

# **Biodiversity messaging to Generation Y students at the Durban University of Technology, Kwa-Zulu Natal**

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## **EXAMINERS COPY**

### **ABSTRACT**

This study deals with the intersection of three global influences that are rapidly changing our world; the first a looming environmental crisis or loss of biodiversity, the second the growing influence of a new generation of students (Generation Y) who possess the ability and power to reshape the socio political, economic and cultural landscape and finally the phenomenal power and penetration of multimedia communication platforms. Mindful of these global themes and context this particular research focuses on a relatively new area of study not yet covered in the literature, that of South African university students perceptions of nature. The study involved establishing the extent of the knowledge, attitudes and perceptions of South African students (Generation Y) toward Nature, discovering how they connect with local biodiversity and determining the best communication modes for reaching this audience. The work posited that Generation Y students may be unfamiliar with the exact meaning and significance of the term biodiversity but could respond positively when exposed to nature based experiences at accessible botanic gardens, and protected urban green spaces.

Student opinions (n= 428) at the Durban University of Technology were sampled statistically using an appropriate survey instrument. The resultant quantitative data revealed significant student levels of concern for biodiversity loss and a strong cultural bias in terms of personal linkages with medicinal plants. Visitor frequency to nature reserves was low however the use of botanic gardens proved more popular. Visual modes of communication such as television were preferred over text modalities and while the influence of multimedia electronic platforms was acknowledged the possible use of nature apps received a limited response.

Qualitative data gathered from four focus groups involved guided discussion on the relevance of biodiversity, and local field visits to Pigeon Valley Nature Reserve and the Durban Botanic Gardens. Students produced response posters which revealed high levels of personal empathy and connection to nature, emphasizing existing cultural connections with local plants. A biodiversity communication model for South African university students was presented building on these findings.

**Key words:** biodiversity communication, nature reserves, botanic gardens, social media, Generation Y students

## **PREFACE**

The work described in this thesis was carried out in Durban under the auspices of the University of KwaZulu- Natal under supervision from Professor Donal McCracken with additional input from Professor Snowy Baijnath during the period 2013- 2016. The study represents original work by the author and has not otherwise been submitted in any form In part or whole 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.

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## LIST OF ACRONYMS

BGCI	Botanical Gardens Conservation International
CBD	Convention on Biological Diversity
CREW	Custodians of Rare and Endangered Wildflowers
DEAT	Department of Environment Affairs and Tourism
DUT	Durban University of Technology
DBG	Durban Botanic Gardens
DMOSS	Durban Metropolitan Open Space System
GSPC	Global Strategy Plant Conservation
HE	Higher Education
PVNR	Pigeon Valley Nature Reserve
SANBI	South African Biodiversity Institute
SMT	Social Media Technology

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## Chapter One: Introduction

*“Everything must have a beginning and that beginning must be linked to something that went before.” Mary Shelley*

### Topic Introduction

This study deals with the intersection of three global influences that are rapidly changing our world; the first a looming environmental crisis or loss of biodiversity, the second the growing influence of a new generation of students (Generation Y) who possess the ability and power to reshape the socio political, economic and cultural landscape and finally the phenomenal power and penetration of multimedia communication platforms (Global Biodiversity Outlook 4, 2014; Willis, 2006; Stein, 2013; Tapscott, 2009; Goneos-Malka, Grobler and Strasheim, 2013; Chen and Bryer, 2012). Mindful of these global themes and context this particular research focuses on a relatively new area of study not yet covered in the literature, that of university students perceptions of nature. The study involves establishing the extent of the knowledge, attitudes and perceptions of South African students (Generation Y) toward Nature, discovering how they connect with local biodiversity and determining the best communication modes reaching this target audience.

In its simplest form biodiversity is the variety of life forms (plants and animals) on planet earth (Global Biodiversity Outlook 4, 2014; Willis, 2006). The term biodiversity or biological diversity entered the global lexicon shortly after world leaders met at Rio De Janeiro in 1992 to host the Earth Summit, a forum where global environmental concerns were raised. 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 4, 2014). Biodiversity as a life support system is under severe threat and writers concur that the scale of disturbance taking place in the twenty-first century is unprecedented. Reports from *Nature* journal indicate that a total of 5522 mammals, birds, amphibians and insects are currently under threat and that anthropogenic (man induced) causes

of cultivation and urbanisation pressures are the primary threats (Monastersky, 2014: 160; Global Biodiversity Outlook 4, 2014; Cardinale *et al.*, 2012; Mace, *et al.*, 2012; Butchart *et al.*, 2010).

The second global influence concerns the impact of a new generation of young people called Generation Y (those individuals born between 1981-1999). Generation Y has the ability to mobilise mass movements, generate political, economic and environmental opinions and influence the alignment of marketing trends, culture and products (Stein, 2013; Goneos-Malka, 2012: 174; Bevan-Dye, Garnett and de Klerk, 2012: 5578; Tapscott, 2009). The South African student group appear to be characterised by their spend thrift habits, and conspicuous consumerism focussed largely on 'bling, brands and booze' (Student Village, 2015; Bevan-Dye, Garnett and de Klerk, 2012; De Waal, 2008). Unfortunately biodiversity /nature does not appear to feature strongly on the youth agenda as it seems to be eclipsed by other competing interests. As a developing country of nearly 56 million with the youth (18-34 years) comprising some 36% of the total population this is cause for concern particularly as South Africa has the third highest biodiversity or richness of plant and animal life in the world (Stats SA, 2016; DEAT, 2009). Yet another concern is the fact that Generation Y students currently studying at the 23 Universities and UoT's nationwide are becoming increasingly politically active, often violently disrupting campuses as they express their frustration with dysfunctional funding systems, educational inequalities and perceived and actual socio-economic class distinctions (Soudien, 2010; DHET, 2015; Chetty and Knauss, 2016; Student life, 2016; Hall, 2016).

The power and penetration of multimedia communication platforms has impacted all facets of modern business, education and personal life. The technology is exponentially expanding its reach through the world nowhere is it more eagerly embraced than on the university campus. As one student relates; "We are glued to our phones". Estimates of mobile phone handsets world wide are in excess of 5 billion representing a global subscription of 71% (Goneos-Malka, 2012: 11). Academics are now examining new ways to include Social Media Technologies (SMT's) in Higher Education (HE) curricula making use of Facebook, Twitter and

Youtube platforms (Chen and Bryer, 2012; Jones *et al.*, 2010 and Davis *et al.*, 2010). Studies at Rhodes University and Fort Hare (Thinyane, 2010), University of Pretoria (Goneos-Malka, 2012) and the University of Cape Town (North, Johnstone and Ophoff, 2014) have investigated ways in which students interact with their cell phones and on line media platforms. These studies inform this thesis as we probe the question of how some of these on line technologies could be used as a vehicle for biodiversity communication. This work will also investigate student response to traditional communication modalities such as television, film, video and print media.

Structurally this chapter begins by introducing the topic and then examining the problem in greater depth, unpacking some of the main themes and developing problem statements and research questions. This leads to the purpose statement and formulation of the research objectives. The thesis statement then explicates the main argument of this work and the scope of work with its constraints and borders is clearly defined together with the key terms used throughout. The significance of this work is then described followed by an overview of the subsequent chapters.

### **Problem statements**

Untangling the roots of complex problems such as those presented by environmental and student crises in a post modern technological society is indeed a challenge of no small magnitude. These challenges are exactly what researcher Juliette Klein (2004:4) describes as:

*Arising from environments characterized by turbulence and uncertainty, complex problems are typically value, laden, open ended, multidimensional, ambiguous, and unstable. Labelled 'wicked' and 'messy', they resist being tamed, bounded or managed by classical problem solving approaches.*

Since Karl Popper<sup>1</sup>, scientist and philosopher observed that 'Science only starts with problems' we begin by defining four major themes related to biodiversity

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<sup>1</sup> Quoted in Hofstee (2001:83)

communication to HE students. A problem statement is formulated from each and a research question(s) as applicable are drafted to direct the study. The first theme addresses biodiversity loss as a wicked multidimensional problem, the second describes humankind's disconnect with nature, the third outlines the beneficial effects of urban green space and the fourth introduces communication challenges and media preferences.'

*Biodiversity loss – A wicked multidimensional problem*

South African biologists Martin Sharman and Musa Mlambo (2012) cast biodiversity loss as a 'wicked problem' –solutions are not easily found and tackling the issue with conventional methods may be a futile exercise since only new, unprecedented and innovative solutions are required. They recommend that since there are multiple causal agents for biodiversity loss similarly there is no one single solution (Sharman and Mlambo, 2012: 274; Sterling 2009: 80). Sharman and Mlambo (2012: 275) explain that Biodiversity can be viewed from at least three vantage points: biophysical science, economics, and social aspects.<sup>2</sup>Understanding of the issues and the potential solution can vary between stakeholders depending on one's perspective which may be coloured by upbringing, race, class divides and social and cultural contexts (Saljoe, 1991: 184; Shumba, 1999: 56). It is precisely some of the neglected perspectives from Generation Y that need to be heard in this debate and this research will provide an insight into student thinking and solutions regarding Biodiversity loss.

*Problem statement: Biodiversity loss is indeed a wicked problem but breaking it down in to tractable portions can provide solutions and this involves a multidisciplinary approach with individuals taking responsibility for their own thoughts and actions. Individual constructs and understanding of nature may be shaped and influenced by cultural diversity and related factors*

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<sup>2</sup>These key dimensions of the biodiversity message are described in some detail in Chapter 3.

RQ 1 What are the current knowledge levels of Generation Y concerning the term biodiversity and how is it important and significant to their lives?

RQ 2 What are their levels of concern regarding biodiversity loss both on an individual and national level?

RQ 3 What role does race and culture play in student perceptions of biodiversity?

*A disconnect with nature or the extinction of actual experiences with nature*

The apparent disconnect between our natural selves and the environment has been exacerbated by high degrees of urbanisation and increasing mental and emotional stress levels (Alberti, *et al.*, 2003; Cilliers and Siebert, 2012; Swenson, 2004). Fear of outside spaces, elevated crime levels and lack of security coupled with the rapid development of digital and cellular technologies has effectively conspired to keep children from developed nations inside for longer periods of time thus leading to a physical disconnection with the natural world (Louv, 2005; Moss, 2012; Pyle, 2003; MacKerron and Mourato, 2013). Surveys of American children revealed that the average child could identify 1,300 corporate logos but only 10 plants and animals native to the bioregion (Curthoys *et al.*, 2007). Transferred to a South African context, an emergent developing country where the proportion of children and youth are rising, it is important to understand the level of their involvement that these groups have with nature and to increase the quality of these experiences (Stats SA, 2016; J. Roff, personal communication, 14 June 2011).

*Problem statement: Levels of disconnect with the 'real' nature begin in childhood and are continued into youth and adult phases with increasingly detrimental results.*

## *Urban green space provides opportunities to reconnect with nature and local biodiversity*

By 2030 more than 60% of the world's estimated population of 8.1 billion will be living in cities whose ecological footprint and impact far exceeds their size (Alberti, *et al.*, 2003:1167). Urban green space in the form of public parks, nature reserves and botanic gardens shelter a variety of flora and fauna and are important not only on a conservation level preserving local biodiversity they are green havens of tranquillity and offer an opportunity for individuals to benefit from first hand connections with nature (Williams, Jones, Gibbons and Lubbe, 2015; Ward, Parker and Shackleton, 2010; Cilliers and Siebert, 2012). Environmental education specialist Marianne Krasny describes using these spaces as opportunities for school, college and community learning within the city integrating lessons about biological and cultural diversity alongside stewardship and action (Krasny *et al.*, 2013: 633). The city of Durban has been recognised as a pioneer in the emerging discipline of urban ecology conserving 25 nature reserves within its municipal boundaries and developing a recognised open space system (DMOSS) that represents almost a third of the total municipal area (Boon 2007:10; Cilliers and Siebert, 2012: 3).

One of the study sites for this research, Pigeon Valley Nature Reserve (PVNR) is a representative remnant of Coastal forest nestled in the heart of suburbia (Boon, 2007; Hemson, 2015). The second study site selected for this research is the Durban Botanic Gardens (DBG) which is within walking distance of the DUT campus. Established in 1849 it is Africa's oldest surviving botanic garden and boasts superb collections of indigenous cycads, and arboretum of exotic trees and palms (Woodiana, 2013; McCracken, 1996). An estimated 2500 Botanic gardens are found in most large metropolitan regions worldwide and are visited by some 300 million guests per annum offering landscaped displays of labelled trees and ornamental plants in a park like setting (Williams *et al.*, 2015: 1610). These garden venues provide important arenas for plant conservation, biodiversity learning and community outreach (Tidball and Krasny, 2011; Williams *et al.*, 2015; Ward, Parker and Shackleton, 2010). South Africa has high levels of plant diversity with an estimated 23 000 indigenous plant species, of these some 771 plant species are used in

traditional African medicine (Mucina and Rutherford, 2006; Mander *et al.*, 2007: 189). Many South Africans are reliant on traditional medicine derived from indigenous plant species and this prior existing knowledge may assist the individual establishing personal links between culture and local biodiversity<sup>3</sup>. The potential for this is developed in this thesis.

*Problem Statement: City environments are often ecologically hostile but Urban green space provides accessible venues for individuals to connect with local biodiversity. Botanic gardens are popular but nature reserves are often less popular and may be underutilised. South Africa presents a vast array of indigenous plant material some of which are utilised in the production of traditional medicine often used by the bulk of the populace.*

RQ 4 What is the nature and frequency of student visits to either nature reserves or botanic gardens?

RQ 5 In what other ways do students like to connect with local biodiversity?

RQ 6 What is the extent of students plant knowledge and do they connect with traditional African norms such as medicinal plant use?

#### *Communication challenges and media preferences*

It is vital to realise that environmental issues are often eclipsed or marginalised by social and economic realities. Marketing specialists Ogilvy-Mather point out that many environmental issues do not rank as a priority for people and may be easily undermined by concerns such as the economy, healthcare, or social security, thus making it difficult to elicit public support (Coffin and Elder, 2005: 335-348; Bennett and Williams, 2011). Swiss surveys by Lindemann-Matthies and Bose (2008) indicate that the majority of respondents have never heard of biodiversity or eco-system services

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<sup>3</sup>The trade in traditional medicines in South Africa is estimated to be worth R2.9 billion per year, representing 5.6% of the National Health budget. With 27 million consumers, the trade is vibrant and widespread. The average frequency of traditional medicine use per consumer in South Africa is 4.8 times per year, with an average mass of 157g plant material per treatment (Mander *et al.*, 2007: 189).

and do not know what either term means<sup>4</sup>. Generation Y Students are the ultimate end users of all things digital and have eagerly embraced the cosmic reach of the internet through multiple SMT platforms in and out of the classroom (Goneos-Malka, 2012; Thinyane, 2010). Highly visual learners they avoid text heavy print documents and enjoy film, video and TV communication media (Oblinger and Oblinger, 2005; Chen and Bryer, 2012; Ashraf, 2009; Tapscott, 2009).

*Problem statement: The public and laity is generally unaware of the biodiversity concept which is eclipsed by more immediate pressing issues such as the depressed economy, terrorism threats and family and health needs. Living in a media saturated environment with a seamless flow of internet facilities and Social Media Technologies students may be biased toward entertainment and other options not biodiversity messages*

RQ 7 What is the preferred media of biodiversity communication and why?

### **Purpose**

The purpose of this study is to establish the exact dimensions of the DUT student's interactions, connections and perceptions of local Nature/ Biodiversity and to discover what is the best mode of communication to convey the biodiversity message to this target audience. The findings are used to inform a communication model that could be used at all South African Universities.

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<sup>4</sup>Recent European and American biodiversity surveys to the public are documented in Appendix 2. The student survey in this work is based in part on the EU Barometer 2010.

## **Research objectives**

Distilled from the above discussion and articulation of some of the main problems this work hinges around four main research objectives:

- 1 To evaluate and discover attitudes, perceptions and values toward nature and local biodiversity amongst Generation Y students currently studying at the Durban University of Technology (DUT);
- 2 To determine how Generation Y students would best prefer to connect with local biodiversity;
- 3 To ascertain the role print and electronic media can play in presenting the biodiversity message to Generation Y students, and;
- 4 To develop a relevant workable South African communication model that can be used to forge connections between Generation Y students and the natural world.

## **Thesis statement, terminology and exclusions**

This work postulates that Generation Y students studying at DUT have little or no idea about what biodiversity is, are unaware of the richness and beauty of local biodiversity but can respond positively when exposed to appropriate biodiversity communication and workshops on campus and as well as on site in locally accessible botanic gardens, and protected urban green spaces. This gives rise to the thesis statement:

*There is a significant disconnect between Generation Y Students and local biodiversity that can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media.*

The thesis statement is re examined at the end of this research in Chapter 8 in order to test its validity and relevance. The scope of work along with constraints and delineations now follows along with clarification of the key terms used in this work.

#### *Generation Y student sampling rationale*

The study confines itself to sampling student opinion from a single large University of Technology (UoT) on the eastern seaboard of the country that geographically and culturally is at the heart of the kingdom of the Zulus (KwaZulu-Natal) which is the countries second most populous province comprising some 11.1 million people (Stats SA, 2016: 23). The Durban University of Technology is representative of the provincial demographics comprising nearly 80% Black Africans with minority groupings of Whites, Indians and Coloureds (DHET, 2015; 21). The opinions expressed in this survey therefore will largely reflect an African paradigm towards nature and biodiversity and are not immediately and directly transferable to all other Universities in the country. This thesis does however provide a regional snapshot and insight into HE student perceptions concerning biodiversity, a topic not yet covered in the literature. A broader national sampling strategy is recommended for further research (Chapter 8).

#### *Terminology: Nature*

Given the broad panoply and understanding of the terms used in this thesis such as 'nature', and 'biodiversity communication' some qualifiers are required. Rather than focus on tidy definitions the conceptual framework that informs each term is briefly referred to. The Oxford dictionary refers to the noun 'nature' as:

*The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.*

<http://www.oxforddictionaries.com/definition/english/nature>

In the scientific sense it includes all biotic components (living organisms) and abiotic components (non living) rocks, oceans and atmosphere), in short the entire biosphere of planet earth as referred to by James Lovelock (2009) This may be a useful starting point however its interpretation depends entirely on the viewers social –historic cultural lens and vantage point (Weber and Schell, 2001: 490).

### *Differing Constructs of Nature- Different lens and meanings*

Examining differing historical and social constructs of nature is seen as foundational to this work since it assists in understanding the different divergent and convergent views inherent in the Western and African approach toward nature. Western views on wilderness, nature and biodiversity are well articulated in the worlds libraries, African perspectives are not. In terms of the former this thesis focuses on the writings of prominent American environmental historians such as William Cronon (1995), Donald Worster (1993) and Carolyn Merchant (1980, 2004, 2007). In the case of the later this thesis is guided by the thinking of Lawrence Magi (1986) Overson Shumba (1999, 2011) and Ian Player (1997).

A sceptic would argue that modern environmentalism is essentially and almost exclusively a product of historic events unfolding in the latter half of the nineteenth century in the American West. Cronon provoked an outrage with his influential essay “The Trouble with Wilderness” released in 1995. He demonstrates that the myth of American Wilderness is just that; a profoundly human creation of a *particular human culture at a particular moment in human history* (Cronon, 1995: 69). He is referring to the American Transcendentalists such John Muir (1836-1914) who were influential in shaping public opinion and establishing the first American parks (Cronon, 1995; Worster, 1993; Budiansky, 1996). Merchant examined the birth of Baconian science in the 1600’s and how this influenced Western thinking and evolved as a powerful context independent institution that is now the world’s dominant and foremost paradigm. Humankind thus moved from a holistic, organismic and ‘ignorant’ or ‘superstitious’ world view of nature to a more dispassionate objective method now employing linear and logical thought. This type of thinking led to the so called Cartesian duality of Humankind and Nature (the unknown and mysterious ‘Other’)

and in the authors opinion is amongst the roots of today's modern disconnect with the natural world (Merchant, 1980; Louv, 2005; Pyle, 2003; Gould, 1991).

The African paradigm toward nature is holistic and organismic, humankind is simply and was always part of nature, the world and its natural bounty bestowed on humans by the Almighty for the benefit of all. The approach is pragmatic and utilitarian not informed by deep philosophy and aesthetic considerations. The supernatural world is not discounted, the natural world continually interacts with the spiritual world, humans seek ancestral guidance and the natural flora and fauna are all imbued with significance (Magi, 1986; Shumba, 2011; Mbiti, 1970).

In summation, in this thesis the term 'Nature' is treated in its *broad sense of all its parts* as in the dictionary definition but is always interpreted by the *individual's cultural paradigm* as outlined above. It is also used broadly in association with term biodiversity and may replace it where appropriate.

#### *Terminology: Biodiversity Communication*

Etymologically the term 'biodiversity' is first defined and explained followed by a brief discussion on the combined use of the words to denote the specific type of communication that is central to this thesis. DeLong (1996) reviewed 85 different definitions of the word while Knopf (1992: 242) asserted that the definitions of biodiversity are "as diverse as the biological re-source itself." Ironically scientists themselves are unable to agree on the number of living organisms or species planet earth contains, it is generally accepted to be in the region of 8.7 million (Mora *et al.*,2011) however higher estimates of 30 million were extrapolated by beetle specialist Steve Erwin working in the Amazon rain forest (Erwin, 1991). 'Biodiversity' is simply a contraction of the words 'biological' and 'diversity'. The term first appeared in publication by entomologist and conservation champion E.O Wilson in 1988 and was deemed to be most effective as a unifying concept for all life forms (Haber, 2008; Noss, 1990, Novaceck, 2008).

The 1992 United Nations Earth Summit in Rio de Janeiro defined biodiversity 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.

This statement has been formally adopted by the Convention on Biodiversity or CBD an international body to which South Africa is signatory. Other simpler textbook explanations include, "the variation of life at all levels of biological organization." (Gaston and Spicer 2004: 3)

The following general explanation adopted for use in this thesis reads:

*It (biodiversity) includes the variety of living organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that keep them functioning, yet ever changing and adapting.*

Noss and Cooperrider 1994:5.

Wilson simplifies this into three levels or tiers. The first is the species level (the physical variety of living organisms), the next the genes or distinguishing traits and finally the ecosystems or habitats in which the organisms (plants and animals) are found (Wilson, 2013: 1). Given the above complexity of definitions it is no surprise that the term is not in current use amongst the laity or general public (Novaceck, 2009; Noss, 1990). *This thesis attempts to achieve a greater understanding of the term amongst students not primarily as a scientific definition but as an overall environmental concept that has relevance and adds meaning and value to their everyday lives* (Fischer and Young, 2007; Buijs, Fischer, Rink and Young, 2008; Bickford, Posa, Qie *et al.*, 2012).

### *Communication- Nailing down the terms and exclusions*

In examining the second term of 'communication' it too, is a broad construct with many tomes devoted to formulating communication theories tailored to fit a variety of purposes. Semiotics and associated theories pertaining to the mechanics of the communication process are *not* examined in this thesis. The widely accepted threefold marketing communication model of identifying the target audience, crafting the message and selecting the mechanism or media for delivery *is* used in this work. This model is endorsed by science communicators such as Novacek (2008:11572-11575) and interpretive practitioners and theorists such as Carter (2001) Beck and Cable (2011) and Verwerka (1994) who adds a fourth step that of receiving feedback from the audience.

The communication aspect of this work is also guided in part by Maura Navarro-Perez, and Keith Tidball (2012) who conducted a literature review of some 70 articles on biodiversity awareness, biodiversity education and biodiversity communication. Popular terms such as Environmental Education (EE) and Education for Sustainable Development (ESD) frequently come to the fore. These linked but historically distinct topics, while they add immense value to the biodiversity discourse are *not* examined in this work. Interpretive strategies of communication however are often used in botanic gardens and nature reserves to convey the biodiversity message in a site specific manner and are therefore the preferred mode for this study (Ballantyne, Packer and Hughes, 2008; Chang and Bisgrove, 2008; Ham, 2010; Navarro-Perez, and Tidball, 2012). Unlike EE the use of interpretive facilities is entirely voluntary, visitors select their own level of participation engaging with brochures, labels, outdoor signage and displays. Boosted by naturalist and educator Freeman Tilden's publication *Interpreting our Heritage* in 1957 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).

Tilden (1977: 5) 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.*

Freeman's quote encapsulates the *communication ethos of this thesis*, to encourage the establishment of first hand links between the individual and the natural world of biodiversity. This type of communication is open ended, not prescriptive adopting a constructivist approach toward knowledge allowing the individual to build on his/her own individual experiences and cultural constructs of nature.

### **Significance and Rationale**

While several large scale European and American biodiversity surveys (EU Barometer, 2010; Ogilvy and Mather, 2011, World Wide Views, 2012) have been carried out in recent years no single survey poll evaluating student's opinions and perceptions toward Biodiversity in South Africa has been carried out to date. Student spending polls and lifestyle polls are popular but these are directed largely toward informing marketing patterns and brand preferences (Naidoo, 2011; Bevan-Dye, Garnett and de Klerk, 2012). The unique contribution of this work will be to firstly to establish the level of knowledge, perceptions and values toward nature and local biodiversity amongst South African young people currently studying at the Durban University of Technology a bustling campus of some 20 000 learners at a major South African city (DHET, 2015).

Secondly this data forms the basis of discovering how to frame the biodiversity message in an exciting and visually fresh manner that Generation Y students can relate to using appropriate print and electronic media. Third a workable South African interpretation model will be posited. This adds value to sociologists, educators, conservationists and curators in Southern Africa who seek out ways to popularise science and make local biodiversity more meaningful and enjoyable to civil society. In a small way this study contributes to the larger global context of mainstreaming the biodiversity message to the public which is one of the stated 2010 Aichi biodiversity

targets emanating from the Convention of Biodiversity (CBD) convention of parties as part of the UN global strategy for the years 2011-2020. This work also ties in with other international strategies such as the Global Strategy for Plant Conservation (GSPC) which shares similar objectives of sensitizing the public to biodiversity issues in general and plant conservation in particular (GSPC, 2012; CBD, 2014).

## **Chapter Overviews**

### *Chapter Two – Theoretical aspects of biodiversity messaging*

This work begins by outlining the dilemma of the growing disconnect between modern society and nature and how Biodiversity loss affects human wellbeing on many levels. Nature was viewed as either malign or benign, alternatively vilified or worshiped. Major sociobiological theories were put forward to explain this chief of these being E.O. Wilson's Biophilia hypothesis whereby he postulated that humankind has an evolutionary and innate desire to associate with nature. This was followed by Tuan's concept of topophilia where humankind has developed an instinctive bond for and a love of the land a concept reinforced by Aldo Leopold's 'Landcare ethic' where humankind being part of the ecosystem takes responsibility for their own ethical behaviour and seeks to integrate with the natural (biotic and abiotic) world around them. Finally James Lovelock's Gaia hypothesis was examined where the biosphere itself was viewed as an organic self regulating unit. This theory found popular traction with the modern environmental movement and its holistic world view embracing both scientific and social paradigms has merit and meaning in biodiversity communication.

### *Chapter Three – Key dimensions of the biodiversity message*

Scientific definitions of the term biodiversity are probed here as well as its meaning and significance to the laity and members of the public. The mainstreaming and communication of the term has been articulated as one of the goals of the Aichi biodiversity targets to which South Africa is signatory. These goals developed by the Convention on Biodiversity (CBD) form part of the strategic global strategy from 2011-2020. Clearly a matter of international concern, the link between community

and ecosystem health has been emphasised by the Millennium Assessment Goals (MA) of the UN. Scientific dimensions of biodiversity loss in this country are briefly explored since South Africa is ranked as the third most biodiverse country in the world with its floral and faunal biota being a national asset. Species decline and habitat destruction are threatening the biological fabric of our lives since its citizens are fully reliant on the silent range of goods, services and benefits that biodiversity provides. Running parallel to these biological concerns are the historical and social cultural constructs of the human/nature interface. Classic writings and ideas from the great American Wilderness were briefly examined since these form the basis of much modern environmental thought. Contrasting these ideals African ontology's toward nature were probed in detail with their divergent paradigms from Western culture and Science. Understanding these ideals is vital since the student audience at DUT is largely made up of African learners.

#### *Chapter Four - Generation Y and Biodiversity Communication*

A profile was then constructed of the so called Generation Y (those individuals born between 1981-1999) the target audience of students drawing on international data from American, UK and Australian universities. Social commentaries either praising their creativity, inventiveness and flexibility or excoriating their laziness, narcissism and self absorption were presented. Defining traits and attitudes were summarised providing a picture of a supremely confident postmodern generation with considerable ability to influence society. This generation responds positively to seamless social media technologies (SMT's) and multiple use internet and cell phone platforms. Student ICT habits at some major South African Universities were examined in order to benchmark and further inform this study. Since biodiversity has been described as a messy intractable problem, current challenges to biodiversity communication were identified and explained followed by solutions and strategies to more clearly articulate the message. These included lessons from global surveys internationally and locally in the form of SANBI's recent Making The Case for Biodiversity campaign (MTC) and the use of Nature 2.00 technologies whereby conservation agencies and institutions utilise cutting edge ICT innovations to engage young people with local biodiversity.

## *Chapter Five - Research Methodology*

This chapter begins by defining the importance of selecting the correct meta theory or paradigm lens with which to view the research problem of this interdisciplinary study. Science adheres to a positivistic approach while humanities and arts tend toward theories that are constructivist and postmodern in nature. Part of the solution lies in bringing together the two paradigms in the mixed methods research design. The rationale for this is then explained and the *modus operandii* of the research methodology outlined. Phase One of the research gathers empirical data using a survey instrument to test student responses to questions designed to meet the key research objectives; namely the extent and interest of Generation Y in biodiversity and some indication of the preferred media students could use to better connect with nature. This statistical data was then to be processed and analysed as a discrete set of results in chapter 6. Phase Two of the research involved the use of focus groups in the qualitative gathering of data. This provided a forum for student voices and narratives to be recorded and added to the debate. The focus groups were to meet on three occasions, the first briefing involved a set of discussion questions designed to elicit frank responses to the topic, the second involved a guided field trip to Pigeon Valley Nature Reserve (PVNR) and the Durban Botanic Gardens (DBG). The former is a pristine suburban remnant of Durban Coastal forest located below UKZN Howard College and the latter a premium botanic gardens found in the heart of Durban's Berea. The significance and attraction of each site is described in some detail. The final session involved the submission of student posters documenting their personal connection with biodiversity at the study sites. The findings were documented in chapter 7.

## *Chapter Six- Findings, results and analysis of Phase One – Surveys*

The chapter details how the survey was prepared in accordance with the research objectives and rolled out across the six faculties of DUT to obtain a representative spread of opinions. Non probability sampling or convenience sampling was used and 428 valid student responses were received and processed with data entered manually, first into Excel spreadsheets and then for statistical analysis using SPSS V

24.00. Divided into four discrete units the survey first examined student demographic data, then explored aspects of understanding and interest in the biodiversity topic. This section was modelled in part after the EU Barometer Biodiversity survey of 2010 and adapted for local conditions. Thirdly actual experiences with biodiversity, student visits of nature reserves and botanic gardens were recorded and finally the virtual connection with nature was questioned to determine student media preferences such as television, internet and print platforms. The survey was validated statistically using Cronbach's Alpha test and factor analysis. The resultant data is presented textually and graphically in the form of descriptive frequencies, and inferential statistics derived from cross tabulations and Chi squared testing methodologies (Appendix 5). Findings and sub conclusions are presented for each of the four sections and a concluding summary prepared. Overall the students responded positively to the survey indicating significant levels of interest in the biodiversity message. Respondents demonstrated strong cultural linkages with nature through the traditional use of medicinal plants. Lower levels of actual connection with nature were observed especially in the use of nature reserves. Higher visitor levels to botanic gardens were recorded. Students indicated high levels of virtual connection with nature via broadcast media such as television but limited enthusiasm was recorded for the viewing of nature content in SMT applications using cell phone and internet technologies.

#### *Chapter Seven - Findings, results and analysis of Phase Two –Focus groups*

The purpose, *modus operandii* and composition of the focus groups are detailed followed by an explanation of the method and structure used to systematically record, interpret and analyse the discussion. Informed by best biodiversity communication practise and the work of researchers in the USA (Farrior, 2005), UK (Fischer and Young, 2007) and Europe (Buijs, *et al.*, 2008) a discussion guide of seven questions was devised to elicit honest and frank student responses. Each question related to aspects of three umbrella topics namely Benefits and functions of biodiversity, biodiversity communication and lastly aspects of the human /nature relationship. Four focus groups were convened drawn from the faculties of Fine Arts and Design, Applied Science, Health and Engineering and the Built Environment. The results from

each group were synthesised and verbatim comments were selected for this chapter followed by a discussion and analysis relating to each question. Successful field trips to each study site took place and students recorded their interactions with biodiversity in the form of A2 posters. Full details of the focus groups, the transcripts and selected posters are contained in Appendix 6. A summary of results was presented at the conclusion of the chapter outlining the findings. The findings were instructive in terms of how and where students wished to engage in nature activities, their perceptions of the term biodiversity as well as the voicing of significant cultural differences between Black and White conservation paradigms.

### *Chapter Eight - Conclusions and recommendations*

The final chapter weaves the various strands of evidence presented into a cohesive whole and examines the extent to which the research objectives were achieved. The validity of the thesis statement postulated in the introduction is revisited, tested and amended in the light of the primary data presented by the student survey and focus groups. The chapter begins by synthesising the findings of research phases one and two and relating them to the original study objectives. Second, key conclusions regarding the thesis statement are presented relating them back to the literature reviewed. Thirdly by building on these findings a South African model for biodiversity communication to students in the HE ambit is proposed and finally areas of future research arising from this work are suggested. These include a nationwide rollout of the student survey in order to gain a more even and accurate picture across all university campuses as well as suggesting an in depth examination of the use of SMT's as a vehicle for communicating the biodiversity message more effectively to university students.

## **Conclusion**

Having provided a contextual background for the topic, and a brief elucidation of this 'wicked and messy problem' called biodiversity messaging we moved on to the development of the research objectives and the refinement of the central thesis statement around which this work is built;

*There is a significant disconnect between Generation Y Students and local biodiversity that can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media.*

The chapter overview then provided a glimpse into how this work will further unfold as we seek to unravel the tangled skeins that comprise this messy but significant issue that affects the lives of all South Africans. The spotlight of focus shines specifically on the student population of Generation Y within the Higher Education (HE) sector at the Durban University of Technology (DUT). The literary review that now follows is presented as three distinct but linked chapters. Chapter 2 introduces theoretical aspects of biodiversity messaging; chapter 3 surveys key dimensions of the biodiversity message, the scientific, historic and cultural aspects while chapter 4 investigates the characteristics of the audience Generation Y and reviews current challenges in communicating the message to this particular age group. As Lewis Carol says "Begin at the beginning and go on till you come to the end: then stop."

## Chapter Two: Theoretical aspects of biodiversity messaging

### Introduction

Robert Thayer, the American landscape architect believes that the bond of affection tying humans with the earth has always been strong but also elusive and that a crisp definition of our affection toward nature is nigh impossible to locate – we learn about it by circumscription of the territory from many vantage points (Thayer 1994:3). This thesis follows this argument and the literary review records these multiple viewpoints, the different lenses through which humanity views nature and biodiversity that provide the contextual and theoretical framework for this particular research.

This literary review is presented as three chapters. Chapter 2 introduces a theoretical base highlighting key aspects of biodiversity messaging; chapter 3 surveys key dimensions of the biodiversity message, the scientific, historic and cultural aspects while chapter 4 investigates the characteristics of the audience Generation Y and reviews current challenges in communicating the message to this particular age group.

There are two broad clusters of theories on which this research is grounded and which inform the conception and *modus operandi* of this thesis. The first cluster concern socio-biological theories explaining humankind's innate link with nature. These relate to the primal need for humans to connect to nature namely Biophilia, Topophilia and Gaian theory. The second cluster of theories relate to communication in a post-modern world. Current theories of postmodernism describe the context of our millennial society and speaks to the nature and characteristics of Generation Y students.

### Sociobiological theories

Sociobiology attempts to explain various facets of human behaviour maintaining that gene selection and evolutionary factors play a determining role in the development of advantageous social behaviour, including in this context our relationship with nature and the environment. Edward. O. Wilson is generally credited with coining the word

at a 1946 conference on genetics and social behaviour, and later unpacking his theories in his 1975 book, *Sociobiology: The New Synthesis*. Evolutionary psychology emerged out of the nature/nurture debates that followed. Sociobiological meta theories and their various refinements such as biophilia and topophilia inform the biodiversity debate and are central to this thesis.

*The Biophilia hypothesis: Love of life... Love of Nature*

E.O. Wilson, ecologist and an entomologist remains biodiversity's most vocal and quoted champion. He drew attention to the notion that human well being was inextricably linked to Nature and remains an intrinsic and genetic component of our evolutionary history. He explored the intersection of art, biology, religion and psychology in a collection of self contained essays published in 1984 under the title *Biophilia*. Wilson describes the nature and significance of the biophilia hypothesis as follows:

*Biophilia – the innate tendency to focus on life and lifelike processes.... To explore and affiliate with life is a deep and complicated process in mental development ... our existence depends on this propensity, our spirit is woven from it, hope rises on its current. To the degree we come to understand other organisms we will place a greater value on them, and on ourselves.*

Wilson, 1984: 23

The term "biophilia" literally means "love of life or living systems." It was first used by social scientist Erich Fromm to describe a psychological orientation of being attracted to all that is alive and vital (Fromm, 1964). Biophilia describes "the connections that human beings subconsciously seek with the rest of life." The term has also been explained as the 'urge to affiliate with other life forms.' (Kellert and Wilson, 1993: 416). The word '*philia*' is a derivation from the Greek word for friendship, love and admiration, it is the exact opposite of a '*phobia*' which originates from the Greek *phobos* meaning fear or flight (*Readers Digest Great Illustrated Dictionary*, 1984: 1280). Human beings of course are capable of experiencing both emotions. Nature may be viewed as benign (in its extreme forms a lover to be embraced and even

worshipped) or malign (a vicious, untamed beast that needs to be subdued). The historical and cultural roots of these emotions have been described in great detail by Western environmental historians such as William Cronon (1995, 2005) Donald Worster (1993) Carolyn Merchant (1995, 1980) Max Oelschlager (1991) David Pepper (1996) Roderick Nash (1967) and Ian Simmons (2008). The collective distilled wisdom from these authors has direct influence on this thesis forming the basis for understanding the prevailing Western paradigm toward science, conservation and the environmental movement.<sup>5</sup>

Wilson infuses the realm of hard biological science with a sense of mystery, awe and wonder: "The living world is the natural domain of the most restless and paradoxical part of the human spirit. Our sense of wonder grows exponentially: the greater the knowledge the deeper the mystery and the more we seek new knowledge to create new mystery" (Wilson, 1984:10). In developing a deeper conservation ethic Wilson advises a formula of re enchantment with the natural world, an invigoration with poetry and myth, a willingness to, "explore mysterious and little known organisms living within walking distance of where you sit. Splendour awaits in minute proportions." (Wilson, 1984:139). Local Nature reserves such as the study area of Pigeon Valley Nature Reserve (PVNR) 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: 10). 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).

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<sup>5</sup>A selected background narrative of environmental history is provided in Appendix One.

Evolutionary biology explores further the universal connections that individuals make with natural environments. Thus, according to proponents of biophilia: (a) Biophilia has been adaptive in our evolutionary history, (b) biophilia is still today woven into the architecture of the human mind, and (c) the human species cannot achieve its full measure of sensibility and meaning apart from the natural world (Kahn, Severson and Ruckert, 2009). Wilson is joined by other voices within the conservation debate that emphasise the need for a personal connection with Nature. Stephen Gould writing in *Natural History* described the necessity of forging emotional bonds between ourselves and Nature in the following lines:

*We cannot win this battle to save species and environments without forging an emotional bond between ourselves and Nature as well - for we will not fight to save what we do not love.*

Gould, 1991: 14

Similar sentiments have been expressed by British naturalist and film maker Richard Attenborough (2010) who declared in a recent address *to the British Natural History Consortium* “No one will protect what they don’t care about; and no one will care about what they have never experienced.”

Likewise Stephen Moss (2012) in a report to the British National Trust (Europe’s largest conservation organisation) has highlighted the critical role of early childhood experiences with Nature in formulating life-long connections with the outdoor environment. He presents compelling evidence of a widespread Nature Deficit Disorder prevalent amongst children and young people in the UK. David Orr (1992) also suggests that a closer examination elicits associations, fascinations and sensory experiences of Nature that are actually stitched into their childhood and early adult memories (Orr, 1992: 487). These experiences and personal narratives are precisely what motivate environmental concern, an early, deep and vivid resonance between the natural world and ourselves (Orr, 1992: 487). The inestimable value of childhood experiences with Nature has been underscored by numerous reports and writers (Moss, 2012; Louv, 2005; Pyle, 2003; Kahn Jr, 1997). The idea of drawing out Nature narratives forms an integral part of this research where individuals within focus

groups are encouraged to share anecdotal evidence of personal connections with Nature. This echoes in part with methodologies used in biodiversity studies conducted in Scotland (Fischer and Young, 2007), Australia (Davison, 2008) and in the USA with the Biodiversity Project (Farrior, 2005).

### *Criticism of the biophilia hypothesis*

Social scientists were quick to denounce Wilson's reductionist model as compressing an understanding of the full range of human behavioural diversity, others felt the inferences drawn from human socio-biology to be ethically out of bounds but the overall criticism was misinformed poaching on the private property of the social sciences (Joye, and De Block, 2011; Harmon, 2007: 381). Critics of the term biophilia assert that it sounds more like a disease than a positive human condition and Kahn *et al* (2009) questions whether biophilia has been cast so broadly that it can never be dis-confirmed. Kahn *et al* (2009; 39) however go on to assert its usefulness "as a broad construct that helps to generate hundreds of important testable empirical questions and gives voice to the importance of the human–nature affiliation." Wilson's Biophilia theory however still underpins this research on a conceptual level accommodating the more nuanced narratives that emerge from qualitative study, interview and focus groups. We now examine the second sociobiological theory of mankind's innate kinship with the land.

### *A natural sense of place – Human kind in the landscape*

Finding our biological niche in the landscape, the correct habitat or place is another important extension of Wilson's hypothesis. Arguing as an evolutionist he states that certain key features of our ancient habitat and primal landscape actually match choices made by modern human beings. Wilson bases his argument on the premise that two million years ago the natural habitat of man was the open grass savannahs of the African plains and subsequent to that the park like grasslands of Europe and Asia dotted by groves and scattered trees (Wilson, 1984: 110). In general terms the extreme habitats of dense forests and deserts were avoided. Gordon Orians an independent scientist confirmed the ancestral habitat contained three key features, firstly a large open space savannah with an abundance of plant and animal food,

second some topographic relief such as hills, cliffs and vantage points to conduct surveillance. Finally lakes, rivers and sheltering bodies of drinking water were desirable where shorelines became natural perimeters of defense. Wilson proposes that not only are these elements ingrained in our physical make up but they are also embedded in our psyche. These three elements have now become largely aesthetic and a spur to art and landscaping. Open tree studded land on prominences overlooking water is our biological and psychological ideal (Wilson, 1984: 110).

Similar research on idealised landscapes has been carried out by town planners and landscape architects, garden designers and wilderness trail developers who are bringing together both psychological and biophysical data to develop a complete picture of the human experience in the landscape (Arrowsmith, Chhetri and Jackson, 2004; Hull and Stewart, 1995 and Kaplan and Kaplan, 1989). 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 (in Arrowsmith, *et al.*, 2004). Kaplan and Kaplan (1989) translated the psychological benefits of the natural environment into a suite of landscape patterns based on observation of peoples 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.

The National Parks Services (NPS) in America places great emphasis on grading the different parks or protected wilderness areas according to their scenery. In an attempt to measure the aesthetic experience of the landscape US Forestry researchers Brush and Shafer (1975) developed a mathematical model that could be fitted with variables measured from responses to photographs of natural scenes to gauge favourable human response to various landscapes (in Thayer, 1994: 6). As a result of this work the US Bureau of Land management and the US Forestry department developed a scenic quality rating classification for the major landforms,

vegetation and water including characteristics such as colour, adjacent scenery and degree of cultural modification. Such ratings were used as standard models guiding recreational and tourist activities and destinations in American Parks and Forests. (USDA Forestry Service, 2008). Interpretation material and signage were carefully sited at suitable pull off zones for visitors to view and photograph (CDI, 2008; Edwards, 1994). In an attempt to understand human behaviour toward the landscape Richard Chenoweth and Paul Gobster (1990) asked their landscape architecture students to record their aesthetic experiences and emotional response on exposure to natural landscapes. Their findings showed that aesthetic experiences often occurred unexpectedly and suggested that opportunities should be provided for people to experience Nature in their home environments as part of their everyday activities (Chenoweth and Gobster, 1990: 8). Similarly William Cronon supports the idea that personal connections can be made with nature in one's own neighbourhood or backyard and such discoveries are not limited to exclusive isolated wilderness destinations such as Yosemite and the Grand Canyon (Cronon, 1995: 89).

*This thesis supports Cronon's hypothesis that personal connections with nature and biodiversity can be made at local venues such as public gardens such as the Durban Botanic Gardens (DBG) and urban nature reserves such as Pigeon Valley Nature Reserve (PVNR).*

Developing and understanding an individual sense of place, a, personal *genius locii*, is a key theme in this work as the author invites students on a journey of discovery into the local gardens and Nature reserves surrounding their campus. These remnants are a carefully designed recreation, a microcosm of our ancestral homes. Gardens and the consciously designed and planted landscape are simultaneously a manmade copy or simulacra of the natural environment and a venue where the visitor can engage in new sensory aesthetic and spiritual experiences with nature and biodiversity (Ballantyne, Packer and Hughes, 2008; Thayer, 1994). Ideas concerning man and his relations to the landscape have been expounded by eminent authors as Jeffrey Jellicoe (1975) *The Landscape of Man* and more recently by practising landscape architects around the world who seek to contextualize their

professional practise and create environments that appeal to mankind's innate biological and psychological senses.

### *Love of Nature - love of the land*

Kinship or affiliation with the land is supported by other cultures and authors. For ancient Hawaiian's this bond was a way of life called 'aloha aina', love for the land (Thayer, 1994). African culture too expresses a strong bond with the land, it is common property for all and cannot be bought or sold (Magi, 1986: 116). In North America Aldo Leopold described it as a 'land care ethic' as he argued the case for wilderness preservation in the 1920's and 30's. In a pioneering article in 1923 Leopold wrote of the "indivisibility of the earth – its soil, mountains, rivers, forests, climate, plants and animals", encouraging the reader to "respect it collectively not only as a useful servant but as a living being" (Leopold, 1979: 140).

Another useful description describing this bond with the land is the term 'topophilia' coined by geographer Yi- Fu Tuan in 1974. The term essentially refers to love of landscape either pure wilderness or the landscapes of human altered geography and includes a range of possible emotions under this rubric often coupling sentiment with place (Thayer, 1994: 4). Topophilia concerns "the affective bond between people and place or setting ... the human love of place" (Tuan, 1974: 4, 92). Robert Thayer (1994), a conservationist and landscape architect borrows the term extensively in his book *Grey world, Green Heart* where he fuses his observations of the American natural and manmade landscape with environmental history and philosophy.

