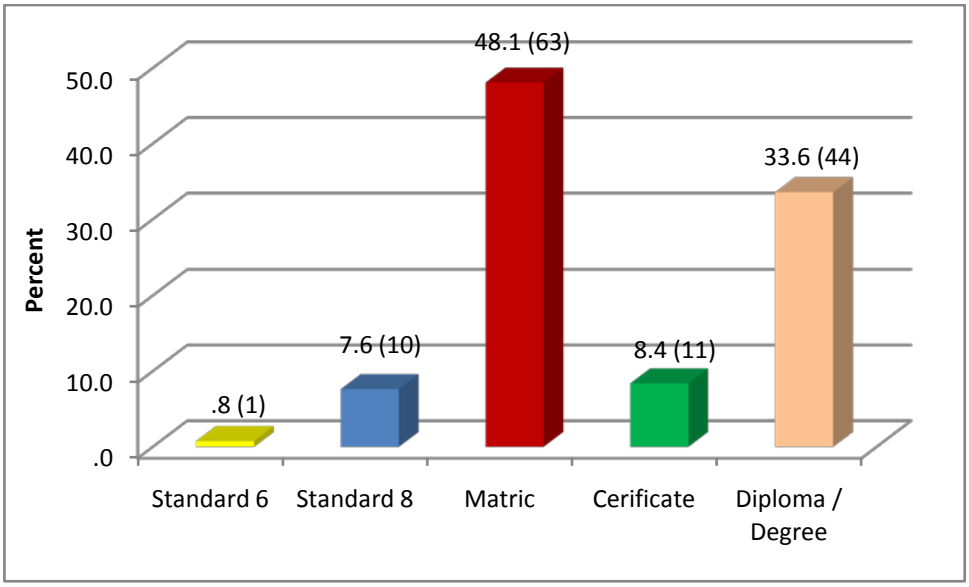

Figure 6.18: Visitor Levels of education

Nearly half of the respondents (48.1%) had Matric as their highest qualification. A third (33.6%) of the respondents had indicated that they had a Diploma or degree. Only 15.6% of the visitors had not completed their school education. The implications of these findings is that reserve managers, educators and conservationists need to engage in efforts to target the under-privileged and rural communities who may not have the access, finance or desire to visit protected areas out of their own volition. In the author's view it is of prime importance to draw such a group into the conservation ambit, particularly as the ultimate ownership of Shongweni Reserve will revert to these communities (Nagaran pers. comm.).

Most of the respondents (83%) indicated that the family unit had a combined income of more than R5 000. The majority of these (19.1%) earned between R20 000 to R50 000. Again the picture reveals a financially well-off visitor set with a certain degree of disposal income available to visit a privately managed protected area. The entrance fee could be seen as a barrier to entry for the poor and disadvantaged local community.

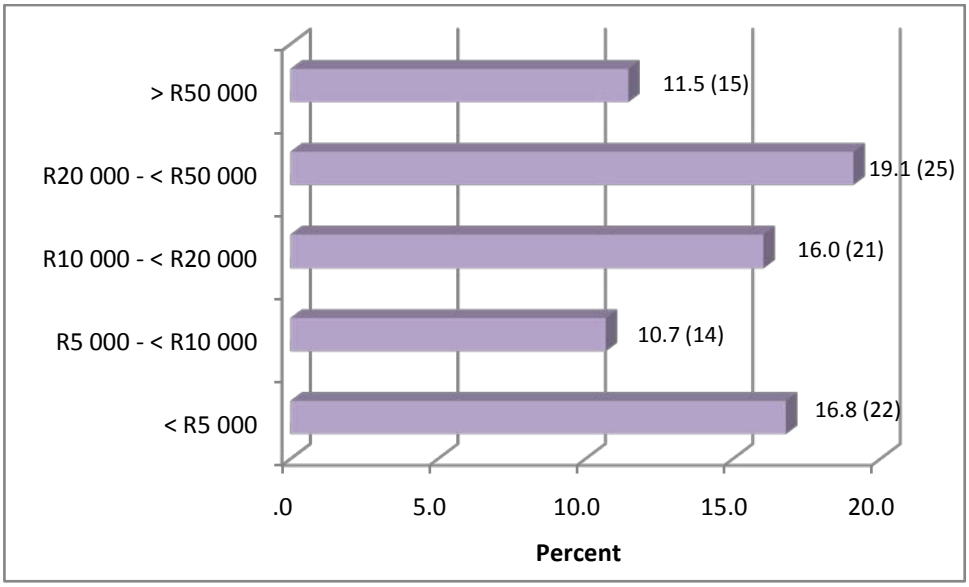

Figure 6.19: Combined Family Income per Month

Section B: Purpose of the visit

More than half (53.4%) of the respondents made an annual visit to the reserve. More than a third visited at least on a monthly basis. These repeat visitors are probably drawn from regular paddlers of the Umzinyathi Canoe Club. These members receive a discounted gate fee.

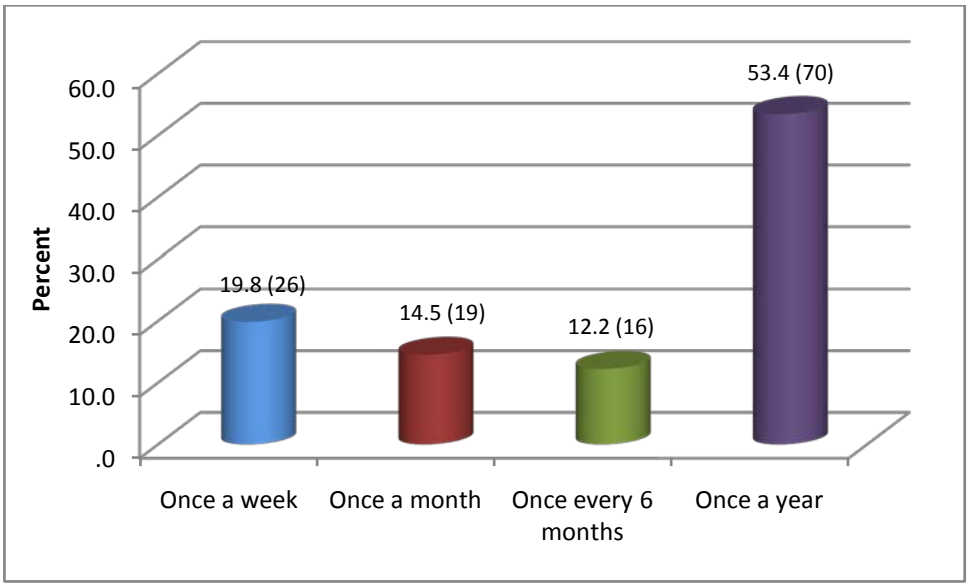

Figure 6.20: Visitor frequency to Shongweni Reserve

These visitors cite the following reasons for visiting the Reserve:

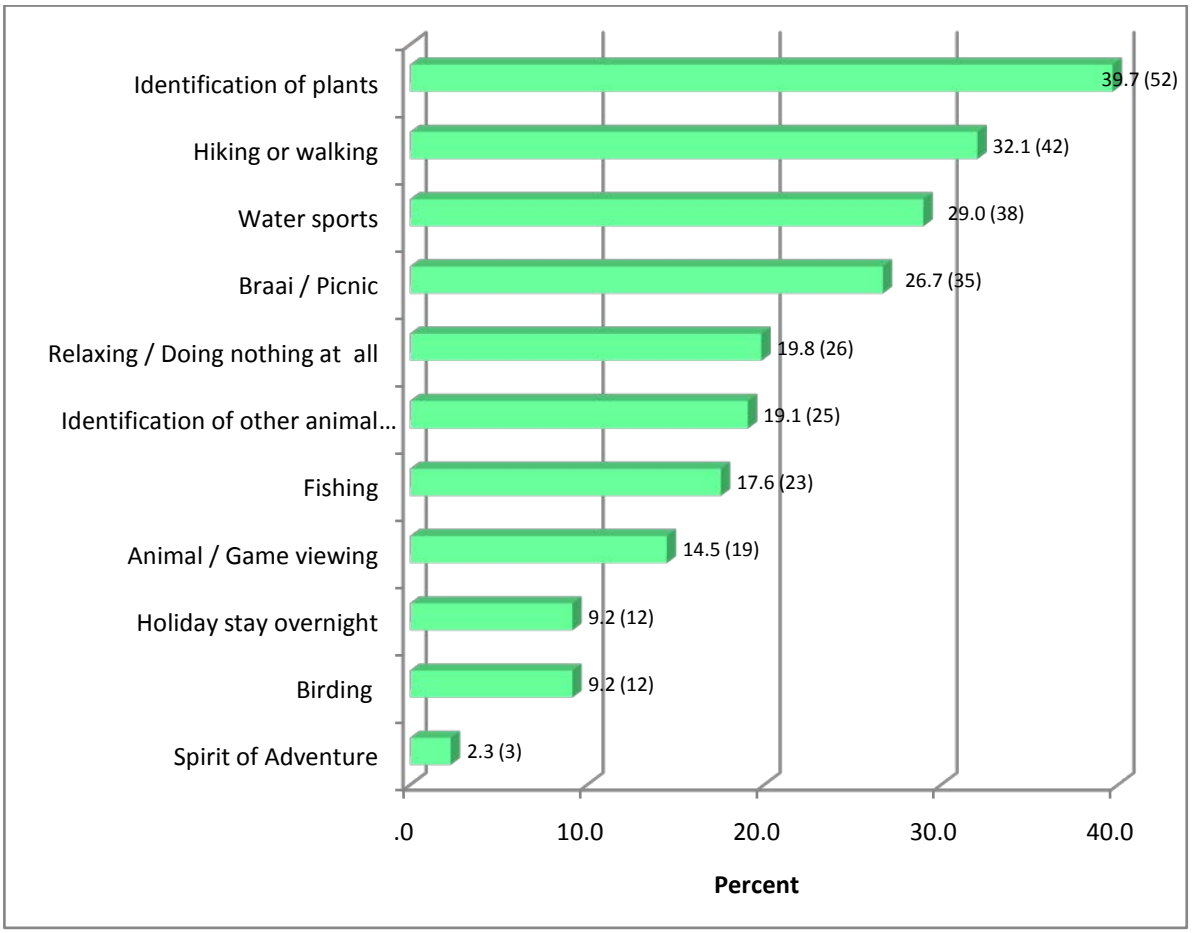

Figure 6.21: Purpose of visit to Shongweni Reserve

The figure above indicates the ranked preferences for respondents visiting the reserve. Respondents were able to tick more than one preference. Amongst the highest preferences are social activities such as hiking or walking, water sports and picnics. This corresponds to the amount of time that visitors spent at the reserve. More than 80% indicated that they spent between 2 to 8 hours visiting the reserve. Nearly 40% of the respondents indicated that they were interested in plant identification. This interest in reinforced elsewhere in the survey (Section C).

Section C: Levels of interest

When asked directly about whether visitors would like to develop knowledge on indigenous plants a strongly affirmative response was received with 81.7% indicating their interest. Those opposed were 4.6% and those who were neutral were 13.7%. This gives value to the author's hypothesis that visitors are indeed interested and receptive to learning about local biodiversity.

Most respondents (35.1%) preferred to learn about plants from an experienced tour guide. A similar percentage of respondents indicated that a self guided trail with signage, the use of pamphlets and demonstration areas would also be adequate.

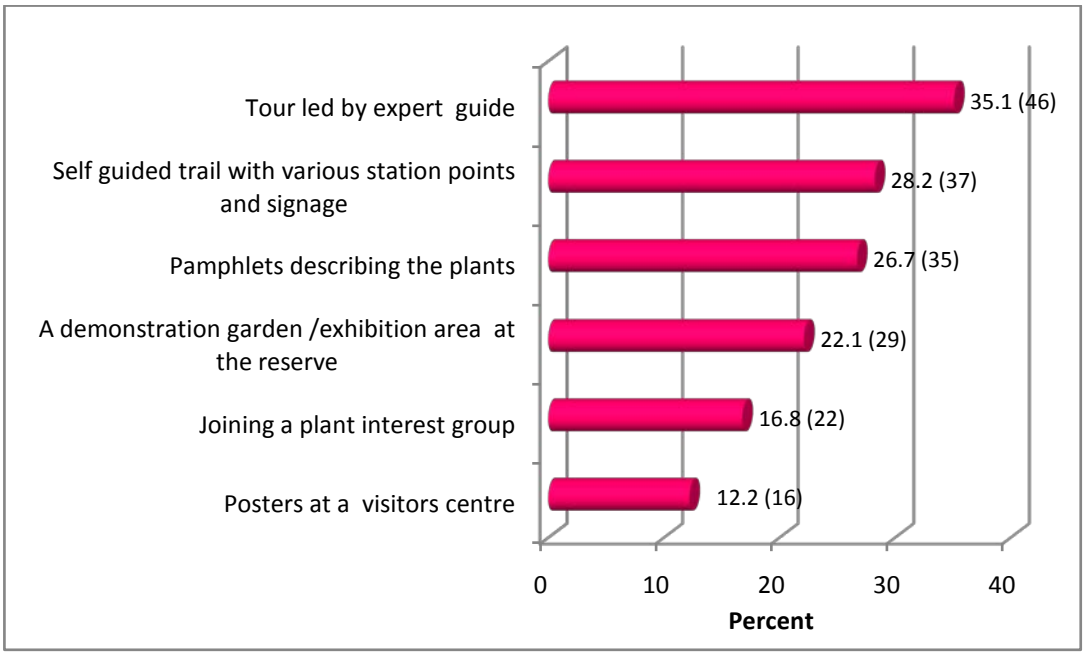

Figure 6.22: Options to develop interest in plants

The results indicated a positive response toward learning about other life forms with 61.8% of respondents indicating an interest in developing their knowledge of birds, 67.2% their interest in mammals, 61.1% their interest in frogs and 56.5% their interest in insects. A further 66.4% wished to expand their knowledge in terms of diverse habitats and finally nearly 59% of respondents claimed to have hiked the Ntini Trail.

These results are encouraging in terms of ascertaining initial levels of visitor interest at Shongweni Reserve and compare favourably with similar findings indicating high levels of visitor interest in invertebrates carried out in Northern KwaZulu-Natal Reserves (Huntly et al., 2005). In this survey 95% of visitors responded positively to the idea of incorporating information about invertebrates into ecotourist activities (Huntly et al., 2005). Some black respondents in the Shongweni survey were quick to point out their initial revulsion towards insects while whites appear to gravitate toward an interest in butterflies and dragonflies (Norman pers. comm.).