Thayer finds more congruence with topophilia or love for the land and sees E.O. Wilson's construct of biophilia as limited more to the plants and animals. James Lovelock's Gaia hypothesis of the earth as a singular living self contained entity has been a powerful influence on the environmental movement since its inception in and can arguably present an overarching paradigm for both Wilsons and Tuan's descriptions both of which find historical roots in the writings of Leopold and the American transcendentalists. Thayer's writings are pertinent to this study in that he believes Topophilia has individual as well as cultural significance and may well break through to the level of consciousness when one feels a keen sense of a bond with

the earth, a nurturing moment of release with ones worries draining away (Thayer, 1994: 6).

Evolutionary theories of human attraction toward the landscape have been also been proposed by David Pitt (1982) Rene Du Bos (1980), Balling and Falk (1982) E.O. Wilson (1994) and Stephen and Rachel Kaplan (1989, 1985). In brief their conclusions are remarkably similar, man has an innate attraction for savannah type environments - grasslands studded with trees, patches of forests to grant refuge, promontories or high places and vistas from which to observe enemies and water for rest and sustenance. It is therefore generally accepted that the common suburban landscape park consisting of scattered trees and green grass is such a universally sought after model for open green space (Thayer, 1994: 12). Theories of topophilia have local implications for this study when it comes to the aesthetic design of botanic gardens (DBG) and nature reserves (PVNR) and how they are experienced by their (student) visitors. A brief review of Gaian theory completes the sociobiological cluster.

#### *Gaia Theory: The nexus of Science, metaphor and myth*

Originally developed in the early 1970's by James Lovelock an astrophysicist employed by NASA to search for the possibility of life on Mars this theory of the Earth as a unique self regulating complex system was initially received with scientific hostility but soon gained rapid acceptance and popularity with the environmental movement particularly after the publication of *Gaia: A new look at life in Earth* in 1979 (Ogle, 2009: 276). A brief description of Gaian theory is relevant to this thesis in that it provides an overarching theoretical framework reconciling sciences and humanities in a united vision appreciating the beauty and complexity of organic and inorganic life on Earth. Environmental educator Martin Ogle presents the case for Gaian theory by demonstrating the value of the empirical scientific model and simultaneously expanding the metaphor of Gaia as a powerful influence within philosophical, ethical and cultural studies (Ogle, 2009: 277). Lovelock himself describes Gaia as "The earth seen as a physiological system, an entity that is alive at least to the extent that, like other living organisms its chemistry and temperature are

self regulated at a state favourable to its inhabitants” (Lovelock, 2000:1). Lovelock used the mythical term ‘Gaia’ as derived from the primal Greek earth goddess ‘Mother Nature’ after a suggestion by novelist William Golding (Lovelock, 2009:197).

The idea traces its origins to James Hutton, one of the key consolidators of modern geological science in the eighteenth century who maintained that geological processes and biological processes were linked (Capra, 1996:23). Scientific research by Lovelock and microbiologist Lynn Margulis demonstrated that many life forms, especially microorganisms are dependent on their interaction with the inorganic elements and that together these processes form a global control system that regulates Earth’s surface temperature, atmospheric composition and ocean salinity contributing to an overall state of homeostasis<sup>6</sup> (Kleidon, 2004: 272).. Lovelock proposed a feedback loop operating between ocean ecosystems and the earth’s climate regulated by temperature responsive phytoplankton (Charlson, Lovelock, Andrea *et al.*, 1987:655). Apart from the mechanics of the science Gaian theory adds value to the biodiversity message in that it offers the layperson *a unified framework of the universe and the planet showing the holistic face of science* (Baarschers, 1996:10). It also demonstrates a welcome reversal of the mechanistic hold that Baconian and Cartesian reasoning has had on scientific thinking for the last 400 years offering a return to a more organic view of nature and nurturing original values of love, respect and stewardship of a living Earth.

Gaian theory has been labelled by critics as a New Age construct but finds broad currency amongst both Western and African world views of nature. Mphahlele (1974) writes that in an African world view Man, society and nature are perceived as a single organic unit - “one huge complex of life’ involving an interplay between the supreme being, human beings, animals, earth, river, mountains and forest.” (Mphahlele, 1974:14). This African writer goes on to maintain that nature will make us whole if we are spiritually at peace with the Supreme being and all living things. Ian Player conservationist and founder of the Wilderness Leadership School in Zululand forms

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<sup>6</sup>*Homeostasis*, a term derived from the Greek simply means staying the same and is also applied to the way in which human temperature stays constant in spite of external fluctuations and threats

an interesting bridge between the American conservation and environmental ethic and local Zulu culture and attitudes toward Nature. Player acknowledges the key role of science in the modern world but underscores the need to retain a vibrant emotional connection with nature. Describing his inner psychological journey Player declares 'there is this ancient goddess within us all and she's coming back. There is this return to the recognition of the feminine, of the earth as the ultimate mother. There's nothing soppy or sentimental about that, it's real.' (Cock and Koch, 1991: 229). Historically Gaian theory was embedded in the language of environmental activism and Deep Ecology but has found acceptance in mainstream environmental text books. It adds value to this thesis as a powerful if somewhat subjective and emotive metaphor that both White and Black students can relate to.

### **Key characteristics and considerations of a post-modern world**

#### *Post modern thought: A maelstrom of options*

It would be accurate to say that *all activities taking place within this proposed research do so within the framework of a chaotic postmodern world.* In analysing the theoretical and philosophical implications of postmodern debates market researchers A. Fuat Firat and Nikhilesh Dholakia (2006:123) argue that Postmodernism's call to accept and appreciate difference has often been misinterpreted as an invitation to 'anything goes', that there is no single preference for any position. As analysts Firat and Dholakia (2006:123) assert postmodernism merely recognises that various communities will have preferences for different ways of being and living, and that these preferences will most likely be for a multiplicity of modes rather than for a single mode of being or living. Amaleya Goneos-Malka (2012) explains that a postmodern world view supports the notion that social realities are dynamic, forming and reforming in response to environmental stimuli. A closer examination of each post modern element correlates almost exactly with the Generation Y profile as detailed in chapter 4. Market researchers Goneos-Malka, Grobler and Strasheim (2013: 125) reviewed the shift in knowledge orientation from modern to post modern thinking. Modern thinking embraced objective knowledge, universal laws and absolute truth. Meaningful generalisations could be made from empirical research

and the Grand Narratives of history and progress, truth and freedom, the triumph of Reason over Emotion and the infallibility of Science<sup>7</sup> was revered (Goneos-Malka *et al.*, 2013: 125). The postmodern thinking is characterised by subjectivity, irrationality and a lack of universal laws. Grand Narratives are rejected and individuals are involved participants not spectators (Goneos-Malka, Grobler and Strasheim 2013: 125).

### *Communication in a post modern world*

Seven key elements are isolated primarily from a postmodern marketing communication perspective and their relevance to communicating the biodiversity message is demonstrated. These include fragmentation, dedifferentiation, hyperreality, chronology, pastiche, anti-foundationalism and pluralism. The boundaries between these traits are not mutually exclusive and may coalesce and merge. Goneos-Malka, Grobler and Strasheim (2013) write that fragmentation refers to chaos, the dissolution of established systems and lack of commitment to any particular course. This becomes evident in communication modalities where a universe of diverse media offerings are presented ranging from traditional print and broadcast media to the ubiquitous internet and mobile cell phone. Here connectivity becomes the ultimate expression of fragmentation, a world of communication clutter, obsessed with an incessant concentration on the passing media (Goneos-Malka, *et al.*, 2013:130). The possibilities of developing tailored biodiversity communication using internet and Social Media Technologies (SMT's) is explored in chapter 4.

Dedifferentiation is closely related to fragmentation where disintegration of existing domains resulted in a new synthesis and reconstruction. Dedifferentiation blurs and diffuses the boundaries between fragments and may contribute to the acceptance of cultural diversity another postmodern trait (Firat and Dholakia, 2006: 130). Barthon and Katsikas (1998) observe that the internet is a 'master de differentiator' dissolving multiple boundaries such as geography, gender, time, commercial and private lives

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<sup>7</sup> Contrasting paradigms of African and Western science are recurring themes in this work. The relevance of this is highlighted in recent HE student demands for a 'decolonized education' and indeed one that does not include 'science' at all. See Youtube link

and fact and fiction (in Goneos-Malka *et al.*, 2013: 131). Hyperreality was a concept developed by French social critic Jean Baudrillard who sought to extract meaning from our post modern society. Here 'copies' of physical environments and social events have replaced the original referents (Baudrillard, 2006: 453; Thayer, 1994: 197). In the context of urbanised nature it may be argued that the intentionally designed landscape has always been a simulation of reality- a carefully designed replica of nature which has its roots in the Persian tradition of gardens of pleasure or Paradise, the original Edenic narrative described by environmental historian Carolyn Merchant (1980). Lines between original and fake, fantasy and reality become blurred and dissipate (Thayer, 1994: 209). The reversal of fantasy and reality is evidenced when science no longer reveals the real but the unfathomable - Global warming, ozone holes, ecosystem services, carbon sequestration even the term biodiversity become increasingly abstract, invisible and unreal (Thayer, 1994: 215).

In defining the next trait of Chronology postmodernists encounter a paradox between an addiction to the 'here and now' an addictive desire for unlimited speed and access to computer mediated technology and social media technology or SMT's (Goneos-Malka *et al.*, 2013: 135). These tendencies corroborate almost exactly with Generation Y student behaviour, a compulsion to simultaneously scan, browse and operate multiple IT devices at 'twitch speed' (The Pew Study, 2010; Tapscott, 2008; Oblinger and Oblinger, 2005). Since the Grand Narratives of Technology and Science saving humankind have been spurned, efforts are now turned to finding *meaning* and *substance* in the present. One of the drawbacks inherent in this postmodern trait is it produces a constant stream of frenetic activity, a state of mind diametrically opposed to the peace, silence and solitude found in nature (Pyle, 2003).

Pastiche is the mixing and recombination of various aspects of different cultures. It refers to an eclectic mishmash, and collage of various aesthetic styles across different domains (Goneos-Malka, 2012:66). Generation Y uses the term 'Mashable content' to describe internet images, text and videos that can be edited, altered, recycled and redistributed according to the users taste (Goneos-Malka *et al.*, 2013:136). The creative aspects of pastiche can enhance biodiversity communication that is fun and culturally relevant to Generation Y students. The final two traits are

Anti-foundationalism and Pluralism. Brown (1995:107) relates these attribute to be postmodernisms deconstructive urge, an antipathy toward orthodoxy, complacency and the establishment. Anti-foundationalism finds full expression in the activities of Green Peace, Earth First, Deep Ecology and other forms of environmental activism as described in the historic narrative of this thesis (Appendix 1).It is the urge that drives Postmodernism, while rejecting the overall Grand Narratives of science, socialism and humanism as a single solution now seeks out multiple points of view, multiple realities and multiple truths accepting plurality and diversity as healthy and needful (Firat and Dholakia, 2006: 126; O' Shaughnessy and O' Shaughnessy, 2002: 119). Pluralism is the final defining trait of post modern society and particular attention is paid in this thesis to understanding cultural differences between Western and African constructs of Nature.

## **Conclusion**

This theoretical review has reinforced the relevance of sociobiological theory to this work as a broad construct within which to operate. While imperfect and open to interpretation these provide a means of understanding our innate attractions to living things (biodiversity), the land (topophilia) and an overarching view of the entire biosphere (the Gaia metaphor). We have also briefly reviewed key concepts concerning the complex character of our post modern world. These principles will be further refined and measured against the findings from the survey and student focus groups (Chapter 6 and 7). We now examine the literature concerning key aspects of the biodiversity message, the scientific, social, cultural and historical dimensions that frame the Nature debate.

## Chapter Three: Key Dimensions of the Biodiversity message

### Introduction

This foundational chapter expands on two major dimensions that inform the biodiversity debate, firstly the scientific dimensions are outlined in some detail, the factual realm of empirical science and the irreplaceable value of biodiversity to mankind is demonstrated, secondly a thematic exploration of the key social, cultural and historic influences that affect individual's perceptions of Nature and biodiversity are described.

An examination of the scientific dimension begins with defining the origins and meaning of the term Biodiversity followed by a brief description of how Biodiversity richness is distributed globally, nationally and locally. The relevance and value of Biodiversity to human wellbeing at various levels is then underscored. Biodiversity loss and protection is then discussed together with what Pyle (2003) has termed the 'extinction of experience' a growing and alarming global disconnect between humans and their Natural world. These critical social facets of what Sharman and Mlambo (2012) describe as a 'Wicked problem' are then probed more deeply in the second section.

The social and cultural dimension that follows examines major themes in Western environmental literature that influence how the biodiversity or Nature message is conceptualised and communicated. Nature is viewed through cultural lenses as either malign or benign depending on the particular and unique socio-historical context. Since most of the literature originates almost exclusively from a Western paradigm and world view it becomes necessary to carefully examine African cultural attitudes and perceptions toward Nature, Wilderness and biodiversity. These are presented in order to arrive at a more complete understanding of the problem and has direct relevance to this study in that a high proportion (81%) of the students being surveyed at the Durban University of Technology are Black Africans (DHET, 2015).

A selected historic narrative provides an overview of the events and individuals that were to shape popular Western thinking and develop the new sciences of conservation biology from which the term biodiversity springs. This narrative is presented in Appendix 1.

## **Scientific dimensions**

### *Biodiversity communication – One of the Aichi global targets*

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 term 'Biodiversity' emerged from this conference and is simply a contraction of the word biological diversity. Most global increased signatories are now undertaking activities related to increased communication, education and raising public awareness of biodiversity.

The Tenth Conference of Parties (COP10) to the CBD held in Nagoya, Japan in October 2010 set detailed strategic global plans for 2011-2020 (CBD, 2010). The CBD describes the vision for the new plan as: " 'Living in Harmony with Nature' whereby 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people." (CBD, 2010). These plans are now referred to as the Aichi biodiversity targets to which South Africa is signatory (SANBI, 2013).

Twenty strategic targets are derived from each of the five goals however *the scope of this thesis concerns itself primarily with the first goal and the first of its strategic targets namely: “Ensure all people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.”(COP10, 2010).*This thesis then is linked in to the mainstreaming of biodiversity across civil society, a global and national imperative. As such it makes a small but vital contribution to understanding how Generation Y students perceive and relate to local biodiversity.

*Defining biodiversity – is it just another word for Nature?*

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

This somewhat cumbersome expression is not easily accessed by the general public who may feel excluded by the scientific literacy and ecological language required to understand the statement (Sharman and Mlambo, 2012; Novacek, 2009; Haber, 2008; Noss, 1990). E.O. Wilson one of biodiversity’s most enthusiastic champions expressed it more simply. Scientists divide biodiversity into three levels. At the top are the ecosystems, for example, meadows, lakes and coral reefs. Below it are the species that make up each of the ecosystems. At the base are the genes that prescribe the distinguishing traits of each of the species (Wilson, 2013:1). Since the species is the most easily understood component of the biodiversity trinity (the other two items being genetic and ecological diversity) it warrants careful scrutiny (Budiansky, 2006; Haber, 2008). Researchers have established that members of the public are more easily attracted to the endangered and instantly recognised mammalian megafauna of the planet, the panda and polar bear, the rhino and the elephant (Lindemann-Matthies and Bose, 2008; Walpole and Leader Williams,

2002). Alexander Cockburn describes the real value of biodiversity in the following words:

*Unknown plants and insects may touch our hearts less than the whales or jaguars, but in the long run they might have been more useful to people and central to the functions of their ecosystems in ways that we cannot imagine. At the present rate, many of them are dead for the rest of history, extinguished by fire, mercury, dioxin, and the loss of the agents of their survival, whether a pollinator, a dispersal agent, a particular type of soil, or a particular tree.*

Cockburn and Hecht, 1990:58

Ferrar (1989: 136) also believes that excessive emphasis has been placed on species rarity which is a phenomenon easily grasped by the layman and public. He maintains that charismatic and attractive species often gain favour over those that appear to be insignificant or “boring” (Ferrar, 1989:136). While the definition espoused by the CBD and promoted by champion E.O Wilson has value and universal acceptance it does present an incomplete part of the nature conundrum. The convention emphasizes the roles of species, their interrelationships through ecology and their genetic evolution (all of which comprise the living or biotic component) but it fails to make explicit the role of the abiotic or non living component; the rocks and soils (lithosphere), the air around us (the atmosphere) and the water around us (the hydrosphere). Seeing biodiversity within the fuller context of our planet or biosphere is best explained by Gaian theories as propounded by James Lovelock. Another omission within the CBD definition is the influence and role that the natural and manmade landscape has on biodiversity and human well being. Geographer Yi-Fi Tuan defines this love of the land as topophilia, a coupling of “sentiment with place” the idea that the land itself possesses not just aesthetic appeal but also represents an enduring functional and emotional attachment for mankind (Tuan, 1974:113, Thayer, 1994: 8). Both Gaian theory and the phenomenon of topophilia have been detailed in chapter2. Having examined definitions of biodiversity we now demonstrate essential linkages between biodiversity and human well-being.

### *Understanding the global value of biodiversity - ecosystems goods and services*

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 4, 2014, Cardinale *et al.*, 2012, Mace, Norris and Fitter, 2012; MA, 2005). The term 'ecosystem services' was promoted by the Millennium Ecosystem Assessment (MA) a study by 1300 scientists over a four year period describing the numerous benefits that humans derive from ecosystems (MA, 2005). These include the provision of food, pollination, carbon sequestration, flood attenuation, nutrient recycling, climate regulation, soil formation and many other goods and services that are provided silently and effectively (Durban State of Biodiversity Report 2012/2013: 4). Environmental economist Costanza *et al.*, (1997: 253) famously declared the economic value of the entire biosphere to be in the region of US\$33 trillion per year. The South African National Biodiversity Institute (SANBI) mandated with conserving our country's biodiversity has provided detailed rand valuations for each national sector. As an example, in the Western Cape alone, wild pollinators give a service to the deciduous fruit industry amounting to nearly R2 500 million each year (SANBI, 2013: 9). Spelling out nature's benefits in purely monetary terms though has its limitations as Holland (1995) illustrates in the following quotation:

*Just as marketed goods have to be itemised, wrapped and packed for consumption, so too must the goods which nature provides. The sea (bits of it, at any rate) must be packaged as 'bathing water', or elephants (glimpses of them, at any rate) as items for viewing—'spectacles', and so forth.*

Holland, 1995: 27.

These glimpses of biodiversity 'packages' and 'spectacles' for the public find full expression within the disciplines of ecotourism and outdoor recreation, urban and landscape design, botanical garden and zoo and museum management each of which may serve as a vicarious nature experience or fragment of the whole.

### *Healthy ecosystems - healthy communities*

The Millennium Assessment (MA) points out that Human Well-being exists on a continuum together with poverty or pronounced deprivation in well-being.” (MA, 2005: 74). It is acknowledged that the interaction of wellbeing and poverty are complex, value laden and reflect geography, ecology, age, gender, and culture. One of the key concerns of the MA report is the fact that indigent communities generally in third world developing countries are the most vulnerable to adverse ecosystem change (MA, 2005: 71). Ironically the greatest concentrations of biodiversity are found in the tropics and the developing Southern countries, led in ranking order by Indonesia, Brazil and Southern Africa (Global Biodiversity Outlook 4, 2014; SANBI, 2013; Perrings *et al.*, 2010). These regions of endemism or global biodiversity hotspots have come under considerable scrutiny due to resource depletion, habitat destruction, species extinctions and loss of biodiversity (Global Biodiversity Outlook 4, 2014; CBD, 2014). Coupled with these transformations is the further loss of aboriginal languages, culture and arts as well as a reduction of indigenous knowledge systems (IKS) so valuable to anthropologists, biologists, ethnobotanists and taxonomists and illustrated locally in KwaZulu-Natal through Zulu medicinal plant use (Gadgil, Berkes, and Folk, 1993; van Wyk, Oudtshoorn and Gerike, 2009). Use of traditional plants by DUT students develops into a most useful individual point of connection when discussing biodiversity in the focus groups (See results chapter 6 and 7).

### *South African Biodiversity: A national asset*

South Africa has over 95 000 known species of plants and animals with a further 50 000, conservatively estimated, yet to be discovered and described (Driver *et al.*, 2011). South Africa is thus 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 (DEA, 2014). 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 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 (DEA, 2014; Willis 2006). Sixty five percent of its 23 000 plant species are endemic to South Africa (DEA, 2014; Mucina and Rutherford, 2006). 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 1 850 (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 (DEA, 2014; Boon, 2007). Details concerning biodiversity in the eThekweni Municipal Area (EMA) are provided as background to the specific study sites of PVNR and DBG in Chapter 5.

### *Biodiversity Loss*

The spectre of species loss is often touted in most biodiversity literature and has been used historically as an alarmist tool to stun the public into action (Navarraz and Tidball, 2012; Futerra, 2010; Novacek, 2009; Kitchin, 2004). Recent biodiversity communication has changed course from this singular focus seeking to shift the emphasis onto establishing personal connections with biodiversity as well as pointing out the benefit of biodiversity to human wellbeing (Futerra, 2010). *This is the approach used in this study, the fostering of individual student connections with nature as evidenced by their honest dialogues in the focus groups convened for this study* (Chapter 7). E.O. Wilson famously stated in his book *The diversity of Life* that that "we are in the midst of one of the great extinction spasms of geological history." (Wilson, 1999: 280). Recent extinction figures reported in *Nature* journal is that since 1500 in the region of 765 extinctions have occurred (Monastersky, 2014: 160). Reports indicate that a total of 5522 mammals, birds, amphibians and insects are currently under threat (Monastersky, 2014: 160).

Drivers of biodiversity loss include *inter alia* anthropogenic causes<sup>8</sup>, habitat destruction, fragmentation and degradation, alien species invasions, over harvesting and more recently, climate change (Global Biodiversity Outlook 4, 2014; CBD, 2008; Willis, 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 4, 2014; Cardinale, *et al.*, 2012; Mace, Norris and Fitter, 2012; Butchart *et al.*, 2010; Boon, 2007; Mucina and Rutherford, 2006). Biodiversity loss has been quantified by means of conservation assessments, or Red Lists which use an internationally agreed set of criteria to assess threatened species based on the likelihood of extinction (Driver *et al.*, 2012:15). Red List assessments in South Africa show that: one in five inland mammal species is threatened; one in five freshwater fish species is threatened; one in seven frog species is threatened; one in seven bird species is threatened; one in eight plant species is threatened; one in twelve reptile species is threatened; and one in twelve butterfly species is threatened (Driver *et al.*, 2011:15).

It may be concluded from this section that Biodiversity is indispensable for the functioning of healthy planetary ecosystems and forms the foundation of human well being on a range of levels. The scientific evidence of global and local biodiversity loss and depletion is compelling, the scale and scope of human impacts on earth is increasing not slowing. South Africa, KwaZulu-Natal and Durban are simultaneously home to a wide range of unique plants and animals. Protected suburban reserves and public gardens such as PVNR and DBG provide unique and accessible venues for citizens and students to observe and interact with local biodiversity.

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<sup>8</sup>Anthropogenic causes relate to man induced activities that alter natural ecosystems

## **The cultural scope of the Nature message**

### *Multiple lenses - multiple views*

Understanding the broad panorama of human perceptions of Nature has always been contested ground and characterized by polarity and ambiguity. Whose Nature (or biodiversity) it actually is depends on the author or speaker framing the discussion. Across the academic spectrum; geographers, environmental historians, psychologists and biologists (Merchant, 2004; Worster, 1993; Oelschlager, 1991; Kaplan and Kaplan, 1989) concur that human views of Nature are indeed strongly influenced by social, historical and cultural constructs. The Environmental movement in the West developed rapidly only in the latter half of the nineteenth century and although it presents itself today in a multiplicity of forms its academic and scientific impact on the developing world is persuasive, often characterized by a Cartesian dualism, a separation of man and Nature, science and humanities, emotion and reason (Oesterhoek, 2005; Cronon, 1995; Thayer, 1994). Nature was viewed through cultural filters as either benign or malign, the mythical wilderness, a place for refreshment or alternatively the malevolent wildness of the darkened woods that had to be tamed (Budiansky, 1995; Pepper, 1996). The Asian world view knows no such dichotomy acknowledging the physical and spiritual harmony of humanity with the material world of rocks and trees, skies and seas (Guha, 1989). It has been suggested that Nature conservation is inseparable from people's worldview and resultant values as it informs them about the importance of natural resources, defines accepted behavioural norms and aids in the setting of priorities (Boonzaier, 2009).

African views on the environment hold a very limited place in the literature and surveys of their attitudes towards Nature and conservation have to date centered largely on rural communities living adjacent to reserves often prized for their display of mega fauna or the 'Big Five' (Koch, 1997). There are few known studies pertaining to African perceptions and attitudes toward local nature reserves (Biccardie Seppe, 1977) and no known studies concerning DBG (J. Fuchs, personal communication, 22 July 2015). This paucity of local research gives this work significance and meaning for a range of concerned stakeholders such as natural resource managers, curators

and science communicators and educators involved in environmental education and eco-literacy programs.

*Bridging the gap between sciences and humanities*

In 1959 the famous author and scientist, C.P. Snow suggested that the critical intellectual weakness of the mid 20th century was the separation of humanities from sciences (Oosthoek, 2005). Snow recognised the distinct identity of these two cultures and maintained that that in order to solve problems we need to bring sciences and humanities together (Snow, 1960). David Harmon, an active advocate for natural and protected areas believes that long-standing rift between the biological and social sciences has done much to shape how Nature conservation and the conservation of cultural heritage are practised today (Harmon, 2007: 380). He proposes a better way of searching for common ground between the disciplines that would more powerfully advance the conservation cause and indeed human well being. Harmon's premise is that we have a moral responsibility to maintain the diversity of the world's natural and culture heritage—together (Harmon, 2007: 386). As Bill Adams observed:

*The challenge is not to preserve (or restore) 'the wild', but peoples' relationships with the wild. ... Without contact with Nature, people's capacity to understand it and engage with it withers. The future of conservation will turn on the extent to which a strong individual connection to Nature and natural processes is maintained.*

Adams, 2004: 235-6.

This is a common thread that runs through this thesis, more precisely what are the dimensions and strength of this contact/relationship between Nature/Biodiversity and students studying at Universities and colleges in a third world African city that is both rich in biodiversity and cultural heritage? This problem leads to the formulation of some pertinent research questions. Firstly is there any connection or contact that student already have with the natural world they encounter on a daily basis?

Secondly if there are no connections what are the root causes and underlying reasons behind this disconnect? Finally how do the students themselves think they can best connect with Nature in a meaningful and effective way to enrich not only their own lives but those who they influence – in short civil society. These questions relate directly to the thesis statement posited in the introduction:

*There is a significant disconnect between Generation Y Students and local biodiversity that can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media*

Nature has become set apart from culture creating two different worlds that are described in different languages (Worster, 1993). It is hoped that this work will contribute positively to develop meeting points, shared connections and collaboration between students in the humanities and sciences where the beauties and wonder of Nature can be shared using a common dialect; that of the human spirit.

*Contrasting cultural paradigms: American and African perspectives*

Selected social constructs and arguments from environmental literature are presented here which often relate to and are influenced by historic events and individuals. A more detailed historic backdrop concerning the environmental movement is therefore presented in Appendix 1. An important feature of this thesis is to ensure that the cultural lens from first world environmental paradigms are critically scrutinised before direct adoption into third world developing countries such as South Africa. A vast body of Western literature is devoted to the topic and in this review the author has centred on the more incisive works of Environmental commentators such as Cronon (1995), Dunlap (2004), Baarschers (1993), Environmental Historians Worster (1993), Budiansky (1996) and Landscape Architect, Thayer (1994).

*American perspectives: Sublime wilderness or local conservation?*

A sceptic view could argue that modern environmentalism is essentially and almost exclusively a product of historic events unfolding in the latter half of the nineteenth century in the American West. William Cronon provoked an outrage with his influential Essay "The Trouble with Wilderness" released in 1995. He demonstrates that the myth of American Wilderness is just that; a profoundly human creation of a particular human culture at a particular moment in human history (Cronon, 1995:69). He is referring in part to the work of Ralph Waldo Emerson (1803-1882), Henry Thoreau (1818-1862) and John Muir (1836-1914) who through their nature writings and lectures initiated the American Transcendental movement (Cronon, 1995; Worster, 1993; Budiansky, 1996). Cronon maintains that these sublime places worthy of protection all had a remarkably similar signature-vast landscapes, mountain top, chasm, waterfall all typical of the first national parks to be chosen; Yellowstone, Yosemite, Grand Canyon, Rainer and Zion (Cronon, 1995:73).

Cronon points out that the less sublime landscapes which do not appear worthy of protection; the urban nature where we live and work is no less deserving of our respect and care as are the untouched wilderness of National Parks (Cronon, 1995: 89). Such thinking resonates with the purpose of this thesis, encouraging others to find beauty and a sense of wonder in the ordinary the small nature reserve in the heart of suburbia (Pigeon Valley) a public garden in the city (Durban Botanic Gardens). These are equally worthy of study and protection as will be demonstrated in this work.

The American parks movement quickly became a bastion of Western conservation popularizing outdoor recreation activities for the entire family (the rising middle class who could afford automobiles) and reinforcing a wholesome appreciation for nature (Thayer, 1994; Dunlap, 2004). Not only was sublime nature protected it was also skillfully interpreted for the visitor by means of natural heritage signage and tour guides steeped in the interpretive ideology of educator and naturalist Freeman Tilden whose principles still inform modern interpretive strategies in natural areas and botanic gardens worldwide (Ham, 2007, 2010; Pond, 1993; Ballantyne, Packer and

Hughes, 2012; Tilden, 1977). Furthermore the parks served as research venues for the emerging new sciences of ecology, conservation biology and wildlife management (Budiansky, 1996; Thayer, 1994).

*New sciences... new exports*

Science itself is a culture, a discrete lens for viewing the world and as such is examined here. Eugene Odum's *The fundamentals of Ecology* was published in 1953 and became the definitive textbook for environmental science. Historian Donald Worster (1993) writes that Odum's ideas still furnish the main themes for our popular understanding of ecology beginning with the sovereign idea of the ecosystem. The whole earth Odum maintained is organised into a series of interlocking ecosystems ranging in size from a small pond to an Amazonian rainforest. The greatest threat to this stable system was of course man with his propensity for extracting Nature's resources and Odum advocated environmental planning as a global US export:

*Ecology must be taught to the public and made the foundation of education, economics and politics; America and other countries must be "ecologized".*

Worster, 1993:161

These statements were foundational to the subsequent birth of twentieth century environmentalism officially heralded by the publication of Rachel Carson's *Silent Spring* in 1962. The reader is referred to Appendix 1 for a continuation of this narrative. Odum's enthusiasm for universal 'eco-literacy' is commendable and his desire to mainstream ecology and biodiversity across the spectrum mirrors the current 2020 Aichi Biodiversity Targets and indeed is the inspiration for this thesis. Unfortunately despite the subsequent proliferation of environmental publications, journals and textbooks and the insertion of ecology into primary and secondary school curricula and universities the global ecological situation has continued to deteriorate. It may even be surmised that the *export of the prevailing Western conservation paradigm is proving unsuitable as a model for third world developing countries* (Global Biodiversity Outlook 4, 2014; Butchart *et al.*, 2010, Guha, 1989;

Cock and Koch, 1994). Nevertheless as Baarschers comments, Ecology has become a Gospel in itself, a world view, an attitude, as the Germans would say a *Weltanschauung* synonymous with environmentalism, a broad territory where activists, scientists and politicians meet (Baarschers, 1993: 14).

This section concludes by illustrating how cultural notions concerning nature are paradoxically different yet similar. A vigorous critique of the American conservation movement and its export to third world nations is offered by Ramachandra Guha (2000) who also points out that the environmental epithet of 'tree hugger' originates from India when Chipko villagers tried to reclaim traditional forest rights threatened by state appointed contractors. Women would hug or 'sentick' (chipko) to the trees. The Chipko movement traces its roots back to 1731, when 363 Indians were killed trying to protect green Khejri trees (Guha, 2000). In a strange turn of cultural events American environmentalists imitated this very behavior when old growth forests of the Canadian Pacific were threated (Cronon, 1995). It would appear that human beings across the globe share similar urges to protect nature when it comes under threat. Having emphasized some key American cultural perspectives we now examine some concepts from the Old World – Africa.

#### *African perspectives-wilderness, urban green space and biodiversity*

Literature concerning African perspectives on wilderness, urban green space and biodiversity are limited. It is hoped that the findings from this thesis would contribute modestly to the local body of knowledge on the topic. Ruch and Anyamrwu (1984) proposed that the emphasis on colour in studying (Black) man's humanity is unacceptable and suggest that the broader phenomenological situation and existence among other people rather be examined. This assertion has its merits and while one has to be aware of the dangers of racial stereotyping it is nevertheless useful to note the essential differences of cultural thought between African and American attitudes toward the environment.

Maurice Magi, a Zulu academic and geographer emphasises the need for a clearer understanding of the African ecological world view, one that is informed by the traditions of the past and the wisdom of emerging black writers in the nineteenth and twentieth century. He believes that an on-going synthesis is possible between traditional African cultural worlds and modern African worlds (Magi, 1986). Magi proposes a new value system of “Integrated African thought and true humanism which rests on African reality and values. While not rejecting the enriching contributions of other cultures this view will be genuinely African but will at the same time have universal importance.” (Magi, 1986: 106; Ruch and Anyanwu, 1984).

One of the key points of divergence with Western thinking concerns the Zulu attachment to the land (topophilia). Magi (1986) explains that the inherent and inestimable value of the land in African philosophic thought means that the natural resources such as mountains, forests, rivers and springs are not regarded as merely interesting or beautiful 'scenic' features but are the handiwork of *uMvelingangi* (The Almighty) from whom the ancestors and the people at large have descended (Magi, 1986:116). The land therefore has spiritual value and is not a commodity for economic exchange. According to Vilikazi (1965) in traditional African societies land is communally owned and there is a collective social responsibility towards its use and maintenance, further it belongs to the dead (ancestors), the living and the yet unborn (in Magi, 1986: 116).

The attachment is not solely spiritual it is also practical and utilitarian. The Wilderness of Africa provided a training ground for the warriors, a proving ground for the young initiates in circumcision rituals, the forests and savannah yield timber for building and firewood for fuel, the animals a source of bush meat and protein, the plants, a diverse source of remedy for all ailments, a basic food source and an emergency pantry in time of famine.

Mbiti (1970) articulates the use of natural resources.

*Nature in the broadest sense of the word is not an empty impersonal object or phenomenon: it is filled with religious significance....beliefs about God are expressed through concrete concepts, attitudes and acts of worship ... This faith is utilitarian, not purely spiritual, it is practical not mystical*

*Mbiti, 1970: 67*

The practical implications of these expressions toward local biodiversity is demonstrated in their traditional use of wild plant and animals. A vast body of locally published scientific literature describes the consumptive use of indigenous food and medicinal plants by Southern African Black peoples and how this overreliance on plant material gathered from the wild has led to endemic species extinctions and perturbations of local ecosystems (Fox and Norwood Young, 1982; Mander, 1998; Crouch and Hutchings, 1999; Van Wyk and Gericke, 2000; Van Ahlenfeldt *et al.*, 2003). Reference in these studies ranges from use of plants as building materials, clothing, beverage and food sources to the particular magico-medicinal properties of the plants and the perceived effect they have on the user. A belief in the latter came strongly to the fore in both phases of this research.

In African culture animals are viewed as a food source or a threat and while treated with respect (*ukuhlonipha*) are not granted the same elevated romantic status as viewed by Western ecotourists (Burnett and wa Kang'ethe, 1994; Cock and Koch, 1991). As Gomolemo Mokae remarks "Whites see beauty in the flight of birds and grace in the movement of animals. Blacks see a possible source of food." (Cock and Koch, 1991:30). African animal tales and symbolism can also play an important role in understanding Black people's perception of the natural environment (Magi, 1986:84). Dhlomo (1939) writes that animals are also regarded as emblems or totems of individual clans or families, reincarnations of ancestors, signs of fortune or omens of bad luck (in Magi, 1986:84). These very perceptions were echoed by DUT students in the focus groups.

### *African ontology's- Holistic and pragmatic*

For just over a century Bantu people have been exposed to Western thought, education and philosophy with varying degrees of effect. A conservation ethic based and rooted in the Western romanticism and transcendentalism as described in the first portion of this chapter is unappealing to the Bantu (Burnett and Kamuyu wa Kang'ethe, 1984:145). The America frontier and wilderness experience that has been adopted around the world as a virtuous conservation model is generally neither trusted nor comprehended by the Bantu or even other indigenous cultures for that matter (Burnett and Kamuyu wa Kang'ethe, 1984:145; Guha, 1989; 71; Harmon, 1987: 147). The African notion of wilderness derives in part from their relationship with God as Creator. African religion has often been framed by colonial writers in general terms as being animistic and polytheistic (Magi, 1986). According to Lithe (1964: 68), animism attributes a living soul to inanimate objects and natural phenomena, the term is implicitly associated with polytheism and idol worship. This approach has been contested by African writers (Burnett and Kamuyu wa Kang'ethe, 1984; 280; Magi, 1986) who point out that the Bantu concept of God is rigidly monotheistic, He is infrequently involved in human affairs, although transcendent He is also seen as immanent and infinitely and always good. It is God who is the apogee and origin of a lively creation and everything in the universe is imbued with this vital energy or being (Burnett and Kamuyu wa Kang'ethe, 1984; 280).

In Bantu thought this enabling power of God has five ontological (ways of thinking) categories; God, Ancestors or spiritual beings, humankind, plants and animals and non biological things (Mbiti, 1973:20). Bantu ontology's toward wilderness thus contrast substantially with the anthropocentric (man centred) and biocentric (earth centred) theories that have dominated the Western conservation paradigm since the nineteenth centuries. In the former wilderness exists to satisfy the aesthetics and physical requirements of human desire which form the sole focus of value. In the case of the latter nature exists and is preserved for its own intrinsic value (Burnett and Kamuyu wa Kang'ethe, 1984:282). For the Bantu mind wilderness is an extension of human living space, a portion of God's creation, it may be authentic, vicious or wild as long as it does not harm human society. There is no need for great

spiritual soul searching and individual reflection, there is no need nor desire to create arbitrary boundaries or to increase cash flow from wilderness generated tourist pursuits - *wilderness just simply is* (Burnett and Kamuyu wa Kang'ethe (1984:287).

Tempels (1959) articulated the idea of a vital life force as being a common African thread – the notion that all objects and the universe are similarly charged and interrelated, that reality cannot be separated from personal experience and that people are part of the rhythm of Nature (in Magi, 1986: 97). These notions of holism and connectedness resonate with Gaian theory and the writings of the American Transcendentalists of the nineteenth century particularly John Muir who famously declared that 'everything in nature is connected' (Cronon, 1995; Budiansky, 1996). These ways of holistic thinking nevertheless form common ground and a meeting place between Western and African conservation ideals that adds value to successful biodiversity messaging to a multicultural audience which lies at the heart of this work. African ontology's of nature are crucial to this study as pointed out in chapter 7 and 8.

#### *Examining the intersection between Science and African culture*

Overson Shumba (1999, 2014) has critically investigated the role of Western Science and technology in African countries such as Nigeria, Ghana, Botswana, Kenya, Zimbabwe and Zambia. He argues that for effective Science education and communication to take place that cognisance must be taken of locally acquired indigenous thought and belief systems and that these cannot be easily supplanted by Western Scientific rationality (Shumba, 1999:55). Similarly Saljoe (1991: 184) wrote that "Human experiences are inescapably cultural by nature, learning and growth take place within cultural boundaries."

#### *Magico traditional thinking versus the Western Science paradigm*

Harvey Williams (1994: 56) declared that a major goal of science education must be to dispel notions of magic and teleology as 'unscientific'. Western science and rationality is assumed to be mandatory for modernisation and progress in Third World economies (and indeed it is in many respects) however Shumba contends that its adoption should not be to the detriment or exclusion of indigenous knowledge

systems and perceptions. He argues against this 'cultural deficit' thinking and asserts that for science communication to be truly effective and meaningful there must be a *conflation of both scientific thinking and traditional thought* (Shumba, 1999:62). It is not an either or scenario, both systems have value but context and curricula (or 'the message' in the case of this thesis) need to be carefully considered. Hodson (1993) investigated the link between traditional African thought and Western science and suggests a multicultural perspective drawing on a comparative analysis of science in various cultures. He illustrated the commonly held view of the Western scientist as a self assured technological powerful controller while Islamic culture emphasizes humility and respect for the topic under study. Outspoken Welsh environmentalist John Seymour (1999:12) had a less favourable view of the 'Men in White Coats' accusing them of 'tunnel vision' and 'overspecialisation', coupled with an apparent disregard for the adverse effects of technology on the environment. Western Science indeed may not be virtuous neither is technology the panacea for the ills of postmodern society (Swenson, 2004; Seymour, 1999; Skomolowski, 1974).

The exploitive nature of science and technology has been articulated by many notable environmental writers including Rachel Carson (1961), Carolyn Merchant (1980, 2004) and William Cronon (1995) as mechanistic, materialistic and elitist. Skomolowski, (1996: 77) surmised that 'progress of science' and 'progress in general' were two different things and often led to the demise of indigenous people groups, their cultures and environments. Appleyard *et al.* (1993: 52) also excoriated the virtuous nature of science in the following terms; "It is spiritually corrosive burning away ancient authority and traditions. Science which pretends to be all-knowing cannot coexist with alternative belief systems."

#### *The need for multiple not exclusive scientific perspectives*

These sentiments may be extreme but they also represent a certain antipathy to scientific thinking present within African thought. Writers such as Mundangepfufu (1988: 49) criticised science as "one system of fallible knowledge... operating only within physical boundaries... it cannot inform us about the reality of beliefs about morals, values, art and magic." He emphasised the need to consider the conceptual

difference in world views and traditional belief when teaching science to students who might have a magico-traditional conception of the world (Mundangepfufu (1988: 3). *The importance of understanding African cultural values before fashioning biodiversity communication has been emphasised in this thesis and is worth probing further.* Within the HE classroom at DUT made up almost exclusively of Africans the author has noted a reluctance to assimilate what is taught in science and environmental education into real life scenarios and contexts. This suspicion is confirmed by writers such as Morris (1983) who observed that students memorise only what is necessary to pass tests and exams and then return to the security of their traditional beliefs (in Shumba, 1999: 58). In a similar vein Odhiambo (1968:43) noted that African students learn ‘facts, procedures and techniques’ but have yet to be ‘imbued with the spirit of science’, with a scientific way of looking at nature. Odhiambo (1968: 40) explains that what is often presented in science curricula is “so alien to their ordinary circumstances and life” and went further to claim that “an African must find a connecting link between the principles of natural science and the basic assumptions of his world view otherwise he is lost.” *In other words there must be a clear congruence between the students’ world view, life experiences and the subject for effective science or biodiversity communication to take place. The focus groups carried out in this research substantiates that this indeed is the case.*

This connecting link is exactly what is required for effective biodiversity communication. Without an understanding of the target audience there can be no effective assimilation of the message (SANBI, 2015). It is this connecting thread that must be immediately apparent to the student audience in all communication media whether of a virtual or physical nature.

#### *Different language approaches – the richness of African prose, proverb and poetry*

Robin Horton refers to the implicit ‘magical power’ of the spoken word in African cultures (Horton, 1967:156). A local example used in isiZulu culture is the decoctions derived from the Leopard orchid or *Ansellia gigantea* which is said to influence romantic affairs. Imbibing this potion and then spitting it out while calling out the name of one’s beloved is believed to secure the relationship (Mander *et al.*, 1995:

11). The use of metaphor and proverb is also emphasised in African culture, the purpose of which is to allude obliquely to things which cannot be said directly (Horton, 1967: 156). As the Ibo from West Africa declare; “Proverbs are the palm oil with which words are eaten.” (Horton, 1967: 166). A richness of language and metaphor is also deeply woven into the fabric of the isiZulu nation as is evident in their descriptions of flora and fauna (Ngwenya, Koopman and Williams, 2004; Player, 1997). The element of poetry too has often been excised in empirical sciences ‘search for truth’ yet according to psychiatrist Ian McCallum poetry itself is a powerful communication vehicle to express ecological concepts and may well be the universal language of choice for developing ecological intelligence (McCallum, 2005: 26). In a similar vein socio biologist E.O. Wilson and philosopher scientist Karl Popper affirm that the poet and the scientist draw from the same unconscious reservoir of myths and images, they both concern themselves with discovering and communicating natural laws with clarity and power, it is only in their methodology that they differ (McCallum, 2005: 32). The isiZulu love for poetry finds expression in student poster responses to the field trips carried out at PVNR and DBG sites during Phase Two of this research (Selected posters are presented in Appendix 6).

Having examined some of the key differences between the traditional African and Western Science approaches we move towards a synthesis of the problem, a solution that appears to offer some promise to biodiversity communication to black African students at DUT.

#### *Ecoliteracy, Ecological intelligence and Ubuntu - moving toward a synthesis*

Ecological literacy, or ecoliteracy, is a term first used by American educator David W. Orr and physicist Fritjof Capra in the 1990’s, in order to introduce into educational practice the value and well-being of the Earth and its ecosystems (Draft Global Issues, 2011: 1). A key part of ecoliteracy is reconnecting students to living systems – what educator Linda Sweeney calls developing a ‘connected wisdom’, which provides them with a deep sense of place and an understanding of their local environment (Draft Global Issues, 2011: 2). Concepts of ecoliteracy have value for this study reinforcing the notion that *effective communication takes place once*

*personal links are established with the individual.* Exactly how these links are to be established depends on the a) the cultural context and personal experiences of the audience b) content and relevance of the message and c) mode of transmission via appropriate media choices. This forms the qualitative content of the focus groups convened for this thesis and is detailed in the research methodology and results chapters of this work. The ecoliteracy concept finds resonance both in the American and African literature which informs this thesis (Merchant 1992, 2004; Orr, 1992; Cronon, 1995; Shumba, 2011; Mbeti, 1970; Nadubere n.d.) Reference has been made to Merchants historic analysis of the tension between the dominant mechanistic world view (as exemplified by Baconian and Newtonian science and represented by the modern technological and capitalistic paradigm) and the alternative organismic world view represented by the environmental movement (Appendix 1). Stephen Sterling (2009: 76) believes that the flexible thinking of ecological intelligence balancing intellect with intuition, and rationality with non-rational ways of knowing including spiritual and aesthetic dimensions is key to dealing with 'wicked' environmental problems.

Ecoliteracy or ecological intelligence embraces holistic thinking emphasising an inclusive ethical and relational world view recognizing the fact that different cultures possess unique ecological intelligences (Sterling 2009: 77). Questioning accepted paradigms of consumer culture and globalisation, ecological thinking involves an understanding of how individuals are nested in cultures and how cultures are themselves nested in natural environments (Shumba 2011: 87). Psychiatrist Ian McCallum writing in his book *Ecological Intelligence* expresses the idea that we need to stop speaking about the Earth needing healing, rather it is ourselves that needs healing as a result of the human-nature split. Like Wilson (1984, 1999, 2013), Kellert (2005, 2012), and Pyle (2003) he believes our human psychology has deep evolutionary roots in which everything is genetically and molecularly linked, an ancient memory of where we have come from. Cut off from the wild, the restless depression, loss of identity and place that so often presents itself in modern psychiatry are all symptomatic of one condition that McCallum calls 'homesickness' (McCallum, 2005: 14). Like Ian Player he believes part of the healing means embarking on an outward and inner journey deriving value from both wilderness and

an awareness of the human psyche. McCallum uses the analogy of the Buffalo thorn tree *Zizyphus mucronata* which has paired thorns, the upper spines reaching forward and the lower squat hooked thorns reaching backward. He sees this as illustrative of healing the human-nature split and reflects that In order to achieve our healing we need both the wings of psychology and the roots of our biology. Within the tension of these complementary opposites, lies the development of what McCallum describes as true ecological intelligence or rediscovering ourselves in nature (McCallum, 2005: 25). The paired thorns also point to a further important principle in this work on biodiversity communication, the need to hold conflicting truths in tension, embracing both the objective value of the empirical life sciences and the subjective value of the organic, and value laden humanities and social sciences. Opposite thorns are both present on the same tree, psychological dichotomies of left and right brain thinking, political dichotomies of apartheid past and rainbow nation future, social economic dichotomies of developed and developing nation states but in all these conflicts Ecological intelligence may just hold the key to achieving the necessary synthesis and fusion that is required for progress.

Shumba (2011) explores the integration of Western concepts of ecological intelligence with the African notion of *Ubuntu*, an accepted ethical and moral framework for sustainable development and harmonious living that has potential for intergenerational learning. *Ubuntu* meaning wholeness (*ubu*) and oneness (*ntu*), as Arch Bishop Tutu famously explained “*Ubuntu* is the essence of being a person... we cannot be fully human alone, we are people through other people, we are made for interdependence.” (in Nabudere, n.d.: 5). Shumba (2011) points out this thinking is key to sub Saharan African Bantu tribes who believe in acting and thinking collectively not individually. Applying *Ubuntu* thinking to the environmental commons is therefore an African tradition of value that requires consideration. Since the ideal revolves around respect for oneself and the community it also involves respect for nature which itself contains a positive life force (Shumba, 2011:91). He posits that much of the breakdown in science education/communication is because of the imposition of Western metaphors which are irrelevant to the African audience. Established dominant Western sender / receiver roles of education reinforce the colonial perception that the voice of the sender (Western education) is superior to

that of the receiver (Oral African tradition). Indigenous ways of knowing, and intergenerational oral tradition is not usually considered (Shumba, 2011: 88).<sup>9</sup> Apart from this cultural and historic divide there may be other factors inhibiting successful communication such as language, age, sex and race since most professors and senior lecturers are generally White males over the age of 50.<sup>10</sup> These demographics are of course variable depending on province and the historic nature of the institution.

In conclusion, concepts of ecological intelligence and *Ubuntu* provide an appropriate and clear framework for communication of local biodiversity issues. The table below offers a concise overview contrasting African and Western World Views.

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<sup>9</sup>The author attests to the validity of these claims having lectured in a transforming HE environment for 21 years it has become clear that the 'Sage on the stage' mode of transmission is expected by the (Black) student audience. The lecturer is viewed as the paid source of wisdom on the topic which is dispensed to the waiting students who use it only to pass the required tests and exams to qualify. In the students own words; cram pass and forget. Any departure from this method such as the 'guide by my side' mentoring approach is viewed with distrust and dismay. Class participation is limited since the lecturer has all the answers and students are loathe to answer questions in an interactive context – it is seen as 'uncool', furthermore any incorrect answers will be ridiculed by their peers.

<sup>10</sup> The study site of Durban University of Technology (DUT) illustrates the point. Technikon Natal with its 100% White lecturing staff merged with ML Sultan College an Indian College on a directive from the minister of education in 2002. Since then the lecturing staff complement has transformed to a predominantly Asian and Coloured complement with Black lecturing posts filled mostly by Kenyans and Nigerians. Whites are currently in the minority many having retired or resigned. See also 2015 DHET statistics for the institution.

<b>Table 3.1 Contrasting paradigms, African and American world views toward nature</b>	
African World View	Western World View
<ul style="list-style-type: none"> <li>• Insular and wary of new theories /realities</li> <li>• Traditions based on oral narrative handed down over generations</li> <li>• Intuitive, instinctive and subjective</li> <li>• An organismic, holistic world view toward nature</li> <li>• Nature is neither exalted nor debased it simply exists and is there for human benefit</li> <li>• Nature is not revered for its own sake-it has utilitarian value</li> <li>• Communal identity and collective thought is emphasised</li> <li>• Traditional cultural religions and belief systems emphasise respect toward God, the ancestors and the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Global and curious of new theories /realities</li> <li>• Scientific traditions based on the supremacy and sacredness of the written word</li> <li>• Rational and objective employing scientific method</li> <li>• A mechanistic dualistic world view toward nature</li> <li>• Nature is either exalted or debased according to the individuals personal belief system</li> <li>• Nature has intrinsic value or exploitative value</li> <li>• Individual identity and critical thought is encouraged</li> <li>• The individual selects a belief systems from a range of options in a post modern world</li> </ul>

**Source:** After Merchant (2004), Shumba (2011), Player (1997), Horton (1967) and Mbiti (1970)

## **Conclusions**

This chapter has detailed key scientific and socio cultural dimensions of the biodiversity message and related them to the study objectives. Both empirical evidence and cultural constructs of nature need to be considered when crafting appropriate biodiversity communication. Attention now turns to profiling the student audience that comprises ‘Generation Y’ and understanding some of the challenges inherent in the biodiversity communication process.

## **Chapter 4: Understanding the Generation Y student audience**

### **Introduction**

The first section of this chapter seeks to define and probe the nature and characteristics of a new generation which has been termed, the Generation Y or Net Generation. This group is the target audience for mainstreaming the biodiversity message, the first generation to come of age in the new Millennium consisting of individuals born between 1981 and 1999. Inherent in this literature review is a consideration of the omnipresent digital shadow of Social Media Technologies (SMT's) an endless stream of seamless connectivity that constantly takes place between Generation Y students and their peers in and out of the classroom. The literature is largely American and European in origin however in assessing the audience which is largely African reference is made to some of the unique attributes of the South African student landscape. The second section outlines some of the pressing issues characterising the South African HE landscape and its students as well as focussing on the specific study site of the Durban University of Technology providing an insight in to the regional dynamics of student life and thought within the Kingdom of the Zulu.

### **Generation Y Students – A profile of the target audience**

#### *Generation Y defined*

As the Pew Report (2010: 4) so accurately notes, generational names are works in progress and are a product of historic events, rapid social or demographic change or significant calendar milestones. As the culture and Zeitgeist of the time changes, labels that were once appeared to be accurate fall into disfavour. While the Millennial label is certainly a popular tag embraced by many writers (Howe and Strauss, 2000; Tapscott, 2009, Pew Report, 2010) this generation is also known as Generation Y, Generation D, the Net Generation, Digital Natives, Echo Boomers, and Nexters (Bracy, Brevill and Roach, 2010: 21). In this thesis the term Generation Y is preferred term for several reasons. Firstly the naming is sequential to the preceding Generation

X and secondly as Goneos-Malka (2012: 173) points out the millennium or turn of the century (2000) generally marks the end of this generations births and the development of the next generational cohort. The term Net Generation is also not entirely accurate as while this generation has developed together with internet technologies other defining factors have also influenced it. Historically three distinct generations over the last 70 years are clear (Pew Report, 2010: 4).

**The Baby Boomers (1946-1964)** Returning soldiers from World War II started families resulting in a tremendous fertility spike ending about the time the birth control pill went on the market. More people were born during this 20 year period than any other time in US history. While primarily an American phenomenon the cultural and economic influence of this anti-establishment generation is still being felt today.

**Generation X (1965-1980)** A smaller generation Gen X'ers are generally characterised as hard working, independent and sceptical. A smart and entrepreneurial cohort of business people and innovators they form the backbone of the privileged middle class.

**Generation Y (1981-1999)** The first generation to come of age in the new Millennium its members are identified as confident and technologically advanced with high expectations and narcissistic tendencies. They are history's first 'always connected' generation. The group has received a lot of media attention and are highly influential continuing to shape marketing and cultural norms and trends. The term 'Echo Boomers' reflects their population size and influence not unlike that of the Baby Boomers.

Generational reporting is not an exact science and researchers should be aware that there are as many differences in attitudes, values, behaviours and lifestyles within a generation as there are between generations (The Pew Report, 2010: 5). General estimates of Generation Y population size in the USA vary from 80 million (Stein, 2013: 27) to 100 million (Howe and Strauss, 2000: 21). In South Africa the highest number of people are those under the age of 34 while the median age in the country is 25 years old (Goneos-Malka, 2012: 174; SA Census, 2011). As the world's largest population group (more than half of the global population is under 25 years old) and

through their joint globalised networks linking individuals together Generation Y has the ability to mobilise mass movements, generate political, economic and environmental opinions and influence the alignment of marketing trends, culture and products (Stein, 2013; Goneos-Malka, 2012; 174; Bevan-Dye, Garnett and de Klerk, 2012: 5578; Tapscott, 2009).

*Social commentary on Generation Y: Generation We or Generation Me?*

In an article entitled "Is Gen Y Becoming the New 'Lost Generation'?" posted in 'Psychology Today' Ray Williams (2013), summarises some of the literature to provide a varied social commentary on Generation Y. He issues a cautionary note to social scientists not to use scientific research to fuel the unfounded stereotypes of young people. This maxim has relevance for this study as the researcher needs to avoid bias, halo effect, prejudice and preconceived notions particularly when interpreting survey findings and interacting with focus groups. Williams describes the work of Jean Twenge, a psychology professor at San Diego State University who surveyed some 1.3 million young Americans over a 14 year period in a comparative study between Generation Y and the Baby Boomers. Twenge notes that Generation Y. "speak the language of the self as their native tongue. The individual has always come first, and feeling good about yourself has always been a primary virtue. Generation Me's expectations are highly optimistic.....This is a time of soaring expectations and crushing realities." (Twenge, 2006: 109). *Time magazine* too ran a cover story on Generation Y in a similar vein decrying the values of the Me, Me, Me generation (Stein, 2013).

Using findings drawn in part from the 2012 Clark University Poll of emerging adults and the 2010 Pew Study conducted across Universities in the USA Joel Stein paints a picture of a narcissistic, self absorbed and media saturated lazy generation with 'atmospheric expectations' (Stein, 2013: 27). Is this an accurate assertion and to what extent does it colour and influence communication to Generation Y students? Don Tapscott coined the term 'Net generation' in 1998 and presents a more optimistic view. According to Tapscott, this generation is "smart, fluent, social,

analytical, self-reliant, curious, contrarian, creative, articulate and media-savvy.” (Tapscott, 2009: 200).

### *Educational strategies for connecting with Generation Y*

Gaming theorist Mark Prensky (2001) posited the idea of a digital generational divide between the students of today (the digital natives) and their instructors (the digital immigrants). Diana and James Oblinger from the University of North Carolina edited an influential publication “Educating the Net Generation” both espousing Prensky’s principals and unpacking the consequences of implementing these in Higher Education (Oblinger and Oblinger, 2005). These authors advocate learning approaches that involve the use of teamwork, peer to peer reviews, visual methods of learning and interactive multitasking in a collaborative and open learning environment. Academics across the spectrum generally agree that the values that the today’s students hold are not congruent with traditional course content and methods and that most youth drop out because they feel disengaged from the classroom (Reilly, 2012: 3; Pletka, 2007). Ray Smith (2006) outlines the challenges faced by academics teaching at universities in South Africa and advocates a combination of traditional and technological approaches. He supports the views of Prensky and Oblinger and suggesting the redesign of campus learning environments and the adoption of new technologies by the current Baby Boomer faculty to meet the needs of the millennial student (Smith, 2006: 4).

### *The use of Social Media Technologies (SMT’s)*

Considerable academic research has been devoted to exploring the use of net technology and various social media platforms such as Facebook, Twitter and You Tube in Higher Education (Oblinger and Oblinger, 2005; Junco 2011; Chen and Bryer, 2012; Jones *et al.*, 2010 and Davis *et al.*, 2010).

Reviewing the literature Davis *et al.* (2010: 1) describes social media in higher education and defines the term Social Media Technology (SMT) as:

*...referring to web based and mobile applications that allow individuals and organisations to create, engage and share new user-generated or existing content, in digital environments through multi-way communication.*

As each application is experienced, other innovative technologies rapidly emerge, enabling new utilities for users (Davis *et al.*, 2010: 1). The numbers are staggering reflecting the global penetration and reach of internet and SMT. Writing in *Time Magazine* Lev Grossman describes Mark Zuckerberg's vision of the future for the second decade of Facebook and his plan to get every human online (Grossman, 2014: 36). The company now boasts 1.35 billion users generating some USD 7.87 billion in 2013. Earth's population is currently 7.2 billion with 2.9 billion internet users leaving a further 4.3 billion outside the digital fold (Grossman, 2014: 37). Not only is the internet used by 1 in 7 human inhabitants the sale and rental of mobile telephones has exploded exponentially. Estimates of mobile phone handsets world wide are in excess of 5 billion representing a global subscription of 71% (Goneos-Malka, 2012: 11). While 85 % of humans may live within range of a cell phone tower 50 % of the world's offline population have been categorised as low income earners, a situation not unfamiliar to many South Africans (Grossman, 2014: 39).

#### *SMT, Internet and cell phone usage in South African Universities*

Mobile cell phones are the ubiquitous student currency of choice and personal hand held device. Able to connect to the internet at a tap of the finger and with the ability to source millions of apps or applications for myriad purposes the question has to be posed in this thesis "*Do these instruments have the potential to effectively distribute the biodiversity message to students?*" Some nature based cell phone apps have been mentioned but how effective are these proving to the South African University audience? Questions pertaining to this issue were posed in the survey portion of Phase One of this research and answered in part in the results of chapter 6. Studies at four South African Universities now provide the necessary context for this thesis. These include Rhodes University and Fort Hare (Thinyane, 2010), University of

Pretoria (Goneos-Malka, 2012) and the University of Cape Town (North, Johnstone and Ophoff, 2014).

Thinyane (2010) investigated patterns of Information and communication technologies (ICT) including cell phones and computer usage amongst first year South African students studying at Universities in the Eastern Cape (Rhodes University and the University of Fort Hare). Findings demonstrated an overwhelming use of the mobile telephone as the preferred technology, used primarily to call people, send and receives SMS'S and to play MP3 music (Thinyane, 2010:410). A staggering 98.1% of respondents in Thinyane's study had unrestricted cell phone access ranking the mobile phone as the preferred technology they would like to use to enhance their studies (Thinyane, 2010:412). Similarly Goneos Malka (2012) conducted a student survey of 400 marketing students enrolled at University of Pretoria to determine their preferred method of communication particularly in terms of marketing and branding in a postmodern society. Respondents in this empirical study indicated a total saturation of cell phone use and a dependency on digital media seamlessly fusing their on line and off line worlds. These outcomes corroborate findings from *Davis et al.*, (2010) and Junco (2011). In the Pretoria study Goneos-Malka (2012: 381) analysed patterns of cell phone usage noting that the three primary features that were used most often were messaging, accessing social media and talking. Findings showed that 90% of respondents accessed the internet from their cell phone and nearly 55% accessed social media at least five times or more per day (Goneos-Malka, 2012: 227). Key behaviours and associated attitudes were a high use and dependency on mobile phones, the desire to keep updated of the latest trends, the need to be recognised as individuals, and the urge to participate either as content users or contributors (Goneos-Malka, 2012: 382).

South African students demonstrated consistently higher use levels of web based technologies than their Australian counterparts in the Kennedy *et al.* study (2008) ranking the use of email facilities, gaining access to course material and social networking in the top three categories of preferred use (Thinyane, 2010: 411). The choice of 23 options included applications such as the creation and reading of blogs, building and maintaining a website and podcasting. Only 7.9% used the web for

blogging in contrast to 74% who stated they never used it. Goneos-Malka agrees noting that most students are *content users* rather than content generators (Goneos-Malka, 2012: 390). Nevertheless South African academics continue to investigate and implement the use of ICT and SMT technologies in Higher Education Institutions by means of online classrooms and Facebook groups (Smith, 2006).

#### *Mobile cell phones: Text Messaging and calls - not apps*

Research conducted at the University of CapeTown (UCT) revealed that the core use of mobile phones was for socializing and security purposes (North, Johnstone and Ophoff, 2014: 115). Quantitative data was collected from 362 respondents and revealed some signs of addiction to the technology particularly amongst the female group (North, Johnstone and Ophoff, 2014: 115).

Text messaging (IM and SMS) was highly prevalent in this study with 50 % of respondents texting 100 times or more per day while 85 % handled or used their phones (for whatever reason) between 21- 40 times a day (North, Johnstone and Ophoff, 2014:126). This intensifies the trend originally reported in America where the majority of students send between 30 and 80 text messages a day (Lenhart *et al.*, 2010) mostly using mobile internet platforms (in North, Johnstone and Ophoff, 2014:117). The UCT authors acknowledge the paucity of South African literature on the topic and admit that conclusive arguments regarding mobile phone use are elusive since culture, values, and belief systems differ around the world and play a part in the perception and use of technology (North, Johnstone and Ophoff, 2014: 117). The UCT study did not however consider the use of apps and this clearly remains a future focus area of research that would be instructive to this thesis. It may be safely concluded that while the thought of using cell phone technology holds out some promise for biodiversity messaging to South African students the current reality indicates they are preoccupied with using these devices primarily for texting purposes. The table below summarises some of the key findings from the literature regarding Generation Y.

**Table 4.1. Defining personality traits and attitudes of Generation Y**

**Defining personality traits and attitudes**

- Supremely confident
- Ego centric and peer dependant
- Superb multi taskers
- Wish to redefine and renegotiate traditional roles regarding respect towards key authoritarian figures such as employers and teachers
  - Reject old traditional values held by previous generations at work and school
- Most child centred generation in history
- Literary skills poorly developed, apparently unwilling to engage with deeper texts
- Content creators and consumers with considerable ability to influence society in terms of branding and marketing trends
- Respond to visual not text stimuli
- Respond to seamless technology and multiple use electronic platforms

**Sources:** Compiled from Williams, 2013; Stein, 2013; Tapscott, 2009.

In summation of the literature some key facts and questions emerge. First, Generation Y possess highly developed visual literacy skills and lesser developed reading skills. They relate better to visual based interactive material rather than to text. Second, an ability to continuously multitask at 'twitch speed' does not promote quietness or a willingness to engage with less stimulating activities (could this be some of the more banal and mundane activities often associated with nature trails, reserves and gardens such as hiking and tree spotting?). Third, the amount of time spent pursuing SMT may mean that the virtual experience is often embraced at the expense of the actual. The distracting and all absorbing power of techno addictions is widely acknowledged. Fourth, the amount of influence and credibility granted to their peers is considerable and is often valued above that of their parents or educators. Lastly, their optimistic nature, ability to embrace diversity and to search for new and better ways of doing things may indeed be a transforming feature of the new century. The challenge is to harness these possibilities and channel them into a new appreciation for the diversity, value and beauty of the natural world around them. Having presented a general profile of Generation Y we now examine some of the unique characteristics and pressing challenges that present themselves at South African Universities.

## **The South African HE landscape**

### *Socio economic and political considerations*

South Africa has a vibrant higher education sector, with 23 state-funded tertiary institutions: 11 universities, six universities of technology, and six comprehensive institutions. According to the DHET (2015: 11) there are a total of 596 820 registered undergraduate and post graduate students enrolled at South African Universities in 2014. This excludes vocational and former FET colleges and private institutions. The output rate of graduates in the same year was 185 385, a success rate of approximately 82% (DHET, 2015: 19).

A Higher Education briefing paper by Crain Soudien (2010) provides a succinct summary of some of the challenges facing the black African student in the HE arena. He writes that HE during the apartheid era was a fiercely contested space producing at the structural level “an obdurate legacy of social and economic inequalities ... underpinned by a complex skein of discriminatory political and cultural attitudes, dispositions and orientations.” (Soudien, 2010: 2). He views the disparity in the HE ambit as symptomatic of both issues of representivity and ideology. In brief an institution that reflects the correct demographic profile as desired by the government does not always translate into a transformed institution where Soudien asserts that racism, sexism, preconceived attitudes and prejudices still need to be confronted in order for meaningful progress to take place (Soudien, 2010:3). The very real crisis facing HE is symptomatic of widespread collapse of uneven education delivery at the primary and secondary school level Soudien (2010: 2).

As middle class black children leave the poorer schools behind in favour of former Model C schools and an advantaged White education these schools fall into further disrepair and states of demise. By the time these children write their National Senior Certificate the numbers eligible for university entry are small with the national higher education participation rate is 17%. For black students it is 12% compared to that of about 60% for White students (Soudien, 2010:10). Middle-class children therefore are likely to have achieved the kinds of skills set that the school, and later the

university require (Soudien, 2010:11). Nick Spaul (2016) records that 644,536 passed matric in 2015 yet of these only a small portion will enter the HE institutions and these students are inadequately equipped to meet its demands. Spaul describes the decision to raise raw matric marks across the board, from maths and physical science to life science, maths literacy, history, accounting, geography and 24 other subjects as an “unprecedented set of adjustments.”

### *South African Student Life: Contested Ground of race and class conflicts*

Although this thesis centres on biodiversity communication to students in Durban the nature of the current audience needs to be considered within the context of a dynamic and unstable HE system. Media reports are used given the immediacy and volatility of the changes taking place in the sector. During the writing of this thesis (2014-2016) student unrest in the HE arena has literally fanned into flame with arson attacks throughout the country including *inter alia* UKZN (Westville campus), Howard College, (defacing of colonial era statues) and with protests concerning the racial composition of South African academia at the University of Cape Town.<sup>11</sup> In May 2016 arson attacks at University of Johannesburg destroyed a computer auditorium worth R100 million (Student Life, 2016; Chetty and Knaus, 2016). Martin Hall writing for the Guardian sees these actions as emanating from root causes of colonialism, poverty, high levels of unemployment and unequal opportunity (Hall, 2016).

At DUT student strikes take place regularly during the first year registration period<sup>i</sup> due in part to failed Government funding systems such as NASFAS (National Association of Student Funding), lack of housing and other diverse perceived and actual inequalities. The power of a mobilized and now politicized student body is threatening the fabric of the HE institutions with new agendas coming to the fore. Chetty and Knaus (2016) are of the opinion that racism and class have been largely

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<sup>11</sup>Julien Rademeyer from Africa Check verifies that there were a total of 4,073 university professors in 2013. Of these, 708 were black (17.4%) and 2,870 were White (70.5%). The low number of black professors remains contentious.

excluded from any understanding of the current youth resistance in HE. They argue that the current education system (via NASFAS) has distributed limited scholarships and loans to the working class thus allowing them entry into elite, predominantly White institutions. These students are placed outside their normal class zones leading to depressed expectations, anger and frustration (Chetty and Knaus, 2016). Given the high inequalities between rich and poor in a country that is second only to Brazil in the world this should come as no surprise (Soudien, 2010: 10).

Melanie Walker (2005) investigated racial and class based narratives in a detailed article examining Black and White University students in Post-apartheid South Africa. These stories are instructive in that they are authentic representation of first hand cultural, race and class issues in the emerging democracy. The narratives may have progressed since democracy but still remain unresolved as evident from the violent student protests of 2015. As Walker describes it 'Race is nowhere, race is everywhere...now you see it now you don't.' (Walker, 2005: 50). Nowhere is this more evident than the mixed anomaly of the South African political social and cultural milieu. Student narratives recorded from the focus group sessions likewise record a similar awareness of stark differences in upbringing and childhood education experiences, a factor the students themselves described as likely to impact on their attitudes toward nature. Unafraid to shy away from race and class issues they bring some helpful perspectives toward the biodiversity narrative.

Another prominent feature of SA student life is their propensity for spending freely. Figures released by Student Village (2015) found that South African students spend on average R2 702 per month or R32 424 p.a. excluding tuition fees and that this spend is distributed unequally amongst them. The greatest proportion (86%) of this funding comes from parents. The survey examined the lifestyle of some 3500 students nation wide reporting a total spend of R30.4 billion for 2015. This includes a combined tertiary student population of 938 000 (Student Village, 2015). Student spend is substantially higher than that of the average South African who reportedly spend R25 208 p.a. in 2015 (Student Village, 2015). Materialism featured high on the student agenda along conspicuous consumerism and the pursuit of a celebrity lifestyle and accessories (Student Village, 2015). Black students according to the

survey place a higher priority on 'bling, booze and brands', a claim also corroborated by empirical research from Bevan-Dye, Garnett and de Klerk (2012) and anecdotal evidence from Naidoo (2011). Attention now focuses on the Durban University of Technology from which the student samples are derived.

#### *The Durban University of Technology study site: Attributes and characteristics*

A brief overview of DUT provides the necessary context for understanding the nature of the student audience both locally and within their context of a greater student body. Originally developed as a career focussed college in Durban (The Natal College for Advanced Technical Education or NCATE) morphed into an HE institution called Natal Technikon serving the needs of both the provincial region as well as attracting national and international students during the apartheid years (Lamp, 1982). With the advent of democracy in 1994 these predominantly White institutions were forced to 'massify' inserting large numbers of blacks into the system. The failure rate was high as the country grappled with meeting both the education and training needs of the defunct Bantu Education system. Technikon Natal then merged on Ministerial decree with its sister training college ML Sultan to form the Durban Institute of Technology in 2002 (Govender, 2014:1). Following rationalisation and consolidation the Universities of Technology were brought into being through a stroke of the pen by the then Minister of Education Kadar Asmail in 2006 (Govender, 2014:1). DUT is home to 26 417 students with a racial composition largely made up of Africans (21 325), Asians (3941) Whites (765) and Coloureds (386) (DHET, 2015: 21). The genders are split fairly evenly with slightly more males (13 726) than females represented (12746). Highest enrolments are greatest in the fields of Science, Engineering and Technology (SET) followed by Business Management and related field and Humanities /Social Sciences (DHET, 2015: 21). The survey sample issued in Phase One of this research thus sought to capture a representative sample from across the faculties and disciplines. In terms of full time lecturing staff at DUT (579) the institution has transformed with 73% of these being African, Coloured and Indian/Asian staff employed on a permanent contract (DHET, 2015: 21).

In summation of this section on DUT and the prevailing HE climate it becomes clear that a range of competing socio –economic demands are pressing in on the current student population and almost none of them involve a conservation agenda. Nevertheless this research shows a willingness to engage with environmental and conservation issues and a desire to get more involved in a personal level. Having built a profile of the potential audience we now turn to examining key challenges for biodiversity messaging as well as exploring possible solutions via a variety of media platforms.

### **Biodiversity messaging: Challenges and Strategies**

#### *Current Challenges for biodiversity messaging*

Moramay Navarro-Perez and Keith Tidball (2012: 13) conducted a comprehensive literature review of some 70 articles focussed on biodiversity communication and education and identified four main challenges: the need to define a consistent approach for biodiversity education, the notion of biodiversity as an ill-defined concept, the need to develop appropriate communication, and the disconnection between people and nature. They suggested that these represent obstacles to the achievement of educational targets, and therefore, to accomplishing conservation goals as set forth by the CBD (Navarro-Perez and Tidball, 2012: 13). Each of these challenges is relevant to this thesis and biodiversity messaging as a whole and is discussed in some detail here. The outcomes of this research are then correlated with these themes in chapter 8.

#### *Challenge One: Multiple approaches to biodiversity education*

*Biodiversity education* presents a plethora of synonyms each claiming a distinct identity and destiny. Into this confusing array we find four distinct but linked academic disciplines including Environmental Education (EE), Education for Sustainable Development (ESD) biodiversity or conservation education, and natural or heritage based interpretation (Krasney *et al.*, 2013: 632).

The education approach used in this thesis is *nature based or heritage interpretation*. This particular communication strategy forms a large part of the practical research carried out by the focus groups detailed in the Research Methodology of Chapter 5 and the findings of Chapter 6. Interpretation is practised worldwide in botanical gardens, national parks and protected areas, zoos, museums and cultural heritage sites (Ballantyne, Packer and Hughes, 2008; Chang and Bisgrove, 2008; Veverka, 1994). Unlike EE the use of interpretive facilities is entirely voluntary, visitors to museums, parks, gardens and natural areas can choose the level of their participation. 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).

Tilden (1977: 5) 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.*

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 of Interpretation, 2010). 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 (Ham, 2007, 2010; Ververka, 1994).

While accepting the validity of a number of forms of interpretation the focus of this study will primarily be on exploring Tilden's vision of *encouraging meaningful personal connections between individuals and the natural environment* (urban green space). *It is the relationship the student establishes with local biodiversity that is*

*important.* Traditional interpretive modes of communication such as print media and signage and modern electronic media such as video clips and web based content can be used to augment and enhance these connections and achieve the Aichi targets for the next decade. The emphasis in this thesis however falls firmly under the domain of natural heritage interpretation.

#### *Challenge Two: Biodiversity as an ill-defined concept*

The second challenge articulated by Navarro-Perez and Tidball(2012) is the notion of biodiversity as an ill-defined concept, an idea supported by Marrion Farris (2005); Petra Lindeman-Matthews and Elizabeth Bose (2008); Michael Novacek (2009), David Johns (2009) and Sharman and Mhlambo (2012). Ill-defined concepts have various interpretations, are multi dimensional and value laden(Navarro-Perez and Tidball, 2012: 19). It appears that the word 'Biodiversity' itself has not been assimilated into the lingua franca of our day being largely confined to academic debate. The term also smacks of 'pseudo-science' requiring lengthy explanations in order to be understood by the average citizen. Addressing the American National Academy of Sciences Novacek (2008: 11571) emphasises that the word itself suggests only the richness of life but not its significance and connection of these forms to functioning ecosystems. Novacek (2008: 11571) records that the word requires repeated and vigilant explanations to be heard in today's modern media. Interpretations of biodiversity remain 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).

#### *Challenge Three: Developing appropriate biodiversity communication*

The third challenge as framed by Navarro-Perez and Tidball(2012) is the need to develop appropriate communication, a debate that forms the central core of this thesis. Since the mainstreaming of Biodiversity across all sectors of the public is one of the key UN Aichi goals for the next decade and a national imperative now acknowledged by SANBI the following discussion informs both the conceptualisation of this thesis and directs the research methodology that follows this literature review (CBD, 2014; DEA and SANBI, 2011). The results from the global polls provide

substantial evidence that there is a need for broader and deeper public understanding about biodiversity and why it is important to conserve it. Understanding of the issues alone does not necessarily lead to the desired conservation action (Navarro-Perez and Tidball, 2012: 22; Bennett and Williams, 2011). A communication disconnect between scientists and the general public may be part of the problem.

### *Communication disconnects between science, the media and the public*

A significant gap exists between the scientist's perception and the public's awareness about biodiversity in spite of a perceived knowledge about environmental issues in recent times (Navarro-Perez and Tidball, 2012: 22). William Baarschers, a chemist and environmental communicator also defines a credibility and comprehension gap between scientists and the general public in his work *Eco-facts and Eco-fiction: Understanding the environmental debate* (Baarschers, 1995: 7). The gap or disconnect becomes clearly evident when environmental opinion polls are conducted. Baarschers (1995: 40) explains that the people who answer these polls are constantly exposed to a bewildering mixture of biases from ranging from stereotypical caricatures; arrogant scientists, zealous environmentalists, suave politicians and defensive corporate spokespersons. Added to this confusing array the public has to select from various media 'translations' and 'interpretations' in order to formulate their own rational opinions (Baarschers, 1995: 40). These conflicting reports result in public confusion about what biodiversity is and why they should care about it. In our technological post modern world 'professional languages' and 'literacies' are increasing in complexity. This problem of '*Scientific isolation*' – *using the wrong language that never connects with the target audience* is a serious miscommunication error which will be investigated in this research.

Scientists and ecologists themselves acknowledge a serious communication disconnect between themselves and the public (Ladle, Jepson and Whitaker, 2005: 231; Pace *et al.*, 2010; 292; Kahan, 2010: 296). Dan Kahan writing in the *Nature* journal states that Science needs better marketing but points out that unlike commercial advertising the goal of these strategies is not to induce public

acceptance of any particular conclusion but rather to create an environment for the public's open minded unbiased consideration of the best available scientific information (Kahan, 2010: 297). He explains that 'cultural cognitions' cause people to interpret new evidence in a biased way that reinforces their predispositions. As a result people with opposing values (environmentalists and green sceptics) become more polarised when exposed to scientific information (Kahan, 2010: 297). To overcome these inherent halo effects Geoffrey Cohen (2007) suggests presenting information in a manner that affirms rather than threatens peoples values (in Kahan, 2010: 297). This approach has been confirmed by communication practioners such as Futerra Branding (2010); Kitchin (2004) Bennett and Williams (2011) and in South Africa with SANBI's 'Making the case for biodiversity' (DEA and SANBI, 2011). Messages about love not loss are key (Moss, 2012; Attenborough, 2010; Orr, 1992) Alternative viewpoints toward issues such as biophilia and species extinctions have already been explored in this text and serve to illustrate the multiplicity of cultural cognitions and diverse interpretation of scientific facts.

*Should we be forcing people what to think or should we be guiding them to make their own personal and meaningful connections with nature? These constructs will be challenged and debated as the topic is investigated at a deeper level.*

Kahan (2010) concludes that environmental debate and messaging should therefore avoid cultural polarisation which becomes a real threat to the efficacy of the process. These conclusions have particular relevance to this thesis since the racial and cultural landscape of Generation Y students is highly heterogeneous and diverse. Cultural cognitions toward the environment have already been discussed in the sections on historic and social dimensions of the biodiversity message.

Communication specialists Weber and Schell (2001:490) also agree that the lay public may guide its interpretation of scientific information through the social context rather than the underlying science itself. They note that our reasoning about science is coloured by personal and social beliefs and is often guided by community norms and the social context in which the information is offered (Weber and Schell, 2001:

490). This reinforces the assertion of this thesis that cognizance of race, culture, religion and social values is key in devising effective biodiversity communication to students at South African Universities. It also confirms SANBI's concern that poverty, unemployment and other social ills in this country are eclipsing the biodiversity agenda as 'National Priority' (SANBI, 2011). Weber and Schell (2001: 491) contend that a single statement of fact offered to a group with multiple frames of reference will rarely be enough and that questions and qualifications are a natural part of the process with *dialogue in some form being the primary trait of a communication process. Differing and often conflicting frames of reference can be problematic nevertheless they must be included in the dialogue.* Weber and Schell (2001: 492) argue that the objectivity of empirical science and the subjectivity of the lay public are not necessarily polar opposites, we need both the validity of scientific method (experimentation and controls, peer review, identification of variables and so on) and the subjective appeal to multiple perspectives and social confirmation to realise effective communication. *These statements encapsulate both the research ethos and findings in this thesis.*

*Challenge Four: Addressing the disconnect between people and nature.*

A central tenet in this thesis is the apparent extinction of real experiences with nature, a disconnect and malaise experienced in this postmodern world. This disconnect primarily evident in Western cultures begins in childhood and continues through the (screenage) teenage years to adulthood (Pyle, 2003). David Orr (1992), Richard Louv (2005) and Stephen Moss (2012) describe this disaffection in detail and a review of this literature is found in under social dimensions of biodiversity in Chapter 3. Key imprints relevant to this work are hands on encounters with nature or the benign influence of a parent or teacher who demonstrates a passion for the natural world. This is often a deciding factor in shaping adult behaviour in terms of environmental stewardship or even determining a green career choice (Pyle, 2003; Louv, 2005; Moss, 2012). As Louv recounts (2005), education strategies and curricula in the US tend to emphasize learning about scientific facts and issues without prompting any hands-on experience. In fact, Louv argues that this broken bond between children and nature stems from an "overly abstract science education"

that fosters a distancing rather than a reconnection between them (Navarro-Perez and Tidball, 2012:13). *These aspects of environmental awareness during childhood development form a well documented theme in the literature and emerge again in the survey and focus groups conducted by the author in Chapter 6 and 7.*

### **Solutions and strategies for biodiversity messaging**

In finding solutions to successful biodiversity messaging Novacek (2008:11572-11575) suggests (like most marketers) to firstly identify the audience to be reached and then to probe their level of understanding on the topic. The next step is to craft the message according to the audience and finally to consider the mechanism for delivering the message. This triple approach is endorsed by interpretive practitioners and theorists such as Carter (2001) Beck and Cable (2011) and Verwerka (1994) who adds a fourth step that of receiving feedback from the audience. We now examine some contemporary international and local approaches to crafting and delivering the message that are relevant to this work. These include looking to lessons from global surveys, the possibility of 'branding nature'; SANBI Making the Case for Biodiversity (MTC) and using contemporary communication vehicles such as Nature 2.00 technologies that blend ICT and biodiversity issues.

#### *Lessons from Global Surveys*

International surveys have been conducted over the last twelve years to understand public levels of biodiversity awareness. Eight surveys were identified by the author and a summary of the outcomes presented in Appendix 2.1 *No comprehensive survey concerning public attitudes and perceptions toward biodiversity has yet been undertaken in South Africa and this thesis contributes in part toward filling the knowledge gaps.* Surveys have been largely American and European centred with the exception of the Airbus report (2010) Bennett and Williams (2011) and the Danish World Wide Views on Biodiversity or WWV (2012). Overall it appears that biodiversity /environmental awareness is increasing to a certain extent amongst the public, the latter survey indicating that seven out of ten respondents demonstrated some level of biodiversity awareness and environmental concern (WWV, 2012:14). The limitations of polls and surveys as surface indicators of awareness must be acknowledged here

since by their very nature they are not able to probe deeper levels of individual constructs of biodiversity which are often dependent on cultural values and influences. This demonstrates the value of the focus groups in Chapter 7 where more honest opinions were elicited.

### *Branding Nature – a viable solution?*

Should nature be 'branded' as in advertising? – does branding even have a place in the biodiversity message? Tasked by the UN to develop a communication strategy for the 2010 International Year of Biodiversity (IYOB) Futerra Branding advocates a shift from the doom and gloom predictions of scientists to a warmer more personal interaction and appreciation of nature. They argue that the most frequently repeated biodiversity message of extinction, inspired guilt but not action (Futerra, 2010). Concerning climate change the same agency noted wryly that 'The threats of climate hell haven't seemed to hold us back from running headlong towards it.' Futerra posits that it is easier to sell heaven not hell and that by *framing the environmental issues in a language people can understand results in effective communication* (Futerra, 2010). *This is exactly the ethos embedded in this thesis.* Tim Kitchin (2004), advocates a brand building approach toward biodiversity messaging. Kitchin maintains that while the idea of branding biodiversity may be distasteful to many that saving biodiversity means thinking like a marketer. He argues that *the benefits of biodiversity may be too nebulous to be captured through traditional scientific or educational communication.*

### *SANBI 'Making the case for biodiversity.' MTC*

As the mandated custodian of our national biodiversity SANBI plays an enormous role in conservation and has recognised the value of communicating complex scientific concepts to non-technical audiences (K, Maze, personal communication 1 September 2016). Through the assistance of contracted copy writers, journalists and advertising agencies they aim to appeal to the audience on a personal level, facilitating emotional investment around the issues in question (SANBI, 2015). Making the Case for Biodiversity (MTC) has progressed from its inception in 2010 (research and development) through to message testing at COP-17 and the

development of an over arching biodiversity sector messaging strategy 2012-2015. The aim was to empower the biodiversity sector with a new language and communication tool kit and to position biodiversity as a key ingredient in the Green Economy thus stimulating National Treasury to release more sector funding (SANBI and DEA, 2011).

It is vital to realise that environmental issues are often eclipsed or marginalised by social and economic realities. Coffin and Elder (2005: 335-348) as well as (Bennett and Williams, 2011) point out that many environmental issues do not rank as a priority for people and may be easily undermined by concerns such as the economy, healthcare, or social security, thus making it difficult to elicit public support. SANBI hired an advertising agency Freedthinkers to research and recommend an appropriate messaging strategy to mainstream biodiversity issues primarily to government and then to the general public. The rationale of the campaign would be to redress the underfunding and exposure the biodiversity sector has been experiencing and to frame the message in ways that resonate with government priorities (SANBI and DEA, 2011: 9).

Key findings that emerged reinforce the literature surveyed that; a) the term biodiversity is not understood, b) communication from the biodiversity sector is sometimes contradictory and confusing and c) the link between economic development and biodiversity is not well understood and that these are commonly seen to be in competition with each other (SANBI and DEA, 2011: 9). Eight biodiversity messages were developed then tested and ranked by selected government stakeholders. The winner was valuing biodiversity as a National Asset, followed by leaving a legacy of biodiversity for our children and finally presenting practical solutions. The other messages focussed on the wealth of the rural economy, the effects of climate change, SA as a global leader in biodiversity conservation and the link between health and humanity (SANBI and DEA, 2011: 9). The central narrative was that the wealth of South Africa is built on biodiversity (as described in Chapter 3) and the core message being that *Biodiversity powers the Green Economy* providing a natural resource base and revenue as well as multiple job and development opportunities. The MTC program represents an encouraging

move on behalf of the scientific community to prioritise biodiversity communication and place it firmly on the government agenda. It is unclear whether this campaign will filter down to the youth and whether the media budgets and allocations are sufficient (K, Maze, personal communication, 1 September 2016).

#### *Use of appropriate and contemporary media*

A central concept in this thesis is the use of contemporary media to communicate the biodiversity message more effectively. This view is supported by Novacek (2008: 11576) who asserts that adults mostly learn about science through television and print media. In partnering with media he believes that content and messages should be educational rather than sensational or over simplified. The author however believes that documentaries with 'talking heads' rapidly lose the interest of Generation Y and that any environmental visual material should be as exciting and stimulating as other media offerings to compete successfully. The use of celebrities endorsing biodiversity issues in films has value as evidenced by the Leonardo Di Capriccio documentary *The 11<sup>th</sup> Hour* (2007). Novacek also endorses the role of the internet as an important communication tool for disseminating scientific research results and conservation initiatives with the added capability of engaging potentially different audiences (Novacek, 2008: 11578). The literature concerning Social Media Technology (SMT) has already been reviewed and is further probed in the surveys of Phase One. We now examine some of the literature investigating advances in the use of SMT platforms, a phenomena termed 'Nature 2.00'.

#### *Nature 2.00 - The nexus of interpretation and internet communication*

Bram Büscher (2014) is currently exploring and theorizing the links between new media and nature conservation. He believes that Web 2.00 and social media applications that allow people to share, co-create and rate online content are crucial new ways for conservation organizations to reach audiences (Büscher, 2014: 1). Büscher maintains that research on the socio-political dimensions of the new media have generally neglected environmental questions and human/nature relations, a view endorsed by the author. High profile conservation agencies such as The Nature Conservancy (TNC), THE World Wide Fund for Nature (WWF) and the International

Union for Conservation of Nature (IUCN) all urge supporters to 'like' their activities on Facebook, join debates and retweet environmental news and campaign slogans. In this 'Like economy' Büscher (2014: 2) dryly observes Nature is increasingly being saved by mouse clicks and double taps. TNC urges supporters to create their personal *my.nature.org* page, the intersection between 'you and nature.'<sup>12</sup> A cell phone app 'Nature near you' has been developed by TNC which encourages the user to explore nature reserves capturing and sharing photographic experiences on Flickr, Twitter, Pintrest, YouTube and Facebook<sup>13</sup> (Büscher, 2014: 3; Büscher and Igoe, 2013).

.Other examples of Nature 2.00 technologies being used at HE institutions include work carried out in Germany, UK, SA and a pilot attempt at the DBG study site. In Germany Markus Ruchter (2010: 1054) combined hand held GPS navigation systems with the use of printed material and tour guide to create new interpretive experiences. The UK study at the University of Reading involved life science students using GPS and mobile internet based platforms to describe local biodiversity on campus (White *et al.*, 2015). Results were then fed into a data base and shared with the community. In South Africa similar endeavours by citizen science group CREW (Custodians of Rare and Endangered Flowers) members photograph local biodiversity and feed these images onto the iSpot internet platform for verification and comment (CREW, 2014). At the DBG indigenous trees were labelled with a quick response (QR) label as a pilot project. Scanning the label with appropriate software would take the visitor directly to the SANBI PlantzAfrika website with detailed descriptions of the species (Fuchs, 2014). In summation these Nature 2.00 technologies hold contemporary interpretive potential at the selected study sites of PVNR and DBG. *Whether or not South African HE students are interested in utilising these Nature 2.00 possibilities is an issue that is examined later in both the surveys and focus groups of this research.* Further detail concerning Nature 2.00 technologies is found in Appendix 2.2.

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<sup>12</sup><http://my.nature.org/nature/> (accessed 7 November 2013).

<sup>13</sup>[https://play.google.com/store/apps/details?id=com.treeline.tnc&feature=search\\_result#?t=W251bGwSM5wLDEsImNvbS50cmVlbGluZS50bmMiXQ](https://play.google.com/store/apps/details?id=com.treeline.tnc&feature=search_result#?t=W251bGwSM5wLDEsImNvbS50cmVlbGluZS50bmMiXQ) (accessed 28 October 2013).

In conclusion of this literature review a broad contextual platform has been established identifying the various dimensions of the biodiversity message, the characteristics of its audience and prevailing worldviews and technologies as well as the scientific, historic and socio cultural planks of understanding on which the scaffolding of the research methodology may be erected in next chapter.

## Chapter Five: Research Methodology

### Introduction

Research design of necessity must be an enabling device and pathway in order to answer the research questions posed in the introduction and to realise the objectives and purpose of this particular research. Therefore, objectives are reiterated here for clarity and to demonstrate linkages with the research design:

- 1 To evaluate and discover attitudes, perceptions and values toward nature and local biodiversity amongst Generation Y South Africans currently studying at the Durban University of Technology (DUT);
- 2 To determine how Generation Y students would best prefer to connect with local biodiversity;
- 3 To ascertain the role print and electronic media can play in presenting the biodiversity message to Generation Y students, and;
- 4 To develop a relevant workable South African interpretation model that can be used to forge connections between Generation Y students and the natural world.

These objectives relate directly to the thesis statement posited in the introduction:

*There is a significant disconnect between Generation Y Students and local biodiversity that can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media*

The thesis statement presented here differs from a hypothesis in that it cannot be empirically and conclusively proved or disproved. The primary data gathered and its interpretation does provide some indicator of current attitudes in a specific geographic locale, however caution needs to be exercised before extrapolating the findings to the entire student population in South Africa or even beyond that to all Generation Y citizens. The value of this study is that no other specific surveys of this

nature have been undertaken in South Africa relating to this particular age group. The conclusions derived from this study can serve to inform the mainstreaming of biodiversity communication by national agencies such as South African National Biodiversity Institute (SANBI) and the Southern African Association for the Advancement of Science (SAAAS). Value is further extended internationally as findings can contribute to the body of knowledge accruing from global biodiversity surveys and make a meaningful contribution to specific Aichi Targets as set out by the UN and the CBD to advance the decade of biodiversity mentioned in chapter 3.

A common thread runs through this work, which is the need to probe and interrogate the precise dimensions and strength of this contact/relationship between Nature/Biodiversity and students studying at universities and colleges in Durban, a developing city that is both rich in biodiversity and cultural heritage.