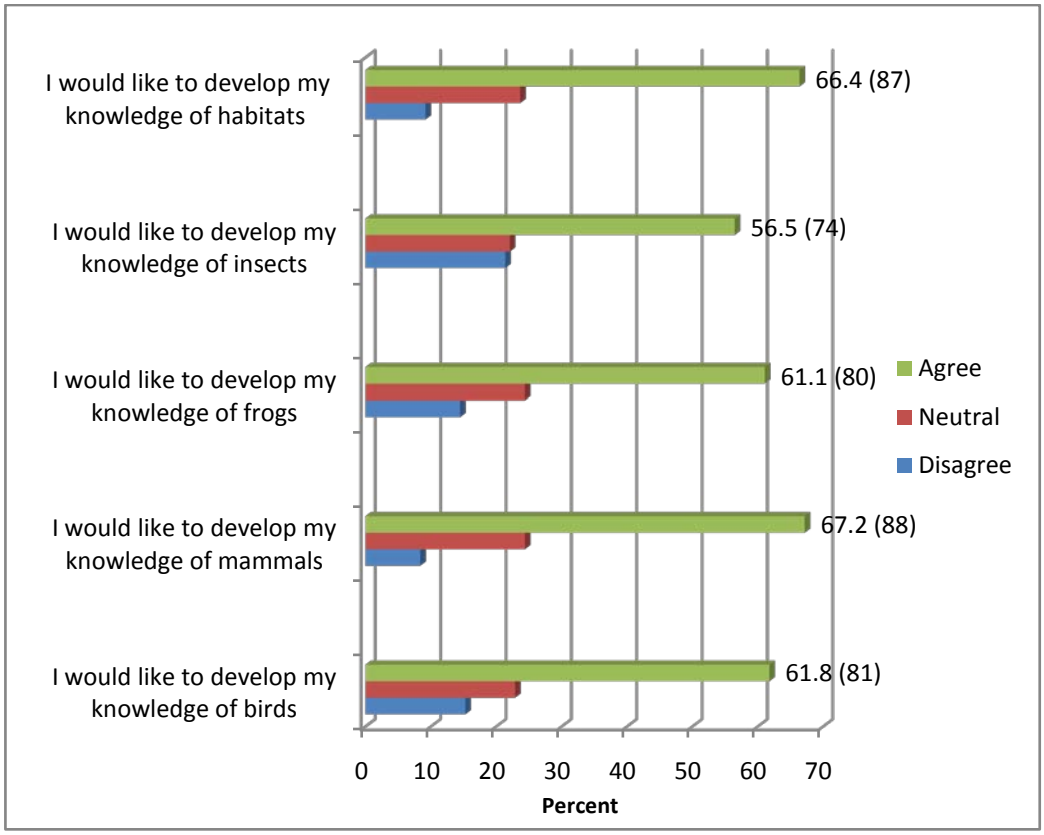

Figure 6.23: Levels of visitor interest in other life forms

In the section on interpretive print samples, respondents were shown four different types of interpretive print samples of local biodiversity at Shongweni Reserve and asked to rank these in terms of personal relevance or importance. These sample sign boards, fold out brochures and posters were designed and developed by the author in accordance with the methodologies described in Chapter 5.

The percentile scores reveal that in response to the plant interpretation label that 69.5% of visitors found the image moderately to highly relevant with 24.4% indicating some degree of personal relevance. Response to the biodiversity brochure showed that 74.1% of visitors found the brochure moderately to highly relevant with 23.7% indicating some degree of personal relevance.

The bird poster was the most popular with 74.1% of visitors finding the image moderately to highly relevant with 21.4% indicating some degree of personal relevance. The reptile signboard ranked second in popularity with 73.3% of visitors scoring the board as moderately to highly relevant with 24.4% indicating some degree of personal relevance.

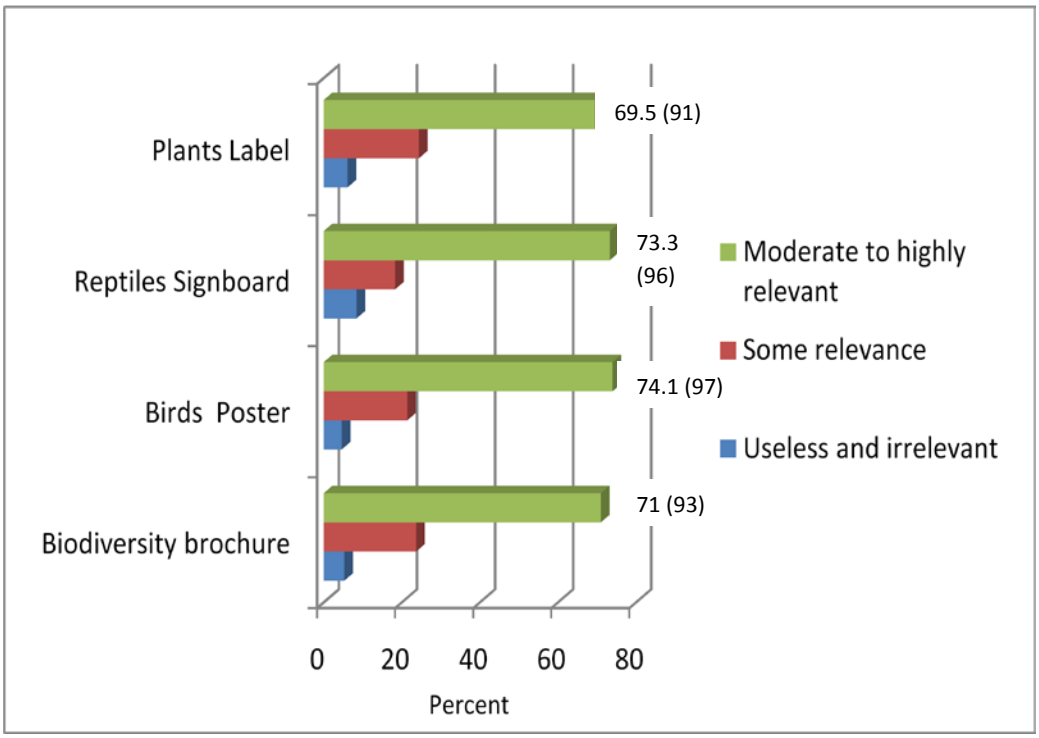

Figure 6.24: Visitor response to biodiversity print samples

The mean scores indicated an overall positive response with the average visitor rating closer to the value of 4 (moderately relevant). A rating of 3 indicates some personal relevance while a rating of 5 indicates highly relevant.

It would appear then from the data that there is broad based visitor support for the interpretive material presented.

Section D: Service delivery

This section deals with general levels of visitor satisfaction regarding the infrastructure at Shongweni Reserve.

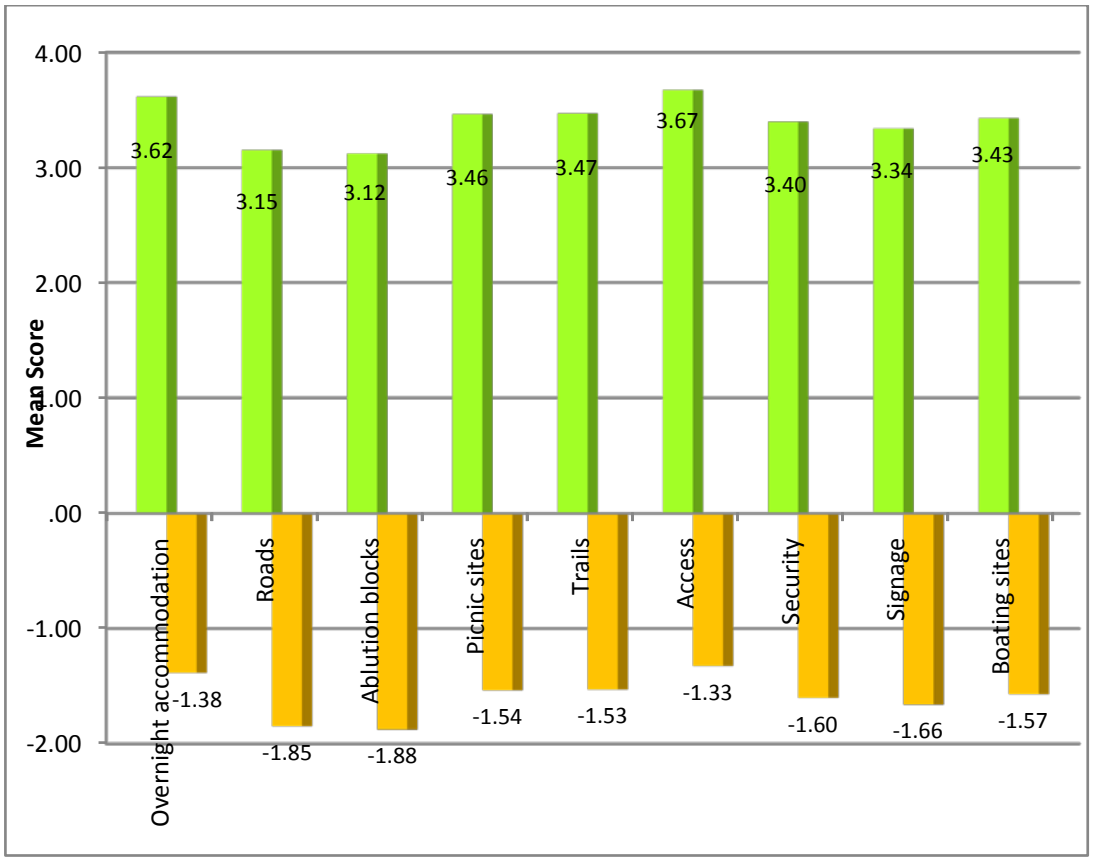

Figure 6.25: Visitor rating of infrastructure and facilities

The figure above indicates the mean rating with a gap score (derived from an ideal score of 5 being excellent). Most of the values lie in the region of average to good. Values closer to a score of 4 (indicating good) imply that there were slightly more respondents who scored in that direction.

Average scores closer to 3 imply that there were as many respondents who agreed with the statements as there were those who did not. Statements that have the largest gaps are the ones that cause concern. Identified gaps include roads, ablution blocks and signage that require attention. A quarter of visitors (25.2%) stated that roads were poor and unacceptable and nearly 23% expressed dissatisfaction with ablution blocks. Signage was rated as poor and unacceptable with 19% of respondents.

In general, reasonable levels of visitor satisfaction are reported for the reserve; however, a much larger sample size is required to ensure a more accurate reflection.

Service and price rating showed the following responses:

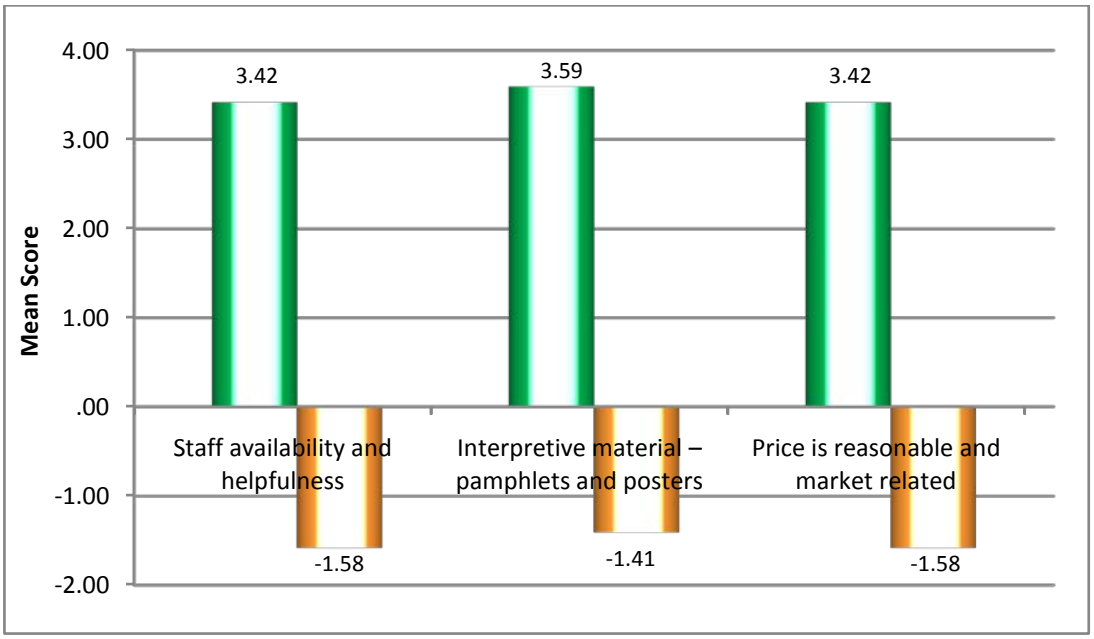

Figure 6.26: Visitor satisfaction regarding service, interpretation and price

Scores in these categories also lie between average and good. The largest gaps are for the first and third items indicating room for improvement. Visitors did complain verbally about the high gate fee. This particular visitor sample does not appear to be too demanding in terms of signage and interpretation material – only 14% noted that these items were unacceptable or poor.

6.6.3 Hypothesis testing, P-values and statistical significance

Statements of statistical significance were derived from a p-value generated from the test statistics**.** A significant result is indicated where "$p < 0.05$". These values are indicated with a single or double asterisk. Measures of association were determined for certain variables.

The Chi square test was performed to determine whether there was a statistically significant relationship between the variables (rows vs columns). The null hypothesis states that there is no association between the two. The alternate hypothesis indicates that there is an association. The results are presented in Appendix 3 (Chi Square – Crosstabs). A strong association was observed between frequency of visit, time spent at the reserve, age, levels of education and visitor point of origin when it came to hiking the Ntini Trail. It may be argued that these factors play some role in decisions to hike self guided trails when visiting nature reserves.

There is a significant relationship between the area in which respondents live and wanting to learn about indigenous plants (p = 0.004). This means that people living in certain types of areas have a greater bias toward learning about plants. Since nearly 60% of the visitors surveyed live in reasonably affluent suburbs it may be reasonable to surmise that they already have the context and the opportunity to have had more exposure through a good education to the Biological Sciences. However, the relationship between gender and wanting to learn about plants is not significant (p = 0.212). The implications are that gender does not play a part when making a decision about wanting to learn about plants.

An observable pattern is that level of education, income and race play a significant role in many of the key relationships, a confirmation of the findings in the literature.

6.6.4 Conclusion and discussion

A wide ranging body of international and local literature was consulted for this work analysing the nature and significance of ecotourism, biodiversity and interpretation and relating these to the study area. It is now necessary to integrate these findings with the results arising from the visitor survey.

6.6.4.1 Critique of survey: strengths and weaknesses

Unique interpretive products communicate and celebrate local biodiversity

The visitor survey has proved statistically to be a valid survey instrument and achieved its stated objectives. This survey was unique to standard questionnaires in that it presented four products of interpretive print samples created by the author as a direct result of this research. These print samples showcased selected biodiversity themes evolved in the methodology. By showing visitors actual samples of proposed interpretation they were able to respond honestly and meaningfully to the visuals and text presented to them. The theoretical interpretive constructs and philosophies as described in the literature review were thus put into practise and evaluated by a sample audience. The evolution and development of these products therefore form an important component of this work.

The print samples produced make explicit the natural resources of the reserve that are not included in the standard ‘Big Five’ or mega fauna to which visitors are attracted. Lesser known mammals, such as Wahlberg’s epauletted fruit bat, that are represented in the biodiversity brochure also have value and appeal. Care was taken to include the various categories of life forms at SR and portray a small selection of these in a non-threatening manner that could be understood by a wider audience.

One respondent remarked that while she enjoyed her hike on the Ntini trail it was a pity she did not spot more animal life mentioned on the biodiversity brochure. On reflection this is quite understandable given the shy and mobile nature of many birds, invertebrates, reptiles and mammals. Finally these print samples can be used practically in the reserve once funding has been secured.

Evaluating the efficacy of interpretive material presented

It would be naive to assume that each respondent has been turned into an ardent conservationist as a result of being exposed to the interpretation samples. A process, however, has been initiated and a new window has been opened to visitors revealing a larger and more detailed view of nature. Visitors have been equipped with another lens that would encourage them to look with fresh eyes at old and familiar landscapes in order to discover novel and exciting treasures from local habitats. In evaluating the efficacy or lack thereof of a particular interpretive practise much of the literature fastens onto simplistic premises of communication theory (Ham, 2007; Ajzen and Fishbein, 2005) and even the use of checklists in signage design (CDI, 2008b).

The researcher, however, believes that the multi-layered issues of individual experience, complexity and cultural tradition as described by Ablett and Dyer (2009) play a significant role in determining visitor response to interpretation. The demographical evidence presented in the statistical component reflects the local South African visitor context at SR, a diverse melting pot of ages, race, and cultures. In order to thoroughly interrogate some of the issues raised in the literature (Davison, 2008; Fischer and Young, 2007; Castree, 2005) regarding detailed visitor attitudes and perceptions toward local biodiversity further research would prove valuable. Nevertheless in presenting the visitors with some interpretive material on local biodiversity the author has been able to awaken curiosity and open minds. Antole France describes it well “...Put there just a spark and if there is some good stuff there it will catch fire...” (Roff, 2007: 26).