Since it is prudent to begin with the end in mind, some of the findings emanating from this research would be:

- a) An understanding of the knowledge levels of Generation Y concerning the term biodiversity and its importance and significance to their lives;
- b) An indication as to their levels of concern regarding biodiversity loss both on an individual and national level;
- c) Some understanding of the target populations links with traditional African norms such as medicinal plant use;
- d) Some indication of the nature and frequency of respondents visits to urban green space of either nature reserves or botanic gardens, and;
- e) A baseline level of understanding as to respondents preferences for connecting with nature using different media platforms such as TV, print, internet and social media technologies (SMT's)

Questionnaires and surveys are traditionally suited for this type of data collection. Detail as to the methodologies employed are found in Phase One.

Providing statistical evidence alone however is not going to fully address the stated research objectives. Further probing utilising in depth interviews and focus group will contribute further to the validity of the evidence and provide so called 'thick descriptions' that add value to the research process. Descriptions of the research methodologies employed in this segment of the work are found in Phase Two of the research design.

Structurally the chapter opens with confirming the rationale behind this research and the importance of selecting the correct paradigm lens or viewpoint with which to focus the research. Important meta theories such as positivism and constructivist ideals are briefly examined and their relevance and applicability to this research design are demonstrated and clarified. Second the rationale behind the choice of a mixed methods research design is presented. Third the operational methodology is made explicit including the choice of research instruments, methods of data collection and analysis along with attendant research constraints and ethical considerations. Finally a contextual description of the study sites of PVNR and DBG is presented along with a rationale for their selection and relevance to this thesis.

### **The role of meta theory: Selecting the correct paradigm lens**

Meta theories are the overarching umbrella viewpoints and perspectives from which all research emanates. Meta theories may include several different theories that seek to further unravel research problems and phenomena (Ritzer, Zhao, and Murphy, 2001). In broad strokes the physical and life sciences adhere to positivist meta theories while humanities and arts research tend toward meta theories which are constructivist and postmodern in nature (Stead and Struwig, 2013; Mouton, 2012). Since this particular research on biodiversity messaging seeks a marriage of both sciences and humanities as articulated by C. P. Snow (1960) the value of both meta theories and paradigms is espoused and applied. Given the dynamic, complex and broad based nature of the topic - the intersection of biodiversity and Generation Y students living in a post-modern world the study then seeks to integrate the three research worlds as described by Mouton (2012: 138). These are World One, everyday social and physical reality of pragmatic interest, World Two, of Scientific

Enquiry also called the epistemic world or search for 'truthful knowledge' and World Three, the realm of meta science where reflections on the philosophy of science include positivism, interpretivism and postmodernism (Mouton, 2012: 139).

In examining Mouton's model of World One or the physical world, realists take the view that real objective 'world exists independent of human belief, perception, culture and language we use to describe it' (Hart, 1998: 85). This measurable observable world (in the case of this thesis -biodiversity) is able to be verified, examined and measured objectively. Descriptions of biodiversity richness and loss fall into this category and have been described in chapter 3 under scientific dimensions of the biodiversity message. The process of examining and exploring the everyday physical world of urban green space at PVNR and DBG remains an important and vital aspect of this study. This thesis, therefore draws extensively on empirical global and local studies of pragmatic interest concerning the state of biodiversity and its demonstrated value to human wellbeing (Global Biodiversity Outlook 4, 2014; DEA, 2014; Driver, *et al.*, 2012; Butchart, *et al.*, 2010; MA, 2005).

The meta narrative of positivism or Scientific Enquiry originated historically in the seventeenth century under the influence of Francis Bacon who in 1620 emphasised the production of value free objective knowledge and the rejection of the myths and superstition that had hitherto dominated the mediaeval world (Buckingham *et al.*, 2011; Merchant, 1980; Cronon, 1995). This line of thought continued through the Age of Reason under Rene Descartes and Immanuel Kant through the nineteenth century ideal of positivism articulated by Auguste Comte to the twentieth century logical positivism that dominated scientific thought from 1920-1960 (Buckingham *et al.*, 2011). Central tenets were that that science is the highest form of knowledge and that philosophy therefore must be scientific, that one scientific method was common to all science and finally that metaphysical claims are pseudoscientific (Birger and Jeppe 2007:1). Analysing the philosophy of science Karl Popper (1902-1994) however argued that science itself was not infallible and scientific theories were capable of being falsified i.e. shown to be wrong through experience (Buckingham *et al.*, 2011: 263). Two pertinent examples in this thesis are the variability of animal and plant extinction figures which have fluctuated wildly over the last thirty years and the

'current climate wars' concerning climate change where public perceptions may be swayed by either sceptical or concerned scientists (Budiansky, 1996; Baarschers, 1995). Popper developed the post positivist concepts central to current empirical research and famously noted that 'Science only starts with problems.' (Hofstee, 2001:83). Most scientific biodiversity research is post positivist following a clear research design trajectory from the articulation of a problem to the development of a hypothesis (falsifiable statement) through to a description of the method and means (usually quantitative and statistical) used to prove or disprove the hypothesis(s). (Struwig and Stead, 2013; Mouton, 2012).

Paul Feyerabend (1924-1994) however argued that scientific methodologies were limited in scope and there is no such thing as 'scientific method' (Buckingham *et al.*, 2011: 297). Setting out his ideas in his landmark publication *Against method: Outline of an Anarchistic Theory of Knowledge* and building on the work of Thomas S. Kuhn (1922-1996), Feyerabend maintained that there is no permanent framework of meaning and that science and myth overlap in so many ways (Buckingham *et al.*, 2011: 297). In examining the environmental movement and its communications and the realm of public perception this observation certainly holds true with multiple examples some of which are mentioned in the historical Appendix 1. This line of thinking became popular in the social sciences giving rise to the constructivist viewpoint where knowledge is 'co-constructed', the researcher is directly and intimately involved with his/her subject. Phillips (1995: 5) explains that the entire sum of human knowledge-whether it be the bodies of knowledge known as the various disciplines (biology, sociology and philosophy), or the cognitive structures of individual learners is constructed. Mindful of the influence of historical and cultural thinking regarding Biodiversity and Nature the author is of the opinion that these constructs need to be built into this research paradigm. Significant authors advocating a constructivist research paradigm include Jean Piaget considered to be a foundational figure of the movement, John Dewey, Jurgen Habermas and Richard Rorty. Earlier authors such as Fleck (1929) observed...“The content of our knowledge must be considered the free creation of our culture. It resembles a traditional myth.” (in von Glaserfeld, 1991:118). This statement finds echoes in the postmodern theories of the twenty first century described in chapter 2.

The work of Kuhn(1962) on scientific revolutions and paradigm shifts has been a major influence on constructivism since he stresses the active role of scientific communities in knowledge construction Phillips (1995: 6). This has parallels with the citizen science movement of today which not only popularises biodiversity amongst members of the public but makes an active contribution to its conservation (White *et al.*, 2015; CREW, 2014; Pocock *et al.*, 2014). Significantly Kuhn also stated that ...“The bulk of scientific knowledge is a product of Europe in the last four centuries. No other place and time has supported the very special communities from which scientific productivity comes.” (Kuhn, 1962: 166-167). The implications for this research paradigm warrant scrutiny. Could it be possible that Western science and ecology norms as articulated by the American and European press presumes to speak/dictate/command developing countries in particular, South Africa, KwaZulu-Natal which historically and culturally have divergent values and perceptions of nature? These considerations have been developed in chapter 3 where American and African ontology’s toward nature are discussed and will be further explored in the focus groups of this research.

Biodiversity loss has been cast as a wicked possibly intractable scientific and cultural problem (Sharman and Mlambo, 2012), a complex multifaceted environmental issue mired in shifting sand for which there is no one clear solution. Given this scenario the author is convinced that a constructivist paradigm which takes cognisance of postmodern theories is the best fit choice for this particular research. The author further believes that since Biodiversity concepts are rooted in the realm of empirical science that the post positivist research paradigm also has value for this study and should be followed. The solution in bringing the two paradigms together lies in the mixed methods research design as articulated by Creswell (2013), Hanson *et al.* (2005) and Tashakkori and Teddlie (2003).

## **Rationale behind the mixed methods research approach**

Considered as a legitimate stand alone research design in the social sciences the mixed methods approach may be defined as:

*the collection or analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research*

Creswell, Plano Clark, Gutmann, and Hanson, 2003: 212.

The method affords a richness of data gathering and analysis allowing researchers to simultaneously generalize results from a sample to a population and to gain a deeper understanding of the phenomenon of interest - in this case perceptions of Biodiversity amongst Generation Y (Hanson *et al.*, 2005: 224). A key element in research design is triangulation (borrowed from naval science) whereby the use of multiple reference points is used to locate an objects exact position. A mixed methods approach then allows for the complementary use of both qualitative and quantitative data where each could uncover some unique variance that might have been neglected (Jick, 1979: 603). Furthermore a mixed methods approach extends the breadth and range of the enquiry since each component has the ability to inform and develop the other (Beck, 2005). According to Greene and Caracelli (2003) the benefit of using these in a single research study is it takes advantage of the representativeness and generalizability of quantitative findings and the in- depth, contextual nature of qualitative findings since each has an equal footing and merit (in Hanson *et. al.*,2005: 224). Should these paradigms clash giving rise to contradictory ideas and contested arguments Greene and Caracelli (2003) maintain that this is part of the 'dialectical' nature of research.

The first step in this research design process is the choice of an explicit theoretical lens or paradigm that informs the study. Paradigms of positivism and constructivism has already been selected and explained in the opening paragraphs of this section. The next step refers to *how* the data is to be collected. The collection of qualitative

and quantitative data may be done sequentially or concurrently at the same time assigning a priority rating to the significance of each data set. The final step involves deciding the point at which data analysis and integration will occur. In mixed methods studies, data analysis and integration may occur by analysing the data separately, by transforming them, or by connecting the analyses in some way (Hanson, *et al.*, 2005: 227).

Given the multiple layering of issues in this study the author has opted for a concurrent triangulation design whereby quantitative and qualitative data are collected and analysed at the same time with equal priority relegated to each data set. Data analysis for each set would be separate, with integration occurring at the data interpretation stage. Interpretation would involve discussing the extent to which the data triangulate or converge or alternatively contradict and diverge from each other. Hanson *et al.*, (2005: 229) affirm the use of this particular design for attempting to confirm, cross-validate, and corroborate study findings. Having located and selected the appropriate epistemologies for the study we now move to a detailed description of the actual methods to operationalise the research.

## **Research Methodology**

The rationale, justification, *modus operandi* and mechanics of the actual methodologies employed are discussed separately under Phase One and Phase Two but follow a similar structural template.

### **Phase One: Quantitative study**

#### *Rationale and justification*

Phase One deals with the handling of quantitative empirical data and participation studies. Students of the Generation Y cohort studying at the Durban University of Technology (DUT) will be surveyed. Located in Durban, KwaZulu-Natal DUT offers career-focussed higher education. Students comprise a diverse range of backgrounds coming from rural, peri-urban and urban environments throughout the province (DUT HETQC Audit, 2011). A cross section of students will be surveyed across six faculties (Engineering and the Built Environment, Health, Management

Sciences, Arts and Design, Accounting and Informatics and Applied Science) to establish the extent of interest and knowledge of the term biodiversity. The survey strategy is employed since the results may be considered to be representative of the larger population (Mouton, 2012: 20). In this case it would be university students studying within the Durban precinct.

The development of a structured questionnaire with opinion rated items produces primary data suitable for descriptive statistics from which certain inferences may be drawn (Mouton, 2012: 21). The actual questions were developed in accordance with the issues raised in the literature review and were designed to satisfy the research objectives. The questionnaire included closed and open-ended questions, multiple choice items and Likert scale ratings. After assessing the range of recent international biodiversity surveys a decision was made to use the Euro barometer survey as a point of departure adapting the questions for the South African context (See Appendix 3). Once the survey instrument was interrogated by appropriate academics and students a pilot run of 40 valid respondents was carried out to further test the measuring instrument under similar sampling conditions before releasing it across the faculties. Operationally hard copies of the surveys were handed out by selected lecturers in each faculty. Statistical data was analysed using social sciences software package SPSS V 24.00. Phase One then established indicators for one of the primary research questions; namely the extent and interest of Generation Y in biodiversity awareness and provided some indication of preferred media young people would choose to connect better with Nature be it print or electronic media platforms.

#### *Data (Population and sample strengths and weakness)*

A non probability or convenience sampling method was employed. The target sample size of 400 is considered adequate to produce reliable data sets for correlation and analysis of the factors since statistically a larger sample size will not influence the results both in terms of confidence level and margin of error (Mouton, 2012; Payne, 1967). A similar study in Pretoria assessing South African students use of social media and cell phones carried out by Goneos-Malka in 2012 used the same sample

size. For purposes of this research the author felt that this target figure would yield more consistent and valid statistical results. In order to compensate for incomplete responses it was decided to by issue a further 40 (10 percent) questionnaires.

### *Statistical Analysis (Techniques and justification)*

In order to address the demands of empirical research concepts of Validity, Reliability and Rigour were deemed key. Face validity is a subjective judgment, the conviction that the research instrument measures what the researcher set out to measure (Maree, 2008). To a certain extent this may be validated statistically using Cronbach's Alpha test on the survey instrument and results. Construct validity is a central concept within psychological research and is the degree to which characteristics may be inferred through people's behavior. It refers to the ability of a measurement tool such as a survey or test to actually measure the psychological concept being studied, in this case constructs of biophilia (Man's innate affinity for nature). Intuitive appraisals have their strengths and weaknesses, and depend heavily on the skill and motivations of the reviewer (Westen and Rosenthal, 2003). Validation is also confirmed through replication in other studies over time and place where the same survey instrument is repeated with similar results (Mouton, 2012).

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). Cronbach's alpha is not a statistical test - it is a coefficient of reliability or consistency (UCLA, 2010). 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). Factor analysis can also be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (Maree, 2008; UCLA, 2010). Items measured on a five point

Likert scale are well suited to this analysis (Maree, 2008). As multiple closely related characteristics are being examined Multivariate analysis (MVA), which involves observation and analysis of more than one statistical outcome variable at a time will be employed. The technique is used to perform studies across multiple dimensions while taking into account the effects of all variables on the responses of interest (Hair *et al.*, 2010). Measuring instruments would be a five point Lickert scale suitable for gathering opinion centred data. Minimising the options to five enables respondents to more easily distinguish between the scales and increases the accuracy of responses (Goneos-Malka, 2012).

Academic rigour, which as Mouton (2012) describes is at the heart of good scholarship will be applied at all stages of the research design and implementation to reduce error. Limitations on this study include the sample size, researcher bias, non response and refusal to cooperate (student apathy). Obtaining valid data in both Phase One and Two as described is critical to constructing a credible model in chapter 8.

#### *Limitations, constraints and ethical considerations*

Challenges include development of an appropriate length questionnaires for the Phase One that meets the research objectives while avoiding survey fatigue from the audience. Scrutiny and testing by other students may guide the process while a pilot run will assist in achieving a workable balanced survey instrument. Unresponsive students and general apathy and malaise is a reality that can inhibit the submission of 400 valid responses. This will be overcome by offering them the opportunity to enter their student numbers in a draw for an android cell phone prize. The draw will be administered by the DUT registrar to ensure complete that fairness and due process were followed.

In line with international best practice and university requirements the following ethical considerations were met. The nature and purposes of the research was clearly and simply outlined to respondents along with the identity, contact details and institutional association of the researcher and supervisor. All participation was voluntary with participants having the freedom to withdraw from the research at any

time without any negative or undesirable consequences to themselves. Furthermore respondents were informed that their responses would be treated in a confidential manner with complete anonymity being retained. The benefits of participating in the survey were explained and it was made clear that only fully completed surveys would be considered for entry into the draw for the android cell phone. Participants were not exposed to any questions which may be experienced as stressful or upsetting. Finally respondents were asked to sign an informed consent form signifying that they understood the implications of the survey. The survey sheets were distributed manually and consisted of three sections namely an introduction and information sheet, informed consent form and then the survey proper.

## **Phase Two: Focus Groups**

### *Theoretical rationale and justification for using focus groups*

This phase deepens and extends the discussion with the use of selected focus groups to interrogate the issues raised in Phase One and to elicit honest and critical feedback in a relaxed setting. Focus groups are used in exploratory and descriptive research when investigating constructs that have not yet been effectively operationalized or to examine highly phenomenological constructs - in this case attitudes towards nature (Roller, 2011; Kress and Schoffner, 2007).

Focus groups are used extensively in communication studies, counselling contexts and psychological studies for information gathering about the opinions, perceptions attitudes beliefs and insights of a small group of people wherein 8-12 individuals discuss a particular topic of interest for 1-2 hours under the guidance of a group moderator (Kress and Schoffner, 2007: 190; Stewart and Shamdasani, 2014). The role of the moderator is to direct the line of questioning, promote interaction between participants, probe for details and to ensure the discussion remains directed on the chosen topic (Stewart, Shamdasani and Rook, 2007: 22). These discussions are in fact facilitated and purposeful data collection since pre established structured questions are developed to guide the conversation (Kress and Schoffner, 2007: 191). Focus groups are naturalistic in that a range of communicative processes are used including storytelling, joking, arguing, teasing persuasion, challenge and

disagreement (Wilkinson, 2003: 185; Kitzinger, 1995: 299). Since the facilitator must be flexible, and able to articulate issues quickly and accurately the role is often suited to counsellors or lecturers who feel comfortable and competent to direct and channel group dialogue (Kress and Schoffner, 2007:191; Kitzinger, 1995:299). Since the interaction between participants is a defining feature of focus groups Kitzinger (1995) points out that the method can be used to examine not only what people think but how and why they think that way. This has parallels with the emphasis this researcher has placed on the need to understand divergent social and historical constructs of nature that have a powerful influence on attitudes and behaviours (Chapter 3 refers). Focus group are thus ideally suited to explore individual constructs of nature and attitudes toward biodiversity encouraging participation from people who may be reluctant to be interviewed on their own or who feel they have nothing to say (Kitzinger, 1995:299).

Interaction between participants achieves important research objectives including the need to highlight respondent's framework of understanding, to encourage participants to develop their own analysis of common experiences and to identify group norms and cultural values. Furthermore the focus group environment provides insight into the operation of group social processes, permits the expression of criticism, promotes disclosures identifying questions researchers had not yet considered and illuminates participants perspectives through group debate (Pennsylvania State University, 2007; Kitzinger, 1995: 302). The composition of the focus group may be 'naturally occurring' for example work colleagues or student classmates while homogenous groups have the advantage of sharing similar experiences. Conversely the inclusion of diverse participant from different backgrounds may initiate further debate and bring fresh perspectives to the research (Kitzinger, 1995: 300). While the benefits of using focus groups to gather in depth qualitative data in a time efficient manner are acknowledged constraints include unbalanced results because of group dynamics, the requirement for a skilled facilitator and the fact that the results from the group cannot be generalised to broader populations (Stewart, Shamdasani and Rook, 2014; Kress and Schoffner, 2007; Kitzinger, 1995). Interpretation difficulties on the content of the discussion also arise however these may be overcome through the use of careful auditing and

qualitative coding of themes together with the analysis of video transcripts to identify individual speakers and group dynamics (Kress and Schoffner, 2007:194).

### *Theoretical basis for Image making and analysis*

Since image making by respondents from the focus groups forms an integral part of probing the communication process it is necessary to root this research process within a suitable theoretical paradigm. Caroline Wang pioneered the use of camera images by the rural communities in China as a means of personal expression developing a process called Photovoice whereby members discuss the pictures they have produced and so give meaning or interpretation to their images (Wang, 1999:186). Essentially used as a Participatory Action Research tool in the field of Health communication the technique and principles have been used successfully in USA among urban youth and more recently in South Africa as a convenient research tool (Mitchell, *et al.*, 2005; Strack, Magill, and McDonagh, 2004; Wang, 1999; Wang and Burris, 1997). Working with AIDS stricken communities in KwaZulu-Natal Mitchell, *et al.*, (2005: 265) observed that the photovoice technique works best when the participants are engaged in selecting, commenting on and deciding on how their views can best be represented visually. According to her research this goes far beyond photo-elicitation, and positions picture-taking within a broader framework of narrative and display (Mitchell, *et al.*, 2005: 265).

Pioneering community photographer Spence noted that images with their hidden and explicit meanings help to shape our concepts of what is real and normal (in Wang, 2009:186). As Berger points out lessons on image do not reside in their physical structure but rather how people interpret it (Berger, 1984: 52). Building on the theoretical framework of Hall (1997) and Mukeridj and Schudson (1991) who described the production of culture Wang adopts a three pronged approach to understanding the influence of images by analysing 1) the production of the images, 2) the reception of the images and 3) the content of the images themselves ( in Wang, 1999:186).

The methodology behind the photovoice research method is described by Wang and Burris, (1997) and Wang (1999,187-189) as follows:

- Recruit a representative group of photovoice participants maximising representatives along key demographic characteristics
- Introduce the photovoice methodology to participants via a group discussion
- Obtain informed consent (see ethical considerations in this chapter)
- Pose an initial theme for taking pictures
- Distribute cameras to participants and review their usage
- Provide time for participants to take the images
- Meet to discuss the photographs
- Finally settle on an agreed format /media platform to share their findings with their peers, student community and policy makers

As a research technique Photovoice is compatible with the use of surveys, interviews and focus groups. According to Wang (1999) the selection of photographs, contextualisation or story telling(narratives) and codifying issues and themes or theories occur during group discussion. The first step allows participants to select the photographs they feel are most significant while the second stage encourages them to critically engage with these images and here Wang (1999: 188) suggests using the acronym SHOWeD namely:

- a) What do you See here?
- b) What is really Happening here?
- c) How does this relate to Our lives?
- d) Why does this situation, concern, or strength exist?
- e) What can we Do about it?

The final stage assists participants to summarise the issues raised by their image making. The Durban Botanic Gardens educational outreach is currently using the photovoice method amongst school children from disadvantaged backgrounds on a regular basis firstly in documenting evidence of learning and secondly as an

exploratory research to distil their finding from multiple environmental teaching sessions (J. Fuchs and R. Moletsane, personal communication, 15 July 2015).

#### *Modus operandi for focus groups*

Three to four focus groups made up of ten – fourteen voluntary members was envisaged drawn from differing DUT faculties and departments. Each focus group would involve three sessions. The first session would take place in a seminar / boardroom setting involving a discussion of the term biodiversity and its personal relevance to the respondents. The discussion would be guided by a standard set of questions to maintain focus and direction (See chapter 7). Contemporary environmental film clips would be screened to introduce the topic in a meaningful manner. The second session involves briefing the members as to the Photovoice methodologies and respondents would then participate in their own image making when they physically visited the study sites of PVNR and DBG. At the final meeting members present their images/posters at the institution and share their personal reflections on the process. It is the process of visual making and firsthand experience and connection with Nature that is paramount and this promises to be an exciting and creative phase of the project.

The focus groups have three main objectives that inform this research:

- a) *To discuss in an open forum the meaning and relevance of the term biodiversity to the respondents daily lives.* This guided discussion follows the lines of similar work conducted by Fischer and Young (2007) where attitudes toward local conservation amongst members of the Scottish public were assessed as well as a study by Buijs *et al.*, (2010) that examined Europeans perceptions of biodiversity in protected areas on the continent. The discussion builds on American Citizen Science projects such as the Biodiversity Project (2002), the SANBI 'Making the case for biodiversity' campaign (2015) as well as data drawn from the World Wide Views - Biodiversity survey hosted by the Danish Board of Technology in 2012. Discussion questions for the focus groups are presented in chapter 7 and the transcripts in appendix 6.

- b) *To physically visit botanic gardens and nature reserves* within walking distance of the survey so participants can engage and enjoy direct encounters with local biodiversity. Here participants are provided with an opportunity to visually record and document their personal experiences. This includes photographic images from their cell phones as well as video footage if so desired. This allows participants the freedom to focus on those personal aspects of local biodiversity that are important to them. In accordance with Wang's Photo Voice methodologies (1999) participants then share their images, thoughts and findings with the group. This will be done formally in a final feedback session.
- c) *To allow participants to provide feedback to the group utilising text and pictures to communicate their personal connection to nature.* Guidelines for students to create an A2 size colour poster expressing their site experiences are presented in Appendix 6 together with samples of selected student posters. Here personal motivations and traditional cultural connections with nature merge in often unique unexpected ways.

#### *Limitations, constraints and ethical considerations*

Challenges for Phase Two include the selection of suitable members for the focus groups that are committed, involved and excited to work on the 'Lets Talk Nature' project. The prize or incentive for these participants would be a raffle into which each participating member is entered. The winner would receive a Hero 3 GoPro camcorder for their movie making efforts and inputs into the group. Only those members that participate in all three sessions are eligible to be entered into the draw which is administered by the registrar's office. Draw results and images will be posted on the researcher's web page. Challenges in this phase include the need for the researcher to guide and lead but not be prescriptive as to the style and content that must originate from the group. Other obstacles include personality conflicts, peer pressure and the need to keep discussions focussed on the topic. Focus group members are not 'press ganged' they participate because they see enriching benefit in their personal lives. Ideally the price incentive should not be the driving force behind their participation – it is seen as a 'sweetener' or additional bonus for giving

up time and effort. Price incentives are not unique to this research they have been used successfully in other postmodern doctoral surveys such as Gonyea-Malka (2012) who conducted surveys amongst marketing students at Pretoria University.

### **Study sites for Phase Two Focus Groups**

Two urban green open spaces within the heart of the Durban have been selected and their relevance and significance to this study further detailed in this chapter.

The Durban Botanic Gardens (DBG) is a world class botanic garden and arboretum containing specialist collections of indigenous and exotic plants and is within walking distance of DUT. Pigeon Valley is a suburban nature reserve, a remnant of coastal forest and home to a rich variety of plant and animal life including the endemic Natal White Stinkwood, *Celtis mildbraedii*. The reserve provides an excellent sample of local biodiversity and is within walking distance from the Howard College Campus of UKZN.

### **The Durban urban open space context**

Covering a spatial footprint of some 2 297 square kilometres, the city of Durban has a population of 3.44 million and is located within a global biodiversity 'hotspot' the Maputoland - Pondoland - Albany complex or MPA that gives rise to an extraordinary variety of plants and animals within an urban setting (Mattson, 2015: 38; Boon, 2015: 100). The Durban Metropolitan Open Space System (DMOSS) is the footprint which defines the environmentally significant land in the City (Durban: State of Biodiversity Report., 2014/15). 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: 10).

This open space system of 76 000 hectares represents almost one-third of Durban's total area and includes river catchment areas and nature reserves (Boon, 2007: 10). Almost 9.5% of this land is under protection (Durban: State of Biodiversity Report., 2014/15).

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, 2007:12).

Biodiversity response planning and the DMOSS in the eThekweni Metropolitan Area (EMA) has been through various iterations evolving from the initial proposal by the Wildlife Society in 1979 to the eThekweni Environmental Services Management Plan or EESMP and most recently to a catchment based protection focus and strategy that provides environmental rebates to ratepayers (Durban: State of Biodiversity Report., 2014/15)..

### **Pigeon Valley Nature Reserve (PVNR)**

#### *Background, location and climate*

Pigeon Valley Nature Reserve (PVNR) is a 10 hectare remnant of Coastal Forest on Durban's Berea, once part of an extensive forest tract which ranged on the eastern slopes of the Berea Ridge, from the Umgeni River in the north to the Umbilo River in the south (Boon, 1992: 3). Pigeon Valley and Burman Bush, which overlooks the Umgeni River, are the only two significant forest tracts remaining on Durban's Berea's eastern slopes (Boon, 1992: 3). As recently as 1932, the "Stellawood" forest/ woodland, alluded to in herbarium collections from that period, covered an area of 168 hectares (Boon, 1992: 5).

Surrounded by a sea of suburbia this urban green space is now a refuge for birdlife and endemic forest plants bounded by busy motorways on each side. PVNR lies in close proximity to the University of KwaZulu-Natal's Howard College campus, and is bounded by Masizi Kunene Ave (formally King George V Avenue), Princess Alice Avenue and Bowes Lyon Avenue (Boon, 1992: 4). The reserve boasts a high level of local biodiversity richness with a current bird list of some 152 species and an indigenous tree list of 110 species (C, Hemson, personal communication, 15 July 2015). According to Henley Juta, PVNR has, been protected as a park by the Durban city council since 1936 with the area being managed by the Natural Areas

Division of the Durban Parks Department, since 1981 (Juta, 1988; Boon, 1992:4). This corresponds with pre-World War II development in the area including the building of Howard College and the sub division of Glenwood housing plots (McCallum, 2014). Boon (1992: 12) describes the climate of PVNR as summer-rainfall with 60% of the rainfall falling in the months November to March. Mean annual rainfall is in the region of 1100 mm for the period. The area receives no frost and a storm water discharge pipe in the centre of the reserve fills two small artificial ponds. The reserve lies at an altitude range from 65 m a.s.l. in the east to 110 m a.s.l. in the west (Boon, 1992: 13). Soils are red, deep and sandy and well drained being derived from the Berea dunes (King and Maud, 1964). A central brick paved path bisects the reserve in its valley into two distinct portions a cool moist south facing slope and a hotter drier north facing slope. These topographical differences influence the microclimate and plant distribution patterns of the reserve (Fairall and Nichols, 1992: 69).

### *Flora and Fauna*

Vegetation at PVNR consists largely of what Boon (2015: 106-107) describes as Northern Coastal Forest, a dense species rich subtropical forest of medium to tall height. The representative flagship forest species within the reserve are the Natal Elm (*Celtis mildbraedii*) and the Natal Loquat (*Oxyanthus pyriformis* subsp. *pyriformis*). Both trees have interesting and unique natural histories and form worthy subjects of local biodiversity for guided tours, visual interpretation and focus groups. The Natal elm is endemic to the area and is surviving relic from the original Stella Bush. The protection of this tree within the reserve gives it a National Heritage status. A close relative of the White stinkwood (*Celtis africana*) also found in the reserve the Natal elm is characterised by its larger leathery leaves and distinctive flaring buttress roots. The Natal Loquat is a member of the Coffee family (Rubiaceae) and forms an attractive garden subject with its glossy green leaves and gardenia scented flowers (Pooley, 1993: 466). The reserve was initially named after the Bronze-naped Delegorgue's Pigeon, which was first collected here and described by Delegorgue in 1847 (Hemson, 2015). Robins are prolific in the reserve and the Natal Robin may easily be spotted foraging in the leaf litter layer (Boon, 1992: 17).

Forest raptors include Black Kite, Black Sparrowhawk, African Goshawk, and the Spotted Eagle-Owl (Hemson, 2015; Boon, 1992; 14-16; Fairall and Nichols, 1992:69). The birding fraternity is active in the reserve on a regular basis under the auspices of Friends of Pigeon Valley and the Natal Bird Club. Both organisations play an active role in local city biodiversity forums which address issues of urban conservation. Red duiker are resident in the reserve, troupes of vervet monkeys feed in the forest and various local snakes have been spotted (Hemson, 2015). Published scientific research concerning the reserve and environs is extremely limited and deserving of future attention by UKZN students.

#### *Current Interpretation to stimulate biodiversity learning*

A dated coloured map at the entrance assists visitors to locate the trail loop best suited for their needs together with a clipboard for visitor comments on bird sightings. A comprehensive list of trees and birds complete with line drawings was compiled by Geoff Nichols (1992) but is believed to be out of print and is not readily available to the public. Selected trees have been relabelled with their current botanical and Zulu names and sponsored by a local business (Hemson, 2015). Interpretive signs are conspicuously absent due to institutional malaise.

### **The Durban Botanic Gardens (DBG)**

#### *Plant Collections and biodiversity conservation at DBG*

Currently marketed as the oldest surviving botanic garden on the African continent and Durban oldest public institution the gardens were originally proclaimed in December 1849 as a botanic station for the trial of agricultural crops which included sugarcane, coffee, rubber, cinchona and arrowroot (McCracken, 1996: 5; Lambert, 1994: 2). Today nestled at the base of the Berea ridge the landscaped grounds provide an urban green lung and a haven of tranquillity for city dwellers as well as a popular tourist destination for international and local visitors. Horticulturally the gardens are known for their fine collection of trees, palms, orchids and cycads. As an arboretum of exotic trees DBG is unsurpassed, its colonial curators having sourced and planted a variety of specimens from around the world (Mattson, 2015).

In terms of the orchid collection there are more than 8000 plants comprising 75 genera. These flowering plants are displayed together with other tropical foliage specimens in the Ernest Thorp orchid house. A significant portion of the collection are *Cattleyas* and *Dendrobiums* with other genera such as *Vanda*, *Phalaenopsis*, *Oncidium* and *Miltonia* on display (H. Peters, personal communication, 5 April 2014).

A fine collection of 800 palms are displayed chiefly around the Lake and the upper Palm Walk below Edith Benson road. The collection includes 130 species in 58 genera (Lambert, 1994:15). Southern African species include the iLala Palm (*Hyphaene coriacea*), Pondo Coconut Palm (*Jubaeopsis caffra*), Wild Date Palm (*Phoenix reclinata*) and the Kosi Bay Palm (*Raphia australis*) (Lambert, 1994: 24). The cycad section presents a full range of South African specimens from the Eastern Cape, Drakensburg, Gauteng and Limpopo while international genera originate from Venezuela, Central America and Oceania (A. Nel, personal communication, 12 April 2014). The iconic specimens of Wood's Cycad (*Encephalartos woodii*) planted adjacent to the steps leading to the Old Reservoir represent a viewing station in the garden that combines conservation rarity with colonial heritage value.

#### *Purpose and ethos of botanic gardens and DBG*

A botanic garden is far more than a public park, it provides a complex multi layered experience for the visitor, a restorative natural environment which improves human wellbeing psychologically, spiritually and physically (Ward, *et al.*, 2010; Ballantyne, Packer and Hughes, 2008: 439; Connell, 2004; Darwin-Edwards, 2000: 37). As a conservation agency Botanic gardens cultivate and propagate endangered plants as an *ex situ* conservation strategy whereby some of the plants will be displayed and allowed to grow as mother stock while seed will be harvested to propagate new plants in the nursery (BGCI, 2007; GSPC, 2012). Botanic gardens protect and foster plant biodiversity and subscribe to international conservation agendas such as the Global Strategy for Plant Conservation (GSPC) (Ward, *et al.*, 2010).

There are over 2500 botanic gardens around the world and together they receive over 300 million visitors a year (Williams, *et al.*, 2015: 1610). As a tourist destination Julia Willison director of Botanic Gardens Conservation International (BGCI)

observes that 1 in 33 of all the people in the world visit a botanical garden each year (Chang, Bisgrove and Liao, 2008: 233). Kirstenbosch, a world heritage site and a showcase for South African flora developed received some 764 913 visitors in 2007 (SANBI, 2008). DBG is not funded by gate fees and thus visitor volumes are difficult to estimate (J. Fuchs, personal communication, 2 July 2015).

As environmental historians Donal and Eileen McCracken rightly observe in their book *The Way to Kirstenbosch* :

*A botanic gardens may delight the eye and the aesthetic senses, satisfy idle curiosity and excite wonder, but the capacity to produce these reactions is of only secondary importance to its basic function: accumulating botanical and horticultural knowledge (research) and disseminating that knowledge (information and education).*

McCracken and McCracken, 1988: 1

It is the last phrase that has import for this thesis providing its *raison d'être*. One of the stated roles of botanic gardens is communicating botanical knowledge to a wide audience. Surveys conducted by Botanic Gardens Conservation International (BGCI) indicate that 91% of botanic gardens worldwide include education in their mission statement (BGCI, 2007). Furthermore the Global Strategy for Plant Conservation (GSPC) is explicit about mainstreaming plant education and awareness in Target 14 which emphasises the importance of plant diversity and the need for conservation to be incorporated into communication, education and public awareness programs (GSPC, 2012). Global concerns reflected the growing disconnect between young people and nature, 'plant blindness' and the general neglect of plant education in environmental programs. The GSPC acknowledged that plant conservation messages were being lost under an overwhelming volume of advertising media. The objectives and targets of the GSPC find congruence with the Aichi targets of the UN and the biodiversity awareness campaign being developed by SANBI (MTC).

### *Plant Interpretation, Environmental Education (EE) and Community outreach at DBG*

Labels, signage and well placed and designed interpretation have enormous potential to convey the biodiversity message to the general public (Ward, *et al.*, 2010; Ballantyne, Packer and Hughes, 2008; Connell, 2004).

The role of plant interpretation and its efficacy as a communication tool for biodiversity have been debated by writers such as Darwin-Edwards (2000) who declared that visitors do not enter a botanic garden with notepad in hand to record plant sightings and Wise (1979) who observed that people some people view plant labels as 'numbs' or useless information. Similarly at the 7<sup>th</sup> international BGCI conference Richard Benfield's research from Queens Botanic Garden USA indicated that visitors were simply not stopping at signs (Benfield, 2011). Despite these limitations good progress has been made at DBG in terms of plant interpretation, signage and labels however much work needs to be done to raise the level to the standards of excellence set by the Royal Botanic Gardens Kew. The author has produced interpretative signage for the bromeliad garden, Alien Alley, the herb garden as well as a series of biodiversity posters housed in an exhibit near the lake. A clear and colourful site map directs the visitor along the established block system to the various attractions which are clearly signposted in English and isiZulu. Some of the trees, palms, ferns and bromeliads have botanical labels bearing the family name, botanical name (genus and species) common name and country of origin. During the site visits of the focus groups the students will be able to voluntarily engage with some of the plant interpretation presented.

A dedicated education officer at DBG coordinates Environmental Education (EE), plant interpretation and community outreach for a wide range of audiences with the express aim of cultivating a sense of citizenship, awareness and responsible action related to plant biodiversity, ecology and conservation (J. Fuchs, personal communication, 2 July 2015). EE takes place largely at the Primary and Senior Primary phase and is conducted by trained guides and volunteers on a regular basis. Institutional support from the municipality particularly in bussing in school children from the Inanda, Ntazuma and KwaMashu districts (INK) has meant that previously

disadvantaged children are now getting first hand experience of local plants and relating the value of biodiversity and healthy ecosystems to their own lives. The programs are themed and deal with issues such as climate change, ecology and the interaction of plants and people (J. Fuchs, personal communication, 2 July 2015). While this thesis is primarily directed at the HE student audience the literature is unanimous in demonstrating the close link between childhood experiences of nature and an interest in biodiversity concerns in later life (Louv, 2005; Pyle, 2005; Kellert, 2009; Moss, 2012). The gardens also partner in providing a venue for practical horticultural training at the HE level with the DUT School of Horticulture and the University of South Africa (UNISA) horticulture contact course hosted annually (M. Clement, personal communication, 3 April 2015).

In summation both DBG and PVNR sites provide excellent examples of urban green space that can act as 'arenas of learning' with their immense plant diversity, aesthetic appeal and cultural heritage. They serve as useful host venues in which students may discover their own personal connections with local biodiversity during Phase Two of this research.

## **Conclusions**

The research methodologies generated in this chapter have sought to develop a fitness of purpose for the objectives of this thesis, namely to probe the level of connections between Generation Y Students and local biodiversity and to establish how this connection that can be strengthened in part through exposure to urban green space and augmented by modern interpretive strategies and media. A mixed methods approach was advocated using a positivist scientific approach to generating empirical data through the use of survey instruments while an interpretivist approach was adopted to gathering more detailed nuanced data through the use of focus groups whose participants were engaged in first hand exposure to local biodiversity at the designated site venues of PVNR and the DBG.

## **Chapter Six: Findings, Phase One - Survey**

### **Introduction**

The research results and findings of Phase One (Survey stage) and its associated descriptive and inferential statistics are presented in this chapter as a distinct unit together with its own critique, analysis and sub conclusions. Results and findings from Phase Two (Focus Groups) including qualitative discussions, critique and analysis are presented in Chapter 7. Since this thesis makes use of a mixed methods research methodology as described in Chapter 5 the findings of the two phases are then coalesced and keyed in to the literature for a more complete and summative analysis. This discussion integrates and cements the two phases of the research and is found the conclusions in Chapter 8.

This chapter then presents the results and discusses the findings obtained from the questionnaires in this study. The questionnaire was the primary data collection tool of Phase One. The results present the descriptive statistics in the form of graphs, cross tabulations and other figures illustrating the quantitative data that was collected. Inferential techniques include the use of correlations and chi square test values; which are interpreted using the p-values. Structurally the descriptive and inferential statistics are presented first while technical data concerning survey validity and reliability are presented at the end of the chapter. Further data relating to the quantitative aspects of the statistical analysis are in Appendix 5. The chapter concludes with a summary of the findings from Phase One.

## The Research Instrument

### *Use and purpose of Survey Instruments*

A structured questionnaire (Appendix 3) was developed in accordance with the literature to meet the overall research objectives. Phase One was designed to specifically elicit the following data:

- a) An understanding of the *knowledge levels of Generation Y concerning the term biodiversity* and its importance and significance to their lives;
- b) An indication as to students *levels of concern regarding biodiversity loss* both on an individual and national level;
- c) Some understanding of the target populations *links with traditional African norms* such as medicinal plant use;
- d) Some indication of the *nature and frequency of respondents visits to urban green space* of either nature reserves or botanic gardens, and;
- e) A baseline level of understanding as to respondents *preferences for connecting with nature using different media platforms* such as TV, print, internet and social media technologies (SMT's)

These goals may be checked at the conclusion of this chapter and the results tabulated in the summary. The survey included closed and open-ended questions, multiple choice items and Likert scale ratings. The first portion of the survey introduced the researcher and the purpose of the survey to the respondent obtaining informed consent in order to proceed.

The questionnaire was then divided into four self contained units:

Section A Demographics (7)

Section B Thoughts on nature and the environment (22)

Section C Actual experiences and connections with Nature in urban and rural open green space (6)

Section D Connecting with nature through media (Virtual connection)(14)

A total of 49 different questions were posed with the number allocated to each section indicated in brackets.

Using best international practise concerning biodiversity surveys to the public the questionnaire adapted some of the questions posed in the EU Barometer (2010) surveys to meet South African conditions (Section B 1- B7). This allowed some comparison of local student response with that of the continent.

#### *Sampling size and modus operandi*

After issuing a pilot survey to a group of 40 students in the first semester of 2015 in order to check for clarity and to guard against survey fatigue the document was adjusted and then released during the second semester of 2015 across the DUT campus at the Steve Biko, Ritson Road, ML Sultan and City Campus venues. Lecturers who were willing to make their classes available were contacted and the purpose and benefit of the survey was explained to the students at the start of each session to ensure free and voluntary participation. The necessary ethical clearance forms were obtained from the DUT research office and ethical clearance was received from the University of KwaZulu-Natal's research committee (Appendix 4).

Non probability or convenience sampling was used with an initial target of 400 valid responses. In total, 440 questionnaires were despatched and 428 were returned which provided a 97% response rate. This included a representative spread across the Universities six faculties as indicated by the table below:

**Table 6.1 Faculties surveyed at DUT**

<b>FACULTY</b>	<b>Frequency</b>	<b>Percent</b>
<b>Accounting &amp; Informatics</b>	3	0.7
<b>Applied Science</b>	202	47.2
<b>Arts and Design</b>	45	10.5
<b>Engineering and the Built Environment</b>	68	15.9
<b>Health</b>	26	6.1
<b>Management Sciences</b>	84	19.6
<b>Total</b>	428	100.0

The greatest responses were received from Applied Science (47.2 %). Figures from DHET confirm that student enrolments are greatest in the fields of Science, Engineering and Technology (SET) followed by Business Management and related field and Humanities /Social Sciences (DHET, 2015: 21). The allocation of departments to faculties is also unique to DUT for example Textiles Technology is considered an Applied Science as is Sports Management.

The actual breakdown of responses per qualifications are reflected below:

**Table 6.2 Undergraduate diploma responses**

<b>Name of Faculty</b>	<b>Name of Diploma</b>	<b>Frequency</b>	<b>Percent</b>
<b>Applied Science</b>	Analytical Chemistry	47	11.0
<b>Engineering and the Built Environment</b>	Architecture	38	8.9
<b>Applied Science</b>	Biotechnology And Food Technology	41	9.6
<b>Applied Science</b>	Chemical Engineering	50	11.7
<b>Health</b>	Environmental Health	26	6.1
<b>Arts and Design</b>	Fine Art	24	5.6
<b>Applied Science</b>	Food And Nutrition	34	7.9
<b>Accounting &amp; Informatics</b>	Informatics	3	0.7
<b>Management Sciences</b>	Marketing	56	13.1
<b>Management Sciences</b>	Operations Management	28	6.5
<b>Applied Science</b>	Sports Management	17	4.0
<b>Applied Science</b>	Textile Technology	13	3.0
<b>Engineering and the Built Environment</b>	Town Planning	30	7.0
<b>Arts and Design</b>	Video Tech	21	4.9
	<b>Total</b>	<b>428</b>	<b>100.0</b>

The surveys represent a sample of 1.62 percent of the entire DUT student body of 26 417 students registered in 2014 (DHET, 2015: 21). Data from each questionnaire was recorded manually on EXCEL spreadsheets and coded for entry and analysis using the Statistical Package for Social Sciences software SPSS V 24.00. Technical data pertaining to survey reliability, validity and vigour follow the descriptive and inferential statistics. Each of the four sections is now examined with an initial description followed by the analysis and subconclusion.

## Descriptive and inferential statistics

### Section A Demographics

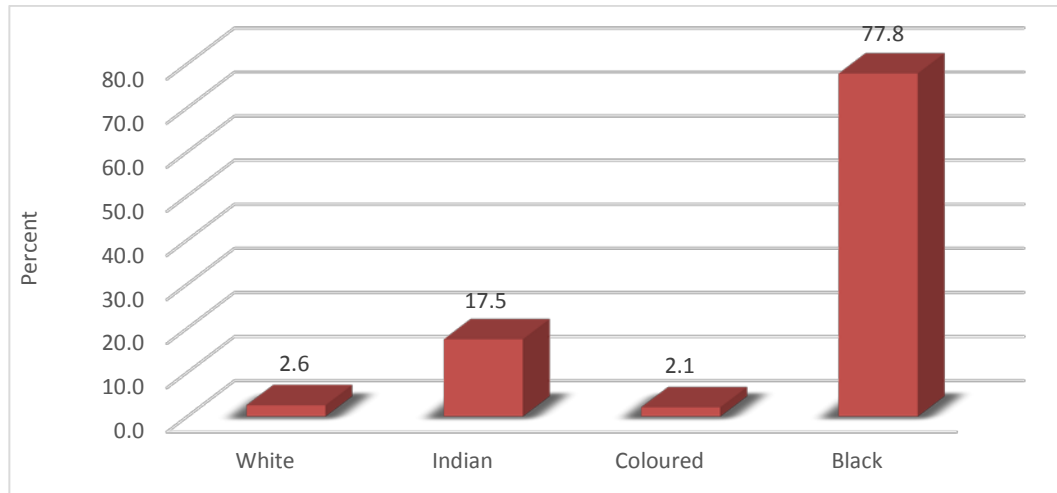
The responses mirror the demographics for the University, the city and indeed the province. In terms of age distribution all responses fit the Generation Y criteria as indicated by the table below

**Table 6.3 Responses by age and gender**

Age	Frequency	Percent
17-21	243	56.8
22-25	157	36.7
26-30	26	6.1
31+	2	0.5
Total	428	100.0

Gender	Frequency	Percent
Male	239	55.8
Female	189	44.2
Total	428	100.0

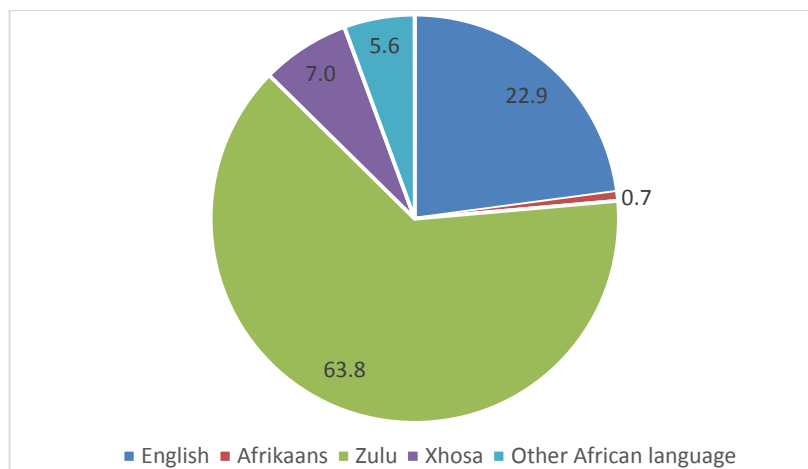
The greater percentage (56.8) falls in the younger age group with the greater balance (36.7) distributed largely in the 22-25 year group. Only 6.6 percent were older than 25 years. A higher proportion of males responded to the survey (55.8 percent) as opposed to females (44.2 percent). This could be due in part to the traditional higher number of males enrolled in SET courses and the high numbers of responses from these faculties. A cross tabulation of genders by age revealed a higher number of females (n=133) as opposed to males (n=110) in the younger age group of 17-21 years while the following age group of 22-25 years the number of females was half (n=52) that of the males (n=105). A range of factors could contribute to this demise including high dropout rates in the sciences, pregnancies, family responsibilities and financial constraints.



**Figure 6:1 Racial Composition of respondents**

In terms of racial distribution the highest percentage of students are Black Africans (77.8) with a much smaller cohort of Indians (17.5) and a minority of Whites (2.6) and Coloureds (2.1). This is consistent with the DHET (2015) figures released for DUT.

In terms of home language most respondents were isiZulu speakers (63.8%) followed by English (22.9%) and Afrikaans (0.7%). Xhosa (7%) and other African languages (5.6%) complete the graph. The figures confirm KwaZulu–Natal as the undisputed home of the isiZulu and the primacy of the isiZulu race and culture in this student audience. National statistics indicate a population in excess of 10 million—one in five South Africans are isiZulu (SA Stats, 2016).



**Figure 6.2 Home language of respondents**

In terms of the students home town most were brought up in the township (32.7 %) followed by the suburbs (28.9 %). A fair proportion of students are drawn from small towns (19.3%) and rural areas (15.3%). The city centre yielded only 3.8% of the total.

**Table 6.4 Variation in home towns**

<b>Home town</b>	<b>Frequency</b>	<b>Percent</b>
<b>Suburb</b>	123	28.9
<b>City Centre</b>	16	3.8
<b>Township</b>	139	32.7
<b>Small town</b>	82	19.3
<b>Village in a Rural Area</b>	65	15.3
<b>Total</b>	425	100.0

### **Section A Analysis and sub conclusion**

The demographic criteria are a fairly standard survey staple but are instructive to this thesis in that they reiterate the picture portrayed in the 2015 DHET data of a transformed HE institution representative of this provinces population groups. The respondents match the Generation Y age profile as described in the literature. The overwhelming majority are isiZulu speakers drawn largely from townships and suburb to DUT with a higher percentage of males than females. These dependant variables of Section A will be cross tabulated with the independent variables of Sections B- D to determine significance, correlation and in some cases to extrapolate causality at the end of Phase One .

## *Section B Perceptions on Biodiversity*

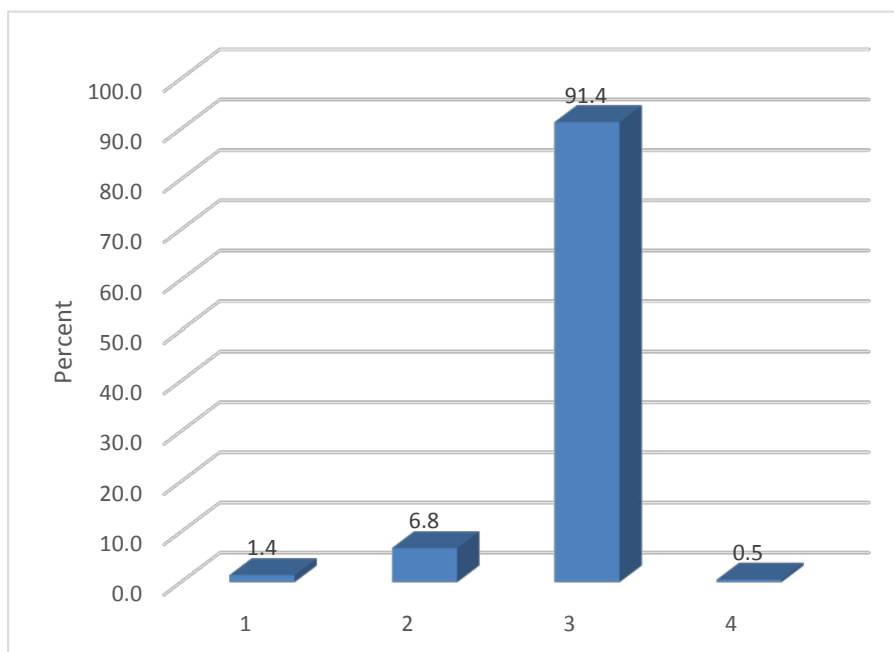
### **B1 Have you EVER heard of the term “biodiversity” before receiving this survey?**

This key question required some prior explanation for respondents to proceed since if they did not know what the term meant they would find the rest of the survey confusing. Biodiversity research concerning public awareness of the term in Europe provided some guidance. Dutch authors (Buijs *et.al*, 2008: 66) argued that the dominant scientific discourse of educating the public and so raising biodiversity awareness is in itself a flawed premise. This ‘information deficit’ model of public understanding and action does not take cognisance of an individual’s personal experiences, knowledge and emotions concerning biodiversity that do not fit into the scientific definitions of the term as provided by the CBD. The research for this thesis then moved from its initial position of “How many students know the term Biodiversity ?” to a position of “What is the student’s existing knowledge and experience of the biodiversity concept?” While some indication was received in the quantitative data of Phase One a more fuller exploration of the topic took place in Phase Two of the focus groups.

The EU Barometer Survey (2010) on which Section B was based consisted of telephonic interviews where the facilitator was able to offer some prompting or cuing to respondents while the DUT survey was administered in writing. The DUT students were unanimous that they had heard the term before (90.4%) with only 9.6% claiming never to have heard the term. In this aspect they surpassed the EU Barometer survey where one-third (34%) of respondents claimed they had never heard of the term biodiversity.

**B2It has been stated that Biodiversity is just another word for Nature. Bearing this in mind please circle the ONE option that you think BEST describes the concept**

Here similar definitions and meanings were provided and most students (91.4%) selected the correct Scientific option as provided by the CBD – Biodiversity is the richness of plant and animal life and includes diversity between species at physical, genetic and ecosystems levels.



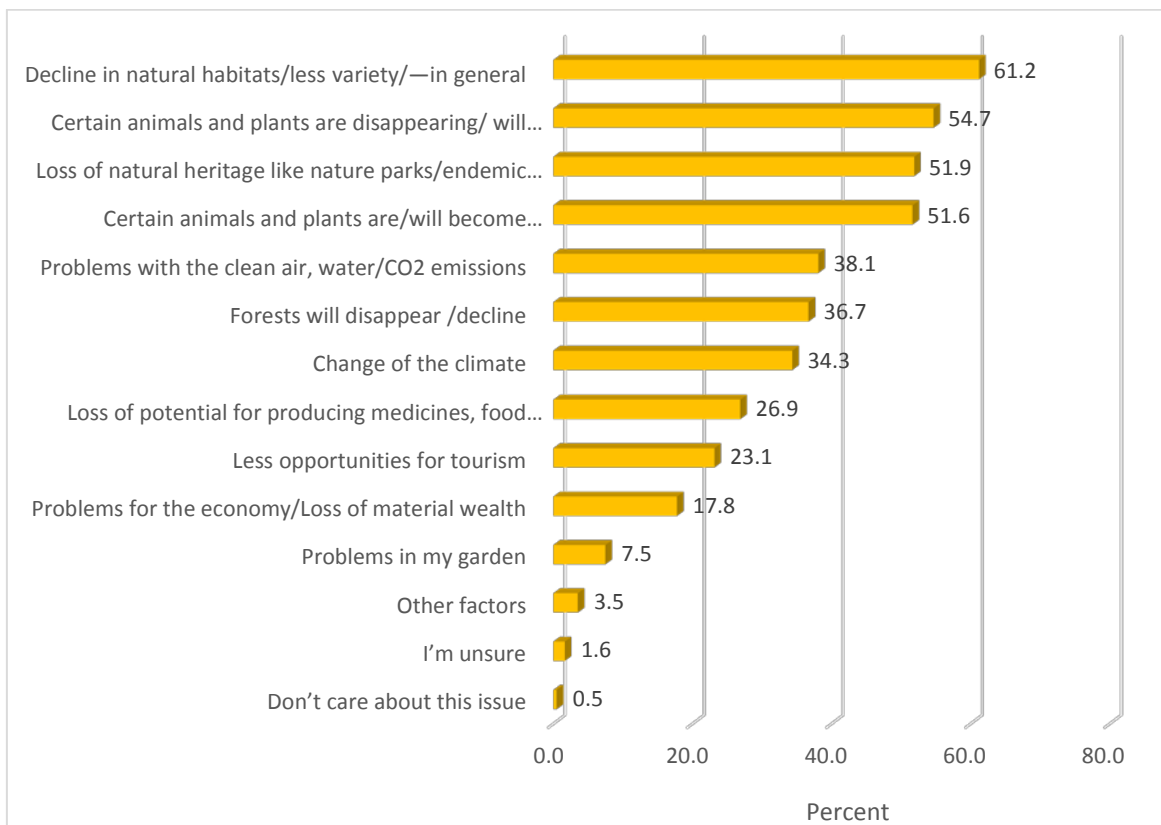
**Figure 6.3: Biodiversity definitions**

**Definition options**

<b>1</b>	Biodiversity and climate change are essentially the same thing
<b>2</b>	Biodiversity is the richness of plant and animal life on planet earth
<b>3</b>	The richness of plant and animal life and includes diversity between species at physical, genetic and ecosystems levels
<b>4</b>	Biodiversity is only concerned with genetic engineering and stem cell research

**B3 How would you best describe what "Nature / biodiversity loss" means to you? You may circle MORE than one statement if you wish.**

In the telephonic EU Barometer survey (2010: 11) when the term *biodiversity* was explained, the majority of citizens were able to define the meaning of *biodiversity loss* in their own words, and even expand on this multidimensional term. Like wise in the Danish survey of 2012 World Wide Views on biodiversity respondents received a full day briefing on the term replete with videos and power point presentations before participating in the focus group on the topic. The DUT survey by contrast relied on the students understanding of the written questions presented and here the results were positive and are reflected in the bar chart below.



**Figure 6.4: Perceptions of biodiversity loss**

In this question respondents were allowed to circle more than one option.as the term biodiversity loss was unpacked in some detail. As the European Union (EU) biodiversity survey (2010) points out the terms *biodiversity* and *biodiversity loss* are both multidimensional concepts and are generally understood to mean either habitat

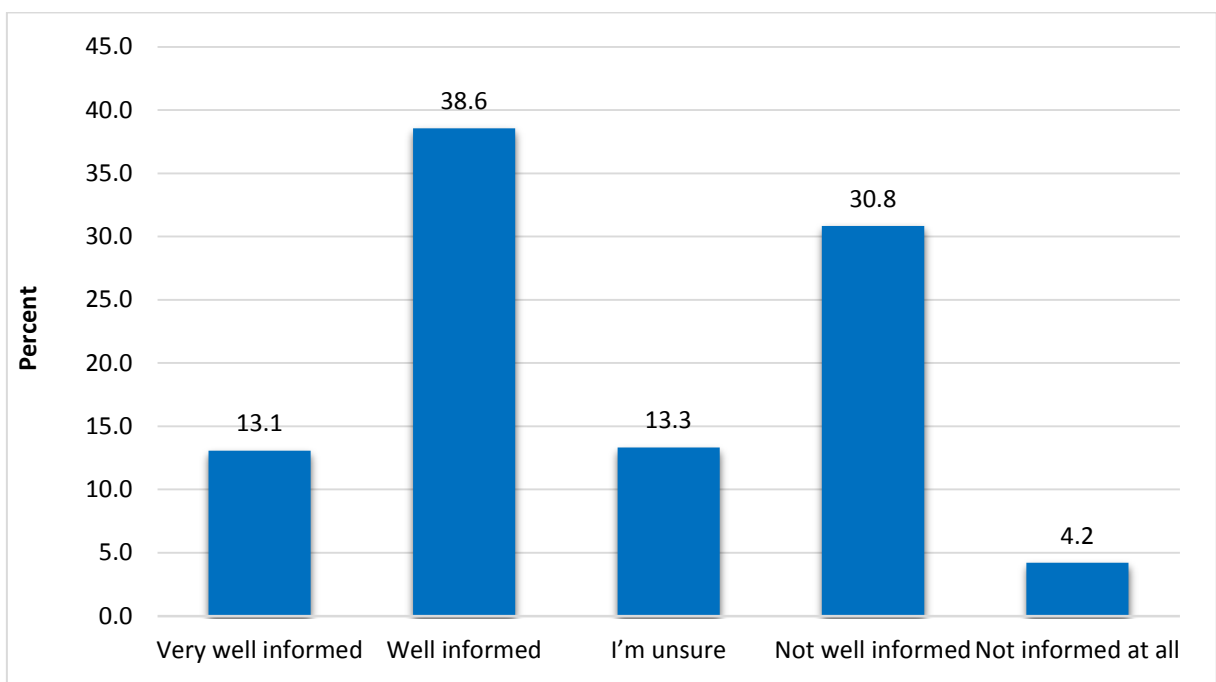
or species loss. DUT students responded in a similar fashion with these two criteria scoring 61.2 and 54.7% respectively while the EU survey scored 43% for species loss (Certain animals and plants will become endangered). The top seven criteria pinpointed in the EU survey (2010) was mirrored in the DUT results which reflected only higher percentages for each category. DUT students also expressed concern for air and water quality (38.1%) disappearance of forests (36.7%) and climate change (34.3%). Students attending the Faculty of Applied Science were able to make the link between biodiversity loss and air and water quality with nearly 50% responding to this option. Strangely only 9 out of the 26 Environmental Health Diploma students responded positively to this option where this topic forms a core theme in their 3 year course.

Biodiversity loss through Climate change was fairly low on the student agenda with just over one third responding positively to the linkage of the two topics. Underexposure to environmental media may be the problem as well as conflicting opinions voiced by prominent scientists giving the sceptics more power (See climate wars in Appendix 1). Evidence presented in the literature review provides a compelling case for anthropogenic induced climate change (Butcher *et al.*, 2010).

Students ranked ecosystem goods and services lower since they might not be aware of these. These included loss of medicines, food and fuel (26.9%), lost opportunities for tourism (23.1%) and decline in the economy (17.8%). Concerning the latter only 15% of Blacks flagged this option, 31% of Indians and 50% of Whites. Evidently media campaigns describing the economic benefits of biodiversity by state institutions such as SANBI and local government efforts by the Ethekewini Environmental Planning and Climate Protection Department (EPCPD) are not gaining traction with this student body. This is significant since an understanding of how biodiversity powers the economy is foundational to SANBI's Making the Case for Biodiversity where the link between economic and ecosystem wellbeing is made explicit. The strapline is "Biodiversity – Powering the green economy."

#### **B 4 How informed do you feel about the loss of Nature/ biodiversity?**

Just over half of DUT students asserted confidently that they were very well (13.1%) to well informed (38.6%) about biodiversity. A reasonable cohort, just over a third (30.8%) admitted they were not well informed on the topic. These assertions were not always followed by scientifically verifiable facts as evidenced in their answers concerning medicinal plant loss and plant invasions.



**Figure 6.5: Levels of Biodiversity knowledge**

#### **B5. Please give us your personal opinion about WHY we should conserve and value Nature/ biodiversity**

DUT students responded extremely positively to each of this suite of five statements. Considering both agree and strongly agree responses together over 82% indicated we have a moral obligation to look after biodiversity and 84% agreed that our quality of life is dependent on biodiversity for pleasure and recreation.

A full 77% agreed that biodiversity was indispensable for the provision of food, fuel and medicines and over 75% agreed that South Africa's economic wealth was linked to biodiversity, a positive sign for the SANBI Making the Case for biodiversity campaign. Finally nearly 85% of students saw protecting biodiversity as an essential step to tackling climate change. The number of dissenters was marginal.

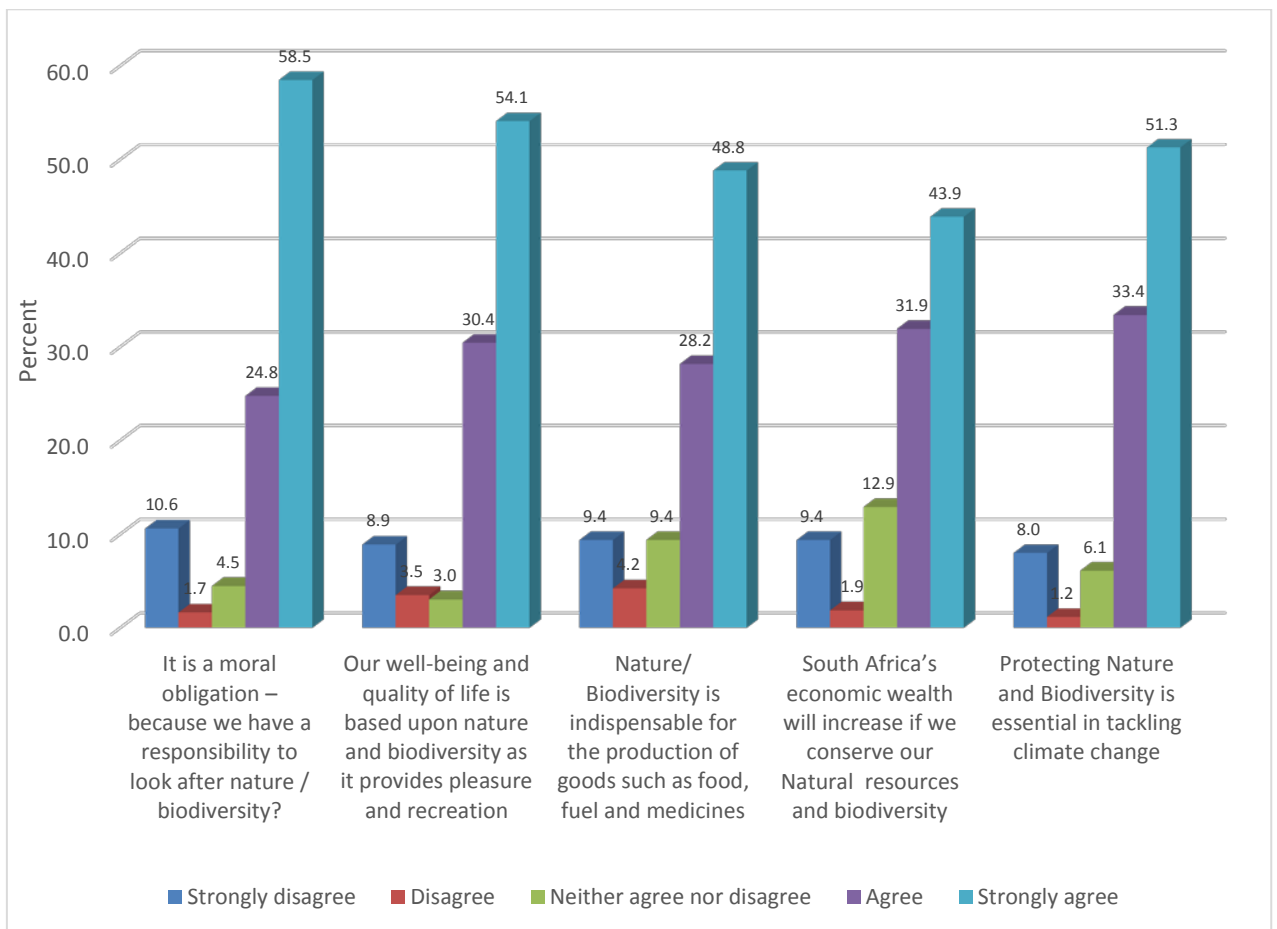
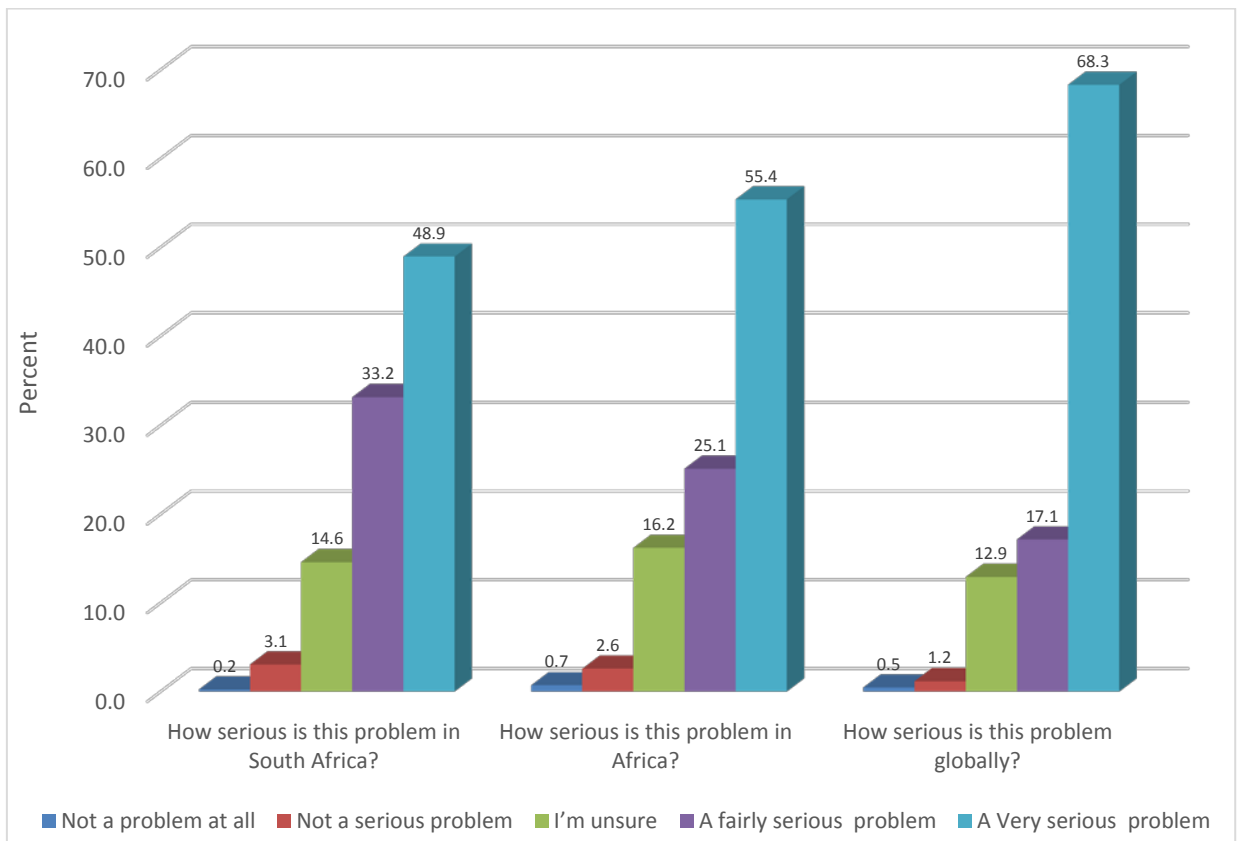


Figure 6.6: Reasons to conserve biodiversity

**B6. HOW SERIOUS do you think is the decline and possible extinction of animal species, flora and fauna, natural habitats and ecosystems.**

When DUT students were asked to consider the seriousness of the decline in biodiversity in South Africa, Africa and the World the statistics indicated that the majority of respondents were concerned at all levels. Considering both positive responses together over 85% agreed it was a global problem with healthy concerns being expressed at the continental level (80.5%) and the national level (82.1%).

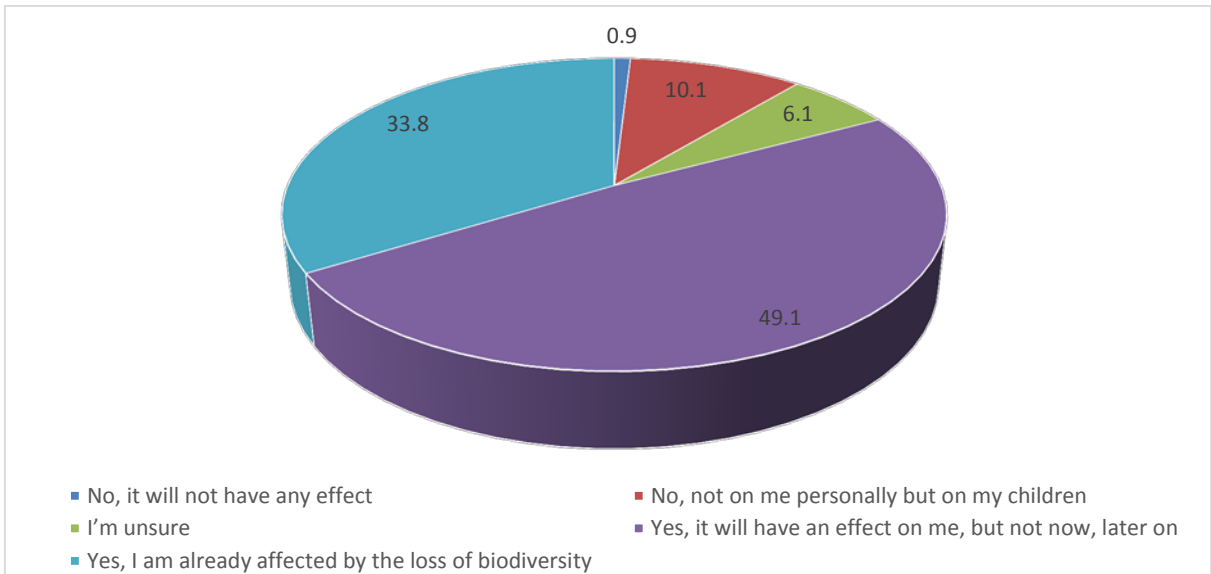
Less than 4 % disagreed that biodiversity loss was problematic while about 1 in 14 was unsure. The DUT results echoed the EU trend where more than 8 in 10 respondents (84%- 93%) felt that biodiversity loss was a *very* or *fairly* serious problem at national, European and global levels (EU, 2010:22). The view that global biodiversity loss was not a serious problem, or no problem at all, was supported by less than 1 in 20 respondents (EU, 2010:22).



**Figure 6.7: Severity of biodiversity loss on a national, continental and global level**

**B7.1 Do you think that the decline and possible extinction of plant and animal species will have an impact on YOU personally?**

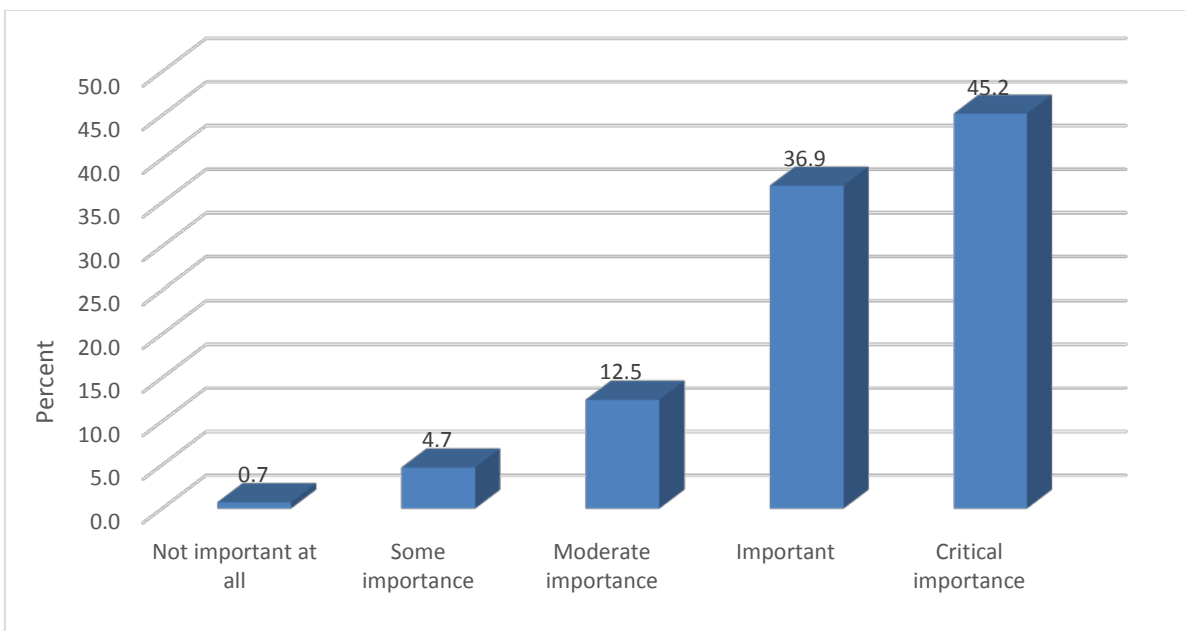
Nearly half of the respondents (49%) wrote that biodiversity loss would affect them personally but that the effect would only be felt in the future while a further 33% stated they were already affected by biodiversity loss. One in ten students (10%) felt that biodiversity loss would not impact them personally but it would have an effect on their children. Less than 1% felt it would have no impact at all. A small percentage were undecided.



**Figure 6.8: How biodiversity loss impacts me personally**

**B7.2 How important is conserving biodiversity /nature (by means of Nature Reserves, National Parks and Botanic gardens) to YOU at a personal level?**

The DUT students responded favourably with 45.2% stating this issue was critically important and nearly 37% stating it was important. A smaller group found the issue to be of moderate importance (12.5%) and some importance (4.7%).

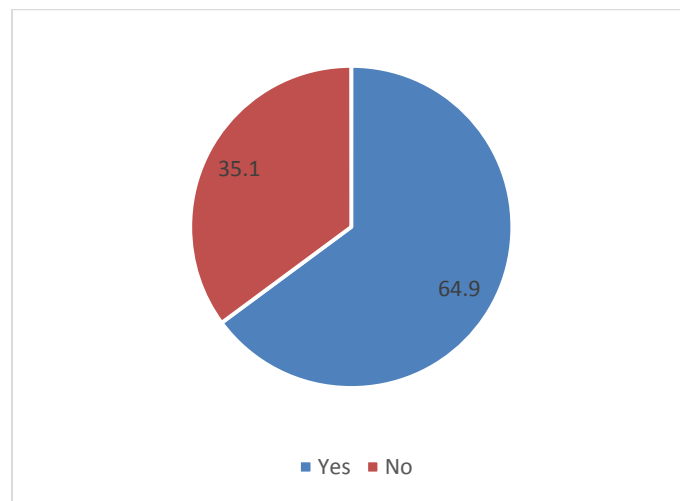


**Figure 6.9: Importance of conserving Nature reserves and Botanic Gardens**

## B 8 Tell us about your plant knowledge

This section departed from the EU Survey and was designed to elicit local scientific and cultural knowledge concerning medicinal and food plants and to probe the awareness of local plant extinctions and alien weed invasions - all issues affecting local biodiversity loss.

### B 8.1 Do you make use of traditional medicine at home? Yes or No



**Figure 6.10: Use of traditional medicinal plants**

A positive response of nearly 65% shows value is placed on traditional medicinal plants and culture be it Asian or African. The question was easily understood and given a positive response by most Black students (66.9%) and once the Indian students grasped its relevance they responded positively (65.3%) White students had the greatest difficulty relating to this question and only one out of 11 responded positively. In the Coloured grouping five out of nine responded positively. Some debate centres around the exact percentage of medicinal plant use in South Africa and this is detailed at the end of this section (sub conclusions).

**8.2 If you use traditional medicine do you have any idea of what plants and animal parts are used in its preparation? a) No idea at all OR (b) Some idea**

Of those students who indicated they use traditional medicine (65%, n = 275) the majority (77.2%, n = 207) declared that they have some knowledge of the plant and animal ingredients used therein.

**Table 6.5: Knowledge of traditional medicine ingredients**

			<b>Do you make use of traditional medicine at home?</b>
			Yes
<b>If you use traditional medicine do you have any idea of what plants and animal parts are used in its preparation?</b>	No idea at all	Count	61
		% within Do you make use of traditional medicine at home?	22.8%
	Some idea	Count	207
		% within Do you make use of traditional medicine at home?	77.2%
<b>Total</b>		Count	268
		% within Do you make use of traditional medicine at home?	100.0%

**B 8.3 If you answered positively to the above provide the name of 2 plants that have been used in traditional medicine. Common names are acceptable but if you do know the scientific or traditional name include this as well in your response.**

A high percentage (77.2) of students claimed to have some idea of the plant and animal ingredients used in traditional medicine. Not many respondents named the plants that were used but those did provided fairly homogenous examples. These included generic isiZulu names that could fit a range of plants for example *impepho*

which is a grass land wild flower traditionally burnt as incense providing a fragrant smell when communicating with the ancestors. The term could refer to many *Helichrysum* species found in KwaZulu-Natal although *Helichrysum cooperii* and *H. petiolare* are the most common (Pooley, 1998).

Other common responses included *iboza* or Plumebush (*Tetradenia rippraria*) which is often used to induce vomiting (*phalaza*) and *amathitibala* another generalised term referring to various species of Haworthia and Aloe. Species commonly sold at the Warwick Avenue market include *Haworthia limiifolia* and *Aloe aristata* both of which are endangered and cultivated artificially by means of tissue culture in the laboratory of Durban Parks (Scott Shaw, 1999; V, Reddy, personal communication, 12 May 2016). Aloe (*inhlaba*), cycads and African potato *Hypoxis hemerocallidea* (*inkompfo*) were cited as medicinal plants as was Amarula (*Sclerocarya birrea subsp africana*) Flat Mimosa (*Albizia adianthifolia*) and Buffalo thorn (*Zizyphus mucronata*).

IsiZulu vernacular names were used frequently and these were submitted to Mkhipheni Ngwenya of the KwaZulu-Natal Herbarium for translation and checked with other sources. Table 6.6 reflects the isiZulu and Xhosa names of the plant used together with the botanical name and traditional use. According to African respondents animal parts used in traditional medicine included crocodile and snake skins, snake heads and the bile of a snake.

Asian respondents indicated some exposure to traditional healing plants however these responses were limited due in part to the lower overall number within the survey. Examples included Murthie and Murinkere and Thulsie herbs (*Ocimum tenuiflorum*), turmeric and ginger, Curry leaves *Murraya koenigii*, Alma or Indian gooseberry (*Emblica officinale*) Sacred basil (*Ocimum sanctum*) and the Neem tree (*Azadirachta indica*).

These names were submitted to Mkhipheni Ngwena of the KwaZulu-Natal Herbarium for translation and checked with other sources. The table below reflects the isiZulu and Xhosa names of the plant used together with the botanical name and traditional use.

**Table 6.6 Medicinal plants identified by DUT students**

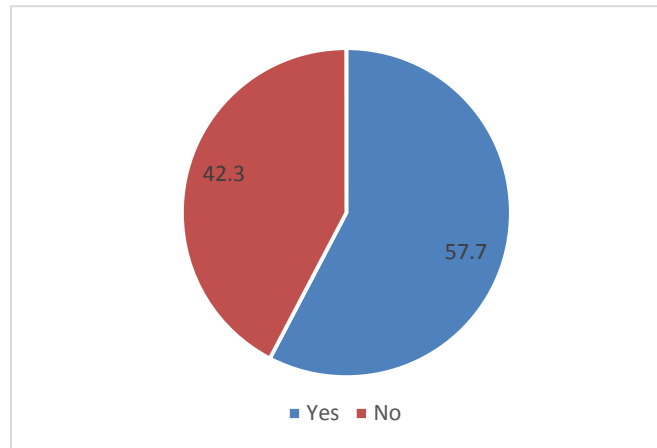
English Name	isiZulu and Xhosa(x)	Botanical Name	Traditional and socio cultural Use
Peach tree	<i>inhlaka</i> , - this is the name of the gum that oozes from the bark of certain tree	<i>Prunus persica</i>	The general nature of this word makes exact plant identification problematic. Exotic fruit trees are often planted in the traditional Zulu <i>umuzi</i> or homestead (Crouch and Hutchings, 1999)
Aloe	<i>iNkalane</i>	<i>Aloe candelabrum</i>	Aloes have different uses including the production of snuff and aloe bitters (van Wyk and Gericke, 2000)
Pepper bark tree	<i>isibhaha</i>	<i>Warburgia salutaris</i>	The plant is applied topically on cuts to the temples relieving headaches. Used as a natural antibiotic for chest infections (Diedrichs <i>et al.</i> , 2009)
Peacock flower	<i>Isiqungu (x)</i>	<i>Dietes bicolour</i>	The plant is used for ritual washing following the death of a family member. A decoction made from the roots also removes previously used medicines from the body (Zukulu <i>et al.</i> , 2012)
Lemon grass	<i>Isiqungasikatokoloshe</i> . <i>Isiqunga (z)</i> refers to a grass species	<i>Cymbopogon nardus</i>	There may be some variation in the naming of this plant since <i>Cymbopogon</i> is a widespread genus. <i>Cymbopogon nardus</i> or Lemon grass, originates in tropical Asia and is planted for its citronella oil (van Wyk and Gericke, 2000)
Fever tree	<i>Makhanyakhude</i> ,	<i>Vachellia xanthophloea</i>  <i>syn Acacia xanthophloea</i>	A popular ornamental tree widespread in the Umfolozi region the bark is frequently stripped for its medicinal powers (Boon, 2010)
Flat crown tree	<i>umgadankawu</i>	<i>Albizia adianthifolia</i>	Extracts from the roots are applied to inflamed eyes and the powdered bark is reportedly used for anthelmintic or tapeworm treatment as well as headaches and sinusitis. Used by the Zulus as a love charm (Boon, 2010)

<b>Leucas</b>	<i>umagumede</i>	<i>Leucas lavandulifolia</i>	A cosmopolitan weed also used in India and Malaysia as a food and medicinal resource. The crushed leaves of Leucas species are applied to wounds, sores, especially those of the eyes and nose, chronic skin diseases (Plant Resources of Southeast Asia) <a href="http://proseanet.org/prosea/">http://proseanet.org/prosea/</a> . The plant occurs locally as documented by SuvarnaParbhoo on iSpot <a href="http://www.ispotnature.org/node/506881">http://www.ispotnature.org/node/506881</a>
<b>Pineapple flower</b>	<i>umbola</i>	<i>Eucomis autumnalis</i> <i>subsp. clavata</i>	Decoctions of the bulb are used to assist in healing fractures. Emetics extracted from the plant treat flatulence and syphilis (Diedrichs <i>et al.</i> , 2009).
<b>Maroela tree</b>	<i>umganu</i>	<i>Maroela –</i> <i>Sclerocarya birrea</i> <i>subsp. caffra</i>	.Roots and bark are used as laxatives. A drink made from marula leaves is used for the treatment of gonorrhoea. Fruit is eaten widely and distilled into liquor (van Wyk and Gericke, 2000)
<b>River euphorbia</b>	<i>Umhlonwana (z) Umhlonto</i> <i>(x)</i>	<i>Euphorbia</i> <i>triangularis</i>	In Pondoland The tree of twins is planted on their birth behind the homestead, one for each child and monitored throughout their life, the growth of each being linked. The bathwater from bathing the infants is used to water the plants (Zukulu <i>et al.</i> , 2012:)
<b>Small knobwood</b>	<i>umlungumabele</i>	<i>Zanthoxylum</i> <i>capense</i>	A powerful Pondoland medicinal tree the bark is used to treat back pain while the roots are used to treat snake bite and erectile dysfunction. Powdered bark is used to treat toothache and rubbed onto the gums (Zukulu <i>et al.</i> , 2012)  Literal translation by a student respondent -Breasts of a White women referring to the woody cone shaped thorns that resemble a women wearing a brassiere (Dwayi, pers. comm, 2014; and Zukulu, <i>et al.</i> , 2012)]
<b>White's ginger</b>	<i>umondi</i>	<i>Mondia wightii</i>	Roots are chewed or used as an emetic to treat indigestion, loss of weight and constipation (Diedrichs <i>et al.</i> , 2009)
<b>Kei-apple</b>	<i>Umqokolo</i>	<i>Dovyalis caffra</i>	Fruits used as a famine food and fodder with plants placed around the homestead for protection ( <a href="http://www.plantzafrica.com/plantcd/dovycaf.htm">http://www.plantzafrica.com/plantcd/dovycaf.htm</a> )
<b>Fever tea/ Lemon bush</b>	<i>Umsuzwane</i>	<i>Lippia javanica</i>	Different parts (the leaves, twigs and occasionally the roots) of the plant are used for different reasons. The Xhosa people are known to drink an infusion of Lippia as a tea substitute. <i>Lippia javanica</i> has been known to aid the disinfection of meat that has been infected with anthrax ( <a href="http://www.plantzafrica.com/plantklm/lippiajavan.htm">http://www.plantzafrica.com/plantklm/lippiajavan.htm</a> )
<b>Senecio</b>	<i>unsukumbili,</i>	<i>Senecio</i> <i>serrutuloides</i> syn <i>serrurioides</i>	A flowering forb endemic to the Eastern Cape. Insufficient data exists on this plant (Raimondo <i>et al.</i> , 2009)

<b>Pig weed</b>	<i>uMbido</i>	<i>Amaranthus hybridus</i>	A large genus of cosmopolitan weeds often used for famine food.(Fox and Norwood Young, 1982)
<b>Natal bush milkwood</b>	<i>Umthunziwezinkuhle (x)</i>	<i>Vittellariopsis marginata</i>	Edible red fruit eaten by people, monkeys and bushpigs while the wood is used for sticks (Boon, 2010)
<b>Triffid weed</b>	<i>usandanezwe,</i>	<i>Chromolaena odorata</i>	An invasive alien plant widespread in the Durban region (Boon, 2007)
<b>Monkey Rope or Granadilla vine</b>	<i>impinamshaye</i>	<i>Adenia gummifera</i>	The stems, roots and leaves are used for various traditional medicinal and magical purposes throughout its range. Cunningham (1988) reported A. gummifera to be the fourth most popular plant traded in the KwaZulu-Natal muthi market. Its popularity according to Manders (2007) is in decline
<b>Sodom apple or nightshade</b>	<i>Intuma, A name given to a number of Solanum species</i>	<i>Solanum incanum</i>	A cosmopolitan weed this alien invasive plant is problematic when eaten to live stock but its fruits have an antibiotic effect <a href="http://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Solanum_incanum_(Sodom_Apple).htm">http://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Solanum_incanum_(Sodom_Apple).htm</a>

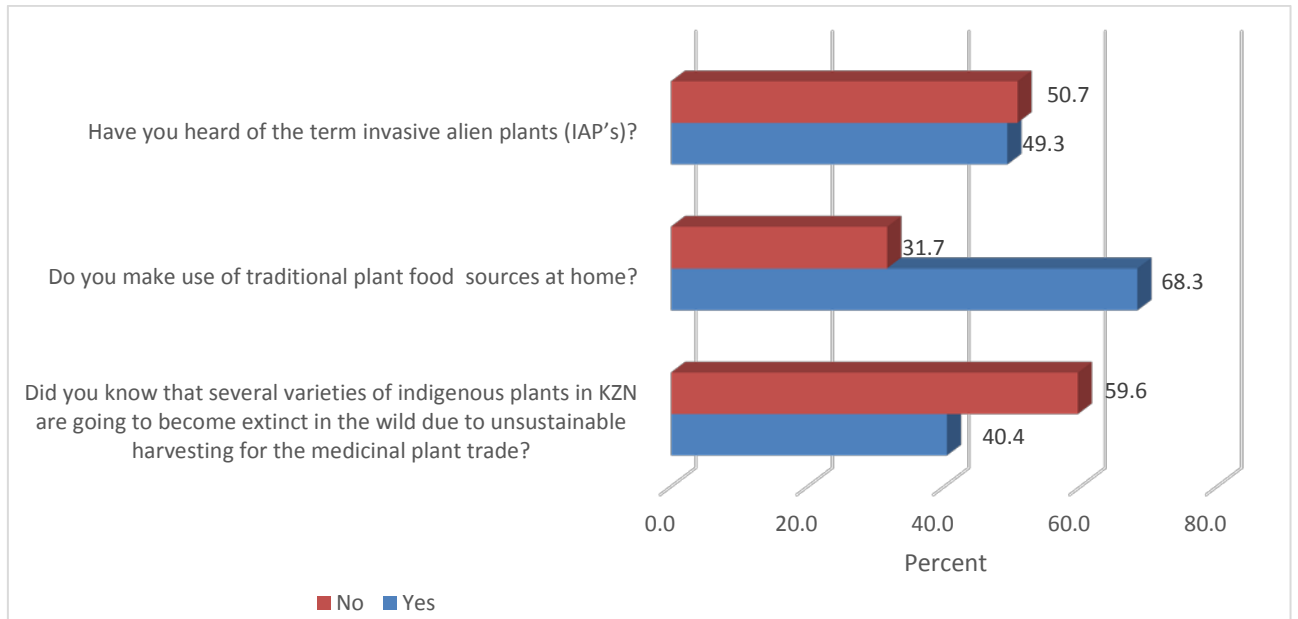
Sources: As indicated under each entry

## 8.2 Did your parents or extended family ever teach you about the importance of medicinal plants in your culture? YES or NO



**Figure 6.11: Family values on medicinal plants**

The majority (57.7%) of students answered positively to this question demonstrating the importance of plants in Zulu culture. Given the breakdown of the nuclear family as well as high levels of urbanisation and 'Westernisation' taking place at in South Africa this figure may diminish as young urban blacks absorb a consumer culture and the accumulated indigenous knowledge of the older generation is lost. The difference in family values between urban and rural areas came to the fore in the focus groups of Phase Two.



**Figure 6.12: Responses to invasive alien plants (IAP's), traditional food sources and medicinal plant extinctions**

**8.5 Did you know that several varieties of indigenous plants in KZN are going to become extinct in the wild due to unsustainable harvesting for the medicinal plant trade? YES or NO**

Nearly 60% of students were unaware of the extinction threat to medicinal plant stocks in the wild. This knowledge deficit is significant to conservation and discussed at the end of Section B.

**8.6 Do you make use of traditional plant food sources at home? YES or NO**

A significant portion (68.3%) claimed to use traditional food sources, an area of plant use that intersects with the next question

**8.7 Have you heard of the term invasive alien plants (IAP's)? YES or NO**

Some respondents such as those from Town planning and Architecture had a more developed awareness of the threat of IAP's to local biodiversity. This is due in part to the environmental tuition received in these programs. Many respondents confused categories of traditional plant food with weeds, this could be a linguistic barrier since

words like 'spinach' and 'imifino' are used interchangeably and could refer to a number of plant species including *Bidens pilosa* (Blackjack) and Wild spinach *Rumex spp.* Cosmopolitan weeds are also used as famine food such as Maphorogo or Pigweed (*Amaranthus spp.*). Some food plants may also pose an invasive alien threat to local plant biodiversity.