Survey fatigue and design issues

On critical reflection, one of the shortcomings of this survey was its length and complexity. Section C, relating to visitor interest in biodiversity and interpretation, needed careful thought, requiring the reader to read and examine the four print samples as part of the survey. Survey fatigue is a well known phenomenon and needs to be considered especially when visitors have come to a reserve seeking a certain level of tranquillity and relaxation (Crilley and Price, 2005; Kaplan and Kaplan, 1989).

Related to this aspect it may be argued that some of the print samples contained too much textual information. One respondent remarked that she enjoyed the plant label (Q 20.1) the most, due its simplicity of design. In retrospect the bird poster (Q 20.3) may be considered too text heavy without enough 'blank' space.

The biodiversity brochure (Q 20.2), while visually attractive, may also fall into the same trap. The reptile signage (Q 20.4) may be considered to have an even balance of text, images and open space. As mentioned in the literature review, one of the key challenges to interpretation is selecting how much (or little) data or information to include and then to stimulate and interest the viewer through appropriate visuals and design (CDI, 2008b). It is important to note that the selection of images and the formulation of copy into a unified design is essentially an individual act of creation. It may be informed and influenced by current thinking and experience (Ablett and Dyer, 2009; Tilden, 1977) but the end product is unique to this research. As Tilden (1977) and Roff (2007) describe it, interpretation is essentially a process driven by love and a sense of care.

Limitations of sample size and timing

Surveys, by their very nature, are not all encompassing and conclusive. This survey was aimed at capturing a reasonable spread of *gate visitors* in terms of demographics and interests. It did not focus on a specific user group such as canoeists, bird lovers, climbers or fisherman. Such surveys would no doubt reveal valid and useful sets of sub data for further research. The 'snapshot' concept of a smaller survey reaching a wider visitor audience is therefore applicable to this study. Seasonal timing also plays a role in that higher visitor volumes are experienced over weekends and in school and public holidays. Special functions at SR such as scheduled sporting events (canoe races, mountain biking and cross country) attract visitors whose expectations would differ from the average picnicker and day tripper.

6.6.4.2 Discussion and interpretation of survey results

Visitor profiles

The majority of visitors to SR visitors it would seem are still live in the nearby affluent suburbs. Most of the respondents were domestic tourists from the Durban area with only 10% coming from further afield. An even racial mix was also observed with more young people entering the reserve, many of them attracted to the active sports of canoeing and hiking. No foreign tourists appeared in this particular survey (See comments on World Cup, Section 2.4.3). The need for more specific marketing of SR to the foreign market through

web based media becomes increasingly apparent. The need for further research engaging young people from the under-privileged sector in terms of their understanding and relationship with local biodiversity would be seen as the next step forward in developing more effective visitor interpretation for all South Africans. This is particularly key in the light of the fact that SR has been the subject of a successful land claim to be handed over to members of the local community by Umgeni Water, the land owner (Nagaran, Mkhize pers. comm.). It remains to be seen whether the community wishes to retain the services of Msinsi Management as a conservation and ecotourist service provider.

Purpose of visit

Most visitors were regular arrivals at SR needing no introduction selecting activities they were most familiar with. Walking, water sports (canoeing), braai/picnicking and fishing were still the most popular. In this survey a slightly higher preference was given to learning about plants. Surprisingly less than 10% of respondents indicated they had come to watch birds. The Natal Bird Club is active at SR but its members did not partake of this particular survey. The use of focus groups, interviews and surveys of specialist user groups as discussed in Section 2.3.3 would yield some interesting data but was beyond the scope of this work.

Fewer respondents indicated that they were staying overnight probably due to the limited capacity of the hutted tents. Young people active with Spirit of Adventure programs were not surveyed – this could form a separate research focus as their core activities are largely team building, abseiling, raft building and the like and do not contain any environmental component. Potential exists to tap into this age group (13-17 years) to awaken an interest in nature, given the 'Nature Deficit Disorder' described by Louve (2005).

Level of interest in indigenous plants

Nearly 82% of respondents indicated a desire to learn about indigenous plants. This shows an encouraging increase from a previous survey at SR conducted by the author in 1999 where 59% of visitors expressed an interest. This rise in interest may be due in part to the increased attention indigenous plants have received in the last ten years particularly with the annual Botanical Society (BOTSOC) Plant Faire and the increasing range of publications relating to indigenous gardening. Another contributing factor may be current municipal legislation - virtually all new landscape developments are required to submit an environmental management plan to the Durban Council demonstrating at least 70% indigenous plant content (Boon, 2007). Given that most visitors arrive from affluent suburbs they would likely have been exposed to the topic.

In considering learning options for indigenous plants first preference (35.1%) was given to trails led by an expert guide, followed by self guided trails with signage (28.2%) and thirdly the use of pamphlets (26.7%). These results point to the important role of interactive interpretation where the guide stimulates and directs observation (Roff, 2007; Pond, 1993; Tilden, 1977). The application of these principles has been explored fully in Section 4.2.

A practical action step for Msinsi would be to further train the existing guides who conduct game drives on plant identification and their cultural uses and thus add value to the Reserve. This is also an opportunity for local tour guides to develop new tourist products and itineraries. At the moment there are no formal guided walking trails at SR, only the two hour game drives which allow visitors access to the larger game such as rhino and giraffe.

These survey results also demonstrate the usefulness of appropriate signage along a self guided trail to visitors. An action step referred to in the next chapter is the installation of tree labels and larger plant interpretation labels along the Ntini trail. The trail could be upgraded considering the principals of trail design already mentioned in the literature (Enting, 2005; Price and Stoneham, 2001; Trapp et al., 1994).

Credibility for the establishment of a demonstration garden at SR is also given in these survey results where 22% of respondents indicated its effectiveness as a learning tool. The use and efficacy of demonstration gardens has already been examined using the SANBI National Gardens as examples. Demonstration gardens are internationally accepted as useful vehicles for advancing visitor interest in local flora, particularly where this intersects with ethno botanical plant use by indigenous people groups. Numerous examples cited from Australia (RBG Melbourne, 2008; Saffigna et al., 2005), Madagascar (Antsokay Arboretum, 2010) and Nairobi (Atiti, 2008) advocate this method of interpretation to attract visitors and to act as a community outreach tool for local indigenous people groups. Specific action steps and recommendations for SR in this regard follow in Chapter 7.

Interest in other life forms

Visitor interest in mammals ranked first followed by birds, frogs and insects. This corroborates the literature where the mammals appear to have greater appeal. Only 8% of this particular sample group indicated they did not want to learn about mammals as opposed to 21% of respondents who did not want to learn about insects. Insects it appears need to be given greater exposure in interpretation particularly since they are the dominant life form on planet earth (Huntly et al., 2005).

Response to print samples

The print samples were developed as a unique product of this research by the author and received a gratifying response from over 90% of the visitors in this survey. Only a small percentage (between 4.6-8.4%) indicated the material was personally irrelevant. Most visitors surveyed were strongly supportive of conservation at SR. This survey then achieved its purpose and serves as a useful indicator of visitors feelings toward print interpretation.

6.6.4.3 Conclusions

The evidence presented in this chapter shows that over 60% of visitor respondents have a reasonable to strong desire to learn more about the floral and faunal biodiversity of Shongweni Reserve. Furthermore between 91-95% of visitors also demonstrated a positive response to the interpretive print samples indicating reasonable to high levels of personal relevance. This confirms the author's chief hypothesis that interpretation can enhance the ecotourist experience at a local level at Shongweni Reserve. These results are also congruent with findings in the literature (Ballantyne, Packer and Hughes, 2008; Roff, 2007; Ham, 2007; Huntly et al., 2005).

While this survey has been a useful indicator of visitors' responses to interpretation at Shongweni Reserve it is, however, necessary to relate this work to the larger context of interpretation and biodiversity conservation synthesising best interpretive practise from both developed and developing countries surveyed in Sections 4.4 and Sections 4.5 respectively.

Developed countries (North America, UK and the Continent and Australia), recognising the value of interpretation as a communication tool for biodiversity conservation, have been able to package and sell their natural resources to ecotourists using graphically slick signage and print media. Protected areas have often been successfully linked with botanical gardens drawing in higher visitor volumes offering the ecotourist an enriched experience. In certain contexts such as the large North American Parks the interpretive approach appears to have become formulaic and predictable while botanical gardens such as Longwood, Missouri and Fairchild have used interpretation as an effective outreach tool to all ages. In the UK, creativity and innovation has been one of the hallmarks of Kew Gardens and the Eden Project where plant interpretation is presented in a fun contemporary manner using a range of modern media. Australia too, with its highly organised ecotourism products and destinations has demonstrated how to integrate the richness of Aboriginal storytelling and cultural contexts into interpretation.

The developing third world continents surveyed in this work (Africa and Madagascar, South Africa, South and Central America and Asia) has documented both successes and challenges that are instructive. All these regions are exceptionally rich in biodiversity which is increasingly under threat from human and economic pressures. Protected areas within developing countries are often surrounded by poor rural communities yet these protected regions have become the preferred ecotourist destinations for affluent visitors from the developed world, an activity that promises both conservation and economic benefits for the local populace. Africa, often racked with poverty and political turmoil, has made encouraging progress using environmental based interpretation to add value to school outreaches in Nairobi cooperating with local zoos and museums, while in eastern Madagascar conservation outreaches at Ranomafana National Park and Ivoloina Park have developed hands on interpretive techniques to inform communities of all ages of the need to conserve and enjoy local biodiversity. Africa has a rich cultural tradition of plant use for food and medicine gathered from the bush and this indigenous knowledge has immense interpretive potential for ecotourist product. South Africa, with its flagship National Parks and nine National Gardens, has led the way with the development of themed interpretation gardens incorporating traditional African cultures and various aspects of plant use. Interpretation protocols have been developed by SANBI concerning content, layout and language requirements of print signage and media. In some respects this institutionalised approach is quite similar to that of North America but does serve to inform local interpretive efforts such as the work carried out at SR.

In South and Central America centres of interpretive excellence have developed through multiple partnerships between botanical gardens, protected areas, zoos and natural museums. The modern Belo Horizonte Reserve and education centre and the Las Cruces Biological station in Costa Rica are both examples that have attracted high end funding, showcase local flora and fauna in adjacent protected areas for ecotourist visitors and act as multi-purpose hubs of research excellence into local biodiversity conservation. In many respects a similar centre could be developed in part at SR. Finally, India offers examples of combining biologically rich parks with botanical outreach to local villages empowering the community with regard to environmental protection, local plant use and health and nutrition using various interpretive methods. Again parallels emerge which could be replicated through partnerships at SR. Cognisant of the above international and local background this particular research has been able to add value to local biodiversity conservation efforts and can serve to enhance the visitor experience at SR. In the following final chapter recommendations are proposed to carry these findings forward in a practical and concrete manner.

CHAPTER SEVEN RECOMMENDATIONS

These recommendations are developed as a natural progression and logical extension of the previous chapter.

7.1 Manufacture interpretive signage and print brochures for use in the Reserve

Samples of thematic interpretation have already been produced by the author and a positive visitor response to these items indicates that these would further enhance the ecotourist experience at Shongweni Reserve. The four print samples produced as an outcome of this research are by no means exhaustive as a range of other suitable topic and themes for the reserve have also been developed in Table 6.2. Further interpretive signage and poster material can be designed using these concepts and the natural resource and cultural data presented in Chapter 4. Msinsi management are in favour of securing funding and sourcing suitable design and signage contractors to expedite the work (Nagaran pers. comm.). This will ensure that the products of this dissertation will be used to practically benefit the ecotourist experience at SR.

7.2 Design and build interpretive facilities to enhance the ecotourist experience

Research carried out in this work indicates that most visitors have a desire to be exposed to further aspects of nature when they visit the reserve. At present interpretive facilities require upgrading and expansion and the following capital improvements are suggested.

7.2.1 An interactive demonstration garden showcasing traditional Zulu medicinal plants

Authors such as Mander (1998) and Roff (2007) have described the extensive uses of indigenous plants within Zulu culture, yet at present it appears that these resources are not serving as the powerful tourist attractions that they could be if they were presented in an accessible and popular format. The word “Zulu” appears in over 70% of literature presented

to tourists and would be an ideal starting point to introduce foreign tourists to our indigenous plant resources (O Brian pers. comm.). The “dark green” ecotourist seeks out intellectual stimulation and value can be added to extant floral resources through the attraction of botanical history, rare or endangered status and the utilisation of plants by various ethnic groups.

Reference has already been made in Section 4.5 of best practise in development of ethnobotanical demonstration gardens by SANBI namely Kirstenbosch Useful Plants Gardens, Pretoria (Ndebele culture), Worcester (San culture) and Harrismith (Sotho /Afrikaans culture). A Zulu garden including a traditional beehive hut was developed at the Pietermaritzburg NBG and enjoyed a measure of success (Crouch and Hutchings, 1998). The garden was a collaborative effort between the NBG, the Natal Herbarium (NH) and the Institute for Natural Resources (INR). The gardens have been well received by members of the Zulu community especially herbalists wishing to increase their botanical knowledge (Nonjinge pers. comm.). Many of them were unaware of what the entire plants looked like as only the plant parts such as roots or bark are hawked on the street (Nonjinge pers. comm.). The author noted that while excellent interpretive posters are available in the hut that no other interpretive material is available for visitors to buy or take home.

In summation, there are sufficient national examples of indigenous demonstration gardens to prove their efficacy as a destination draw card for the visitor adding authenticity and variety to the ecotourist experience. An action step to take this forward would be for Msinsi Holdings to liaise with this researcher in developing a funding proposal to present to a suitable sponsor.

7.2.2 Community nursery and sales area for plants and trees found in the Reserve

A natural linkage is the development of an adjacent community nursery to replenish the plants for the garden, sell surplus stock to visitors and to provide trees for greening the adjacent schools and communities of Damini and Salem. The nursery could also act as a training centre for hands on environmental education for the National Curriculum Statement (NCS). Furthermore the development of such a facility is directly in line with poverty alleviation, skills transfer and Black Economic Empowerment (BEE) policies of the Department of Environment and Tourism (DEAT) and Department of Education (DoE).

The nursery could be sited close to the visitors centre as there is ample flat land and access to water. Establishment of a low cost facility would utilise strategies such as local seed collection, sustainable supervised harvesting of existing plant stock at the Reserve and the

use of local soils for media. External costs would relate to the purchase of gum poles, shade cloth and plastics and nursery consumables such as hose pipes and irrigation fittings. Possible sources of government funding are the Lotto, Youth Fund and Sector Training Authorities (SETAs). Technical advice is readily available from private consultants as well as the eThekwini Parks Leisure and Cemeteries (EPLC) whose Silverglen nursery is currently used as a base for the horticultural training of Zulu herbalists and traditional medicine practitioners (Crouch, pers. comm.).

Through the purchase of plant stock visitors would have the satisfaction of having contributed directly to the upliftment of disadvantaged communities. Secondly they would have fulfilled ecotourisms key principles - that of responsible travel and the empowerment of local communities. Suitable institutions such as the EPLC and the Durban University of Technology (Horticulture Department) could be involved in donating plants and expertise to the project.

7.2.3 An indoor natural science display with artifacts and print exhibits showcasing the variety of natural floral and faunal resources

The body of evidence examined in Chapter 4 (Interpretation) has demonstrated the efficacy of hands on learning experiences where visitors can examine, look, touch, feel and smell natural exhibits while establishing personal connections between local plant and animal life forms. The purpose of this natural science exhibit is not to replicate the contents of Durban Natural Science Museum but to draw attention to the diversity and uses of local plant and animal life at the reserve. Wherever possible non-perishable products and parts should be used in live displays and augmented by labels, posters and story boards. Table 4.1 refers to the full range of interpretive media that could be utilised.