**8.8 If you answered positively to the above provide the common name of 2 plants that belong to this category.**

Students correctly identified the following IAP's that adversely affect local plant biodiversity. The responses are given verbatim: Amajikajolo (Bramble), Bhongabonga (Bugweed) Wattle and Gumtree, Cactus plant, Pompom weed Camphora, Inkberry, Beefwood, Syringa Berry, Mango and Guava, Black Wattle. Orchid tree, Crofton Weed, Madeira vine, Parrots feather, *Sesbania punica*, Cats claw creeper, *Crotalaria agatiflora* and *Acacia dealbata*, Crimson cestrum, Triffid weed, Baileys Wattle and Rooikrans, Indian laurel, Pearl Acacia, *Eucalyptus grandis*. Some non scientific answers were received including the listing of Fynbos and Yellowwoods, ginseng and mistletoe, carrots and spinach as alien invasive plants.

**Section B Analysis and sub conclusions**

**On Biodiversity definitions, loss and concern**

DUT students grasped the biodiversity concept on the whole defining it correctly and expressing its loss in terms of species extinction and habitat destruction. At least half the respondents felt they were well informed on the topic while one third felt they needed more knowledge on this issue. On paper the students claimed high levels of concern about valuing biodiversity as a moral obligation and also because of the tangible benefits that accrued to the country from biodiversity goods and services. Biodiversity loss was seen by the majority of students as a serious threat to this country and indeed globally but its impact they observed would only really take place in their children's generation. The majority of students agreed that conservation of biodiversity in Nature reserves and botanic gardens was personally important to them.

## **On Medicinal Plant use, extinctions and alien weed invasions**

Over two thirds of students claimed to use traditional medicine with a majority claiming they had some idea as to the plant ingredients used therein. About thirty different indigenous healing plants were identified using isiZulu and Xhosa vernacular names, many of which are traded at the local muthi market in Warwick Avenue. Given the fact that most of the students are drawn from the suburbs and townships this demonstrates the importance of traditional culture even to urbanised Zulu speakers. Even though a reasonable majority of students claim to have been taught about medicinal plants at home at least 42 % claimed this was not the case pointing to a possible dilution of cultural values with the younger students in the future. Also of conservation concern was a lack of knowledge concerning unsustainable harvesting of medicinal plants and a widespread lack of knowledge concerning alien plant invaders. Supplementary tuition on environmental issues is taking place at DUT and it is hoped that this will raise levels of biodiversity awareness.

Science and its intersection with culture is contested ground and the following brief discussion illustrates the point within the context of this study. It has been claimed many times in the conservation literature that over 80% South Africans make use of traditional medicine largely derived from plant parts (Mander *et al.*, 2007) This has been challenged recently by some investigators such as Kate Wilkinson (2013) who attributes the thirty year old original lines to Robert Bannerman in the book *Traditional Medicine and Healthcare Coverage* (1983: 320). Bannerman, advisor on traditional medicine to the World Health Organisation (WHO) penned these lines:

*In many of these developing countries primary health care devolves on the healer, herbalist, traditional midwife, and other traditional practitioners. These are the health workers that offer services to the disadvantaged groups that total about 80% of the world's population and have no easy access to any permanent form of health care.*

Bannerman, 1983: 320 in Wilkinson, 2013.

Wilkinson asserts that these generalised claims are in fact unsubstantiated by any empirical evidence citing a conflicting 2011 General Household Survey (GHS) report by the South African Government which found that while 70.7% of households favoured public clinics and hospitals, almost a quarter (24.3%) of households said they would first consult a private doctor. The least favoured options were traditional healers (0.1%) and pharmacies (0.3%) (cited by Wilkinson, 2013). A check on the 2014 GHS revealed a similar pattern with only 0,5% of respondents said that they would first go to a traditional healer (GHS, 2014: 28). Clearly there is a major disconnect in the government reporting with its own citizens given the size and scope of the traditional muthi markets operating in Johannesburg and Durban and the documented evidence of medicinal plant extinctions (Raimondo *et al.*, 2009; Mander *et al.*, 2007; Golding, 2002; Scott-Shaw, 1999, Mander, 1998). Either the GHS questions were not framed properly or they (the government) are unaware of their own traditional African culture. Wilkinson's investigation needs to be included here since it probes generalised statements that are recycled in the literature and come to be accepted as fact, in reality this is another (academic) form of modern myth making. While the exact figures may be disputed the results from this research show that (65 %) students at the DUT campus claim to have used traditional plant based medicine with many being aware of the origin and names of the plants which are used (Table 6.6).

### *Section C Physical Biodiversity contact and experience*

This section probed the extent of actual student contact with Nature Reserves and Botanic Gardens in terms of frequency of visit, ranking of preferred activities as well as indicating reasons or challenges as why they would not visit these green venues

## **C1 Visits to Nature Reserves**

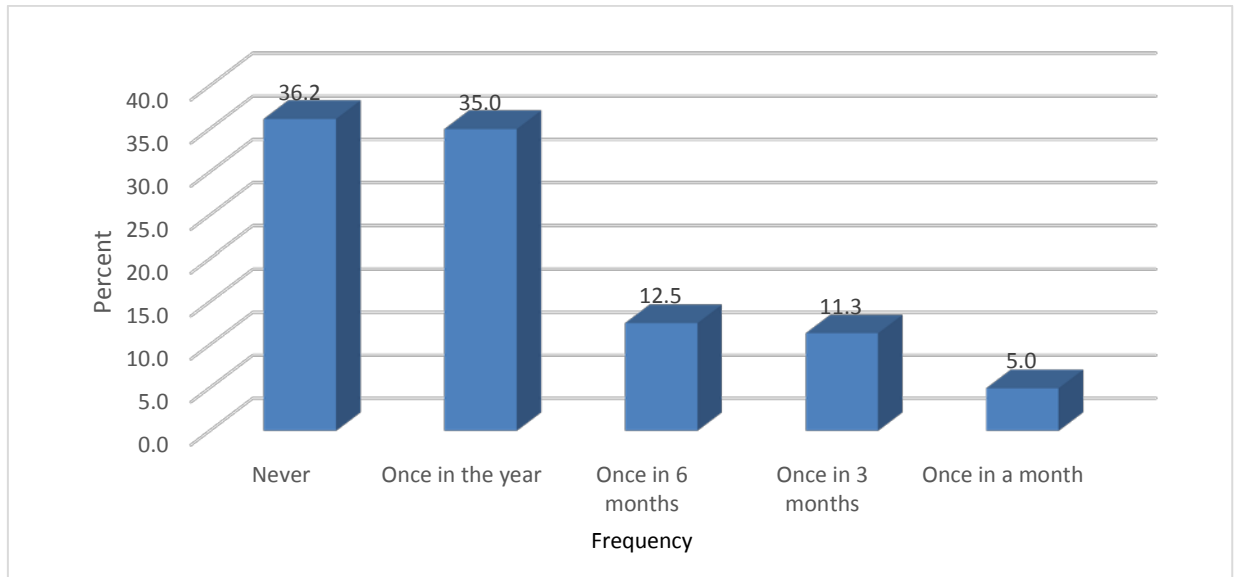
### **1.1 How often have you visited a nature reserve in the last year?**

Over a third of respondents (36.2%) had never visited a nature reserve while 35% claimed to have visited at least once in the last year. A lower percentage visited more frequently (12.5%) once in the last 6 months and 11.3% once in the last 3 months.

Of those who had not visited a reserve in the last year the greatest percentage were drawn from the city centre (50%) followed by rural areas (44%) and small towns (43%) The greatest number of student visitors were drawn from the suburbs (78%). This data corresponds with the literature where it is generally the affluent middle class that visit nature reserves (Koch, 1997, Foley, 2011).

A cross tabulation test of this question with race in terms of those who had never visited a reserve indicated a higher percentage of blacks (40.5%) followed by Coloureds (22.2%) and Indians (18.7%). Whites are traditionally known for their zeal in developing, managing and visiting reserves (Cock and Koch, 1991; Koch, 1997). Since the total number of White respondents in this survey was marginal (11) their opinions on this topic need to be explored in another survey arena.

Of those who had not visited a reserve nearly 41% of these were Black learners and only 19% were Indian students. Taking visitor frequencies of once in six months or more into account Indian learners proved to be the most frequent visitors at 53% while the Black students registered a figure of 23%. Focus groups revealed a substantial amount of resistance by Black students to visit nature reserves since they saw no need to pay cash on entry to view what was perceived to be common currency on the farm and bush (See Chapter 7). In terms of age a younger set (17-25 years) had claimed to have visited at least once a year or more. This percentage was 65% as opposed to the 56% recorded by slightly older students of 26-30 years.

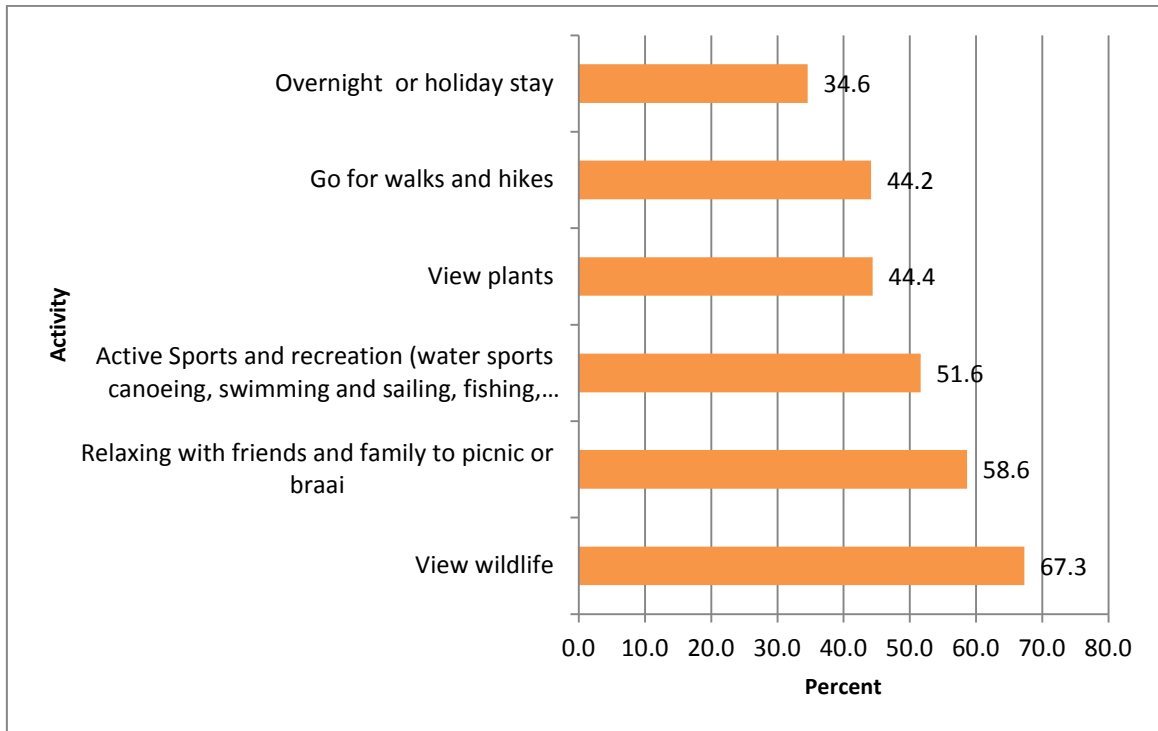


**Figure 6.13: Frequency of visits of to Nature Reserves**

## **1.2 What activities would you like to engage in at a nature reserve? You may circle MORE THAN 1 OPTION**

The most popular activity was Wild life viewing (67.3%) followed by relaxing and picnicking (58.6%), active sports (51.6%), walks and hikes (44.2%) and viewing of plants (44.4%). This follows evidence from previous surveys (Foley, 2011) where visitors prefer to relax and unwind rather than engage in hiking and trail activity. Animals feature more prominently than plants in public popularity polls (Weiler and Smith, 2009; Wandersee and Schussler, 2001) and this is also confirmed in the television viewing preferences of this survey.

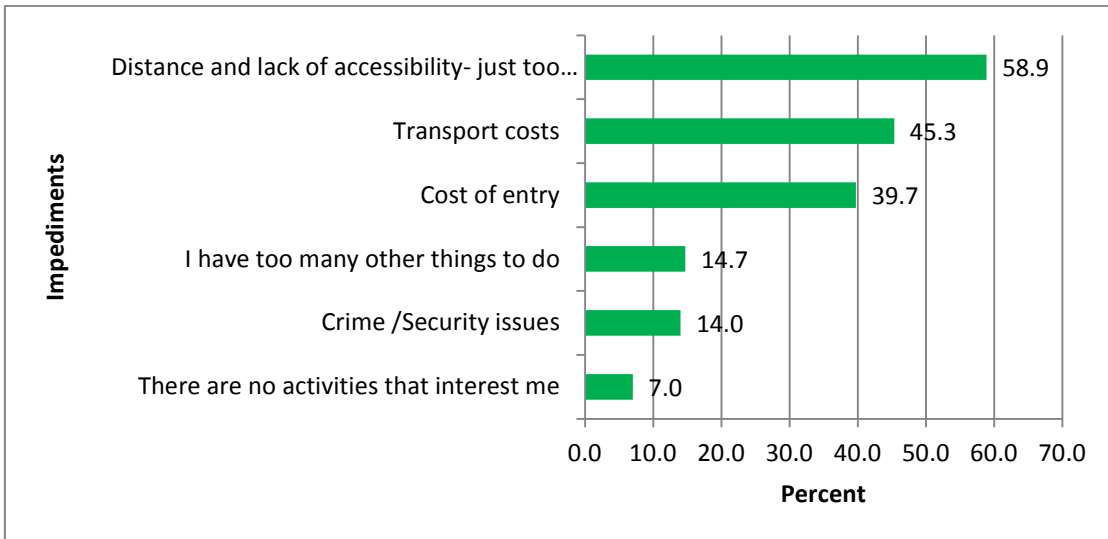
Active sports were favoured by the younger students 17-21 years which accounted for 58% of the 221 respondents that ticked this option. Older students proved more sedentary with 36 % favouring active sports in the 22-25 years and only 5% participating in the 26-30 year bracket. Hiking activities followed a similar trend. The black students were divided in their attitude toward Nature Reserves some questioning as to why they should visit at all ... “I don’t need to go to a nature reserve as I live on a farm.” and “why should we pay money to see wild animals anyway?” with others enjoying the outings “I have been to Croc world where I saw the oldest crocodile about 400 years old!”



**Figure 6.14: Ranking of activities in Nature Reserves**

### **1.3 What are the possible reasons that might prevent you from visiting a nature reserve?**

Issues of distance and lack of accessibility were ranked first (58.9 %) followed by Transport costs (45.3%) and Cost of entry (39.7%), all very real challenging obstacles for potential visitors without disposable income and a personal car. Crime and security issues were seen as a problem by a small percentage (14%) while other competing activities accounted for the same value.

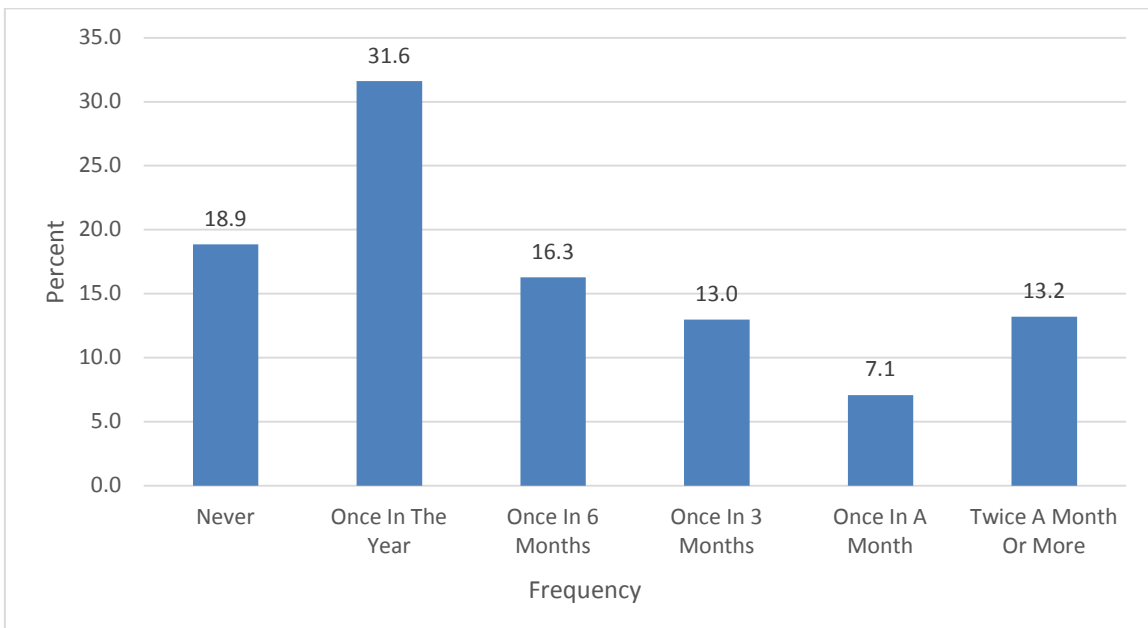


**Figure 6.15: Impediments for visiting Nature Reserves**

## C2 Visits to botanic gardens

### 2.1 How often have you visited Durban Botanic Gardens (DBG) in the last year?

Less than 20% of respondents had never visited the gardens while the remaining 80% had visited at least once or more in the last year. The high use of the facility by students is encouraging since it forms a point of actual contact with nature.



**Figure 6.16: Frequency of student visits to the DBG**

## 2.2 If you have visited the DBG what is the purpose of your visit ?

Respondents indicated the prime purpose was to enjoy nature in its various forms (57.2%) followed by the need to relax and seek peace and tranquillity (45.3%). This confirms the literature concerning visitor activities in botanic gardens (Weiler and Smith, 2009; Ballantyne, Packer and Hughes, 2008; Ward, Parker and Shackleton, 2010; Williams, *et al.*, 2015) as well as findings from a local think tank concerning physical development of the DBG precinct hosted by the Ethekeini architectural department in 2012 and attended by the author. Students cited other reasons such as finding privacy with their partner (23.4%) and learning about plants (22.2%). Exercise and health reasons scored 16.1% while attendance at conferences scored 18.2% and musical function 12.4%. Birding was the least popular activity at 7.7%.

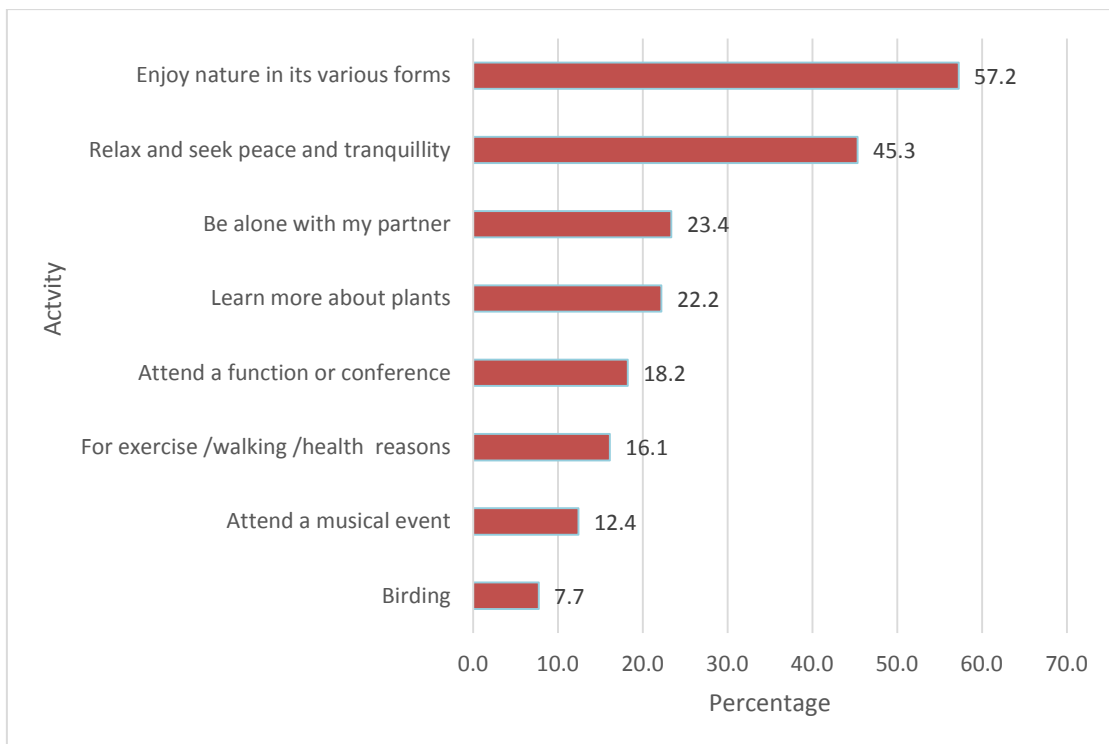


Figure 6.17: Preferred activities at the DBG

### 2.3 What are the possible reasons that might prevent you from visiting the Botanic Gardens?

Similar questions were posed for Nature Reserves but the responses were quite different with 38% of students stating they had too much else to do and there were no activities in the gardens to interest them (18%). These sentiments represents a common challenge to Botanic Gardens around the world and in response the DBG has developed a vibrant musical programme including local South African artists such as Mafikizolo, Prime Circle and Freshly Ground which attract all cultures and ages to the gardens (Woodiana, 2013:2). Distance is not an issue for DUT students yet this was cited as the second reason not to visit the gardens (23.4%). Respondents may have meant taxi costs to travel from off campus residences such as the Beachfront and Alpine Road. Security and crime concerns scored 18.7%.

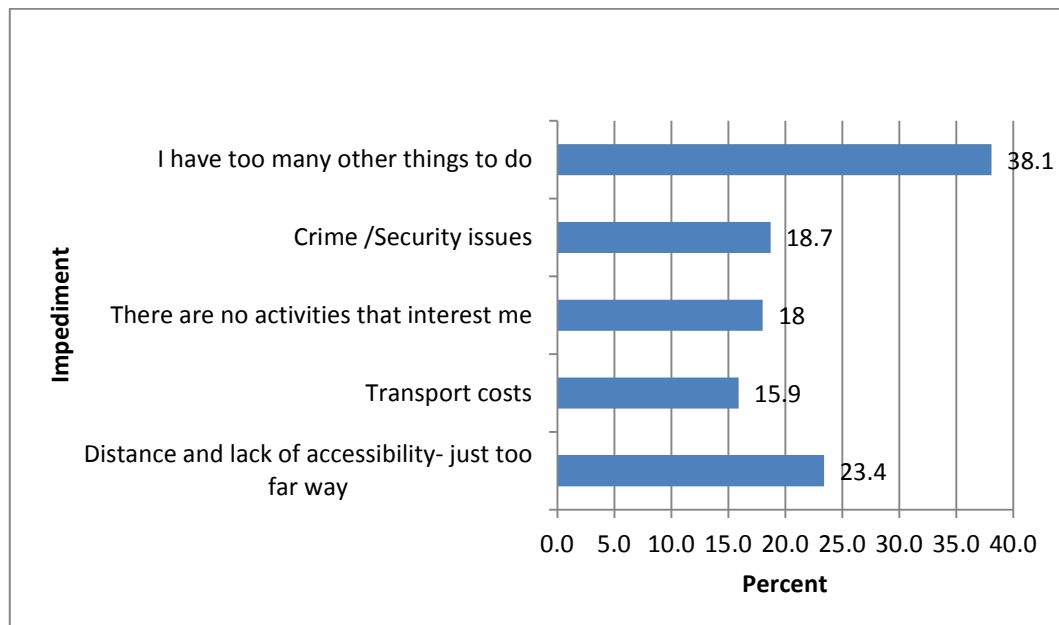


Figure 6.18: Impediments for visiting DBG

## Section C Analysis and sub conclusions

In terms of actual contact with Nature Reserves DUT students had mixed reaction with some challenging the concept and others enjoying their visit and making favourable comments. The ranking of desired activities at reserves were congruent with the literature on protected areas and visitor activities (Weaver, 2008; Boitani *et al.*, 2008; Foley, 2011). Historically nature reserves were initiated by the colonialists and have not been fully embraced by mainstream black culture (Burnett and waKang'ethe, 1994; Cock and Koch, 1991). This is not to say they do not value plants and animal diversity it's just that they are viewed in a different light and for a different pragmatic purpose. With over one third of respondents never having visited a nature reserve one has to consider the effect of skewed income distribution, poverty and lack of access and opportunity which are real challenges facing institutionalised reserves and private game reserves. While entry fees at private reserves outside the city such as Shongweni may be high there is no entry cost attached to the twenty – five municipal owned nature reserves in the city (including PVNR). The only thing lacking are meaningful opportunities and champions to facilitate connections between students and these open spaces. Once DUT students were exposed to wild urban green spaces their delight was clearly evident (See Focus group results Chapter 7).

Thembinkosi Ngcobo- eThekweni Municipality- Head: Parks, Recreation and Culture Service Unit writes in *Woodiana* the official DBG journal (2013:2):

*I grew up in Durban during a time when open spaces were inaccessible amenities to me, but I have a single, cherished memory of my father taking myself and my two brothers to a park, and this experience has stayed with me ever since. I returned to Durban many years later as Director of Parks with these twin boyhood memories still vivid - parks as places of both enjoyment, and exclusion.*

Ngobo goes on to point out the value of placing horticulture within its social context for the benefit of all citizens and wishes to see the Durban Botanic Gardens evolving into a “multi-cultural constituency... with no limit to the number of interests, aesthetics and activities the Gardens can cater to.” (Woodiana, 2013: 2). While the DBG enjoys

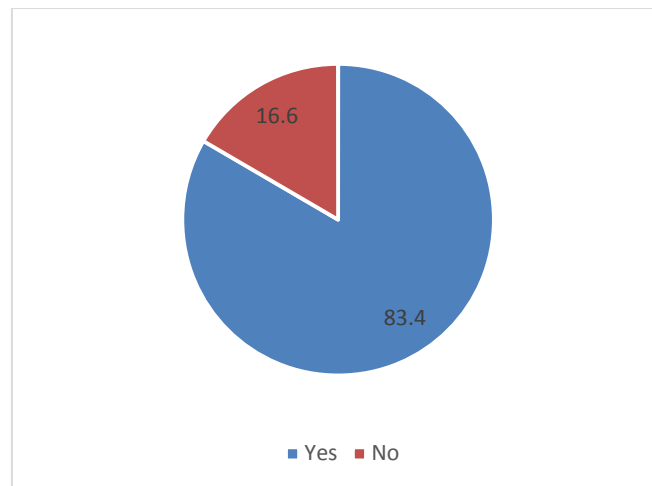
good support from DUT students due in part to its close proximity to the campus offering a tranquil green lung in the heart of the Berea there is definitely scope for creativity in attracting and connecting young people in a more meaningful way to the gardens. The author supports the vision of the Head of Durban Parks and believes that a melding of colonial and African cultural values would be a progressive step for both local horticulture and biodiversity awareness.

#### *Section D Virtual Contact with Biodiversity via media*

Not all students make actual contact with local biodiversity and this section sought to elicit their attitudes toward nature content expressed in popular broadcast, print and online media.

### **Television consumption**

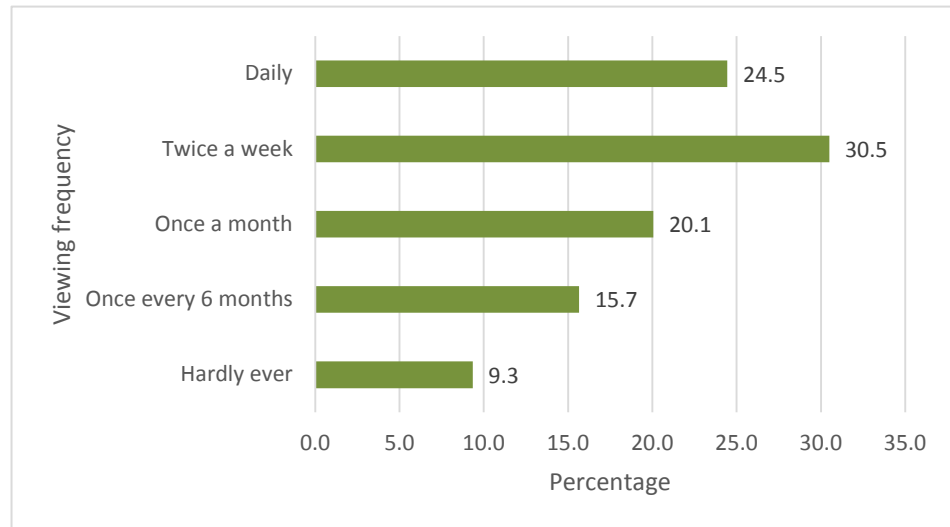
#### **1.1 Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV? YES OR NO**



**Figure 6.19: Viewing of nature content on satellite television (DSTV)**

The positive student response to watching nature content on DSTV was unanimous at 83.4%. Some respondents stated they did not have access to satellite television and others queried why they should have to pay for television access at all.

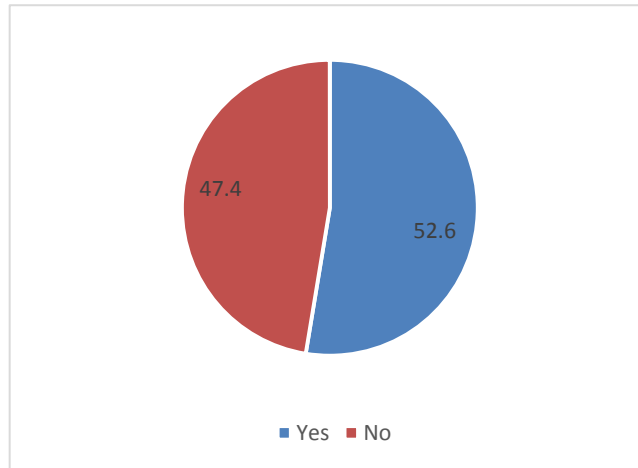
## 1.2 If your answer was yes how frequently do you watch?



**Figure 6.20: Viewing frequency of DSTV Nature Content**

At least one quarter of students claim to watch DSTV Nature content daily while half the student body watches between twice a week and once a month. Cross tabulations with race revealed that Indian students claim to watch the most DSTV nature content (94%) as opposed to Black (83%) and White (73%) students. Furthermore Indian students watch more TV than Blacks in the higher frequency range (daily – once per month). The figure for Asians is nearly 85% while frequency for Blacks is 73%. Minority groups such as Whites watch a lot less nature content at just over 66% while Coloureds watch the least at 62%.

**1.2 Do you watch a dedicated conservation program on any of the SABC channels such as 50/50? or one of the NG slots that are regularly flighted? YES OR NO**



**Figure 6.21: Viewing of Nature content on SABC channels**

On the local front SABC TV programs were not watched as frequently probably due to the widespread coverage of satellite TV but *50/50 conservation programme* proved popular as did *Living Land* SABC 2 and *Into the Wild* SABC 3. Selected comments include:

*It teaches me more about nature and the importance of conserving it*

*50/50 shows me interesting things about nature that relate to me as a person*

*50/50 Local content is relevant to me*

SABC TV Nature content is most popular in rural areas with viewing at 71% contrasted with city centre viewing at 31% and suburban viewing at 40 %. The reasonable explanation is the higher cost of satellite TV is unaffordable in rural areas and only available for the affluent. Black student respondents also complained about the higher cost of DSTV content. As one student remarked “Most SABC channels do not have conservation shows so how can the conservation message spread if there is only limited access to DSTV?” Similarly a significantly higher percentage of Blacks

(57%) as opposed to White (36%) and Indian (37%) students watch SABC TV. content presumably on affordability.

#### 1.4 If your answer was yes how frequently do you watch ?

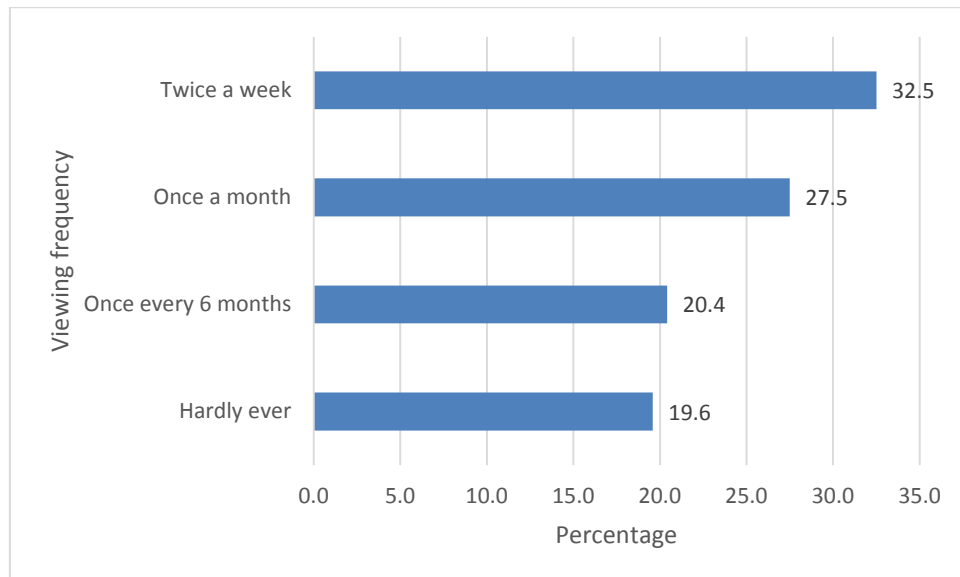


Figure 6.22: Viewing frequency of SABC nature content

#### 1.5 What is your favourite nature program from both SABC and DSTV and why?

The bulk of respondents stated they watched nature related content on satellite DSTV on a regular basis varying from daily to once a month. Favourite programs included the National Geographic suite NAT Geo Wild, NG and Animal Planet as well as Discovery world. Love of the charismatic mega fauna as well as exotic locations featured strongly confirming research in this area (Lindemann-Matthes and Bose, 2008). This response was positive with selected verbatim comments such as:

*These programs are eye openers and give you a connection with nature*

*I watch Nat Geo Wild for the wildlife because I don't get to see these animals in real life*

*NAT Geo Wild is interesting and informative and allows us to see the biodiversity of flora and fauna that exist*

*Nat Geo Wild shows us the beauty of nature and allows us to connect with nature even though we are not at a nature reserve*

Television therefore acts as a vicarious medium which has immense value in exposing students to biodiversity and opening up world views through the use of high quality visually exciting content which is now appealing to Generation Y viewers.

**Programs mentioned by respondents included:**

*Instinctive Killers - Paws and Claws – River monsters - - Monster Fish - Deadliest Animals - Big Cats – Shamwari Game reserve – Gator Boys –Wild Brazil – Wild Amazon –Wild Russia- Bondi Vet- Weird Animals – Lion man - Great Migrations - Shore line- Deadliest Catch – World’s Deadliest Snake- Wild Africa – Gravity falls- Mutant planet- Wicked Tuna – Built for the Kill- Into the pride – Meerkat manor – The story of the Galapagos – Shark men – Caught in the act – Code Green- Dangerous Encounters- After Dark – Walking with Dinosaurs*

**D2 Internet Use**

**2.1 Do you ever watch nature related YouTube content? This can be any item related to Earth and the universe or concerning plants and animals**

Just over half of respondents stated that they never watch any nature related content on YouTube. Those that did respond positively may have taken the question to mean general YouTube viewing (such as music and entertainment) without placing too much care on the ‘nature content’ aspects or interpreting it rather freely. A search using these key words however revealed 101 million different entries. The international literature has extolled the benefits of using YouTube material in HE teaching with articles such as *Teaching the Google Eyed Generation* (Ashraf, 2009; 343) as well as work by Chen and Bryer (2012), Anandhavalli (2012), Jones *et al.* (2010) and Davis *et al.* (2010). Many lecturers at DUT do employ e-learning strategies in their

environmental curricula (I. Govender and P. Reddy, personal communication 19 September 2015) however these are to captive audiences and further focussed research into this arena is recommended. From the authors experience students YouTube preferences are entertainment biased.

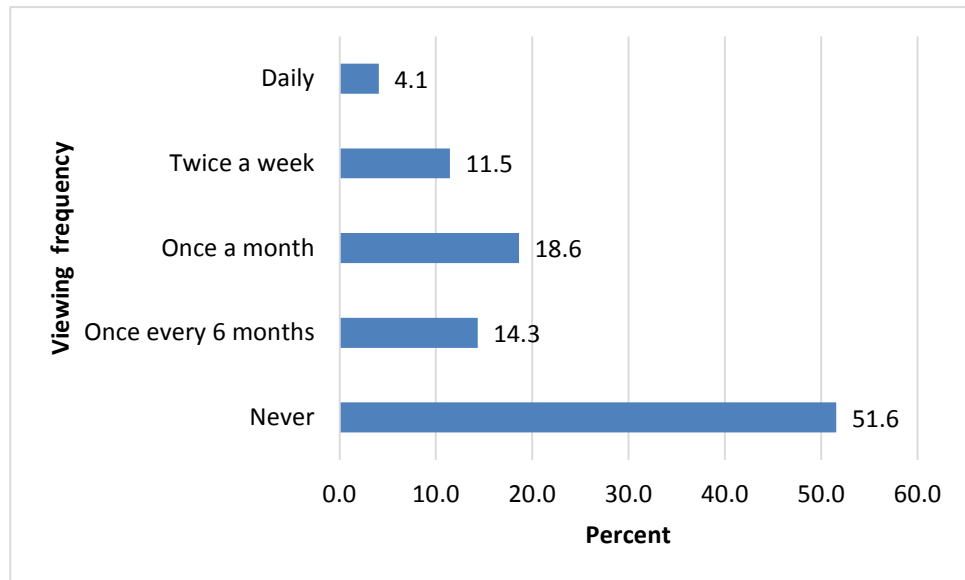


Figure 6.23: Viewing of nature content on YouTube

## 2.2 If you do view nature content on YouTube is this done from your;

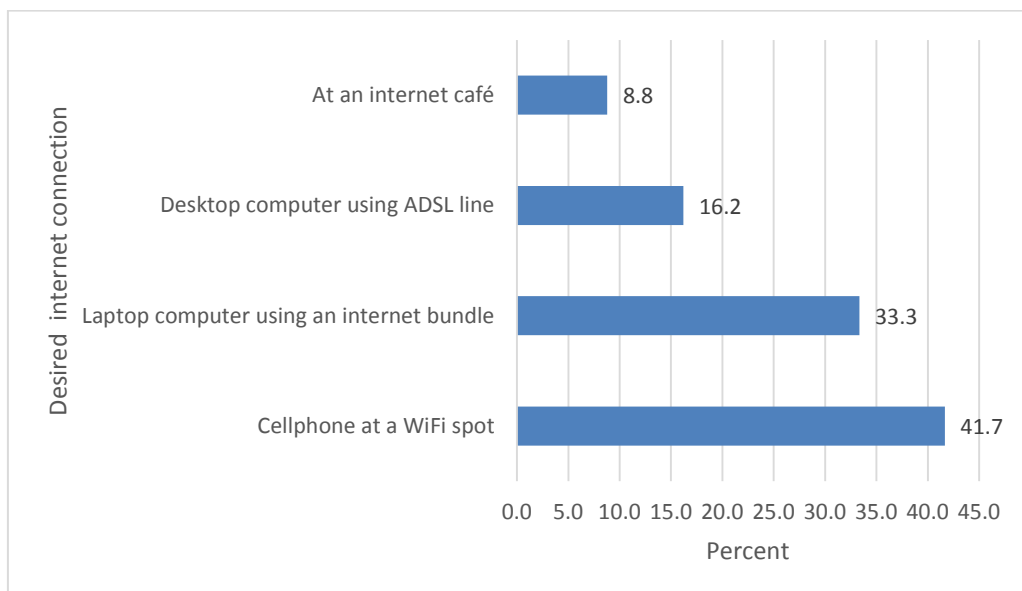
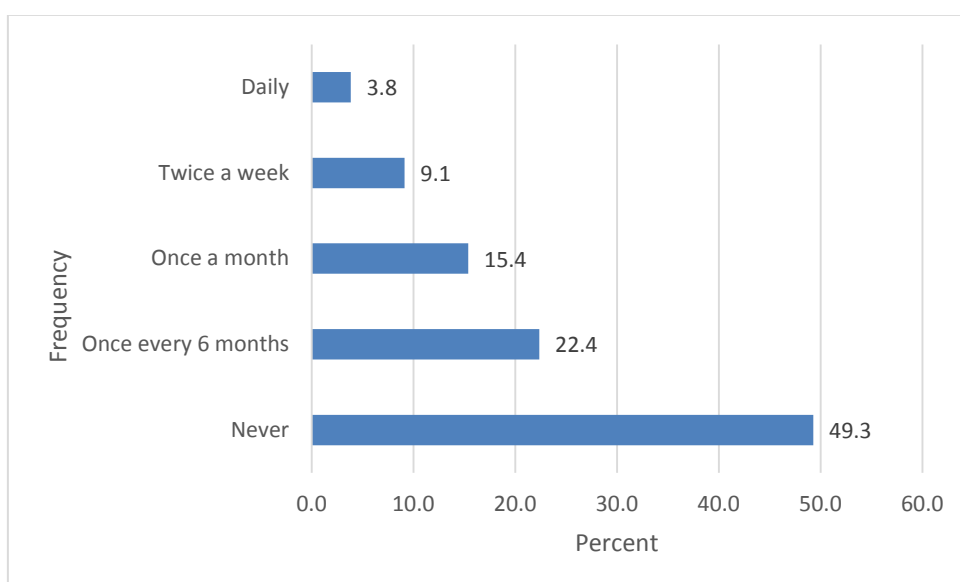


Figure 6.24: Internet Connection preferences

Preferences for accessing YouTube and internet is done cell phones at DUT Wi Fi spots (41.7%), using laptops with internet bundles (33.3%) via PC desktops and fixed ADSL lines (16.2%) and finally at internet cafes (8.8%). This is congruent with findings from the literature on Social Media Technology (SMT) use at South African universities as discussed by Thinyane (2010), Goneos-Malka (2012) and North, Johnstone and Ophoff (2014). Cost is often a determining factor in student decisions, cell phones can access content free of charge and laptops are the next most convenient device.

### 2.3 Do you ever visit nature related web sites to view images, blogs or text articles?

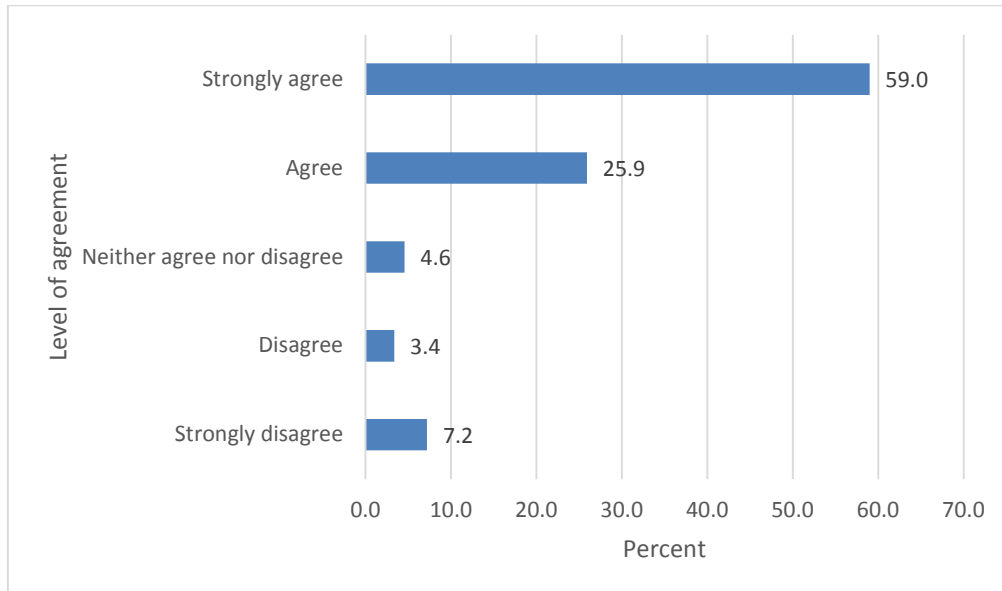


**Figure 6.25: Viewing frequency of nature related websites**

These results are similar to viewing of nature content on YouTube but widens the scope to include other online platforms. Nearly half the students (49.3%) did not voluntarily do so and those that did were not frequent viewers. In such a fluid medium as the internet the competition for clicking is intense and while excellent nature content is available it may just be wilting in the face of other consumer-based web attractions.

## E Cell phone use and social media platforms

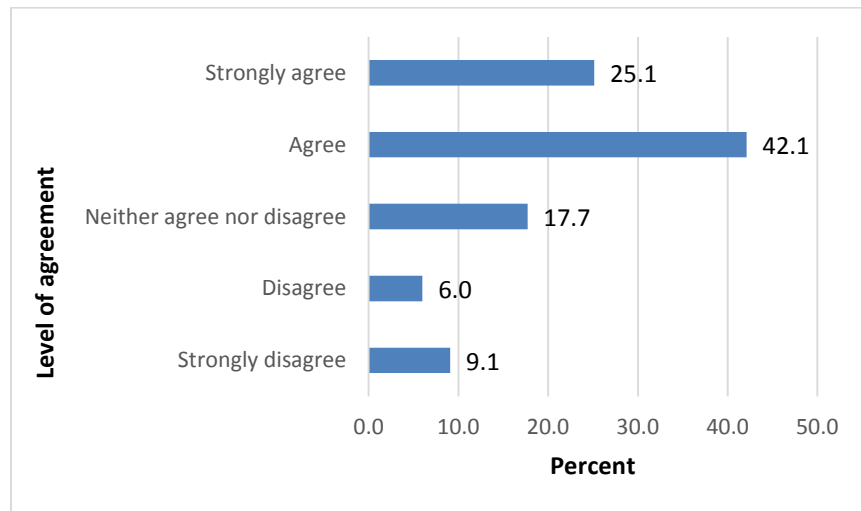
E1 I use my **cell phone** every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and What's app



**Figure 6.26: Daily use of cellular phones**

Here the consensus was unanimous with some 86 % of DUT students declaring their cell phones were used on a daily basis, the chief purpose being communication, socialising and security findings confirmed by other researchers in the HE sector (Thinyane, 2010; Goneos- Malka, 2012 and North, Johnstone and Ophoff, 2014). As mentioned in Chapter 4 South African students are generally consumers not producers of web content.