Suggested plant displays emphasizing local flora could incorporate the following elements:

- Exhibits of seed displays showing diversity of size, shape, colour and texture;
- Displays of wood samples of finished timber and bark from indigenous trees;
- Products made from plant parts such as reed mats, baskets and children's toys;
- Depiction of Traditional Building techniques using wattle and daub construction;
- Traditional wood carving and curio production using alien plant invaders;
- Traditional food sources derived from grasses, vines, fruit, tubers and herbaceous (leafy) plants;

- Traditional medicinal products as used in Zulu medicine derived from bulbs, roots and tree bark; and
- Pharmaceutical products used in Western medicine derived from plants such Aloe and Combretum species.

Figure 7.1 illustrates some potential floral displays and Figure 7.2 depicts some possible faunal exhibits.

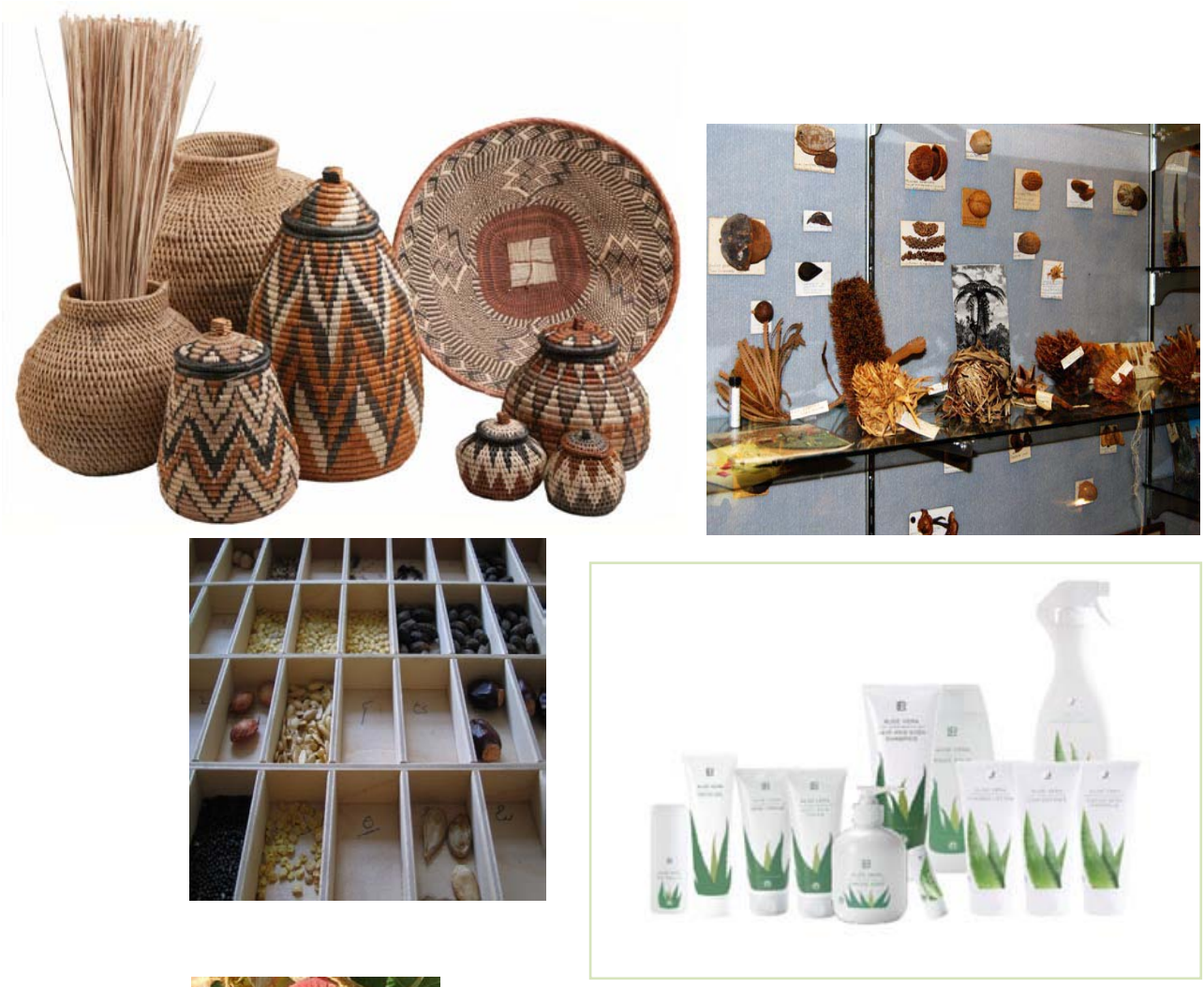

Figure 7.1: A selection of possible floral exhibits for the interpretive centre

(African basket weaving, Seed collections and indigenous plant products made from Aloe sp.)

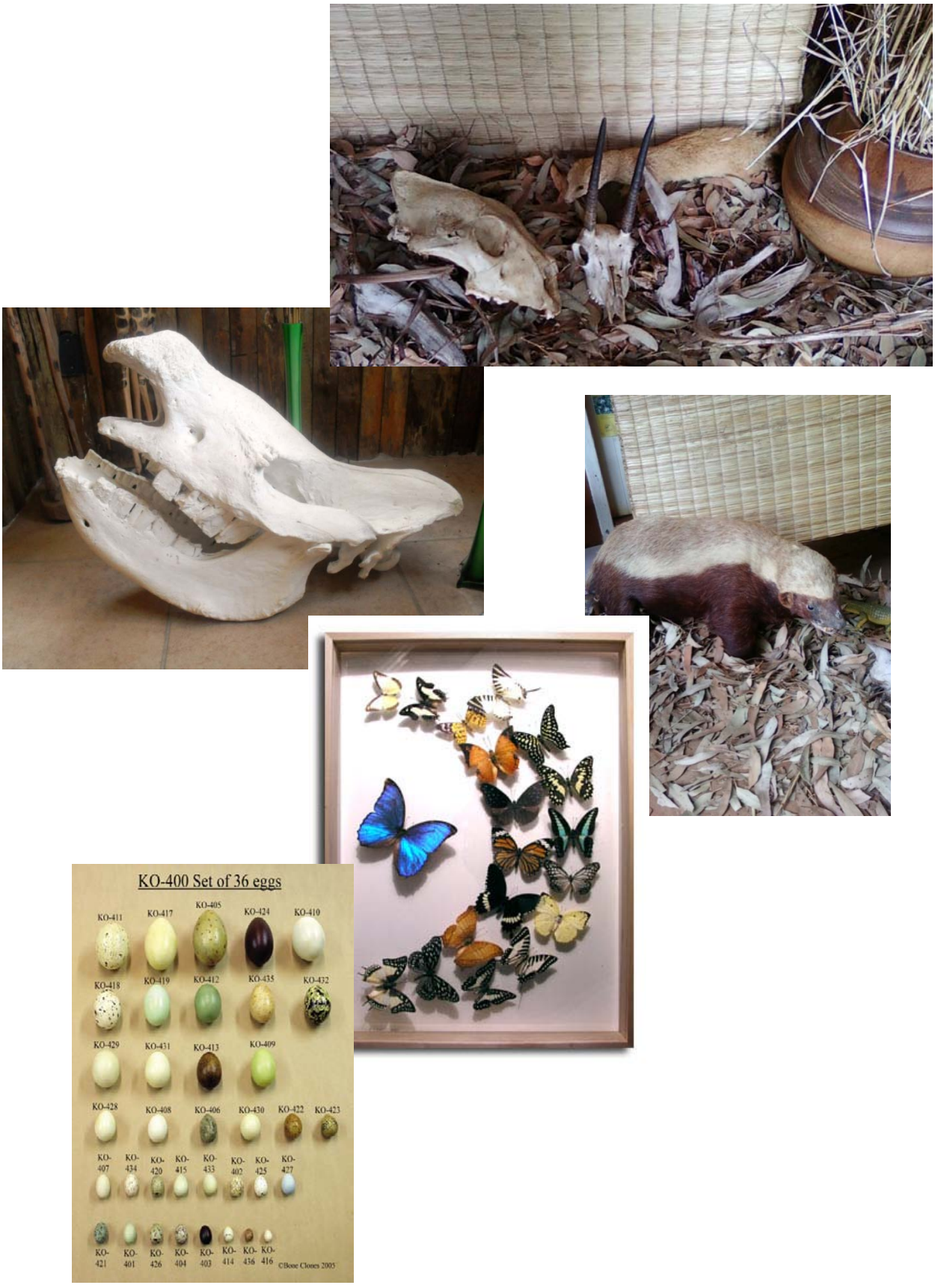

Figure 7.2: A selection of possible faunal exhibits for the interpretive centre

(Animal skulls; rhino and duiker; stuffed honey badger; mounted butterfly and egg collections)

Suggested animal displays emphasizing local fauna could incorporate the following elements:

- Horns, skeletons, bones and teeth of vertebrates including mammals;
- Shells, skins and fur displays including reptiles;
- Spoor and footprint displays;
- Insect collections including beetles, moths, butterflies and dragonflies;
- Stuffed bats and smaller mammals such as mongoose etc.;
- Bird egg and nest collections.

An ideal venue for these activities already exists on site at the dam wall and Iwa campsites (Section 6.3.3.3). The refurbishment of the Durban Waterworks buildings could provide an indoor all weather lecture facility and interpretive display centre not only for visitors but also as an environmental centre for community outreach where active learning about local biodiversity at SR could take place. The benefits of such centres in developing countries have already been emphasised in numerous examples in the survey of best interpretive practice in Section 4.5.

Figure 7.3 depicts the Waterworks buildings that could be refurbished and outfitted as an environmental and interpretive centre. Msinsi management appears to be in favor of these capital improvements and have requested the researcher to present a formal proposal in this regard.

Figure 7.3: Existing Waterworks buildings at Iwa campsite that could be refurbished and outfitted as an environmental and interpretive centre

7.2.4 A covered outdoors lecture area for conservation chats and talks by the ranger and staff prior to embarking on game drives or guided trails

Guided trails form an integral part of the ecotourist experience as mentioned in Chapter Four. An all weather venue adjacent to the visitors centre is seen as essential to these activities. This rustic space could utilize low cost gum pole, thatching lathes and fibreglass material for roof covering similar to that of Ushaka Marine world theme park in Durban and need not be expensive. Characteristic eco lodge finishes could be used similar to those of 'Under the Marula tree' conference centre located on the Shongweni Shuffle T6 tourist route.

7.3 Research and teaching outreach

Numerous opportunities exist to take the products of this dissertation forward. As mentioned in the discussion in Chapter 4 further research regarding specialist user groups at SR would be fruitful as would interrogation of the needs of Spirit of Adventure team building users where an environmental component for young people could be added. A third research focus that requires attention is the current perceptions of members of the local community toward the reserve in general and biodiversity in particular. Biodiversity Interpretation must be able to serve the needs of all South Africans and the author is of the opinion that the aspirations and needs of the local community need to be carefully examined.

This research could be undertaken as postgraduate studies by students of the Durban University of Technology (Department of Horticulture, Biotechnology and Tourism and Hospitality) and the University of KwaZulu-Natal (School of Biological and Conservation Sciences). Shongweni needs to be acknowledged as a local centre of biodiversity within the city and needs to have a higher profile amongst members of the scientific community. This can be achieved through widening the circle of influence to include the Durban Natural Science Museum, the eThekweni Parks Leisure and Cemeteries, Botanic Gardens Conservation International and the universities previously mentioned. This expertise needs to be combined with sufficient external funding from South African and foreign sources to realise the vision outlined in this work. International examples such as Belo Horizonte and Las Cruces have already demonstrated how partnerships can generate funding and produce centres of research excellence that conserve biodiversity, attract ecotourists and provide outreach to the local community.

The Reserve can in future serve as base for outreach to the disadvantaged primary and secondary schools in the area where learners can enter the reserve, visit the interpretive centre, walk the trails, see the animals and develop for themselves a direct contact, connection and love for nature. This is essential to sustain the original concept behind the establishment of the reserve. The establishment of a suitable working group with Msinsi management would be a vital action step in making this a reality.

7.4 Conclusion

The body of evidence presented in this work has demonstrated the significance, richness and value of biodiversity both at a global and local level at SR. The work has also charted the rise of the ecotourist visitor, a more environmentally sensitive traveller who is constantly seeking out new stimulus and experiences in natural areas. The need to bring conservation issues to the fore in the minds of the local visitors is an important part of the visitor experience at SR.

The biodiversity interpretation samples developed by the author as a direct product of this research has proved to be an ideal vehicle or mode of communication to stimulate, provoke and interest the members of public that visit the reserve. The interpretive potential for SR to develop as a multi-purpose hub for biodiversity conservation, ecotourism and community outreach is immense.

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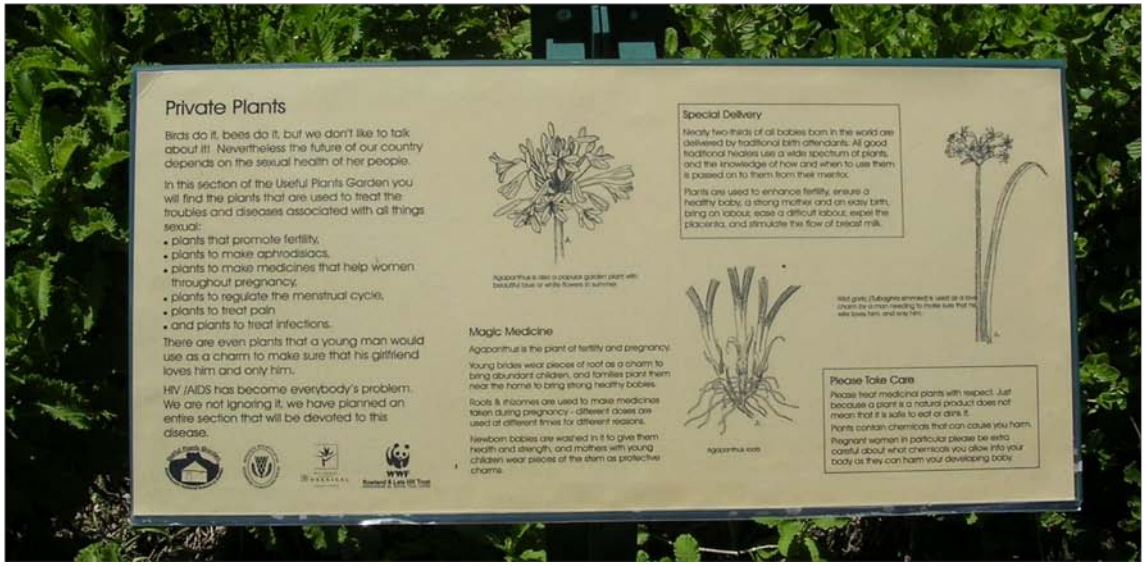
Appendix One: Best Interpretive Practice: Plates and samples

Top : All weather bronze relief model of Table Mountain from SANParks , Bottom left : Trail map from Kranzkloof reserve Ezimvhelo Wildlife KZN
Bottom Right : Botanical site interpretation Table Mountain from SANParks

Plate 1 Interpretive signage examples from SAN Parks and Ezimvelo Wildlife KZN (Photo credits: J Foley)



Top Left: Useful plants theme garden with traditional Xhosa hut , Bottom : Story board with line drawings , Top Right : Plant interpri – label

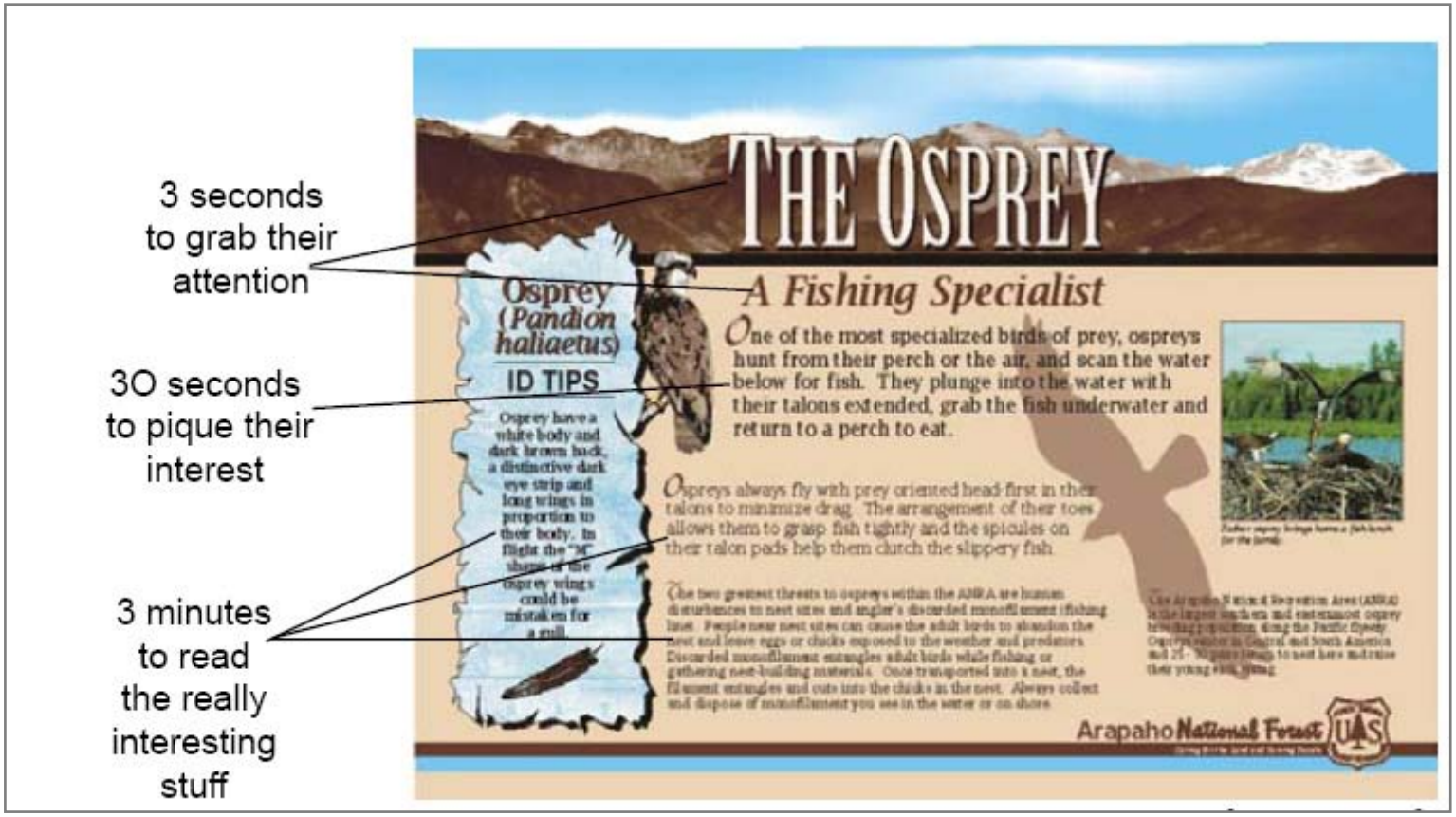
Plate 2: Interpretation signage from Useful Plants Garden Project Kirstenbosch (Photo credits: J Foley 2008)

Plate 3: Interpretation sign and print samples from SANBI Kirstenbosch Conservatory (Photo credits: J Foley 2008)

Appendix Two: Helpful Hints for Interpretive Media Design

Table 6.7: Elements of interpretive print media (Adapted from ANF 2002:151-152, CDI 2008b)

ELEMENT	REMARKS
Accessibility	Legal compliance is required for the disabled
Captions	Captions for graphics can be used to meet learning objectives and capture the theme; some visitors look only at graphics so the graphic and its caption should be a learning opportunity on its own
Color and Contrast	Use contrasting colours for text and background for ease of reading. Avoid busy backgrounds and photographs behind the text
Corporate Image	All interpretation becomes an opportunity for corporate branding which displays graphic excellence and consistency of application
Layout/Design	In general, signs should contain 1/3 graphics, 1/3 text, and 1/3 blank space.
Margins	Margins on text should be flush on the left side and ragged on the right.
Mounting Height	A mounting height of 400 - 550 mm with a 30 to 45 degree angle toward the viewers will be accessible to most visitors.
Site Compatibility	Make sure the sign is compatible with the site and in terms of colour, size, frame, etc. It should enhance the site, not detract from it.
Simplicity	The main body of text should be no more than two paragraphs of three or four short sentences. Keep text to 150 words. Up to 300 words maximum if using captions and smaller fonts (18) for secondary text or captions).
Text	The text should be written with the "3-30-3" rule in mind. You have 3 seconds to hook the visitor, 30 seconds if they are hooked, and 3 minutes if they are very interested. A sign can be designed and written so that it contains three levels of text with each level conveying a feeling of the theme, thus providing all visitors with an interpretive opportunity. For example, a short title at the top of a sign might be the only text some visitors read, so it is important the learning objectives for the site be met to some degree even at the 3 second timeframe.
Titles	The titles of a sign or brochure should be a statement of a theme.
Typeface	Use simple serif typeface or sans serif, upper and lower case, with a minimum 18 point type size on signs. Titles: 72 – 60 point, Subtitles: 8 – 40 point, Body Text – 24 point, Captions: 18 point.



A design example illustrating the 3-30-3 rule (Source: ANF 2002:51)

Plate 4: Design and layout examples of interpretive signage

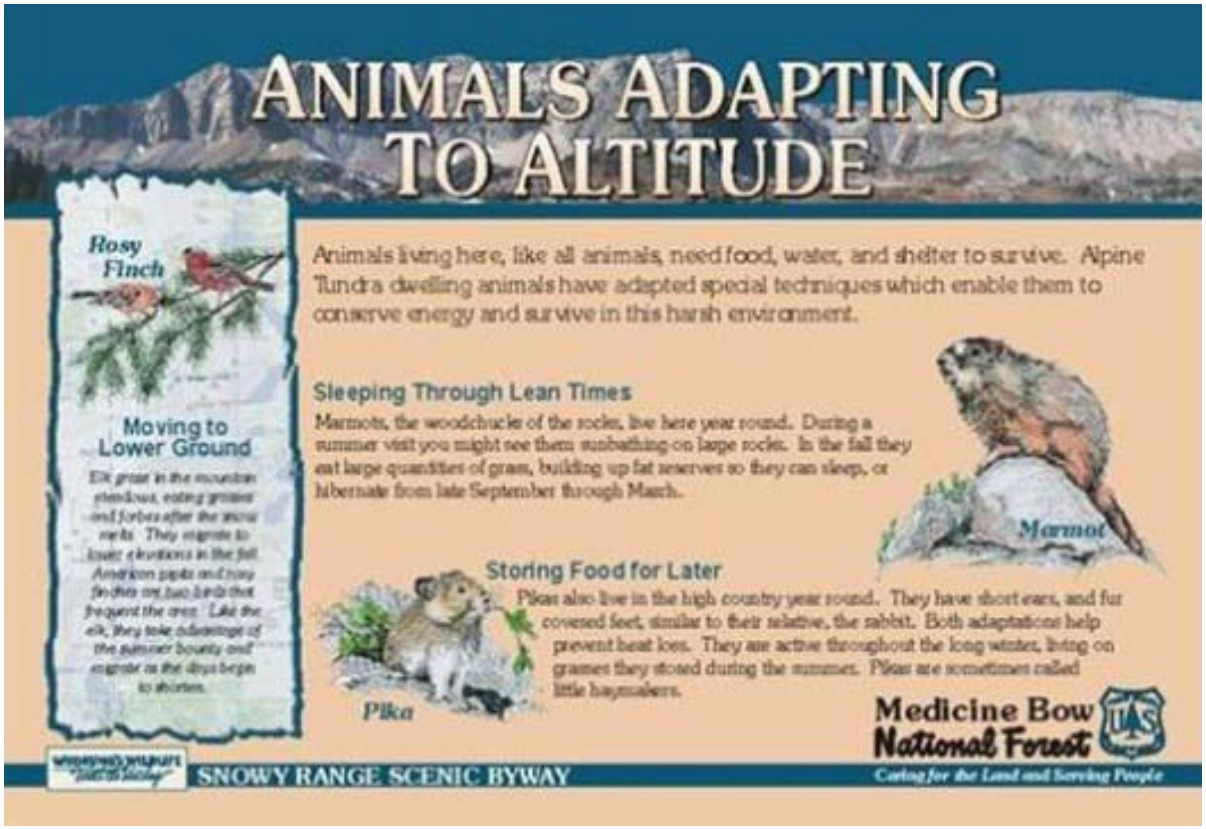


Image Source: CDI (2008b:29)

Plate 5 Print Examples of Interpretive themes

Appendix Three: Visitor Survey, allied statistics and summary of resources at SR

Survey no	Date

Msinsi
RESORTS & GAME RESERVES

Survey for Shongweni Dam and Reserve (SR)

Dear visitor, thank you for completing this questionnaire.

Information derived from this survey will be used to improve facilities and services at SR and to develop trail brochures, signage and displays at the reserve. The data will contribute toward the publication of a thesis entitled: " Enhancing the ecotourist experience at Shongweni Dam and Reserve through the use of appropriate interpretive strategies".

Yours faithfully
Jonathan Foley
Mtech student Durban University of Technology
Department of Tourism and Hospitality / Department of Horticulture

Instructions : Circle a single alphabetic option (either,a,b,c,d,e) and fill in the blanks as required. Reply to multiple options is indicated for some questions

Section A : Personal Particulars

1 In what type of area do you live?

City Centre	a	Suburbs	b	Town	c	Township	d	Rural Area	e	1	

2 Where do you live ?

	2	

3 What is your Nationality if not South African ?

	3	

4 What is your sex ?

Male	A	Female	b	4	

5 What is your age group?

18-25	a	26-35	b	36-45	c	46- 55	d	56+	e	5	

6

6. What is your highest level of education ?

Std 6	a	Std 8	b	Matric	c	Certificate	d	Diploma / Degree	e	6	

7 What is your combined family income level per month ?

<R5000	a	R5000-R10000	b	R10 000-R20 000	c	R20 000-R50 000	d	R50 000+	e	7	

8 To which racial group do you belong ?

White	a	Black	b	Asian	c	Coloured	d	Other	e		8	

Section B: Purpose of your visit

9 How often do you visit this reserve ?

Once a week	a	Ocne a month	b	Once every 6 months	c	Once a year	d	9	

10 What is the estimated duration of your visit today ?

< 2 hours	a	2-4 Hours	b	4-8 hours	c	Overnight	d	10	

11 What is the purpose of your visit today?
You may reply to more than one option.

Animal / Game viewing	a	11a
Birding	b	11b
Braai /Picnic	c	11c
Hiking or walking	d	11d
Holiday stay at Mkangoma bush or Ugede camp	e	11e
Identification of plants	f	11f
Identification of other animal life eg. reptiles, bats, butterflies etc.	g	11g
Relaxing / Doing nothing at all	h	11h
Spirit of Adventure	i	11i
Water sports	j	11j
Fishing	K	11k

If another activity please specify _____

Section C Level of interest in plants, animals and ecology

Please circle the option you feel describes yourself the best.

12 I would like to develop my knowledge on indigenous plants of SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	12	

13 If your answer to 12 was d or e then which of the following options would you most prefer to develop your interest?

Pamphlets describing the plants	a	13
Self guided trail with various station points and signage	b	
Tour led by expert guide	c	
Joining a plant interest group	d	
Posters at a visitors centre	e	
A demonstration garden /exhibition area at the reserve	f	

14 I would like to develop my knowledge of birds of SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	14	

15 I would like to develop my knowledge of mammals (including bats) of SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	15	

16 I would like to develop my knowledge of frogs, snakes and reptiles of SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	16	

17 I would like to develop my knowledge of insects and spiders of SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	17	

18 I would like to develop my knowledge on the various habitats at SR

Strongly Disagree	a	Disagree	b	Neither agree nor disagree	c	Agree	d	Strongly agree	e	18	

19 I have been on the Ntini trail in the reserve

Yes	a	No	b	19	

20 Please inspect the attached images and rate them on the scale of importance to you below

20.1

Useless	a	irrelevant	b	Some relevance	c	Moderately relevant	d	Highly relevant	e	20.1	

20.2

Useless	a	irrelevant	b	Some relevance	c	Moderately relevant	d	Highly relevant	e	20.2	

20.3

Useless	a	irrelevant	b	Some relevance	c	Moderately relevant	d	Highly relevant	e	20.3	

20.4

Useless	a	irrelevant	b	Some relevance	c	Moderately relevant	d	Highly relevant	e	20.4	

Section D Services

Please rate the reserve on its services using the 5 point scale below
Tick the option that you feel best describes your visit to SR

Unacceptable	1	Poor	2	Average	3	Good	4	Excellent	5

21.1 Infrastructure

Item	1	2	3	4	5		
Overnight accommodation						21.1a	
Roads						21.1b	
Ablution blocks						21.1c	
Picnic sites						21.1d	
Trails						21.1e	
Access						21.1f	
Security						21.1g	
Signage						21.1h	
Boating sites						21.1i	

21.2 Service

Item	1	2	3	4	5		
Staff availability and helpfulness						21.2a	
Interpretive material – pamphlets and posters						21.2b	

21.3 Price

Item	1	2	3	4	5		
Reasonable and market related						21.3	

22 Can you offer any further constructive criticism of the reserve especially in terms of using signage for displays, trails and posters ?