**E2 I would like to receive and access nature related web content or news updates on my cell phone**

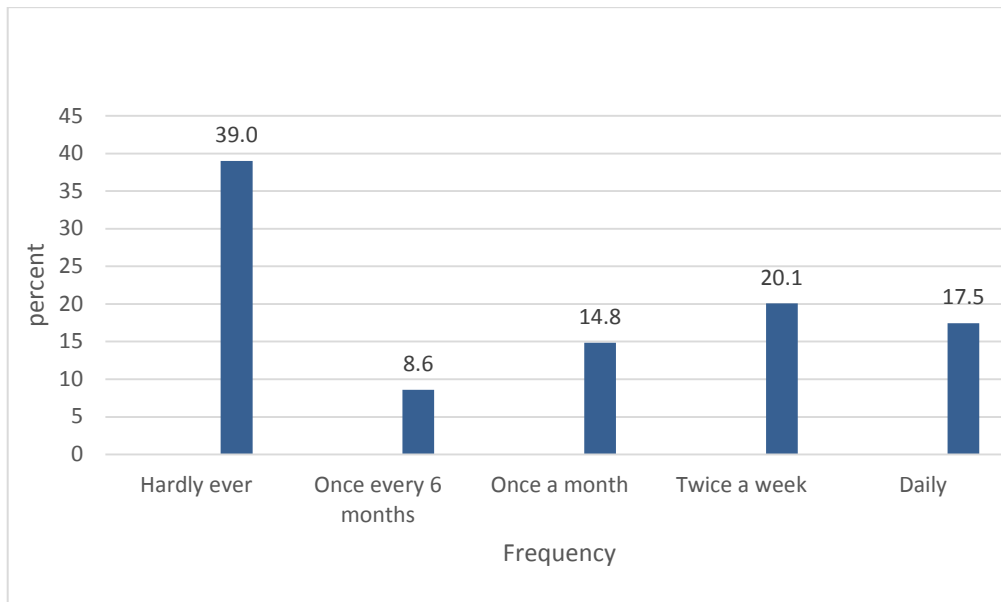


**Figure 6.27: Receipt of nature content on cell phone devices**

Students appear to be open to receiving nature related content on their cell phones and this aspect was discussed more fully in the focus groups where several solutions were proposed. Those in favour were 67.2 % a fair majority however less than one third of these were really enthusiastic. The use of Nature 2.00 technologies as described in the literature review is still an unknown concept at DUT.

## F Print and visual media : Newspapers, Magazines, Posters and Signage, Films

### F1 I buy and read the local newspaper (Isolezwe, Post, Sowetan, Daily News, Mercury, Sunday Tribune)



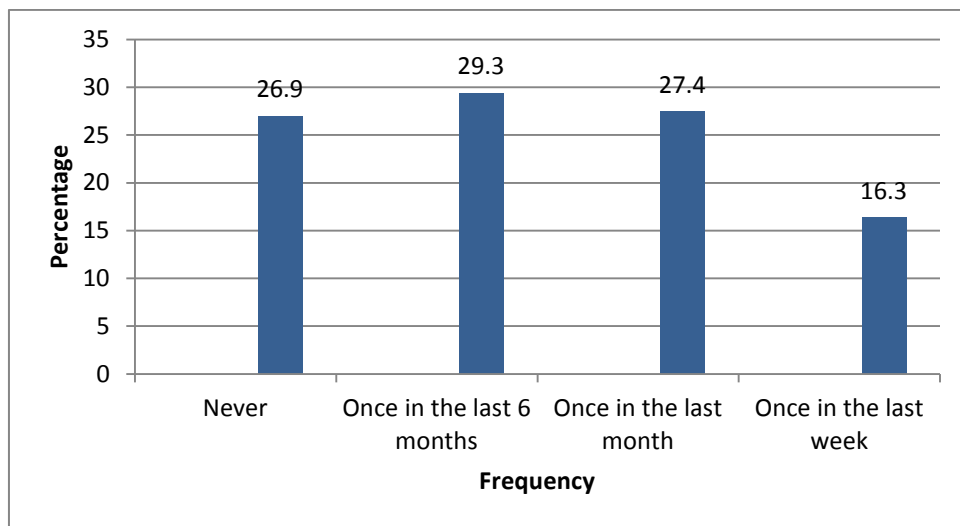
**Figure 6.28: Frequency of newspaper purchase or reading**

Just under 40 % stated they hardly ever buy or read the local newspaper with the balance of students showing low rates of use (17.5% daily, 20.1% twice a week, 14.8 % once a month and 8.6% once every 6 months). In this regard DUT students follow the international trend amongst Generation Y members, they are not readers and prefer visual rather than text content. Bauerlain (2011:28) contends that many American students or 'Screenagers' have difficulty reading and understanding complex texts that require slow focussed thinking. Emphasising the primacy of an image rich visual learning process as opposed to a text only environment James and Diana Oblinger (2005) claim that an overreliance on text may actually inhibit Net Generation participation. While earlier generations were introduced to information through print, this generation takes a digital path (Oblinger and Oblinger, 2005). The claim is made that students on average only retain 10 percent of what they read but closer to 30 percent of what they see.

Much of the reading done by the Net Generation has been web based where learners are more likely to scan than to read (Jones *et al.*, 2010). The implications for this thesis are that virtual rather than print and text media will be more successful in communicating Biodiversity messages to South African students.

**F2 I have read a nature or environmental related article from the newspaper or magazine**

- a) Never, b) once in the last 6 months c) once in the last month d) once in the last week



**Figure 6.29: Frequency of reading nature based content**

In the respondents desire to be seen to be more 'environmentally friendly' these positive responses may be overstated with the question allowing fair latitude for interpretation. Despite these constraints voluntary readership levels of environmental material remain low with over a quarter (26.9%) never reading a nature related article and nearly a third (29.3%) only doing so once in a 6 month period. Again the implications for this thesis is that print media in terms of newspapers and magazines may not be the preferred route to communicate the biodiversity message to students.

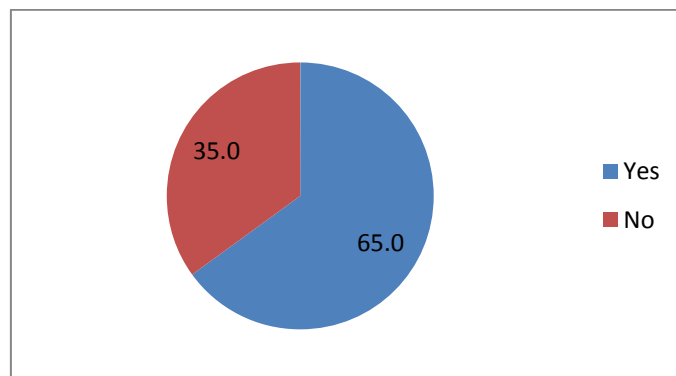
**F3 I think I would learn more about nature from Posters and Signage than newspapers and magazines**

The results again highlighted the primacy of the visual media to students with 62.6% in favour of reading posters and signage over newspapers and magazines. Mass media billboard campaigns therefore hold some promise for promoting the Biodiversity Message as does interpretive signage in botanic gardens and nature reserves (Ballantyne, Packer and Hughes, 2012; Ward, Parker and Shackleton, 2010; Foley, 2011).

**Table 6.7: Opinions on Posters and Signage**

Level of agreement	Frequency	Percent
<b>Strongly disagree</b>	39	9.1
<b>Disagree</b>	33	7.7
<b>Neither agree nor disagree</b>	77	18.0
<b>Agree</b>	187	43.7
<b>Strongly agree</b>	81	18.9
<b>Total</b>	417	97.4

**F4 I have watched a nature or environmentally related DVD or film (other than TV) at least once in the last two years YES or NO**



**Figure 6.30: Watching of environmental DVD or Film (Other than TV)**

It may be that the positive response to this question is overstated given the dearth of Environmental Movies on the circuit. While the exact parameters of an environmental DVD or film were not spelt out the positive response (65%) shows a student preference for video material. Environmental movies such as the *11<sup>th</sup> hour* hosted by Leonardo di Capricio and the David Attenborough BBC Series *Earth* have been screened for DUT students in other classes with good results.

#### **Section D Analysis and subconclusions Virtual Contact with Biodiversity via media**

The reach of the media into student life is persuasive and permeates aspects of learning, social interaction and personal development. Students responded positively to broadcast media such as DSTV and its suite of National Geographic programs containing nature based content and rated these offerings as a substitute for real nature. These programs appear to have captured the enthusiasm of DUT learners and have opened new horizons and expanded geographic, environmental and cultural viewpoints (See verbatim comments in Appendix 6) While SABC programs were are not as popular as DSTV local environmental offerings such as 50/50 still play an important role in describing and communicating biodiversity issues to Generation Y students. In terms of communicating the biodiversity message to students using Social Media Technologies (SMT's) international educators and academics continue to successfully develop new apps and on line platforms especially in England, and Europe that integrate the novelty of hi tech hand held devices such as cell phones and GIS capabilities with the hands on outdoor environment experienced in nature reserves and botanic gardens. The use of these innovative Nature 2.00 technologies has yet to find traction with HE students at DUT who do not voluntarily seek out Nature related You Tube or web content. This is due in part to the siren call of a constant stream of live entertainment now accessible anywhere on campus on their smart phones, tablets and laptops. Cell phones are still used primarily for socialising (Fb), communication (texting IM and SMS) and security purposes. Students generally do not wish to be bothered with receiving nature based content on their devices since their concerns and priorities lie elsewhere.

This is not to say that SMT technologies are unsuitable media for biodiversity communication it is just that this field of development requires exceptional technical and marketing expertise to create relevant attractive products and apps for South African students. The popularity of print media especially newspapers appears to be declining together with reading skills but visual print media such as posters and signage still offer a promising role to communicate conservation issues. Celebrity endorsed environmental movies have value and students responded positively to them.

### **Survey critique**

At least 97% of the surveys were completed satisfactorily however the written quality of open ended questions was disappointing. Most students would rather leave areas empty saving them time and those that did fill in the blanks answered in generalised poor quality English. There were some exceptions however most academics at DUT would agree that literacy skills at the undergraduate level are underdeveloped (D. Timm, personal communication, 10 June 2016.). This is due in part to the lower entrance requirements in English for most programs at DUT as well as inadequate preparation at secondary school level for college education (Soudien, 2010). Another mitigating factor could be complete lack of knowledge in certain areas, students would rather leave an area blank than answer incorrectly. In terms of the statistical analysis and probing of correlations and significant relationships a fairly homogenous student view point emerges from the survey. One would expect some variation of responses within the different diplomas and the faculties which govern these however these variations were marginal, usually less than 5%. In broad strokes students that were best informed were from faculties such as Applied Science and EBE and students that were least informed from the Faculty of Applied arts and design. In the latter case the Fine Art students were least informed on Biodiversity matters obtaining low scores in Section B while the Video technology students were better informed and excelled in lively debate during the Focus group sessions of Phase Two.

## **Statistical methods and techniques**

This section outlines the procedures used to validate the survey instrument and to analyse the data using acceptable quantitative techniques. Due to the bulky and technical nature of these printouts they are presented in Appendix 5. These include *inter alia*:

### **On survey reliability**

- Reliability: Cronbach's alpha score
- Factor analysis: Kaiser-Meyer-Olkin test (KMO) and Bartlett's test
- Principal factor analysis using Varimax rotation with Kaiser Normalization.

### **On data analysis**

- Frequency testing
- Pearson's Chi Squared test to determine significant associations, confidence values ( $p$ ) and cross tabulations used for hypothesis testing
- Spearman's Coefficient testing to determine correlations

## **Summary of findings and conclusion**

These are presented in the box below. Having established an empirical 'snapshot' of the target audience and their attitudes and knowledge toward biodiversity, we probed their actual experiences with 'real' and 'virtual nature' and determined in broad strokes the preferred communication modalities for biodiversity communication. Attention now turns in the next chapter to deepening our understanding of these concepts using focus groups.

**Table 6.8: Summary of Research Findings Phase One**

- In terms of demographics DUT respondents were largely isiZulu speaking Black Africans (76%) between the ages of 17-25 drawn largely from the surrounding townships and suburbs with a smaller population from rural areas and towns. Minority groups included Asians, Coloureds and Whites. There were more males than female respondents.
- Students were able to define the term biodiversity and described biodiversity loss largely in terms of species extinctions and habitat loss
- Respondents expressed high levels of personal concern over global and local biodiversity loss but felt it would be affecting their children on a greater scale
- In terms of plant knowledge over two thirds of respondents claimed to use traditional medicine and had some idea of the ingredients used. Students submitted 30 vernacular isiZulu and Xhosa names for these plants which were verified as authentic indigenous medicinal healing plants. Unaware that these plants faced possible extinction students also were generally unfamiliar with the threat of invasive alien plants to local biodiversity
- DUT students were not regular visitors at nature reserves citing difficulties with accessibility, travel and associated costs however they did visit the Durban Botanic Gardens on a regular basis enjoying the plant life, tranquillity and peace this venue offered
- Many students watched biodiversity and nature related content on DSTV programs on a regular basis and found these were entertaining and informative and in some cases they noted that this virtual contact with nature took the place of actual experience
- The viewing of on line nature content via the internet and YouTube was less popular and the concept of using nature based apps on their cell phones received a mixed reception. Students were however unanimous in their endorsement of cell phones for socialising, texting and communication. Internet connectivity took place at free campus Wifi zones
- Respondents did not read local newspapers on a regular basis preferring visual print media such as billboards, posters and outdoor signage
- Environmental movies received endorsement and greater use could be made of this medium

## Chapter Seven: Findings, Phase Two - Focus Groups

### Introduction

Focus groups are used extensively in qualitative research to deepen and extend the debate enabling the participants to express their true sentiments often revealing further nuances and shades of meaning to the topic at hand (Kress and Schoffner, 2007; Roller, 2011). Positivist statistical data and results from a representative student sample have been recorded in chapter 6 together with sub conclusions and a summative analysis however these in themselves are surface representations, in order to truly probe the 'messy' and 'wicked problem' of biodiversity loss as described by Klein (2004) and Sharman and Mlambo (2012) first hand communication and interaction with the target audience is essential in developing an awareness of what the students really think. The main objectives of the focus group are first outlined followed by a description of the composition and *modus operandi* of the groups. Thirdly a suitable theoretical framework is proposed that provides a logical and supportive structure within which to categorise the various levels of discussion and to interpret the results. Fourthly the results from the focus groups are presented within this framework. Finally a summative conclusion for Phase Two is presented.

### Purpose of focus groups

As described in the research methodology of chapter 5 the focus groups have three main objectives that inform this research:

- a) *To discuss in an open forum the meaning and relevance of the term biodiversity to the respondents daily lives.*
- b) *To physically visit botanic gardens and nature reserves within walking distance of the campus engaging in first hand experiences with local biodiversity.*
- c) *To allow participants to provide feedback to the group via their preferred media utilising text and pictures to communicate their personal connection to nature*

These objectives are integrated with the four original research questions as spelt out in the introduction and research methodology chapters.

### **Modus operandi and Composition of focus groups**

Four focus groups were convened at DUT gathered from three different Faculties; Arts, Applied Science and Health drawn from the departments of Video Technology (n=10), Horticulture (n=12), Maritime studies (n=18), and Child and Youth Development respectively (n=15). This allowed for a multiplicity of views so essential to understanding student's positions on the topic. Each diploma offering has a different teaching focus and attracts a different set of students due to its unique entrance requirements. This may colour or bias response quality and content but has the advantage of presenting a fuller range of responses across the spectrum when analysing a 'messy' or 'wicked project' such as Biodiversity (Klein, 2004; Sharman and Mhlambo, 2012). The Video Technology group (GRP1) was convened on 9 September 2015 and consisted of 2<sup>nd</sup> year students, the Horticulture group (GRP 2) met on 9 May 2016 and consisted of 3<sup>rd</sup> year students while the Child and Youth Development (GRP 3) comprised of 2<sup>nd</sup> year students meeting on 5 May 2016. The Maritime Studies group (GRP 4) comprised 1<sup>st</sup> year students and met on 23 August 2016. Any student attending these class groups was eligible to join the focus group on a voluntary basis. Groups were convened at venues on DUT campus and at the selected study sites of DBG and PVNR. The agenda and full copies of transcripts and selected posters are found in Appendix 6.

Three sessions were scheduled and convened:

- i. Participants met and discussed questions as per the guidelines outlined in Table 7.2 under the direction of the facilitator. Video clips were screened to introduce the topic on a visual level
- ii. Participants physically visited the selected sites of DBG and PVNR as described in Research Methodology recording personal images and responses to local biodiversity
- iii. Participants displayed their responses to the group, answered any questions and discussed pertinent aspects of their work

### **Methods and Structure**

In order to systematically record, interpret and analyse the discussions the author followed best practise of academics working in the field of biodiversity communication. This framework is explained briefly here and informs this thesis generally and this chapter in particular. Marion Farior of The Biodiversity Project USA (2005), Fischer and Young (2007) and Buijs *et al.* (2008) provides some direction on structuring and recording focus group discussions. The latter collated the results of biodiversity surveys and focus groups conducted in three European countries; Germany, the Netherlands and Scotland. Their findings distil many of the sentiments and concepts already articulated in the literature review concerning social, scientific and cultural representations of nature and provides a useful framework from which to referent the statements and sentiments expressed in interviews and focus groups.

Components of biodiversity representations as identified by Buijs *et.al*, (2008: 76) will be applied in this research, namely:

- views on the benefits and functions of biodiversity
- views on biodiversity communication
- views on the relationship between humankind and nature

Most of the opinions expressed by respondents In the focus groups may be aligned to one or more of these three categories. They are coded for convenience and briefly described here.

## **A Benefits and functions of Biodiversity**

**A-1 Biodiversity as the basis of all human life**, essential to human health and survival is a core concept endorsed by the CBD, the Millennium Assessment (MA), United Nations Environmental Program (UNEP) and biodiversity champion and spokesperson E.O. Wilson

**A-2 Biodiversity as ensuring resilience and balance in** nature with each species of plant and animal acting in ecological concert (Buijs *et al.*, 2008: 77). The tale of the 'rivet poppers' as propagated by Elrich and Elrich in the seventies was foundational to the development of the modern environmental movement where each species was seen as indispensable and necessary to the functioning of the whole. Remove enough rivets in the aircraft and it will malfunction. These rigid views on the sanctity of each species are giving way to a more balanced approach where healthy ecosystems are seen as the more desirable goal (MA, 2005).

**A-3 Aesthetic functions of biodiversity.** This aspect included the visual appeal of habitat diversity within landscapes and species diversity within habitats (Buijs *et.al*, 2008:77). Aesthetic functions incorporate recreational hiking trails, national parks and nature reserves allow the visitor to enjoy nature more intimately on foot or fleetingly by car (Pond, 1993). Equally important are human affinities for the built landscape as well as public and private gardens that provide opportunities for the individual to relate on an aesthetic level to nature within an urban environment (Jellico, Jellico and Waymark, 1975; Ballantyne, Packer and Hughes, 2008; Ward, Parker and Shackleton, 2010).

**A-4 Biodiversity as creating a sense of place**, a *genius loci* often describing specific patterns of species and habitats (Buijs *et.al*, 2008: 71). These attributes and narratives derived from these add to the authenticity of the area and so become important voices in the biodiversity dialogue.

**A-5 Economic values of biodiversity** including those industries directly or indirectly on biodiversity functions. These include tourism, farming, forestry and the like; the ecosystem goods and services referred to in the literature review (Boon, 2007; Mace, Norris and Fitter, 2012).

## **B Biodiversity Communication**

**B-1 The science – public communication disconnect** – This examined the use of scientific jargon and the suitability and relevance of the term

**B-2 Best practice solutions for biodiversity communication** – This examined possibilities for using Nature 2.00 Technologies and Social Media Technologies (SMT's) in the South African context

## **C Human – Nature Relationship**

The final representation concerns the **relationship between humankind and nature**. The literature review has already described two overall positions pertinent to this thesis:

**C-1 Humankind as part of nature** (Holism, romanticism, pantheism and New Age spirituality) Humans are viewed as a) Participants in nature b) Responsible Managers/ Custodians of nature

**C-2 Humankind as separate or distinct from nature** (A Cartesian duality, man and the 'other') Humans are viewed as a) Enemies of nature b) Stewards of nature or c) Users and engineers of nature

As described in Chapter 3 these differing world views are viewed as either organismic (C-1 Embraced by African and indigenous cultures) or mechanistic (C-2 Embraced by Western developed technocratic societies). Carolyn Merchant (1980, 1982, 2004) refines three ethical environmental positions prevalent in Western culture since the seventeenth century that are also useful as broad constructs to assist in analysing and interpreting focus group results and dialogues (Merchant, 1992: 61). The three positions are egocentric, homocentric and ecocentric and are echoed in the work of other environmental writer's such as Buijs *et al.*, (2008), Thayer (2004) and Seymour (1999).

An **egocentric approach** allows individuals to extract and use natural resources in whatever way they see fit assuming that what is good for the individual will benefit society as a whole (Merchant, 1992: 64). Using *laissez faire capitalism* and supported ideologically by the Judeo- Christian ethic of Genesis 1 whereby man is given the mandate to subdue the earth. Lynne White Jnr (1967) argued that this approach has been the guiding force behind corporate greed and environmental destruction.

**The Homocentric approach** or the anthropocentric emphasises a social interest model or the greatest good for the greatest number of people. Based on the utilitarian ethics of Jeremy Bentham (1789) and J.S. Mill (1861) and epitomised by the Golden Rule expressed by Christ (do unto others as you would have done unto yourself) the homocentric approach also reflects a stewardship ethic as described in the Genesis 2 account. According to ecologist Rene du Bos (1972: 27) God placed man in the Garden of Eden "not as a master but rather in a spirit of stewardship." Homocentric views have been espoused by environmentalists such as Barry Commoner and Murray Bookchin (Deep Ecology) as well as Left Greens of the political spectrum. According to Merchant however both ecocentric and homocentric approaches fail in that they do not take into account or internalise ecological (scientific) realities such as

the implications of ecological and climate change, biodiversity and species loss. Merchant advocates a holistic partnership ethic based on an ecocentric approach.

**The Ecocentric approach** is intrinsically grounded in the cosmos and the whole environment (consisting of both inanimate and animate elements) is assigned equal value and worth. The new science of Ecology is the guiding light for decision making and principles of holism are key. Modern ecocentric ethics were famously articulated by Aldo Leopold's statement "...the individual is a member of a community of interdependent parts...the land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land." (Leopold, 1970: 203-204). The ecocentric approach is rooted in a holistic (organismic) as opposed to mechanistic world view. Despite its anomalies and problems the ecocentric approach in the author's opinion offers the most appropriate partnership paradigm with which to approach human/nature relations and associated communication. In order to coordinate these themes and stimulate discussion a series of questions was developed and used in each focus group (Table 7.1).

### **Data coding and processing**

All focus group discussions were digitally recorded and subsequently verbatim transcribed and checked. Full transcripts are available as Appendix 6 with MP3 audio recordings on the CD. Broad coding categories were defined according to initial research questions that had also been used to design the discussion guidelines. These elements were derived following best practise in European biodiversity communication as described by Buijs *et al.*, (2009) and Fisher and Young (2007) and modified to suit the South African student context as described In the literature review.

**Table 7.1 Discussion guide used in the focus group discussion**

No	Discussion Question	Code
1	Which video clip impressed you the most and why?	<b>Biocom</b>
2	What attracts you personally to nature?	<b>Man/Nature</b>
3	How important do you think local biodiversity is for your everyday life?	<b>Biobenefits</b>
4	How and where would you best like to connect with local biodiversity?	<b>Biobenefits</b>
5	Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?	<b>Biocom</b>
6	What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?	<b>Biocom</b>
7	What role do you think race and culture plays in an individual's perception of nature?	<b>Man/Nature</b>

**Source:** Derived from Buijs *et al.*, 2009; Fischer and Young, 2007; Merchant, 2004

### **Synthesized Results from focus group discussions**

In this section each discussion question is followed by selected verbatim comments together with a discussion and analysis. The complete transcript each focus group is in Appendix 6.

#### **Q 1 Which video clip impressed you the most and why?**

Three contemporary clips were screened produced by institutions dedicated to raising levels of biodiversity awareness amongst the public. A brief contextual film review is presented here:

**Video 1: *Biodiversity: We are all in this together*** - Length 1.39 min This award winning European video was produced for the 2010 UN Year of Biodiversity. - Using only visuals and music the clip had a strong emotive focus on the urban environment where humans and nature co exist and collide. Playing on this connection and emphasising species loss the video concludes with the strap line 'Today it was the sparrow... tomorrow it may be you.'

**Video 2: *Introduction to biodiversity***- Length 09.42 min. Produced by the Danish Council for Environment this video was used to brief respondents for a survey conducted by the Worldwide Views on Biodiversity (WWV) a global initiative to raise biodiversity awareness in the minds of the public and decision makers. Rational and clear it presents the three facets of the biodiversity concept simply to the layperson

**Video 3: *Biodiversity a graphic explanation*** - Length 2.41 min Produced By the Vancouver Film School (VFS) this extremely fast paced visual introduction to the topic is packed with colourful icons, graphic animations and facts illustrating the three levels of biodiversity.

#### Verbatim (All groups)

*The video on the sparrow (Video 1) had a strong message at the end which leaves one thinking.” (repeated likes)*

*Video 1 impressed me the most since I realised that what is happening to animals (extinction) could happen to us humans in the long run.*

*It (Video 1) can appeal emotionally to anyone causing them to rethink everything and start conserving nature*

*Video 3 amazed me for example we have 80 000 food plants in the world but we only use 30 of these*

*For me I thought the clip from Vancouver Film School (Video 3) with its high graphic content would be most attractive to communicate with SA Youth. The icons and pictures were well used to communicate the message (repeated likes)*

#### Discussion and Analysis

All groups felt the three videos were relevant but were unanimous in their selection of shorter more graphically stimulating clips as contrasted with the lengthy but informative documentary style. Video 1 was ranked first, possibly because of its strong emotive appeal and absence of text. Some students took the strapline literally

and wrote that sparrows are diminishing due to human activities. Others seem to have understood the sparrow was a metaphor for all animal life. Video 3 was ranked second however all agreed that the superb graphics were simply too fast to absorb. Video 2 while scientifically thorough was plodding, dull and last in the popularity polls. The important point for this thesis is that film remains a powerful medium of communication to students but requires a sensitive blend of contemporary images and scientific accuracy...in Ian McCallum's words a 'blend of science and poetry.'

## **Q 2 What attracts you personally to nature?**

### Verbatim

#### GRP2

*It's unlimited, the complexities of design and interaction between species*

*The beauty of nature attracts me... the setup of landscapes and how everything fits together without any human involvement (sublime and pristine nature)*

*The ability of nature to endure damage and repair itself (resilience)*

*The ocean fascinates me, how much water there is, the living sea creatures and the damage it can do when angry (malevolence of nature)*

#### GRP3

*The fact that the waves do not exceed their limits like at the Sun Coast Beach. Why is that?*

*Nature is not attractive ...it's addictive (humankind and nature)*

*What fascinate me is the interaction of components for example the photosynthetic process where the plant uses its green leaves to create food (benefits of nature)*

*The sound of the river or sea attracts me, there I can easily connect to myself (humankind and nature)*

*Nature shows me how powerful and Great God is with his glorious creation*

*Creation itself is unlimited and able to bounce back... it amazes me as an individual how God has created and connected everything*

### Discussion and Analysis

The beauty, tranquillity and peace reflected in nature was a common response together with an admiration for the complexity and resilience of biodiversity. The restorative power of natural elements to the individual came to the fore as did respect for the Creator (This facet was well documented in Chapter 3 of the literature review- African ontology's of nature). Focus groups did not differ substantially on this question.

### **Q 3 How important do you think local biodiversity is for your everyday life?**

#### Verbatim

##### GRP1

*Realistically for Black people it's not that important it comes last, people need to be fed.*

*It's not that we don't care it's just it's the least of our worries*

*Every group has financial cares and needs, we need to have a balance so we need to give attention to conservation.*

##### GRP2

*Local biodiversity is overlooked ... our local biodiversity defines us- if it's healthy we will be healthy too*

*I can even say it is part of my life, what I eat, what I wear, where I live*

*Local biodiversity provides our country with spectacular scenery and wildlife viewing as well as natural products and medicines that can economically benefit the community*

*Local biodiversity gives you a sense of belonging and brings you back to your roots because it's local and not foreign.*

*GRP3*

*It sustains the health of that country or community*

*Without biodiversity our lives would be incomplete*

*Nature supplies us with life (repeated)*

### *Discussion and Analysis*

Many respondents gave text book examples of ecosystem products and services. Comments from GRP 1 (Video technology) are instructive reinforcing the literature that conservation is not on the top of the list for the Black populace (Cock and Koch, 1991; SANBI MTC 2012). The pragmatic utilitarian African view that Nature simply exists for human benefit (food) was strongly expressed. This was countered by others within the group who asserted conserving nature was of equal importance and responsibility to all cultural groups regardless of income. Such responses are race and culture specific, tied to socio economic backgrounds and contexts and are further investigated in Question Seven. GRP2 (Horticulture) had some prior exposure to the topic during their first two years of study while GRP 3 (Child and Youth development) had recently completed a short course in Environmental Studies hence the text book responses.

One of the respondents in GRP1 posed the concept of the need to protect the environmental commons for the greater good. She presented a hypothetical suburban problem and asked the group to imagine removing the entire Pigeon Valley Nature Reserve (PVNR) to make way for low cost housing, a scenario which would benefit the recipients of the housing however the resultant loss of the forest would affect the local microclimate adversely for all residents in the vicinity. Local research has claimed that temperature at PVNR is 2 degrees lower than the Southern Freeway two kilometres distant (Hemson, 2015:167). In summation biodiversity was

given greater prominence by Asian, Coloured and White respondents and the group agreed that biodiversity benefitted all citizens regardless of their socio economic standing.

**Q 4 How and where would you best like to connect with local biodiversity?**

Verbatim

GRP2

*I like visiting the Lion Park at Mpushini as well as the SANBI national gardens In Pietermaritzburg*

*I go to the rural area where everything is natural*

*Camping in the bushes where there is limited technology, no networks or interference with the outside world... Actual connection to nature is better than virtual connection.*

*Gardening...working with the soil, touching the worms and snails kinda makes me fearless. Wherever I am with nature I get a feeling of finding myself*

*I like to connect with nature personally rather than watching on TV. (Nevertheless most of the 428 survey respondents stated they watched DSTV programs such as Nat Geo Wild on a regular basis)*

*I like to connect with local biodiversity by going to the botanic gardens.*

*The best area to visit would be the closest such as D'Moss and Pigeon Valley where I would get a direct connection rather than watching it on TV*

GRP3

*I like the mountains of the Eastern Cape such as Mt Ayliffe*

*I like gardening at home and buy plants from Tropical Nursery. I enjoy my domestic animals. I feel unsafe when I see rats or frogs. I am scared of them*

*I normally go to the farm where I can go to the river and swim or go to the forest and collect fruits*

### Discussion and Analysis

GRP1 students noted that they enjoyed the use of green venues such as the DBG as a great stress reliever just to be quiet and still. Others mentioned visiting the farm, going to the beach, enjoying one's home garden, while other respondents stated they enjoyed camping particularly in the Transkei. GRP2 displayed similar comments congruent with their chosen career of horticulture. Wilderness (Sublime nature) getaways were preferred; beach, bush and berg venues with actual nature experiences taking precedent over virtual vicarious experiences such as TV. Experiencing the joys of gardening and viewing plants at the Durban Botanic Gardens were frequent responses. GRP3 respondents reiterated personal connections with practical gardening as well as rural and wilderness areas. Traditional cultural superstitions toward animals surfaced as described by (Mbiti, 1970). On a positive note students are enjoying some personal connections with nature in their immediate local context be it a rural or urban setting (Cronon, 1995).

Within GRP1 great debate centred on the role and purpose of nature reserves. Many Black respondents saw no need to visit a reserve or park – “I can see forests on the farm.” “I grew up on the farm, I saw birds and wildlife on a regular basis, I see no need to visit nature reserves and pay money to see the same things.” High entrance fees were seen as part of the problem but visits seemed pointless for some respondents since nature could be encountered free of charge in the rural environment. Another student disagreed stating that she visited Paradise Valley Nature reserve in Pinetown regularly just to enjoy the aesthetic beauty and colour of the plants and the surroundings and that this was different to the farm environment. A similar point of view was expressed by another member. “Visiting a nature reserve grounds me. The air smells different. It restores my energy levels. The development there is sympathetic to the natural pristine environment, the links between biodiversity are clear... that for me is the big difference between visiting a nature reserve and a farm where nature has been manipulated.” These opinions have been

articulated in the literature and reflect two clear views of nature, in the first nature is seen as pristine and unspoilt (autarky) and humans are part of this system while in the second view humans are separate from nature and the latter is viewed purely as a resource existing for the sole benefit of humankind (Buijs *et al.*, 2008: 71; Seymour, 1999: 21).

**Q 5 Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?**

Verbatim

GRP 1

*Biodiversity is not a new concept...Blacks hunted and kept livestock and knew they were dependent on nature for survival so it's really a matter of interpretation*

*My opinion is that the average person cannot relate to scientific jargon. Even if they have an interest they will feel like it is 'for experts only'. The term biodiversity creates the idea it's about plants and animals when in fact it includes the whole system including the built environment*

*Most people in Africa are uneducated and not really concerned about scientific messages/adverts about biodiversity they are more concerned with survival*

*I don't think biodiversity has meaning to the average person since it's a scientific word which is difficult for the average person to understand. For scientists to communicate with average people the government must be involved.*

*No I don't think it has any relevance to the average person who thinks the use of the term is for educated people. Therefore action should be taken to change this mentality*

*With proper implementation the term can be brought to everyone's attention*

### GRP3

*It's too scientific and sounds too serious like a difficult module or subject*

*It's intimidating and causes anxiety I prefer the word nature*

*I think I prefer the term nature because when you hear the term biodiversity it makes you think long and hard. Like what is this now? What has it got to do with me?*

*No the name itself is scientific, one needs to Google it first before trying to answer any question related to it*

*Yes It can have meaning and relevance to the average person it depends on how you approach and deliver the message to people*

#### Discussion and Analysis

Most GRP2 respondents believed that the term had value but only once it had been explained fully. They felt it was inaccessible to the average uninformed person and that the word nature was a more understandable substitute. Government intervention was even suggested to raise awareness of the biodiversity concept. The group was divided about use of terms such as 'ignorance' and 'lack of education' with the former taken to mean 'don't know, don't care' and the latter referring to a lack of access to knowledge primarily referring to rural populations. Like Buijs (2008) reminds conservationists it is the public's perception and interpretation of the biodiversity concept that is important not just the exactitude of scientific definitions. In the students own words rural Blacks are aware of their dependence on nature and biodiversity they just don't articulate it in a Western manner.

Scientists were not seen to be forcing their views on the public and had a key role to play in the communication process. GRP3 Respondents echoed similar sentiments some feeling they were grasping the biodiversity concept clearly while many felt the term was too complicated and threatening for common use.

**Q 6 What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?**

GRP2

*I don't think these can play a large role since if a person is not interested in Biodiversity they can just skip these messages, rather use celebrities to promote biodiversity in soapies and movies*

*Social media can play a huge role to those who are already informed about biodiversity. The uninformed will however ignore these messages even if they were posted to their FB wall*

*Almost everyone has a cell phone so people can be educated through them*

*Yes, Social media is very influential on youth for better or worse and catching them with a medium where they spend the most time could point them in the right direction. (The question is how?)*

*It's not playing a role yet but they (unnamed) should create apps on cell phones because everyone carries them around ... the app should have some sort of information about nature (The question is who?) Modern media via cell phones can create an awareness of biodiversity loss... individual stories about biodiversity need to be shared and how to conserve nature for the future. Note : Brackets are author's comments.*

*Modern social media with the likes of Fb, YouTube, Twitter can be vital in communicating the biodiversity message to young people of today since that is where they spend most of their time.*

GRP 3

*It's a convenient place to share ideas and chat about biodiversity (repeated)*

*Get the cell phone networks to sponsor a biodiversity advert that appears as a welcome screen each time you switch on your cell phone (repeated)*

*Develop biodiversity games or apps that will teach the young ones while having fun*

*A game can be developed where people can earn money or tokens for saving the environment*

*We can share inspirational videos on Fb*

*We could use all the social networks to pass the message on*

### **Discussion and Analysis**

This important theme is key to this thesis. If SMT (social media technologies) have such communication potential in the HE ambit as claimed in the (international) literature where are they and why are South African students not aware of them? More importantly why are some excellent existing South African nature apps not being used by students? Most GRP2 and GRP3 respondents believed social media could play an important role in spreading the biodiversity message but failed (apart from a few excellent ideas) to spell out the operational specifics [Rudyard Kipling's project criteria serve as practical reminders: WHO (note the use of the unidentifiable South African anonymous 'they') and WHAT and WHY and HOW and WHERE and WHEN]. Perhaps at this stage it may be ambitious to expect all the specifics to be identified but if these nuts and bolts considerations are not addressed properly a biodiversity centred Social Media Technology (SMT) program has limited chance of success given the fluid nature of the medium, high cost of development and competing markets for student interest. The author believes this discussion therefore to be deserving of further post graduate research.

**Q 7 What role do you think race and culture plays in an individual's perception of nature?**

Verbatim  
GRP1

*The people with the money have the leisure time to visit nature reserves, the majority of Africans are out there working for money to survive.*

## GRP 2

*Most Zulus don't believe in going to hospitals they prefer using inyangas and traditional medicinal plants for healing*

*Black people living in rural areas know and respect nature, the problem starts when they move to the cities and they are caught in between the influence of their Black culture and the new Western Culture*

*Traditional African rules for nature conservation should be used today*

*The present (Black) generation is more aware and informed of nature than the previous generation – the racial and cultural perceptions have changed as technology advances*

*In urban areas Black people remove trees since they are believed to harbour snakes and crack buildings.*

*Black people cut down trees for two reasons, they believe some trees attract lightning and in rural areas trees are cleared traditionally for visibility to spot the enemy*

*Traditional healers only remove a portion of the bark as to keep the tree alive, not all trees are removed for firewood some are retained, not more than one python may be killed at a time. Conservation in rural areas has been traditionally practised for years*

## GRP 3

*Yes, Blacks use medicinal plants for home remedies, the beach as a baptism venue and believe that God created everything*

*Black people are not that crazy about the environment. They are never taught how they can sustain the earth*

*Children are not taught the importance of nature and how to conserve it*

*One can choose to differ from what you have been taught as a child*

*It's our God given right to use the natural resources around us. It's part of our upbringing and I never heard anything different. That thinking gets passed on to each generation. How we are raised creates our perceptions (repeated)*

### Discussion and analysis

This question provoked a lengthy and spirited debate in all the groups with good levels of participation. The focus groups all agreed that issues of race and culture play a key role in determining and shaping an individual's perception of nature. Cultural issues identified by the group included traditional African medicine and plant use, hunting in rural areas, removal of trees in suburban areas and treatment of domestic animals. While opinions were divided as to exactly why Blacks carry out certain actions that impact the environment the overall consensus was that Whites displayed higher levels of biodiversity awareness due to the opportunities that privilege and affluence had afforded them. This thesis is not intended as a treatise on university race relations but the focus groups have highlighted some important perceptions that should not be ignored. In 2005 Melanie Walker produced a paper entitled *Race is nowhere and race is everywhere: narratives from black and White South African university students in post-apartheid South Africa*. She documented the exclusionary effects black students felt at the time and their resentment at White privilege as they were being assimilated into the new democratic South Africa (See also the executive director of Durban Parks comments in Chapter 6 under section C). The political landscape has shifted dramatically since Walkers paper with #Feesmustfall campaigns and trashing and torching of Durban campuses by students during the production of this work (2014-16).

Black students were keen to discuss different racial approaches to the environment in plain terms. The suspicion lingers that enough credence is not being given to these racial and cultural differences in ways that impact conservation and environmental awareness and choices. The literature review of Chapter 4 has already detailed some of the contrasting paradigms toward wilderness, urban green space and biodiversity as well as African ontology's of Nature. Key differences regarding the Western scientific approach and the traditional African approach were also discussed. *The focus groups have confirmed and illustrated the validity of these debates.*

#### *On traditional medicine*

Black student respondents were united in their support of the validity of this treatment and demonstrated first hand experience of being forced to drink 'unpalatable' plant medicines by an aunt or grandmother conceding it led to an actual improvement in health. They differentiated in the use of plants for healing properties as administered by the traditional herbalist (*isinyanga*) and the use of plants in the magical paranormal realm as applied by the *sangoma*. A specific example was cited of spitting out a plant concoction with the express purpose of attracting a past lover, a story corroborated in the literature (Mander *et al.*, 1995). The plant *Ansellia gigantea* (Leopard orchid) is readily obtainable at the Warwick Avenue muthi market literally a five minute walk from the campus. An Asian respondent opined that traditional herbalists took advantage of indigenous peoples perceptions by 'milking' the system making ordinary healing remedies appear more mystical and secretive than they really are. In discussing the fact that traditional medicinal plants are under threat in the wild considerable heated debate was generated.

A Black respondent felt that (White) conservationists were hypocritical in asserting this view since White owned pharmaceutical companies extracted high volumes of plants from the wild to use in their drugs which were sold at high profit. While the

scientific veracity of these claims may be successfully challenged<sup>14</sup> the perception that was strongly held was one of 'eco hypocrisy' on the part of the multinationals. These issues she felt were related directly to the economics of money and power. This respondent asserted that Black herbalists only extracted small portions of plant parts from the wild. She stated her aunt who was a traditional healer believed in harvesting the authentic plants from the wild to avoid the use of 'fake plants' or those grown in nurseries. *This reality is seldom if ever mentioned in the literature that extoll the commercialisation of medicinal plants and products (Mander, 1998; Mander et al., 2007).* A student from another group stated that sangomas were aware that the plants they harvested were becoming increasingly rare.

#### *On hunting and treatment of domestic animals*

Pointing to another issue of hypocrisy one of the respondents resented the fact that Blacks were criticised by the conservation movement for rural hunting for food while White hunting in selected areas was sanctioned. This is contested ground depending on context and background. Young Zulu men taking part in traditional hunting breed and care for their animals, the best dogs fetching high prices. The author investigated this issue first hand and notes this issue is still relevant to certain DUT students with homes in the rural areas (Foley, 1998). One student remarked that White people treated their animals (dogs) better feeding them like humans while Blacks generally mistreated them. Another observed that Whites believe that animals have nothing to do with luck while blacks see certain animals as bringing bad luck and associate them with witchcraft. This points to differing scientific world views (Shuma, 2011). The literature review in Chapter 3 records extensive evidence of the role of animals in African thought (Magi, 1986; Mbiti, 1970; Shuma, 2011).

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<sup>14</sup> The respondent was unaware that multinationals generally harvest plant extracts from monoculture nursery and farm stocks and that forestry companies such as SAPPI create single species plantations not forests

### *On removal of trees in suburban areas*

A strong defence was mounted on this issue with various arguments put forward such as preserving the safety of buildings, keeping the area free from snakes, not wishing to attract lightening, keeping the ground around the house clear for agriculture and being able to spot the enemy easily (security). Black students were aware that (White) conservationists were most unhappy about the removal of trees from the suburbs as the demographics changed. One respondent, a Shembe follower stated he personally planted trees around his Shembe church.

### **Field trips to study sites of DBG and PVNR**

Group one (Video technology) showed poor participation with only two out of the original ten members participating<sup>15</sup>. Groups two (Horticulture) and three (Child and Youth Care) all participated enthusiastically in these field trips which lasted about two hours each. The groups were divided equally with half attending DBG and the other half PVNR. Each *Let's Talk Nature* group was briefed on the Photo voice method of image making and communication as described by Wang, 1999: 187) and articulated in the research methodology of Chapter 5. A one page brief was issued entitled *My Personal Biodiversity* detailing the aim and requirements of the poster that they were to produce (Appendix 6). Students were then introduced to each facility, given interpretive maps and provided some guidance as to the main features of interest. Thereafter the students were free to interact with the natural features as they chose and to record the images that appealed to them. The DBG is a 10 Ha landscaped facility whose features were fully documented in Chapter 5. These public gardens are reasonably well sign posted with some interpretative signage created by the author at

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<sup>15</sup>Two individuals visited the DBG with the author and produced a 4 minute video clip on their biodiversity experiences as per the brief in Appendix 6. They then uploaded this to You tube and Facebook and obtained a fair following in the like economy. The link is <https://www.youtube.com/watch?v=1ZwcocgoUNM&feature=share>

The clip is not analysed in this Chapter since it neither adds nor detracts from the mainstream findings.

features of interest (Bromeliad garden, herb garden, alien alley and a set of Biodiversity posters at the people and plants exhibit by the lake). As an urban protected green space PVNR has little interpretation signage apart from an entrance map and botanical tree labels. An interpretive DMOSS pamphlet was circulated to the students with line drawings of the various plant and animal features as well as tree and bird check lists. The tour guides, both trained horticulturists pointed out features of interest but took care not to unduly influence the student's poster product.