Thank you for completing this survey successfully.
Please leave it with the Field ranger at the gate or hand it personally to the Research assistant in order to participate in the lucky draw for the Game drive !! Don't forget to retain your portion of the ticket stub as proof of entry. For email submissions jonathan@dut.ac.za. For any queries my cell is 0833204335

Table 6.8: Pearson Chi-Square Tests

		In what type of area do you live?	Gender	Age	Highest level of education	Combined family income per month	Race	How often do you visit this reserve?	What is the estimated duration of your visit today?
I would like to develop knowledge of indigenous plants	Chi-square	34.970	5.831	32.551	23.724	8.671	17.886	35.037	19.026
	df	16	4	16	16	16	12	12	12
	Sig.	.004[*,a,b]	.212[,a,b]	.008[*,a,b]	.096[,a,b]	.926[,a,b]	.119[,a,b]	.000[*,a,b]	.088[,a,b]
I would like to develop my knowledge of birds	Chi-square	24.607	.266	26.353	23.660	19.401	17.724	7.706	13.255
	df	16	4	16	16	16	12	12	12
	Sig.	.077[,a,b]	.992[,a]	.049[*,a,b]	.097[,a,b]	.248[,a,b]	.124[,a,b]	.808[,a,b]	.351[,a,b]
I would like to develop my knowledge of mammals	Chi-square	19.789	4.379	17.772	21.850	15.107	20.799	8.680	12.119
	df	16	4	16	16	16	12	12	12
	Sig.	.230[,a,b]	.357[,a]	.337[,a,b]	.148[,a,b]	.517[,a,b]	.053[,a,b]	.730[,a,b]	.436[,a,b]
I would like to develop my knowledge of frogs	Chi-square	26.209	.469	25.674	20.329	14.859	16.941	6.068	8.808
	df	16	4	16	16	16	12	12	12
	Sig.	.051[,a,b]	.976[,a]	.059[,a,b]	.206[,a,b]	.535[,a,b]	.152[,a,b]	.913[,a,b]	.719[,a,b]
I would like to develop my knowledge of insects	Chi-square	36.012	5.187	22.310	13.034	25.314	23.795	12.073	11.600
	df	16	4	16	16	16	12	12	12
	Sig.	.003[*,a,b]	.269[,a]	.133[,a,b]	.670[,a,b]	.064[,a,b]	.022[*,a,b]	.440[,a,b]	.478[,a,b]
I would like to develop my knowledge of knowledge of habitats	Chi-square	39.328	3.770	17.040	22.452	16.179	10.270	6.405	6.029
	df	16	4	16	16	16	12	12	12
	Sig.	.001[*,a,b]	.438[,a]	.383[,a,b]	.129[,a,b]	.441[,a,b]	.592[,a,b]	.894[,a,b]	.915[,a,b]
I have been on the Ntini trail in the reserve	Chi-square	27.516	.258	32.841	18.017	8.709	37.714	17.319	26.855
	df	4	1	4	4	4	3	3	3

	Sig.	.000[*,a]	.612	.000[*,a]	.001[*,a,b]	.069	.000[*,a,b]	.001[*]	.000[*,a]
Image Rating - Plant sign	Chi-square	14.726	1.649	17.102	31.096	27.325	10.037	18.125	17.492
	df	16	4	16	16	16	12	12	12
	Sig.	.545[,a,b]	.800[,a]	.379[,a,b]	.013[*,a,b]	.038[*,a,b]	.613[,a,b]	.112[,a,b]	.132[,a,b]
Image Rating - Biodiversity brochure	Chi-square	20.792	5.861	14.288	17.457	13.558	12.943	8.736	6.591
	df	16	4	16	16	16	12	12	12
	Sig.	.187[,a,b]	.210[,a,b]	.577[,a,b]	.357[,a,b]	.632[,a,b]	.373[,a,b]	.725[,a,b]	.883[,a,b]
Image Rating - Birds	Chi-square	15.892	4.513	15.919	27.323	24.239	15.816	9.127	26.906
	df	16	4	16	16	16	12	12	12
	Sig.	.461[,a,b]	.341[,a]	.459[,a,b]	.038[*,a,b]	.084[,a,b]	.200[,a,b]	.692[,a,b]	.008[*,a,b]
Image rating - Reptiles	Chi-square	19.293	2.672	19.952	26.979	18.569	25.519	10.377	17.950
	df	16	4	16	16	16	12	12	12
	Sig.	.254[,a,b]	.614[,a]	.222[,a,b]	.042[*,a,b]	.292[,a,b]	.013[*,a,b]	.583[,a,b]	.117[,a,b]
21.1a Overnight accommodation	Chi-square	52.266	4.548	14.578	14.904	9.681	26.669	11.562	16.588
	df	16	4	16	16	16	12	12	12
	Sig.	.000[*,a,b]	.337[,a]	.556[,a,b]	.532[,a,b]	.883[,a,b]	.009[*,a,b]	.481[,a,b]	.166[,a,b]
21.1b Roads	Chi-square	14.174	1.347	17.981	26.504	16.024	26.496	9.490	17.909
	df	16	4	16	16	16	12	12	12
	Sig.	.586[,a,b]	.853	.325[,a,b]	.047[*,a,b]	.451[,a]	.009[*,a,b]	.661[,a]	.118[,a,b]
21.1c Ablution blocks	Chi-square	19.803	5.122	25.253	27.005	17.874	19.058	9.437	23.528
	df	16	4	16	16	16	12	12	12
	Sig.	.229[,a,b]	.275[,a]	.065[,a,b]	.041[*,a,b]	.331[,a,b]	.087[,a,b]	.665[,a]	.024[*,a,b]
21.1d Picnic sites	Chi-square	33.987	8.470	24.623	24.474	14.612	30.131	13.056	17.914
	df	16	4	16	16	16	12	12	12
	Sig.	.005[*,a,b]	.076[,a]	.077[,a,b]	.080[,a,b]	.553[,a,b]	.003[*,a,b]	.365[,a,b]	.118[,a,b]
21.1e Trails	Chi-square	28.507	4.183	14.600	19.152	10.590	13.387	13.105	17.507

	df	16	4	16	16	16	12	12	12
	Sig.	.027[*,a,b]	.382[,a,b]	.554[,a,b]	.261[,a,b]	.834[,a,b]	.342[,a,b]	.361[,a,b]	.131[,a,b]
21.1f Access	Chi-square	25.380	2.347	13.985	24.224	18.795	17.003	12.514	13.466
	df	16	4	16	16	16	12	12	12
	Sig.	.063[,a,b]	.672[,a,b]	.600[,a,b]	.085[,a,b]	.279[,a,b]	.149[,a,b]	.405[,a,b]	.336[,a,b]
21.1g Security	Chi-square	39.072	2.025	18.922	20.213	13.290	17.645	16.820	20.427
	df	16	4	16	16	16	12	12	12
	Sig.	.001[*,a,b]	.731[,a]	.273[,a,b]	.211[,a,b]	.651[,a,b]	.127[,a,b]	.156[,a,b]	.059[,a,b]
21.1h Signage	Chi-square	35.299	7.152	19.606	40.045	16.258	23.295	10.098	19.971
	df	16	4	16	16	16	12	12	12
	Sig.	.004[*,a,b]	.128[,a]	.239[,a,b]	.001[*,a,b]	.435[,a,b]	.025[*,a,b]	.607[,a,b]	.068[,a,b]
21.1i Boating sites	Chi-square	25.561	7.674	17.509	32.525	21.052	9.459	16.689	22.673
	df	16	4	16	16	16	12	12	12
	Sig.	.061[,a,b]	.104[,a,b]	.353[,a,b]	.009[*,a,b]	.177[,a,b]	.663[,a,b]	.162[,a,b]	.031[*,a,b]
21.2a Staff availability and helpfulness	Chi-square	28.611	5.481	25.593	25.548	21.633	18.825	6.359	16.437
	df	16	4	16	16	16	12	12	12
	Sig.	.027[*,a,b]	.241[,a]	.060[,a,b]	.061[,a,b]	.155[,a,b]	.093[,a,b]	.897[,a]	.172[,a,b]
I21.2b Interpretive material – pamphlets and posters	Chi-square	21.495	4.237	20.026	20.494	27.170	15.425	15.425	9.338
	df	16	4	16	16	16	12	12	12
	Sig.	.160[,a,b]	.375[,a,b]	.219[,a,b]	.199[,a,b]	.040[*,a,b]	.219[,a,b]	.219[,a,b]	.674[,a,b]
21.3 Price is reasonable and market related	Chi-square	17.754	7.822	26.122	14.684	17.127	24.072	7.180	12.786
	df	16	4	16	16	16	12	12	12
	Sig.	.338[,a,b]	.098[,a]	.052[,a,b]	.548[,a,b]	.377[,a,b]	.020[*,a,b]	.845[,a,b]	.385[,a,b]

Table 6.9: Summarised Inventory of Resources at Shongweni Reserve (Adapted from Patrick, 1998; Morris, 1967; Msini Report, 2008)

Biophysical Components	***Shongweni Reserve (SR)***
Geographic Location and extent	**Shongweni Dam is situated on the Mlazi River and its tributary the Sterkspruit River**. The reserve covers 1560 Ha extending upwards for 4km.
Topograghy and Natural Landscape Features	**The topography surrounding the dam is rugged** with land rising gently from 260 m below the dam steeply up the sandstone cliffs to 690 m. The dam is situated at the base of a large **butte or conical hill (Ntshongweni)**, a characteristic landmark in the area.
Geology and soils	**Bedrock system of Table Mountain Sandstone (TMS)** overlies **Basement Granite**. Resistant fine grained rock of Natal Sandstone Series has given rise to the distinctive cliffs and provides their maroon colouring.
Climate	**Similar to that of the Durban region with the following significant differences. Conditions are semi arid and hot** due to rain shadow effect caused by interactions with topography and wind. Less rain (297mm) occurs per annum than Hillcrest. North facing slopes are hotter receiving more radiation. **Light frosts** maybe experienced.

Vegetation types	**Coast hinterland bushveld** comprising three main plant communities are correlated to the topography of the area. **Plateau communities** include Transvaal Beech *(Faurea saligna)* woodland, Velvet Bushwillow *(Combretum molle*) and Natal Flatcrown *(Albizia adianthifolia).* **Riverine communities** include canopy species such as Cape Fig *(Ficus sur)* and Cape Knobwood *(Fagara capensis)* **Slope communities** include species such as Rubber Tree *(Euphorbia tirucalli*, Naboom *(Euphorbia ingens*) and the Tambotie *(Spirostachys africana*)
Fauna	**Birds:** Over 240 birds have been identified by the Natal Bird Club. Four resident eagles include African Fish Eagle (*Helieetus vocifer)*, Black Eagle (*Aquila verreauxii*), Crowned Eagle (*Stephanoaetus coronatus*) and Martial Eagle (*Polimetus bellicosus)* Birds of the **open water** include White throated Swallow (*Hirundo albigularis*) and the African Black Duck (*Anas sparsa*) while the little Bittern (*Ixobrychus minutus)* is found along the shoreline. Extensive reed beds attract the weavers (*Ploceus spp*.) Emerald cuckoos (*Chrysococcyx cuprous*) and Cinnamon Doves (*Aplopia larvata*) inhabit the **riverine kloofs** while the **woodland birds** include the Natal Francolin (Francolinus natalensis) and Emerald Spotted Wood Dove (*Turtur chalcospilos*). Species common to the **plateau region** include Coqui's Francolin (*Francolinus coqui*) **Mammals**: Giraffe (*Giraffa camelo*), Kudu (*Tragelaphus strepsiceros*), Zebra (*Equus burchelli*), Blue Wildebeest (*Connochaetes taurinus*), Buffalo (*Syncercus caffer*) and Square-lipped (White) Rhinoceros (*Ceratotherium simum*). **Invertebrates:** Variety of butterflies and moths including the Orange Natal Acrea, Citrus Swallowtail and Pearl Charaxes. Reptiles and amphibians include the Black Mamba, the Durban Dwarf Chameleon and the Natal Hinge back tortoise.

Conservation significance	**Key component of DMOSS Umlazi catchment area.** Wilderness refuge for a wide range of habitat types and plant and animal species. Plant species requiring conservation and protection include *Homalium spp.*, the orchid *Mystacidium capense,* a bulbous forest understory plant *Haemanthus deformis* and the perennial *Dietes butcheriana. Turraea pulchella* is listed as a RDB species (Vulnerable).
Nature based Tourism (NBT) significance	High intensity tourist use with a **scenic diversity** of habitats. **Wilderness leadership** (Spirit of Adventure) and Scotts corporate adventure tours **Active recreation**: Water sports and angling. Horseriding and Rock climbing, Mountain biking and canoeing (Umzinmyati Canoe Club). **Self guided trails** (Ntini trail) Passive recreation and **picnic sites** Bheka Ntshonalanga and Iwa picnic sites. **Natural Science Interest groups** Bats (BAT Group), Plants (Botanical Society BOTSOC), Birds (Natal Bird Club) Game viewing and Night drives **Ovenight accommodation** (Mkangoma Bush Camp and Ugede tented camp)

Appendix 4: Floral Resources at Shongweni Reserve (SR)

Appendix 4a: Summary of Plant communities at Shongweni Reserve according to Patrick (1998)

Community	Floral Resources
Community 1: *Phragmites mauritianus-Cynodon dactylon* High Closed Reedbed	*Phragmites mauritianus, Cynodon dactylon, Melinis repens* and *Eragrostis curvula* **Aliens and ruderals** *Conzya albida, Melia azedarach and Senna didymobotrya*
Community 2: *Cyperus immensus-Cynodon dactylon* Low Closed Grassland	**Sedges and aquatics** *Commelina erecta, Cyperus immensus, Equisetum ramosissimum, Ethulia conzyoides, Isolepsis cernua, Juncus kraussii, Ludwigia octovalvis, Pycreus polystachyos, Typha capensis.* **Grasses** *Cynodon dactylon, Sporobolus africanus*, *Paspalum scrobiculatum. Dactyloctenium australe*
Community 3: *Asystasia gangetica-Dactyloctenium australe* Low Closed Grassland	**Grasses and forbs** *Asystasia gangetica, Tagetes minuata, Senecio tamoides, Commelina erecta, Peristrophe cernua, Dactyloctenium australe, Cynodon dactylon*

Community 4: Albizia adianthifolia-Isoglossa spp. Tall Closed Woodland	**Trees and shrubs** *Adenopodia spicata, Albizia adianthifolia, Baphia racemosa, Chaetacme aristata, Clausena anisata, Euclea natalensis, Monanthotaxis caffra, Ochna arborea, Trichalysia lanceolata, Uvaria caffra* **Forbs and grasses** *Cyperus albostriatus, Dicliptera heterostegia, Isoglossa sp, Oplismenus hirtellus, Peristrophe cernua, Prototasparagus virgatus* **Aliens and ruderals** *Cestrum laevigatum and Chromalaena odoratum*
Community 5: *Protorhus longiifolia -Panicum maximum* **Short Thicket**	**Forbs** *Cheilanthes hirta*, *Sansevieria hyacinthoides, Isoglossa woodii* **Grasses and sedges** *Cyperus albostriatus, Panicum maximum* **Trees and shrubs** *Acalypha glabrata, Baphia racemosa, Coddia rudis, Dalbergia obovata, Dombeya tiliacea, Ochna arborea, Rhus chirendensis, Spirostachys africana and Xylotheca kraussiana*
Community 6: *Ochna arborea-Osplimenus hirtellus* Short Thicket	**Grasses** *Panicum maximum, Cyperus albostriatus, Oplismenus hirtellus* **Forbs** *Peristrophe cernua, Achyranthes aspera, Protoasparagus natalensis, Senecio pleistocephalus, Rhyncosia confusa, Cheilanthes viridis, Cyphostemma flaviflorum* **Trees and shrubs** *Acalypha sonderiana, Hippobromus pauciflorus, Euphorbia ingens, Euphorbia tirucalli, Ruttya obovata, Tecomaria capensis, Dalbergia obovata*

Community 7: *Ehretia rigida- Spirostachys africana* Short Thicket	**Forbs** *Drimiopsis maculata, Gerbera ambigua, Sida cordifolia, Isoglossa cooperi, Ruellia cordata, Aizoon canariensis, Protoasparagus natalensis, Commelina erecta, Kalanchoe rotundifolia* ***Trees and shrubs*** *Hippobromus pauciflorum, Spirostachys africana , Ehretia rigida, Rhus pentherii, Canthium ciliatum, Brachylaena elliptica, Acacia robusta, Combretum molle, Grewia occidentalis*
Community 8: Aloe ferox-Aristida junciformis Low Closed Grassland/ Low Bushland Mosaic	**Grasses and sedges** *Eragrostis curvula, Eustachys paspaloides, Aristida junciformis,Mariscus albomarginatus* **Trees** *Aloe ferox, Canthium mundianum , Sclerocarya birrea, Dombeya rotundifolia, Pysdrax locuples, Heteropyxis natalensis, Acacia nilotica, Maytenus heterophylla* **Forbs** *Blepharis integrifolia, Senecio glaberrimus, Cheilanthes viridis, Cyanotis speciosa, Protoasparagus natalensis*
Community 9: Chamaecrista mimosoides-Aristida junciformis Low Closed Grassland	**Grasses** *Aristida junciformis, Eragrostis curvula, Melinis repens, Melinis nerviglumis, Eragrostis racemosa, Trichoneura grandiglumis, Pogananthera squarrosa, Hyparrhenia hirta, Hyparrhenia filipendula, Tristachya leucothrix* **Forbs** *Chamaecrista mimosioides, Callilepsis laureola, Gnidia kraussiana. Zaluzianskya pachyrriza, Kohautia virgata, Gazania linearis, Senecio erubescens, Chaetacanthus sp, Indigofera hilaris and Justicia protracta*

Community 10: Lantana camara Short Thicket	**Alien plant invaders** *Chromalaena odoratum, Solanum mauritianum, Senna didymobotrya, Cestrum laevigatum*
Community 11: Eucalyptus spp. High Forest Community	*Eucalyptus spp.*
Community 12: Mesic Cliffs	**Forbs and grasses** *Cheilanthes sp., Chlorophytum comosum, Commelina erecta, Cyathula cylindrica, Cyperus albostriatus, Cyrtanthus sanguineus, Dietes butcheriana, Drimiopsis maculata, Haemanthus deformis, Oplismenus hirtellus, Streptocarpus polyanthus, Sanseveria hyacinthoides and Panicum maximum* **Trees and shrubs** *Aloe arborescens, Aloe barberiae, Acridocarpus natalitius, Apodytes dimidiata, Baphia racemosa, Cussonia nicholsonii, Dalbergia obovata, Dracaena alectriformis, Encephalartos villosus, Erythroxylum emarginatum, Euphorbia grandidens, Euphorbia triangularis, Ficus burtt-davyi, Manilkara discolor, Protorhus longifolia,* *Rhoicissus tomentosa, Rhus chirindensis, Schrebera alata, Sideroxylon inerme, Strelitzia nicolai, Strychnos usambarensis, Teclea natalensis, Tricalysia lanceolata and Xylotheca kraussiana*
Community 13: Xeric cliffs	**Forbs and grasses** *Aloe maculata, Cheilanthes viridis, Commelina erecta, Crassula heterotricha, Crassula perforata, Cyanotis speciosa, Gasteria croucheri and Eragrostis curvula* **Trees and shrubs** *Dalbergia obovata, Diospyros lycioides, Euclea undulata, Euphorbia tirucalli, Ficus glumosa, Ficus ingens and Manilkara discolor*

Appendix 4b: A selection of Medicinal plants identified at Shongweni Reserve

Adapted: Patrick (1998)

Acacia karoo	*Plumbago auriculata*
Acacia nilotica	*Protoasparagus setaceus*
Aloe ferox	*Ranunculus multifidus*
Aptenia cordiifolia	*Rhoicissus digitata*
Cheilanthes viridis	*Sapium integerrimum*
Callilepsis laureola	*Scadoxus puniceus*
Dioscorea sylvatica	*Senecio rubescens*
Drimiopsis maculata	*Senecio taxoides*
Hypoxis hemerocallidea	*Solanum incanum*
Hypoxis gerrardiii	*Strychnos usamberensis*
Jasminum multipartitum	*Trema orientalis*
Justicia flava	*Typha capensis*
Leonotis ocymifolia	*Vigna vexillata*
Ledebouria cooperii	*Xylotheca kraussiana*
Loxostylis alata	*Ziziphus mucronata*
Macaranga capensis	*Zornia capensis*
Ornithogalum longibracteatum	
Pentanisia prunelloides	

Appendix4c: Rare and endangered plants at Shongweni Reserve

Source: Patrick (1998) Hilton-Taylor (1996)

Plant communities Patrick (1998)	***Plant name and status*** Hilton-Taylor (1996)
Community 5	Plants worthy of conservation include trees such as *Eugenia spp. A* (RDB Listing of rare in KZN), *Homalium rufescens* (RDB Listing of rare in KZN) and *Cassipourea gerardii* .The cycad *Encephalartos villosus* has a RDB Listing of rare in KZN. Other noteworthy species include the orchid, *Mystacidium capense* which has been identified as a priority species, the geophyte *Haemanthus deformis,* the Forest Iris *(Dietes butcheriana*) and the climber *Raphionacme flanaganii.*
Community 7	A number of priority species have been identified including climbers such as *Ceropegia sandersonii ,*and the orchid *Eulophia streptopetala.*
Community 8	*Turraea pulchella* is noted in this community, apparently only the second recorded occurrence for the province. The plant which is endemic to the FSA region has a global conservation status of vulnerable in the RDB listings of Hilton-Taylor (1996). *Polygala natalensis* is also listed as rare (Hilton-Taylor 1996).
Community 12	Geophytes including the fire lily *(Cyrtanthus sanguineus)*
Community 13	Located on the hot dry north-facing slopes vegetation cover is often sparse however several valuable plants species are located here including *Gasteria croucherii* (listed as vulnerable in KZN*).*

Appendix 4d: Selection of common plants around main picnic site

Plant species found at Shongweni Dec 04/08 by JB Foley verified at NH
All noted on Descent to Bheka Ntshonalanga site. An * denotes full flower

Acacia ataxantha *	*Gerbera ambigua**
A. sieberiana	*Heteropyxis natalensis*
A. robusta	*Hippobromus pauciflorus*
Albizia adianthifolia	*Hypoxis hemerocallidea**
Brachylaena elliptica	*Lobelia flaccida **
Canthium inerme	*Maytenus heterophylla*
Combretum molle	*Psydrax locuples **
*Croton sylvaticus **	*Rhoicissus tridentata*
Cussonia spicata	*Rhus chirindensis **
*Dalbergia obovata**	*Rhus rehmanniana*
Dombeya rotundifolia	*Sapium ellipticum*
*Eulophia speciosa **	*Schotia brachypetala*
Euphorbia ingens	*Sclerocarya caffra*
Euphorbia tirucalli	*Vepris lanceolata*
Ficus ingens	*Vernonia natalensis **
	*Wahlenbergia sp**

Appendix 5 Faunal Resources at Shongweni Reserve (SR)

Appendix 5a: Birds observed at SR Source: Norman (2010)

- ☐ 1 Ostrich Common
- ☐ 8 Grebe Little
- ☐ 55 Cormorant White-breasted
- ☐ 58 Cormorant Reed
- ☐ 60 Darter African
- ☐ 62 Heron Grey
- ☐ 63 Heron Black-headed
- ☐ 64 Heron Goliath
- ☐ 65 Heron Purple
- ☐ 66 Egret Great
- ☐ 67 Egret Little
- ☐ 68 Egret Yellow-billed
- ☐ 69 Heron Black
- ☐ 71 Egret Cattle
- ☐ 74 Heron Green-backed
- ☐ 76 Night-Heron Black-crowned
- ☐ 77 Night-Heron White-backed
- ☐ 81 Hamerkop
- ☐ 84 Stork Black
- ☐ 86 Stork Woolly-necked
- ☐ 91 Ibis African Sacred
- ☐ 92 Ibis Southern Bald
- ☐ 94 Ibis Hadeda
- ☐ 95 Spoonbill African
- ☐ 99 Duck White-faced
- ☐ 101 Duck White-backed
- ☐ 102 Goose Egyptian
- ☐ 104 Duck Yellow-billed
- ☐ 105 Duck African Black
- ☐ 108 Teal Red-billed
- ☐ 112 Shoveler Cape
- ☐ 113 Pochard Southern
- ☐ 114 Pygmy-Goose African
- ☐ 116 Goose Spur-winged
- ☐ 126 Kite Yellow-billed
- ☐ 127 Kite Black-shouldered
- ☐ 130 Honey-Buzzard European
- ☐ 131 Eagle Verreauxs'
- ☐ 135 Eagle Wahlberg's
- ☐ 136 Eagle Booted
- ☐ 139 Eagle Long-crested
- ☐ 140 Eagle Martial
- ☐ 141 Eagle African Crowned
- ☐ 142 Snake-Eagle Brown
- ☐ 148 Fish-Eagle African
- ☐ 149 Buzzard Steppe
- ☐ 150 Buzzard Forest
- ☐ 152 Buzzard Jackal
- ☐ 157 Sparrowhawk Little
- ☐ 158 Sparrowhawk Black
- ☐ 160 Goshawk African
- ☐ 161 Goshawk Gabar
- ☐ 168 Harrier Black
- ☐ 169 Harrier-Hawk African
- ☐ 170 Osprey
- ☐ 172 Falcon Lanner
- ☐ 181 Kestrel Rock
- ☐ 196 Spurfowl Natal
- ☐ 200 Quail Common
- ☐ 203 Guineafowl Helmeted
- ☐ 205 Buttonquail Kurrichane
- ☐ 209 Crane Grey Crowned
- ☐ 210 Rail African
- ☐ 213 Crake Black
- ☐ 218 Flufftail Buff-spotted
- ☐ 223 Swamphen African Purple
- ☐ 226 Moorhen Common
- ☐ 228 Coot Red-knobbed
- ☐ 229 Finfoot African
- ☐ 240 Jacana African
- ☐ 249 Plover Three-banded
- ☐ 258 Lapwing Blacksmith
- ☐ 264 Sandpiper Common
- ☐ 266 Sandpiper Wood
- ☐ 269 Sandpiper Marsh
- ☐ 270 Greenshank Common
- ☐ 298 Thick-knee Water
- ☐ 339 Tern White-winged
- ☐ 348 Dove Rock
- ☐ 349 Pigeon Speckled
- ☐ 352 Dove Red-eyed
- ☐ 354 Turtle-Dove Cape
- ☐ 355 Dove Laughing
- ☐ 356 Dove Namaqua
- ☐ 358 Wood-Dove Emerald-spotted
- ☐ 359 Dove Tambourine
- ☐ 360 Dove Lemon
- ☐ 361 Green-Pigeon African
- ☐ 371 Turaco Purple-crested
- ☐ 374 Cuckoo Common
- ☐ 377 Cuckoo Red-chested
- ☐ 378 Cuckoo Black
- ☐ 382 Cuckoo Jacobin
- ☐ 384 Cuckoo African Emerald
- ☐ 385 Cuckoo Klaas's
- ☐ 386 Cuckoo Diderick
- ☐ 391 Coucal Burchell's
- ☐ 394 Wood-Owl African
- ☐ 396 Scops-Owl African
- ☐ 401 Eagle-Owl Spotted
- ☐ 405 Nightjar Fiery-necked
- ☐ 412 Swift African Black
- ☐ 415 Swift White-rumped
- ☐ 417 Swift Little
- ☐ 418 Swift Alpine
- ☐ 421 Palm-Swift African
- ☐ 424 Mousebird Speckled
- ☐ 426 Mousebird Red-faced
- ☐ 427 Trogon Narina
- ☐ 428 Kingfisher Pied
- ☐ 429 Kingfisher Giant
- ☐ 431 Kingfisher Malachite
- ☐ 432 Pygmy-Kingfisher African
- ☐ 435 Kingfisher Brown-hooded
- ☐ 437 Kingfisher Striped
- ☐ 444 Bee-eater Little
- ☐ 446 Roller European
- ☐ 451 Hoopoe African
- ☐ 452 Wood-Hoopoe Green
- ☐ 455 Hornbill Trumpeter
- ☐ 460 Hornbill Crowned
- ☐ 463 Ground-Hornbill Southern
- ☐ 464 Barbet Black-collared
- ☐ 469 Tinkerbird Red-fronted
- ☐ 471 Tinkerbird Yellow-rumped
- ☐ 473 Barbet Crested
- ☐ 474 Honeyguide Greater
- ☐ 475 Honeyguide Scaly-throated
- ☐ 476 Honeyguide Lesser
- ☐ 478 Honeybird Brown-backed
- ☐ 483 Woodpecker Golden-tailed
- ☐ 486 Woodpecker Cardinal
- ☐ 488 Woodpecker Olive
- ☐ 489 Wryneck Red-throated
- ☐ 490 Broadbill African
- ☐ 494 Lark Rufous-naped
- ☐ 507 Lark Red-capped
- ☐ 518 Swallow Barn
- ☐ 520 Swallow White-throated
- ☐ 526 Swallow Greater Striped
- ☐ 527 Swallow Lesser Striped
- ☐ 529 Martin Rock
- ☐ 530 House-Martin Common
- ☐ 532 Martin Sand
- ☐ 533 Martin Brown-throated
- ☐ 536 Saw-wing Black
- ☐ 538 Cuckooshrike Black
- ☐ 540 Cuckooshrike Grey
- ☐ 541 Drongo Fork-tailed
- ☐ 542 Drongo Square-tailed
- ☐ 545 Oriole Black-headed
- ☐ 548 Crow Pied
- ☐ 550 Raven White-necked
- ☐ 554 Tit Southern Black
- ☐ 568 Bulbul Dark-capped
- ☐ 569 Brownbul Terrestrial
- ☐ 572 Greenbul Sombre
- ☐ 574 Greenbul Yellow-bellied
- ☐ 576 Thrush Kurrichane
- ☐ 577 Thrush Olive
- ☐ 581 Rock-Thrush Cape
- ☐ 589 Chat Familiar
- ☐ 593 Cliff-Chat Mocking
- ☐ 596 Stonechat African
- ☐ 600 Robin-Chat Red-capped
- ☐ 601 Robin-Chat Cape
- ☐ 613 Scrub-Robin White-browed
- ☐ 631 Warbler African Reed
- ☐ 633 Warbler Marsh
- ☐ 635 Swamp-Warbler Lesser
- ☐ 638 Rush-Warbler Little
- ☐ 643 Warbler Willow
- ☐ 644 Woodland-Warbler Yellow-throated
- ☐ 645 Apalis Bar-throated
- ☐ 648 Apalis Yellow-breasted
- ☐ 651 Crombec Long-billed
- ☐ 654 Warbler Dark-capped Yellow

- ☐ 657 Camaroptera Green-backed
- ☐ 661 Grassbird Cape
- ☐ 664 Cisticola Zitting
- ☐ 672 Cisticola Rattling
- ☐ 674 Cisticola Red-faced
- ☐ 675 Cisticola Rufous-winged
- ☐ 677 Cisticola Levaillant's
- ☐ 678 Cisticola Croaking
- ☐ 679 Cisticola Lazy
- ☐ 681 Neddicky
- ☐ 683 Prinia Tawny-flanked
- ☐ 689 Flycatcher Spotted
- ☐ 690 Flycatcher African Dusky
- ☐ 691 Flycatcher Ashy
- ☐ 694 Flycatcher Southern Black
- ☐ 698 Flycatcher Fiscal
- ☐ 700 Batis Cape
- ☐ 701 Batis Chinspot
- ☐ 708 Crested-Flycatcher Blue-mantled
- ☐ 710 Paradise–Flycatcher African
- ☐ 711 Wagtail African Pied
- ☐ 712 Wagtail Mountain
- ☐ 713 Wagtail Cape
- ☐ 716 Pipit African
- ☐ 718 Pipit Plain-backed
- ☐ 720 Pipit Striped
- ☐ 728 Longclaw Yellow-throated
- ☐ 732 Fiscal Common
- ☐ 733 Shrike Red-backed
- ☐ 736 Boubou Southern
- ☐ 740 Puffback Black-backed
- ☐ 741 Brubru
- ☐ 742 Tchagra Southern
- ☐ 744 Tchagra Black-crowned
- ☐ 747 Bush-Shrike Gorgeous
- ☐ 748 Bush-Shrike Orange-breasted
- ☐ 750 Bush-Shrike Olive
- ☐ 751 Bush-Shrike Grey-headed
- ☐ 757 Starling Common
- ☐ 758 Myna Common
- ☐ 760 Starling Wattled
- ☐ 761 Starling Violet-backed
- ☐ 764 Starling Cape Glossy
- ☐ 768 Starling Black-bellied
- ☐ 769 Starling Red-winged
- ☐ 781 Sunbird Malachite
- ☐ 783 Sunbird Southern Double-collared
- ☐ 787 Sunbird White-bellied
- ☐ 789 Sunbird Grey
- ☐ 790 Sunbird Olive
- ☐ 792 Sunbird Amethyst
- ☐ 793 Sunbird Collared
- ☐ 796 White-eye Cape
- ☐ 801 Sparrow House
- ☐ 803 Sparrow Cape
- ☐ 804 Sparrow Southern Grey-headed
- ☐ 805 Petronia Yellow-throated
- ☐ 807 Weaver Thick-billed
- ☐ 808 Weaver Dark-backed
- ☐ 810 Weaver Spectacled
- ☐ 811 Weaver Village
- ☐ 813 Weaver Cape
- ☐ 815 Masked-Weaver Lesser
- ☐ 817 Weaver Yellow
- ☐ 821 Quelea Red-billed
- ☐ 824 Bishop Southern Red
- ☐ 826 Widowbird Fan-tailed
- ☐ 831 Widowbird Red-collared
- ☐ 835 Twinspot Green
- ☐ 840 Firefinch African
- ☐ 842 Firefinch Red-billed
- ☐ 844 Waxbill Blue
- ☐ 846 Waxbill Common
- ☐ 848 Waxbill Grey
- ☐ 850 Waxbill Swee
- ☐ 854 Waxbill Orange-breasted
- ☐ 857 Mannikin Bronze
- ☐ 858 Mannikin Red-backed
- ☐ 860 Whydah Pin-tailed
- ☐ 864 Indigobird Dusky
- ☐ 869 Canary Yellow-fronted
- ☐ 872 Canary Cape
- ☐ 873 Canary Forest
- ☐ 877 Canary Brimstone
- ☐ 881 Seedeater Streaky-headed
- ☐ 884 Bunting Golden-breasted

Total Number of Birds Seen = 263

Seen by Others:

- ☐ Heron Squacco
- ☐ Bittern Little
- ☐ Francolin Shelley's
- ☐ Tern Whiskered
- ☐ Robin White-starred
- ☐ Warbler Barratt's

Appendix 5b: Butterflies, moths, dragonflies and damsel flies observed at SR

Source: Norman (2010)

BUTTERFLIES:

☐	1	African Monarch	Danaus chrysippus
☐	3	Friar	Amauris niavius
☐	5	Novice	Amauris ochlea
☐	6	Layman	Amauris albimaculata
☐	7	Chief	Amauris echeria
☐	8	Common Evening Brown	Melanitis leda
☐	11	Common Bush Brown	Bicyclus safitza
☐	18	Eyed Bush Brown	Henotesia perspicua
☐	90	Common Wanderer	Acraea aganice
☐	91	Garden Acraea	Acraea horta
☐	110	Small Orange Acraea	Acraea eponina
☐	112	Yellow-banded Acraea	Acraea cabira
☐	113	Dusky Acraea	Acraea esebria
☐	115	White-barred Acraea	Acraea encedon
☐	117	Natal Acraea	Acraea natalica
☐	122	Window Acraea	Acraea oncaea
☐	128	Acara Acraea	Acraea acara
☐	136	Blood-red Acraea	Acraea petraea
☐	140	Pearl Emperor	Charaxes varanes
☐	142	Green-veined Emperor	Charaxes candiope
☐	148	White-barred Emperor	Charaxes brutus
☐	154	Blue-spotted Emperor	Charaxes cithaeron
☐	164	Satyr Emperor	Charaxes ethalion
☐	179	Blonde Glider	Cymothoe coranus
☐	190	Boisduval's False Acraea	Pseudacraea boisduvalii
☐	192	False Chief	Pseudacraea lucretia
☐	195	Spotted Sailer	Neptis saclava
☐	199	Common Sailer	Neptis laeta
☐	209	Boisduval's Tree Nymph	Sevenia boisduvali
☐	210	Natal Tree Nymph	Sevenia natalensis
☐	212	Common Joker	Byblia anvatara
☐	213	Spotted Joker	Byblia ilithyia
☐	216	Pied Piper	Eurytela hiarbas
☐	217	Golden Piper	Eurytela dryope
☐	219	Common Diadem	Hypolimnas misippus
☐	221	Variable Diadem	Hypolimnas anthedon
☐	222	Common Mother-of-Pearl	Protogoniomorpha parhassus
☐	225	Pirate	Catacroptera cloanthe
☐	226	Gaudy Commodore	Precis octavia
☐	231	Garden Commodore	Precis archesia
☐	233	Soldier Pansy	Junonia terea
☐	234	Brown Pansy	Junonia natalica
☐	235	Yellow Pansy	Junonia hierta
☐	236	Blue Pansy	Junonia oenone
☐	240	Painted Lady	Vanessa cardui
☐	245	African Leopard	Phalanta phalantha
☐	249	Yellow Zulu	Alaena amazoula
☐	253	Spotted Buff	Pentila tropicalis
☐	283	Southern Pied Woolly Legs	Lachnocnema laches
☐	284	Common Woolly Legs	Lachnocnema bibulus
☐	318	Southern Sapphire	Iolaus silas
☐	335	Purple-brown Hairstreak	Hypolycaena philippus
☐	340	Tailed Black-eye	Leptomyrina hirundo
☐	343	Common Black-eye	Leptomyrina gorgias
☐	355	Brown Playboy	Deudorix antalus
☐	359	Common Fig-tree Blue	Myrina silenus
☐	360	Scarce Fig-tree Blue	Myrina dermaptera
☐	364	Natal Bar	Cigaritis natalensis
☐	379	Common Scarlet	Axiocerses tjoane
☐	511	Large Hairtail	Anthene lemnos
☐	518	Black-striped Hairtail	Anthene amarah
☐	520	Pale Hairtail	Anthene butleri
☐	538	Bush Bronze	Cacyreus lingeus
☐	545	Black Pie	Tuxentius melaena
☐	547	Common Blue	Leptotes pirithous
☐	552	Long-tailed Blue	Lampides boeticus
☐	608	Patricia Blue	Lepidochrysops patricia
☐	632	Osiris Smoky Blue	Euchrysops osiris
☐	634	Common Smoky Blue	Euchrysops malathana
☐	635	Sabi Smoky Blue	Euchrysops dolorosa
☐	640	Common Meadow Blue	Cupidopsis cissus
☐	641	Tailed Meadow Blue	Cupidopsis jobates
☐	644	Rayed Blue	Actizera lucida
☐	646	Sooty Blue	Zizeeria knysna
☐	647	Clover Blue	Zizina antanossa
☐	651	Topaz-spotted Blue	Azanus jesous
☐	652	Natal Spotted Blue	Azanus natalensis
☐	653	Thorn-tree Blue	Azanus moriqua
☐	654	Mirza Blue	Azanus mirza
☐	656	Gaika Blue	Zizula hylax
☐	658	African Clouded Yellow	Colias electo
☐	659	African Migrant	Catopsilia florella
☐	660	Common Grass Yellow	Eurema hecabe
☐	661	Broad-bordered Grass Yellow	Eurema brigitta
☐	663	Angled Grass Yellow	Eurema desjardinsii
☐	665	Vine-leaf Vagrant	Eronia cleodora
☐	666	Autumn-leaf Vagrant	Eronia leda
☐	667	Large Vagrant	Nepheronia argia
☐	668	Buquet's Vagrant	Nepheronia buquetii
☐	674	Coast Purple Tip	Colotis erone
☐	679	Sulphur Orange Tip	Colotis auxo
☐	680	Red Tip	Colotis antevippe
☐	682	Smoky Orange Tip	Colotis euippe
☐	686	Small Orange Tip	Colotis evagore
☐	689	False Dotted Border	Belenois thysa
☐	690	Forest White	Belenois zochalia
☐	691	Brown-veined White	Belenois aurota
☐	692	African Common White	Belenois creona
☐	693	African Veined White	Belenois gidica
☐	694	African Small White	Dixeia charina
☐	697	Ant-heap Small White	Dixeia pigea
☐	698	Spiller's Sulpher Yellow	Dixeia spilleri
☐	700	Diverse White	Appias epaphia
☐	702	African Wood White	Leptosia alcesta
☐	706	Twin Dotted Border	Mylothris rueppellii
☐	707	Common Dotted Border	Mylothris agathina
☐	711	Mocker Swallowtail	Papilio dardanus
☐	712	White-banded Swallowtail	Papilio echerioides
☐	715	Citrus Swallowtail	Papilio demodocus
☐	716	Green-banded Swallowtail	Papilio nireus
☐	719	Small White-lady Swordtail	Graphium morania
☐	721	Veined Swordtail	Graphium leonidas
☐	723	Small Striped Swordtail	Graphium policenes
☐	730	Striped Policeman	Coeliades forestan
☐	731	Two-pip Policeman	Coeliades pisistratus
☐	732	Red-tab Policeman	Coeliades keithloa
☐	737	Clouded Flat	Tagiades flesus
☐	738	Rufous-winged Flat	Eagris nottoana
☐	746	Small Elfin	Sarangesa phidyle
☐	747	Dark Elfin	Sarangesa seineri
☐	748	Forest Elfin	Sarangesa motozi
☐	752	Buff-tipped Skipper	Netrobalane canopus
☐	771	Forest Sandman	Spialia dromus
☐	772	Common Sandman	Spialia diomus
☐	781	Gold-spotted Sylph	Metisella metis
☐	805	Macomo Ranger	Kedestes macomo
☐	815	Macken's Dart	Acleros mackenii
☐	840	Long-horned Swift	Borbo fatuellus
☐	841	False Swift	Borbo fallax
☐	847	Olive-haired Swift	Borbo barbonila
☐	848	Twin Swift	Borbo gemella
☐	852	Common Hottentot Skipper	Gegenes niso

Total Number of Butterflies Seen = 132

DAY FLYING MOTHS:

☐ Superb False Tiger	Heraclia superba
☐ Peach Moth	Egybolis vaillantina
☐ White Bear	Nyctemera leuconoe
☐ Cheetah	Argina amanda
☐ Wisp Wing	Coenina poecilaria
☐ Cool Maiden	

DRAGONFLIES:

☐ 1001	Tigertail	Ictinogomphus ferox
☐ 1010	Rock Hooktail	Paragomphus cognatus
☐ 1013	Common Thorntail	Ceratogomphus pictus
☐ 1017	Orange Emperor	Anax speratus
☐ 1018	Blue Emperor	Anax imperator
☐ 1019	Black Emperor	Anax tristis
☐ 1021	Friendly Hawker	Aeshna miniscula
☐ 1028	Darting Cruiser	Phyllomacromia picta
☐ 1037	Long Skimmer	Orthetrum trinacria
☐ 1039	Epaulet Skimmer	Orthetrum chrysostigma
☐ 1044	Julia Skimmer	Orthetrum julia
☐ 1048	Black-tailed Skimmer	Nesciothemis farinosa
☐ 1051	Lucia Widow	Palpopleura lucia
☐ 1056	Broad Scarlet	Crocothemis erythraea
☐ 1058	Little Scarlet	Crocothemis sanguinolent
☐ 1059	Don-Dwala	Bradinopyga cornuta
☐ 1060	Banded Groundling	Brachythemis leucosticta
☐ 1062	Kirby's Dropwing	Trithemis kirbyi
☐ 1065	Violet Dropwing	Trithemis annulata
☐ 1066	Red-veined Dropwing	Trithemis arteriosa
☐ 1070	Navy Dropwing	Trithemis furva
☐ 1071	Donaldson's Dropwing	Trithemis donaldsoni
☐ 1072	Jaunty Dropwing	Trithemis stictica
☐ 1075	Blue Cascader	Zygonyx natalensis
☐ 1076	Ringed Cascader	Zygonyx torridus
☐ 1082	Phantom Flutterer	Rhyothemis semihyalina
☐ 1083	Pantala	Pantala flavescens
☐ 1085	Ferruginous Glider	Tramea limbata
☐ 1087	Red Basker	Urothemis assignata

Total Number of Dragonflies Seen = 29

DAMSELFLIES:

☐ 1101	Glistening Demoiselle	Phaon iridipennis
☐ 1103	Dancing Jewel	Platycypha caligata
☐ 1127	Common Citril	Ceriagrion glabrum
☐ 1133	Kersten's Sprite	Pseudagrion kersteni
☐ 1134	Salisbury Sprite	Pseudarion salisburyense
☐ 1136	Natal Sprite	Pseudarion natalensis
☐ 1142	Cherry-eye Sprite	Pseudagrion sublacteum
☐ 1148	Masai Sprite	Pseudagrion massaicum
☐ 1152	Common Bluetail	Ischnura senegalensis
☐ 1153	Swamp Bluet	Africallagma glaucum

Total Number of Damselflies Seen = 10

Appendix 5c: Amphibians, Reptiles, Spiders, Beetles and Mammals observed at SR

Source: Mkhize (2008)

Amphibians

Bubbling Kassina	*Kassina senegalensis*
Common Platana	*Xenopsis laevis*
Common River Rana	*Rana angolensis*
Guttoral Toad	*Bufo gutturalis*
Natal Sand Frog	*Tomopterna natalensis*
Painted Reed Frog	*Hyperolius marmoratus*
Raucous Toad	*Bufo rangeri*
Red Toad	*Bufo carens*
Reed Frog	*Hyperolius semidiscus*
Snoring Puddle Frog	*Phrynobatrachus natalensis*
Tinker Reed Frog	*Hyperolius tuberilinguis*
Water Lily Frog	*Hyperolius pusillum*

Reptiles

Tree Agama	*Agama atricollis*
Puff Adder	*Bitis arietans*
Berg Adder	*Bitis atropos*
Dwarf Chamacleon	*Bradpodion sp.*
Snouted Night Adder	*Causus defilippii*
Common Night Adder	*Causus rhombeatus*
Flap-necked Chameleon	*Chamaeleo dilepis*
Red-lipped Herald	*Crotaphopeltis hotam*
Southern Brown Egg Eater	*Dasypeltis inornata*
Black Mamba	*Dendroaspis polylepis*
Boomslang	*Dispholidus typus*
Leopard Tortoise (introduced)	*Geochelone pardalis*
Moreau's Tropical House Gecko	*Hemidactylus maboui*
Natal Hinged Tortoise	*Kinixys natalensis*
Red-sided Skink	*Mabuya homaloceph*
Striped Skink	*Mabuya striata*
Variable Skink	*Mabuya varia*
Mozambique Spitting Cobra	*Naja mossambica*
Natal Green Snake	*Philothamnus natalen*
Varigated Bush Snake	*Philothamnus semiva*
Snouted Grass Snake	*Psammophis sibilans*
Mole Snake	*Pseudaspis cana*
African Rock Python	*Python sebae*
Vine Snake	*Thelotornis capensis*
Water Monitor	*Varanus niloticus*

Mammals

Banded Mongoose
Brindled Gnu (Blue Wildebeest)
Burchell's Zebra
Bushbuck
Cape Clawless Otter
Common Reedbuck
Geoffroy's Horseshoe Bat
Giraffe
Grey Duiker
Impala
Kudu
Rock Hyrax
Schreiber's Long-fingered Bat
Single-striped Mouse
Slender Mongoose
Square-lipped Rhinoceros (White Rhino)
Temminck's Hairy Bat
Vervet Monkey
Warthog
Waterbuck

Aranaea or **Spiders**

Araneus sp	Orb weaver spider
Clubionidae sp.	Sac spiders
Cyclosa sp	Garbage line spider
Dinopis sp	Net throwing spider
Hippasa .sp	Funnel web spider
Lycosidae sp.	Sand wolf spider
Nephilinges cruenta	Hermit spider
Palystes supercilious	Rain spider
Pararaneus sp.	Orb weaver spider
Salticidae sp.	Jumping spiders
Tetragnatha sp.	Long jawed spider

Coleoptera or Beetles

Acrocassis gibbipennis	Tortoise Beetle
Cassida viridipennis	Tortoise Beetle
Conchyloctenia hybrida	Tortoise Beetle