### **Poster feedback and results**

Following the methods of Wang (1999) and Wang and Burris (1997) a report back session was held shortly after the field trips at the DUT campus for students to display and discuss their work. Group 2 (Horticulture) were vocal while the mostly female members of Group 3 (Child and Youth development) were extremely shy, coy and averse to public speaking in front of their peers. Selected verbatim comments and analysis follow. Transcripts are in Appendix 6

#### ***Verbatim***

#### **DBG**

*As we stepped into the world of nature, we experienced the Divine connectedness that once was in God's creation, in the Garden of Eden... Ohh! how we long to enter that sacred space once again, with the help of understanding our local biodiversity..*

(Lindelwa and Zonke)

*It is amazing how the bruises we see on nature can symbolize our internal and external personal bruises. Various abuse suffered by women, mostly physical, should be exposed as this camphor tree (Earth Mother) for the whole world to see.*

*Dear butterfly...I have missed you, I remember my childhood days and how we used to be best friends walking side by side. Our walks vanished as trees and flowers were cut down when roads, houses and more big building developed...Now we meet again and my heart is pleased, I have missed you.*

*Black and White in harmony...we see no discrimination in animals. We should learn that we are members of the same*

*In nature we find rest, peace, harmony, insight, strength and deep consolation. Your welcoming love is endless.*

*Being at the Botanic gardens made us to connect with nature in a way that we felt more in love with it and saw the significance of it. It also reminded us that nature is Gods way of reminding us how magnificent we really are.* (Ayanda)

### ***In a world***

*In a world of buildings and roads your beauty gives us a different view*

*In a world of ups and downs the calm waters calms us down*

*In a world of uncertainties you give us stability and peace*

*In a world polluted by industries, cars and dirt you give us a fresh pure fragrant*

*In a world where it is all about taking and taking you teach us to take to give*

*In a world of lost hope you give us hope... biodiversity*

(Sithabile Buthelezi)

### ***Imagine the Nation without Me!***

*I provide you with everything you need yet you still cruel towards me.*

*I'm the paper you reading, I'm the food you eating, I'm your shelter, I'm the air you breathing, Look at the tourists I'm bringing yet you fail to take care of me.*

*Look at the waterfalls, listen to the singing birds, not to mention the scent of the flowers mmmmmm...*

*Imagine the Nation without Me!*

*This is not only about You!! Think of the Beauty you Depriving your future generations, the greatness the Freshness They will never witness!*

*Start today and be a hero, protect me from dirt, stop abusing wild life, stop rhino poaching.*

*I am slowly dying, somebody save me and I promise to give all life.*

*Imagine the Nation without me*

(Phumalele Sifolo and Nolwazi Majola)

## PVNR

*Biodiversity...to me the trees meant a lot, because they give us lots of oxygen, and going to Pigeon Valley made me realize how beautiful the forest is and the beauty of the birds found inside the forest. I like the African dog rose the most. (Thuli)*

*I was truly blessed by the connection I had with the nature at the Pigeon Valley. I saw trees I have never seen in my life such as the forest cabbage tree, figs and the thorny rope. I was also inspired to see the buck weed. Pigeon valley is one of the 25 nature reserve managed by Durban parks... there was so much peace while I connected.*  
(Nosipho)

*Biodiversity to me has a way of calming me down. The trees and the birds have a way of making harmonious music that brings inner peace for me*

*What we felt about biodiversity after going to the valley:*

*We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity.*

*On the intimate level, anyone who has loved an animal companion knows the wonderful experience they provide, and their important presence in our shared lives. In their very local way they show us the global truth of our real wealth, our biodiversity....*  
(Nomcebo and Zethu)

*This plant is commonly known as the cabbage tree, and its Zulu name is uMsenge we Hlathi, the Zulu people have a phrase which says 'Goba msenge zidle izimbuzi' which means don't be superior amongst others when they need you, like a cabbage tree that is not reachable.*

*I felt like I was in my own back yard when I walked into pigeon valley because I am familiar with all the plant life that exist there. It brought back memories from home. Seeing those trees made me aware of it's importance and the measures I plan to take to protect biodiversity.*

*I was astounded and amazed at the variety of trees that existed. I felt grateful and also afraid at the same time because these trees are close to becoming extinct. I thought to myself and said, what can I as individual do to make a difference?*

(Jacqueline Tamara Gabriel)

### Discussion and Analysis

Students displayed a refreshing creativity and many articulated their thoughts extremely well. Others reiterated worn phrases and text book responses. Universal themes of humanity and nature emerged much along the lines of thought pursued in the literature review on social constructs of nature in Chapter 3. Visits to the DBG inspired a lament for a fallen Edenic state of bliss and a desire to return to this utopian state (Thayer, 1994; Cronon, 1995; Merchant, 2004, Dunlap, 2004). A Longing for past childhood spent in nature was lyrically expressed (Louv, 2005; Moss, 2012). Gender issues came to the fore echoing Carolyn Merchant's influential work on ecofeminism and the development of modern science (Merchant, 1980). The gardens evoked a sense of peace and harmony a healing property oft expressed in the literature (Connell, 2004; Ward, Parker and Shackleton, 2015; Williams *et al.*, 2015). Original nature poetry burst forth inspiring the reader to care for nature as its source of life for the nation, directly relating biodiversity to everyday benefits. The poem echoes the sentiments expressed in SANBI's Making The Case for biodiversity media campaign and the loneliness of modern life (Wilson, 2013; SANBI, 2015). The DBG student group lent credibility to Wilson's biophilia hypothesis (Wilson 1984), Leopold's Land Care Ethic (Leopold, 1979) and Tuan's topophilia ideals (Tuan, 1974) as detailed in the theoretical basis of Chapter 1. The student responses to universal constructs (albeit it a different culture on another continent) thus helps to integrate and close the research circle of theory, methodology and analysis.

Student visits to PVNR elicited a similar but site specific response. isiZulu speakers felt a strong affinity to the plant life recognizing and describing many tree species as familiar to them. They related these to practical issues such as a good burning firewood (*Dalbergia armata* or Thorny rope) as well as traditional folk lore and

proverbs as in the example of the Cabbage Tree (*Cussonia sphaerocephala*). These responses reflect the discussion of pragmatic African viewpoints on nature (Mbiti, 1970) as well as the more lyrical philosophic stances that emerges from the richness of the language (Koopman, 2013). African students at DUT are thus moving toward what Maurice Magi terms as a “new system of Integrated African thought and true humanism which rests on African reality and values.” (Magi, 1986: 106). Student responses from the PVNR visit reinforced the validity of the literature concerning African ontology’s in Chapter 3. Asian students responded equally positively but had little prior botanical knowledge of the indigenous forest trees or birds. They expressed a strong desire to protect and nurture local urban biodiversity. All students enjoyed the intimacy and quietness of this urban green space, qualities well articulated by Crispin Hemson in his article on the reserve (Hemson, 2015: 159-177). The visual products were pleasing on the whole since students had no formal training in design or photography<sup>16</sup>. Students were permitted to use internet images of local wildlife proved these were acknowledged correctly.

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<sup>16</sup>Selected posters are found in Appendix 6.

**Table 7.2 Summary of Research Findings Phase Two**

**Summary**

- Students responded positively to visual material presented especially short, graphic video clips that were contemporary and relevant to them. Talking heads and lengthy detail on scientific processes was seen as boring. Film remains a powerful medium for effective biodiversity communication to Generation Y
- The beauty, complexity and resilience of biodiversity was respected by all groups. Each group expressed reverence for the interconnected nature of life with many isiZulu speakers acknowledging the Creator as its source, the earth being the handiwork of *uMvelingangi* (The Almighty).
- Biodiversity was seen as a necessary and integral part of human wellbeing however many respondents gave text book answers without relating to local examples. This difficulty was resolved in the field trips particularly to PVNR where familiar indigenous plants were recognised and the link established
- Students connected to nature in a variety of ways preferring beach, bush and berg destinations while those from rural areas spoke of enjoying farm life once again. Some resistance to visiting nature reserves was encountered and students were divided on this issue. Actual experiences with nature were preferred over vicarious activities such as TV viewing
- Most respondents believed that the term biodiversity had value but only once it had been explained fully. They felt it was inaccessible to the average uninformed person and that the word nature was a more understandable substitute
- All groups agreed that social media could play an important role in spreading the biodiversity message but failed (apart from a few excellent ideas) to spell out the practicalities involved in implementing such a campaign. Solutions building on these ideas are developed in Chapter 8
- Cultural differences in upbringing and childhood education experiences were acknowledged as a factor likely to impact on their attitudes toward nature. Unafraid to shy away from race and class issues the student focus groups added some helpful perspectives toward the uniquely South African biodiversity narrative. These included African insights on traditional medicinal plant use, the removal of established trees in transforming suburbs and attitudes toward animals.
- Black students were unanimous in their perception that Whites were more concerned and conscious of biodiversity and conservation issues. Given the opportunity and exposure to these issues they expressed a desire to make a difference as individuals and to counter biodiversity loss

Having analysed the findings and results of each of the two research phases the outcomes from Chapter 6 and 7 will be merged into a coherent whole in Chapter 8. This final chapter will weave all the discussion strands together and propose a workable model for biodiversity communication to South African students in the Higher education ambit as well as outlining further possibilities for research.

## Chapter Eight: Conclusions and recommendations

### Introduction

This final chapter seeks to bind together all the strands and evidence presented thus far into a cohesive whole and to examine the extent to which the research objectives were achieved. It also serves to establish the veracity and validity of the thesis statement postulated in the introduction and reiterated in the research methodology chapters. The chapter begins by synthesising the findings of Phase One and Two and relating them to the original study objectives. Secondly key conclusions regarding the thesis statement are then presented relating them back to the literature reviewed. Thirdly by building on these findings a South African model for biodiversity communication to students in the HE ambit is proposed and finally areas of future research arising from this work are suggested. As a visual break a student response poster is inserted in the next page (Figure 8.1). In the words of American poet Henry Wadsworth Longfellow “Great is the art of beginning, but greater is the art of ending.”

**B - O D - I V E R S -**

*ZONKE AND LINDELWA GETTING IN TOUCH WITH LOCAL BIODIVERSITY.*

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As we stepped into the world of nature, we experienced the Divine connectedness that once was in God's creation, in the Garden on Eden... Oh! how we long to enter that sacred space once again, with the help of understanding our local biodiversity...




It is amazing how the bruises we see on nature can symbolize our internal and external personal bruises. Various abuse suffered by women, mostly physical, should be exposed as this camphor tree (Earth Mother) for the whole world to see.



Dear butterfly...I have missed you. I remember my childhood days and how we used to be best friends walking side by side. Our walks vanished as trees and flowers were cut down when roads, houses and more big building developed...Now we meet again and my heart is pleased, I have missed you.



Seeing one lady feeding bread crumbs to fish, we thought to ourselves that people feeding the fish think it is amazing to see so many fish so close but if they look at the big picture, they would realize the damage they are causing.



The humbling effects of the tallest tree in the garden...  
 From the day we arrive on the planet  
 And blinking, step into the sun  
 There's more to see than can ever be seen  
 More to do than can ever be done  
 There's far too much to take in here  
 More to find than can ever be found  
 But the sun rolling high  
 Through the sapphire sky  
 Keeps great and small on the endless round  
 It's the Circle of Life  
 And it moves us all  
 Through despair and hope, Through faith and love  
 Till we find our place  
 On the path unwinding on the Circle  
 The Circle of Life:  
[www.lionking.org/lyrics/OMPS/CircleofLife.html](http://www.lionking.org/lyrics/OMPS/CircleofLife.html)



Black and white in harmony...we see no discrimination in animals. We should learn that we are members of the same



In nature we find rest, peace, harmony, insight, strength and deep consolation. Your welcoming love is endless.

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**B - O D - I V E R S -**

CREATED BY ZONKE HLONGWANE (2155489) AND LINDELWA MKHIZE (20993178)

Figure 8.1 Student response poster to field visit to DBG

## **Synthesis of findings related to research objectives**

Research objectives were proposed in Chapters 1 and 5 they are presented here together with the merged findings of the two research phases.

### **Key Research Objective One**

*To evaluate and discover attitudes, perceptions and values toward nature and local biodiversity amongst Generation Y students currently studying at the Durban University of Technology.*

#### **Sub questions**

#### **RQ 1 What are the current knowledge levels of Generation Y concerning the term biodiversity and how is it important and significant to their lives?**

Students were able to define the term biodiversity correctly and described biodiversity loss largely in terms of species extinctions and habitat loss. Most respondents believed that the term biodiversity had value but only once it had been explained fully. The concept of biodiversity was largely seen as an urban construct for the educated, those from rural areas were occupied with survival and integrated with nature on a daily basis. The majority of students felt the term was inaccessible to the average uninformed person and that the word nature was a more understandable substitute. Students acknowledged their dependency on biodiversity for daily living citing generalised text book examples of goods and services provided by nature (Food, medicine, CO<sub>2</sub> reduction by vegetation).

#### **RQ 2 What are their levels of concern regarding biodiversity loss both on an individual and national level?**

Respondents expressed high levels of personal concern over global and local biodiversity loss but felt its effects would affect the future and their children on a greater scale.

#### **RQ 3 What role does race and culture play in student perceptions of biodiversity?**

Students acknowledged cultural differences in upbringing and childhood education experiences as a significant factor likely to impact on their attitudes toward nature. Unafraid to shy away from race and class issues the focus groups added some helpful perspectives toward the uniquely South African biodiversity narrative described in this work. These included African insights on traditional medicinal plant use, the original bond with nature as experienced by those raised in rural areas and an overall respect for creation as the handiwork of the Almighty. Black students were almost unanimous in their perception that Whites were more concerned and conscious of biodiversity and conservation issues. Given the opportunity and exposure to these issues they expressed a desire to make a difference as individuals and to counter biodiversity loss. Some students however felt that issues of race and culture were divisive and that together all young people should advance in their knowledge of conservation regardless of pigmentation or backgrounds.

## **Key Research Objective Two**

*To determine how Generation Y students would best prefer to connect with local biodiversity*

### **Sub questions**

#### **RQ 4 What is the nature and frequency of student visits to either nature reserves or botanic gardens?**

Some resistance to visiting nature reserves was encountered and students were divided on this issue. Impediments to visits included high entrance fees, distance and transport factors. Wildlife viewing was the most popular activity followed by relaxing and picnicking. Reserves outside the city centre were mentioned in responses and few if any student were aware of urban nature reserves such as Pigeon Valley. Students visited the Durban Botanic Gardens on a more frequent and regular basis enjoying the plant life, tranquillity and peace this venue offered.

#### **RQ 5 In what other ways do students like to connect with local biodiversity?**

Focus group members described their connection in a variety of ways preferring beach, bush and berg destinations while those from rural areas spoke of enjoying farm life once again. Despite being fully urbanised many respondents described their delight in the simple pleasures of swimming, fishing, hunting and fruit gathering in rural areas. A few students described their connection with gardening in urban areas and crop farming in the rural context. Actual experiences with nature were preferred over vicarious activities such as TV viewing or even Social Media. While these had value they could not compete with the sensory stimuli and enjoyment from actual nature.

#### **RQ 6 What is the extent of students Plant knowledge and do they connect with traditional African norms such as medicinal plant use?**

The use of traditional medicinal plants was endorsed as a source of pride unanimously in both research phases with over two thirds of respondents using traditional medicine and claiming to have knowledge of the plants used. Vernacular isiZulu and Xhosa names for these plants which were submitted and verified as authentic indigenous medicinal healing plants. These indigenous knowledge systems (IKS) were derived through oral traditions passed on from the family context. Unaware that these medicinal plants faced possible extinction students also were generally unfamiliar with the threat of invasive alien plants to local biodiversity.

### **Key Research Objective Three**

*To ascertain the role print and electronic media can play in presenting the biodiversity message to Generation Y students.*

#### **Sub questions**

##### **RQ 7 What is the preferred media of biodiversity communication and why?**

Television viewing proved to be the preferred medium of communication with DSTV National Geographic and Discovery Channels the most popular. Television acts as a vicarious medium which has immense value in exposing students to biodiversity and opening up world views through the use of high quality visually exciting content. Multiple aspects of the human interface with the planet (biosphere) are thus addressed. Students responded positively to visual material presented especially short, graphic video clips that were contemporary and relevant to them. Film remains a powerful medium for effective biodiversity communication to Generation Y.

##### **RQ 7a Are traditional modalities of communication still valid?**

Respondents did not read local newspapers on a regular basis preferring visual print media such as billboards, posters and outdoor signage. Environmental content is not publically displayed as in the case of commercial brands but some examples of interpretive signage at DBG received favourable comment. As stated in the literature review Generation Y are visual learners.

##### **RQ 7b What role can online modalities of communication play?**

Students were unanimous in their endorsement of cell phones for socialising, texting and communication. Internet connectivity took place at free campus Wifi zones. The viewing of on line nature content via the internet and You Tube was less popular and the concept of using nature based apps on their cell phones received a mixed reception. This survey confirmed other South African studies that students use their cell phones primarily for talking and texting not apps. Some students felt that nature messages would be intrusive and a high irritant factor, others felt that these would be deleted or ignored. Many focus group respondents enthused about the potential role of social media in spreading the biodiversity message but failed (apart from a few excellent ideas) to spell out the practicalities involved in implementing such a campaign. Some proposed solutions were celebrity endorsement of the biodiversity message and sponsorship by cellular networks.

**Key Research objective Four** As per Figure 8.2 and Section 4

## Key Conclusions regarding the thesis statement

*Thesis statement: Opening remarks*

The introduction postulated that Generation Y students in the HE ambit have little or no idea about what biodiversity is, are unaware of the richness and beauty of local biodiversity but can respond positively when exposed to appropriate biodiversity communication on campus and on site in locally accessible botanic gardens, and protected urban green spaces. This led to the development of the thesis statement:

*There is a significant disconnect between Generation Y Students and local biodiversity that can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media.*

Since thesis statements need to be tested, probed, and proved the evidence presented in this work suggests a revision of the first line. Yes there may be a certain level of disconnect between students and biodiversity but is it truly a *significant disconnect*? The evidence in this thesis has demonstrated that the majority of students are in fact concerned about biodiversity loss when it was explained to them in clear terms. Furthermore they would like to learn more about this messy and 'wicked problem' and how they can work toward a solution. Knowledge deficits in Generation Y students regarding biodiversity loss cannot be ignored but can be remedied through constructive dialogue bearing in mind racial and cultural nuances of differing contexts and worldviews toward the topic. Instead of viewing these differences as divisive stumbling blocks they can with sympathetic examination be turned into stepping stones building on an existing scaffolding of traditional African ontology's toward nature. By simultaneously preserving the value of indigenous knowledge systems (IKS) and demonstrating the value of empirical Western science in modern problem solving a new path can be mapped for effective biodiversity communication to South African students in the 21<sup>st</sup> century.

This is not a dilution of each system, since each assertion may contains elements of the truth. The process is ongoing and dynamic opening up new conversation and

discourses. The so called Hegelian dialectic<sup>17</sup> has provided a template for philosophical debate and is particularly useful in examining differing schools of environmental thought. It also provides a means of unifying the man/nature split, the Cartesian duality invoked through the separation of the material world of physical substances and the immaterial world of the mind as set out by Rene Descartes (1596-1650) the so called father of modern philosophy (Buckingham *et.al.*, 2011).By constructing a bridge between Western scientific and traditional African thought new and useful dialogues will emerge particularly for the uniquely diverse South African student context. The following section closes the research circle presented in this thesis relating the key conclusions back to the literature reviewed and ending with a revised thesis statement.

#### *Theoretical foundation validated*

The theoretical foundation of Chapter 2 has been validated in part by these research findings. The innate evolutionary bond between human kind and biodiversity first described by E.O. Wilson as biophilia has been endorsed by student responses from both phases of research. Tuan's articulation of topophilia or 'love of the land' has found substance in reflection by students from rural areas. Leopold's view of humankind as part of the natural community and holistic views of nature and the world as a self sustaining entity presented by Lovelock as the Gaia hypothesis found expression in traditional African world views endorsed by the various student responses. The findings confirmed the literature that in the minds of the students there is no dichotomy or separation of humans from the natural created world around them – it is all one marvellously interconnected system (Player, 1997; McCallum, 2005; Mbiti, 1970; Magi, 1986; Mphalele, 1974).The beauty, complexity and

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<sup>17</sup> Universal notions of paradox have been explored by famous thinkers such as George Hegel (1770-1831) who famously declared that "reality is a historical process" that is human perceptions are always influenced, informed and coloured by context. Subscribing to the idea that everything is linked and is part of a greater whole (also called monism) Hegel explained that "The truth is the whole" and went on to articulate his process of dialectic thought (Buckingham *et al.*, 2011: 182-183). In simple terms it provides a means to reconcile opposites, the assertion (thesis) evokes opposition (antithesis) a resolution is obtained through synthesis which includes and combines elements from the opposing factions

resilience of biodiversity was respected by all student groups. Each group expressed reverence for the interconnected nature of life with many isiZulu speakers acknowledging the Creator as its source, the earth being the handiwork of *uMvelingangi* (The Almighty). Student sentiments included the following:

*Creation itself is unlimited and able to bounce back... it amazes me as an individual how God has created and connected everything.*

*To me nature is proof God exists because of its marvellous balanced systems.*

*Key dimensions of the biodiversity message: Scientific, social and historic constructs of nature*

Key dimensions of the biodiversity message were explicated in Chapter 3. This included an understanding of the scientific significance and value of local biodiversity including the goods, services and benefits it provides and the imperative of mainstreaming the biodiversity message to the public as one of the Aichi goals for the UN decade of Biodiversity (CBD, 2014). Differing social and historical constructs were examined and contrasted, in particular American notions of wilderness and ecology as opposed to traditional African ontology's toward nature (Cronon, 1995; Worster, 1993; Merchant, 1980, 2004). The former has been influential in the growth of the modern environmental movement but indigenous knowledge systems (IKS) drawn from the latter were found to play a more real, persuasive and profound role in student thought.

*Understanding Generation Y- the student audience*

Understanding the audience is an important premise in any communication process. Generation Y profiles were presented in Chapter 4 along with contrasting social commentaries of this student generation. Accused of selfish tendencies with a proclivity towards conspicuous consumerism by a number of writers (Stein, 2013; Twenge, 2012, Bevan – Dye, Garnett and de Klerk, 2012) this generation was also praised for its flexibility, innovation and positive influence in economic, political and environmental spheres (Tapscott, 2009; Howe and Strauss, 2000).

Facets and elements from both viewpoints were experienced by the author. This research confirmed that literary skills were underdeveloped (Soudien, 2010; Ashraf, 2010; Carr, 2010 and Bauerlein, 2011) students responded to visual not text stimuli (Oblinger and Oblinger, 2005), they were supremely confident (the majority of respondents claimed to be well informed or very well informed about biodiversity) and easily influenced by their peers (many respondents produced identical answers/responses). Unlike the international literature on Generation Y that describes a Western post modernist rejection of traditional values and narratives (Williams, 2013; Stein, 2013) the DUT student group embraced their traditional African values and identity responding eagerly to the biodiversity topic. Pride was expressed by this predominantly isiZulu <sup>18</sup>student audience in the use of traditional African medicine. When asked on the role biodiversity plays in ones everyday life this response is indicative of all the focus groups:

*It is the role that it plays in traditional medicine as it is one of the undiluted things that is held dearly by the Africans.*

DUT students from both research phases indicated they felt biodiversity was important to their everyday lives and expressed a strong desire to conserve biodiversity for the sake of their children (Chapter 6 and 7 end summaries refer).

#### *Conveying the message: Challenges for implementing biodiversity communication*

Key conclusions from the research findings regarding current challenges in biodiversity communication are related to the literature. These include biodiversity as an ill defined concept, the communications disconnect between science, the media

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<sup>18</sup>According to the demographic data gathered in *Phase One* of the research 78 % of the DUT students surveyed were African with Asians in the minority at 18% and Whites and Coloureds making up the balance at 3 % and 2% respectively. In terms of language 64% were IsiZulu speakers and 7% Xhosa and 5% comprising other African languages

and the public, biodiversity campaigns and the concept of selling and branding nature.

### *Biodiversity as an ill defined concept*

As mentioned in the literature review the challenge of biodiversity as an “ill defined concept, value laden and open to various interpretations” was met head on in this research (Navarro-Perez and Tidball, 2012: 19; Novacek, 2009: 111571). In the survey phase 91% of respondents correctly identified the term according to the CBD. Students demonstrated an understanding of biodiversity primarily in terms of species and habitat loss which compared favourably with the EU Barometer Survey of 2010 on which some of the questions were based. In Phase Two of the focus groups student response was divided on the use of the term with some feeling that it was too technical and scientific unable to be understood by the average person who would need to ‘Google it’ to discover its meaning. All focus groups preferred the word ‘nature’ as an easily understood substitute. As one student expressed it:

*It's too scientific and sounds too serious like a difficult module or subject.*

*I think I prefer the term nature because when you hear the term biodiversity it makes you think long and hard. Like what is this now? What has it got to do with me?*

Conversely others felt that the term made perfect sense when broken down into its component parts. Once explained to the lay person the concept of all life being linked and interdependent became clear. Regardless of these disparate viewpoints European biodiversity researchers point out that precise scientific definitions of the term do not hold as much significance as the individual social and cultural constructs of the concept (Fischer and Young, 2007; Buijs *et al.*, 2008). As stated in Chapter 6 the emphasis moved from “How many students know of the term biodiversity” to “What is the existing knowledge and experience of the biodiversity concept?”

This thesis was able to probe and record honest student responses to the topic that in many cases cut across assumptions made at the start.

### *A Communications disconnect between science, the media and the public*

The other major challenge raised by Navarro-Perez and Tidball (2012: 22) points to a *communications disconnect* between science, the media and the public (Kahan, 2010: 296; Baarschers, 1995: 40) Scientists may be viewed with suspicion since contradictory statements are often released and messages are 'lost in translation' by journalists writing for a saturated public who are more concerned about depressed economies and international terrorism than they are about biodiversity loss. E.O Wilson, the champion of biodiversity himself issued varying figures of species loss on a sliding scale depending on the type of publication interviewing him<sup>19</sup>. Added to this disconnect we have the divergence of Western and African world views toward science articulated in Chapter 4. In brief the African world view is based on traditions dependent on oral narrative, communal identity and collective thought. Belief systems emphasise respect toward God, the ancestors and the environment (Shumba, 1999, 2011; Horton, 1967; Odhiambo, 1968 and Mbiti, 1970). *These sentiments were reinforced unanimously by student responses in the focus groups. The dominant theme quickly became the use of traditional medicinal plants, an issue each African student was comfortable with discussing.* This formed a significant part of the findings since over 65 % of students surveyed indicated they used medicine derived from traditional plants and the majority of these (77%) claimed to have some knowledge of the ingredients used. Odhiambo (1968: 45) emphasised the importance of a clear link to science that the individual can relate to. It may be concluded that students knowledge of indigenous plants form a significant part of those potential linkages.

### *Biodiversity campaigns and the concept of branding*

Biodiversity campaigns developed by SANBI MTC 2010-2015 to mainstream the topic to the public and to educate national and local government used the strap line

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<sup>19</sup> The Harvard Biologist set the amount of species lost each year on a sliding scale between 4000, 30 000 and 50 000 per year depending on the interviewer (Bast, Hill and Rue 1994: 86). Since science itself is constantly revising estimates as new evidence comes to light Wilson's unpredictability to the press illustrates how confusion may occur in the minds of the laity and provide ammunition to the sceptics.

*Biodiversity: Powering the Green Economy* to provide this link. It is not yet clear whether this campaign will filter down to the youth and whether the media budgets and allocations are sufficient. *None of the DUT students from either of the research phases had heard of the campaign.* Since South African Generation Y students are strongly attracted to branding (Bevan-Dye, Garnett and de Klerk, 2012) the notion of branding nature as described by Futerra (2010) holds certain appeal. Promoting messages of love not loss Futerra was the advertising agency tasked by the UN to popularise the decade of biodiversity 2000-2010. An award winning European film clip from this campaign (*We are all in this together*) were shown to the students and received a most positive response as did the highly visual clip produced by the Vancouver Film School on Biodiversity. *The role of film as a preferred communication media by DUT students was confirmed in both research phases.*

*Selecting the communication media [TS: 'Augmented by modern interpretive strategies and media']*

- *The role of broadcast media*

The use of virtual technologies as a preferred media to communicate the biodiversity message was examined in both the survey phase and focus groups. Broadcast media such as DSTV proved to be extremely popular among the students with 83% watching nature related content on a regular basis. As mentioned in Chapter 6 television acts as a vicarious medium which has immense value in exposing students to biodiversity and opening up world views through the use of high quality visually exciting content. Exposure to biodiversity content on TV is beneficial however the focus groups clearly stated that they would prefer to connect directly with the 'real nature'. The verbatim comments illustrate the point; "I would rather interact with nature directly than look at pictures or text." Actual experiences with nature whether in rural areas on the farm or in the garden or in suburbia walking on the beach or strolling through the botanic gardens were the preferred points of contact.

- *The role of online media*

The use of cell phones, internet and Social media Technologies (SMT's) by students locally and internationally emerged as powerful influence (Chen and Bryer, 2012; Goneos-Malka, Grobler and Strasheim, 2013; Thinyane, 2010). These technologies have been co opted in various forms in America, Europe and the UK to spread the biodiversity message to students in an exciting and contemporary way using GPS and smart phone technologies (Ruchter, Klar and Geiger, 2010; Buscher, 2014; White *et al.*, 2015). Efforts at the DBG to encourage the use of internet and cell phone technologies using QR (quick response) labels on trees have failed to gain traction with the DUT students (Fuchs, 2014; H. McClarty, personal communication, 22 April 2015). There are just too many constraining factors at this point to make it successful and attractive to the students (limited data bundles to use outdoors, lack of knowledge, limited distribution of smart phones). DUT student response to receiving and sharing nature content via SMT's (Social media technologies) was divided and support lukewarm at best. Some respondents felt that social media users would be irritated by messages appearing on their cell phones and either ignore or actively disable them.

*I don't think it (social media) can play a large role since if a person is not interested in Biodiversity they can just skip these messages, rather use celebrities to promote biodiversity in soapies and movies.*

Others suggested that cell phone networks and the government should sponsor appropriate adverts and updates and that SMT's were useful for conveying the biodiversity message economically and efficiently.

Another group stated that this student generation was "glued to their screens" and this prevented them from interacting with the "real nature", a concept popular in the literature that the extended internet use is both inhibiting an outdoor active lifestyle (Moss, 2012, Louv, 2005, Pyle, 2003) and weakening academic performance (Bauerlein, 2011; Reilly, 2012 and Pletka, 2007).

- *The role of print media*

Findings from the survey phase indicated that respondents did not read local newspapers on a regular basis preferring visual print media such as billboards, posters and outdoor signage. Students responded positively to the viewing of outdoor interpretive signage at PVNR such as tree labels which proved to be a useful point of contact especially where the student was familiar with the isiZulu name of the plant. In the DBG gardens students investigated some of interpretive signage created by the author at the bromeliad garden, herb garden, alien alley and the plants and people exhibit. Generally students responded favourably however this material itself did not form part of the survey or focus group discussion, it was simply part of the entire botanic gardens experience. Outdoor interpretation by its nature is neither intrusive nor mandatory for visitors to engage with, its use is entirely voluntary (Tilden, 1977; Ham, 2010; Ballantyne, Packer, and Hughes, 2008). The analysis and efficacy of outdoor interpretive signage in botanic gardens is another topic which is flagged for further research later in this chapter.

*Connection with actual nature [TS: Exposure to urban green space]*

Chapter 5 described the study sites of DBG and PVNR in some detail focussing on the aesthetic and biodiversity value that each unique urban green space provides. The survey phase probed student's actual contact with nature in the form of visits to nature reserves and botanical gardens. Over one third of respondents surveyed had not visited a nature reserve in the last year and cited difficulties of distance, transport costs and entry fees. Student respondents from the focus groups did not place a high value on visiting nature reserves but placed a higher value on connecting with nature in rural areas:

*I normally go to the farm where I can go to the river and swim or go to the forest and collect fruits.*

*I connect with nature by hunting and fishing at Uthukela river. There I see many plants and animals and fresh fruits.*

*Engaging with nature physically is always the best way. Going to rural areas is always best. There the biodiversity is untainted and pure. (repeated)*

Such statements confirm a traditional African unity with nature and an uninhibited enjoyment of using its benefits (Magi, 1986. Mbiti, 1970). All students involved in the field visits to PVNR remarked on rediscovering themselves in this intimate urban forest space confirming what Crispin Hemson articulated as a strong identification with the sights, sounds and smells of this suburban forest refuge (Hemson, 2015: 177). As one student indicated on her poster documenting her experience:

*I was truly blessed by the connection I had with the nature at the Pigeon Valley. I saw trees I have never seen in my life such as the forest cabbage tree, figs and the thorny rope... there was so much peace while I connected...*

Similarly the Durban Botanic Gardens was confirmed by the students as a haven of tranquillity both in the survey phase where higher visitor volumes of 80% were recorded and in the focus group phase where students created posters of their experiences there. Various Edenic romantic and childhood ideals of nature were expressed in an outpouring of poetry and prose that would have done John Muir and the American romantics of the late nineteenth century proud (Chapter's 4 and 7 refer).

*As we stepped into the world of nature, we experienced the Divine connectedness that once was in God's creation, in the Garden of Eden... Ohh! how we long to enter that sacred space once again, with the help of understanding our local biodiversity.*

Poetry becomes a powerful communication vehicle to express ecological concepts and psychiatrist and naturalist Ian McCallum believes it is the universal language of choice for developing ecological intelligence (McCallum, 2005: 26). In a similar vein socio biologist E.O. Wilson and philosopher scientist Karl Popper affirm that the poet and the scientist draw from the same unconscious reservoir of myths and images, they both concern themselves with discovering and communicating natural laws with clarity and power it is only in their methodology that they differ (McCallum, 2005: 32).

This thesis has dipped into the wells of both disciplines and this has enriched the research process and analysis. Clearly student exposure to local urban green space in both reserves and public gardens as demonstrated by these visits not only led to a greater mental and physical awareness of biodiversity but also enriched their lives adding a sense of happiness, well being and peace, a concept articulated many times in the literature (Kaplan, 1995; Leary *et al.*, 2008; MacKerron and Mourato, 2013; Capaldi, Dopko, and Zelenski, 2014).

*Mindful of differing social and cultural constructs [TS: ...Dependent on a clear understanding of both Western and African ontology's of nature]*

American developments in the late nineteenth century particularly under the leadership of the nature romantics headed by John Muir did much to shape Western (European) attitudes toward sublime wilderness, the untainted Eden's of the West (Cronon, 1995; Merchant, 1980, 2004). Providing impetus to the new sciences of conservation and ecology this was to provide a template to be exported all over the world, in the words of Eugene Odum<sup>20</sup> "...America and other countries must be 'ecologized'." (Worster, 1993: 61).

All commendable except for the fact Africa had already developed its own paradigms and worldviews concerning nature that were not based on empirical science nor unduly influenced by romantic pantheistic notions. African ontology's of nature are utilitarian, pragmatic and based on communal not individual requirements (Magi, 1986: 97; Mbiti, 1970: 67). Traditional plant based medicine, the use of plants for food and building materials, and rural hunting and fishing practices were all ways in which DUT students connected naturally with biodiversity (Appendix 6). This was part of the fabric of their cultural identity, upbringing and social reality and as relevant to young people in the 21<sup>st</sup> century as it was in the nineteenth. Focus group discussions on how race and culture influenced biodiversity perceptions provoked refreshingly honest and conflicting comments. Perceptual differences toward nature were

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<sup>20</sup>Odum published *The fundamentals of Ecology* in 1953 considered to be a definitive textbook placing the ecosystem as a sovereign concept in the new science of ecological studies

attributed to diverse childhoods in either rural or urban areas with the former perceived as having stronger bonds to the 'real nature'.

Students raised in rural area areas often differed with the opinions of those raised in a more westernised affluent and middle class suburban environment. Those from the former emphasised practical traditional conservation techniques; "not more than one python may be killed at a time...traditional healers only remove a portion of the bark as to keep the tree alive, not all trees are removed for firewood some are retained."

*Black people living in rural areas know and respect nature, the problem starts when they move to the cities and they are caught in between the influence of their Black culture and the new Western Culture.*

Students raised in urban areas emphasised conservation knowledge and the need to move from a place of ignorance to understanding. Perceptual gaps and differences between Western science and African views as articulated by Odhiambo (1968) and Shumba (1999, 2011) proved to hold true for this student population.

A few members of the focus groups felt that as young South Africans issues of race and culture were divisive and that a united effort should be made to conserve biodiversity regardless of pigmentation. Stereotypical perceptions of blacks destroying nature and Whites conserving it had no place. Another student blamed colonisation for the destruction of biodiversity stating Blacks had a strong existing bond with nature. In his own words "White people feel guilty because of destroying nature then they tell us about biodiversity." These debates further expand on Melanie Walker's 2005 campus narratives; "Race is nowhere and race is everywhere." *The value of direct student discussions and engagement in this thesis has therefore been instructive in constructing an accurate picture of student perceptions of biodiversity.* Communication specialists Weber and Schell (2001:490) emphasise that interpretation of scientific information comes about through the social context rather than the underlying science itself. They argue that our reasoning about science is coloured by personal and social beliefs and is often guided by community norms and the social context in which the information is offered (Weber and Schell, 2001: 490).

This reinforces the assertion of this thesis that cognizance of race, culture, religion and social values is key in devising effective biodiversity communication to students at South African universities

*Thesis statement: Closing remarks*

Having now examined the combined evidence from both research phases the revised thesis statement would read:

*Knowledge deficits between Generation Y Students and local biodiversity can be remedied in part through exposure to urban green space and augmented by modern interpretive strategies and media. Effective biodiversity communication to this audience is dependent on a clear understanding of both Western and African ontology's of nature.*

This thesis then has moved from a “significant disconnect” to a milder stance of “knowledge deficit” and adding the qualifier of a “clear understanding of both Western and African ontology’s of nature.”

### **Toward a South African model of biodiversity communication**

Many theoretical communication models have been developed however the simplest and most direct is the three step approach used by Novacek (2008:11572-11575). Firstly identify the audience to be reached and probe their level of understanding on the topic. (Chapter 4 refers.) Secondly craft the message according to the audience and finally to consider the mechanism or media for delivering the message.. The model presented here is neither definitive nor closed, it simply keys in the research findings from this thesis at one University of Technology (UoT) with the literature to present guidelines for consideration to biodiversity communicators and educators at the other twenty two HE institutions. Many of the findings are directly transferrable while some issues may be site specific to DUT.

### *The audience*

South African Universities have transformed substantially since the advent of democracy in 1994<sup>21</sup> and generally reflect the current demographics of the country (Soudien, 2010; DHET, 2015). With an average Black African student population of nearly 80 % and minority groupings of Coloureds and Whites at 9% and Indians at 2.5% (Govinder, Zondo and Makgoba, 2013: 3) the current university student population of just under 600 000 are actually the privileged elite drawn from a total South African population of some 56 million of which the median age is 25 (DHET, 2015; SA Stats, 2016).

Arriving from a diverse background and upbringing in rural, township and suburban homes these aspirant graduates drawn from a slice of school leavers have mixed and uneven secondary school experiences depending on the degree of affluence and opportunity afforded them (Soudien, 2010; Spaull, 2016; Chetty and Knauss, 2016). While they may exhibit mixed tribal and rural and urban perspectives depending on their origins essentially they share the same organismic world views on nature and are highly influenced by traditional conservative African religions and upbringing which colour perceptions and attitudes toward the biodiversity concept and indeed much of campus life (Chapter 6 and 7 refers). Their eager embrace of Social Media Technology (Thinyane, 2010; Goneos-Malka, Grobler and Strasheim, 2013; North, Johnston, and Ophoff, 2014) and spendthrift habits have been documented both in the popular press and in recent academic papers (Student Village, 2015; Bevan-Dye, Garnett and de Klerk, 2012; Naidoo, 2011). Not only are these students coping with new academic languages and literacy demands for which they are underprepared (Soudien, 2010 and Spaull, 2016) they find themselves under severe financial stress caused by dysfunctional government funding mechanisms (Chetty and Knauss,

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<sup>21</sup>This statement is open to dispute by certain academics notably Govinder KS, Zondo NP, Makgoba MW. A new look at demographic transformation for universities in South Africa. *S Afr J Sci.* 2013;109(11/12), Art. #2013-0163, 11 pages. <http://dx.doi.org/10.1590/sajs.2013/20130163>

2016). In addition to these stresses they are caught in the nexus of often violent dynamic and shifting political and class based scenarios (Student life, 2016; Hall, 2016). Inserted into these contextual scenarios we now discuss biodiversity, a little known concept that is not always high on student agendas- literally in the words of one respondent;

*When you hear the term Biodiversity, it makes you think long and hard. Like what is this now? What has it got to do with me?*

This knowledge deficit, the author proposes is in part the result of government inaction to address this topic. Krystal Maze (SANBI Director for Biodiversity Information and policy) acknowledges that their awareness campaign Making the Case for biodiversity (MTC) was established largely to inform national and local government of the urgency to prioritise the sector in decision making and was not targeted at the youth (K. Maze, personal communication, 1 September, 2016).

Surprisingly little academic attention has been given to examining how the majority of students actually perceive the HE process and science or biodiversity issues in particular. A Western ecological and educational paradigm has been assumed to be the correct choice yet as has been demonstrated both in this research and in the literature that is not always the case. Other cultural ways of knowing and seeing may be equally valid and can lead to more valid and relevant learning opportunities since they build on the students prior knowledge, context and world view (Horton, 1967: 156; Odhiambo, 1968: 45; Mundangepfupfu, 1988: 3; Shumba, 2011: 88). *Nowhere is this more evident than in the students existing connection with traditional medicinal plants a topic they embraced with enthusiasm.*

#### *The message*

As started earlier biodiversity itself is a “wicked and messy problem”, that resists being tamed since it is open ended and value laden (Klein 2004: 4; Sterling, 2009: 80; Sharman and Mlambo, 2012: 274). There is therefore no single message, or ‘one size fits all’ approach. Various approaches have been tried by the Convention on Biodiversity (CBD) to mainstream the topic to the general public using strap lines

such as ‘Biodiversity is Life’ and ‘Biodiversity is Your Life’, establishing the link between daily life and the silent benefits, goods and services biodiversity provides. This thinking was reinforced by the millennium Ecosystem report who asserted that Healthy Ecosystems make healthy communities (MA, 2005). The United Nations Environmental Programme (UNEP) then developed a branding and communication strategy for the 2010 International Year of Biodiversity (IYOB) appointing an advertising agency called Futerra. Their branding campaign moved away from the doom and gloom predictions of scientists to a warmer more personal interaction and appreciation of nature. Simply expressed the new branded message was “Love not Loss” a concept endorsed by this thesis and shared by prominent naturalists, and science communicators (Futerra, 2010; Attenborough, 2010; Moss, 2012; Gould, 1991; Pyle, 2003). Recent European and international biodiversity surveys aimed at understanding public perceptions were mentioned briefly in the text (Chapter 4) and the results from each synthesized in table form (Appendix 2). In order to create meaningful biodiversity messages seven guiding principles were distilled from the literature. *These principles have resonated with both research phases of this thesis and may serve as guidelines for future communicators.*

**Table 8.1 Principles of Biodiversity Messaging**

- 1) To really engage people messages must give them a reason to care;
- 2) Messages must appeal to cultural values as well as personal interests;
- 3) Threats of environmental doom are not as convincing as messages of love and affirmation;
- 4) Messages should not overwhelm the public with a sense of despair towards environmental issues but rather it should try to emphasize the links between other species, habitats and human needs;
- 5) Practical steps need to be outlined to assist in solving the biodiversity crisis – this ultimately makes them feel empowered;
- 6) Messages should make biodiversity real by drawing attention to local issues that affect people personally;
- 7) Communication should be scientifically sound, clear, contemporary, stimulating and fun

Sources: Bennett and Williams, 2011; DEA and SANBI, 2011; Futerra, 2010, Novacek, 2008; The Biodiversity Project, 2002; Orr, 1992.

Krystal Maze, Director of SANBI Biodiversity Information and Policy expressed the messaging conundrum in the following words:

*I'm not sure exactly what the answer is to biodiversity messaging, perhaps there are multiple solutions, people create their own valid meanings and constructs as to what biodiversity is, they do this by drawing on their own contexts and stories.*

K, Maze, personal communication, 1 September 2016

This willingness to gather individual narratives and weave them into a larger tapestry is fundamental not only in understanding the audience better but it also enables the crafting of more effective and relevant messages.

#### *The media and the model*

Traditional and online modalities were considered in detail under Research objective 3 and item 3.6. Broadcast television media such as DSTV proved to be the most effective communication tool with students always responding well to video and film content. Scope therefore exists for local documentary and film makers to produce and sell more nature related content to the TV net works such MNET (Carte Blanche) and the like since this is reaching the Generation Y audience. There needs to be a meeting of science and entertainment expressed and articulated in local conservation stories. A quick browse of any South African video store reveals an almost total absence of environmental movies apart from Leonardo di Capriccio's *11<sup>th</sup> Hour* and David Attenborough's *BBC Earth series*. Entertainment focussing on natural disasters is popular but not scientifically accurate (*San Andreas, Deep Impact* and *2012*).

Print media may well be eclipsed in this 21<sup>st</sup> century since Generation Y respond to images not text, in fact they pride themselves on *not* reading (Carr, 2010; Bauerlein, 2011). The use of celebrity's to endorse biodiversity billboards in the same way as the Love life Aids campaign is a possibility since these pop icons hold considerable influence over Generation Y students.

Such national mass marketing interventions would require either government funding, commercial sponsorship or a combination of both. The role of signage and outdoor garden interpretation as discussed has some value but is limited in its universal appeal to young people. Much potential exists for using multiple on line platforms and SMT innovations and this has been discussed in detail. The recommended communication model for this thesis involves crafting contemporary messages for Generation Y South African audiences and revolves around four principles:

- 1 Use and develop relevant online SMT platforms;
- 2 Stimulate individual connections with actual nature experiences via local botanical gardens and urban open spaces;
- 3 Link messages with existing traditional nature values and world views, and;
- 4 Contextualise and integrate message for a developing post modern society where personal development and peer pressure are influential factors

A graphic representation of the suggested model is found in Figure 8.2

Implementation of this model is beyond the scope of this work and requires collaborative action as described in the next section.



Figure 8.2: Biodiversity communication model for South African Universities

## **Recommendations for future research**

The literature concerning specific environmental attitudes of South African Generation Y students is sparse at best and this thesis addresses the topic in part providing a clear platform for further research, suggestions for which are outlined below.

*National roll out of biodiversity survey to other UoT's and Universities to gather a fuller picture free from regional and provincial bias*

This study confined itself to a single University of Technology (DUT) in a major port city in the Kingdom of the Zulu which comprise a total population of over 10 million (SA Stats, 2016). Since one in five South Africans are Zulu the findings of this thesis are instructive on a regional level and can inform biodiversity educators and communicators in the province. In order to obtain a more even national picture from the other student population groups it is recommended that the methodology employed in this thesis be replicated as part of a larger national student survey to all 23 South African HE UoT's and Universities (DHET, 2015).

The survey and focus group questions proved to be valid instruments in establishing levels of biodiversity awareness and concern amongst the HE student population as well as serving as a stimulus to open up new dialogues and honest student discourse on the topic. The research instruments are fully replicable and transferable to other university contexts in the country and could act as a powerful tool to inform biodiversity educators and communicators as to how students really view the topic. In short existing assumptions may be challenged however the findings can assist in the development of more meaningful communication to this sector. A national student biodiversity survey would ideally be a collaborative and funded research initiative with potential partners such as SANBI (Green Matter), the CSIR, South African Association for Science Advancement (SAASA) and would have to be executed with the support and cooperation of the universities themselves.

The importance and significance of biodiversity as contrasted or ranked with other student concerns and agendas would be a useful multidisciplinary research project yielding specific data sets on this topic. This could be linked with other student marketing surveys that are done to establish brand preferences and spending habits for example Student Village (2015). By portraying biodiversity as a lifestyle choice it may attract further student interest and visibility amongst the other competing options such as beauty, entertainment and sport (M, Mkhize, personal communication, 4 September, 2015).

*Detailed research regarding South African student response to online nature media*

This thesis 'tested the water' in terms of student response toward virtual nature technologies. Findings from the international and local literature in the review concerning the phenomenal reach of cellular linked internet technologies appeared promising yet received a divided response from DUT students in both the survey and the focus group discussions. Some excellent suggestions regarding the use of nature content using SMT's as a communication vehicle were however received and these warrant further scrutiny. Mbali Mkhize a post graduate Masters student recommended that one way to encourage the viewing of nature related YouTube content could be to have 'mini trailers' that appear as adverts on other sites. These adverts have a captive audience and always take a few seconds for the viewer to close so by that time they do so the seed (literally) has been sown. A number of students advocated the use of celebrity endorsement of the biodiversity concept as being effective in reaching young people. Other students were enthusiastic in embracing on line media as a communication vehicle;

*It's not playing a role yet but they (unnamed) should create apps on cell phones because everyone carries them around ... the app should have some sort of information about nature."*

Generalised statements have some value but the nuts and bolts of this proposal require dedicated time, expert technology and funding. Existing South African nature apps are generally of a commercial nature chiefly ornithology (Bird calls and identification) and

Dendrology (Indigenous Tree guides). Students generally are not keen on purchasing on line items that are not entertainment based, disposable income is spent on 'booze, brands and 'bling' (Student village, 2015; Bevan-Dye, Garnett and de Klerk, 2012).

A possible solution would be the exploration of public and private partnerships including sponsorship from the three main Cell phone networks and Government involvement from DEAT and SANBI. A multidisciplinary research collaborative made up of marketing specialists, IT experts and software developers would be required to establish the viability of such a proposal. While this thesis has touched on some of the possibilities a project of this magnitude falls outside the scope of this work.

*Establishment of a national "Lets Talk Nature" forum to place the biodiversity issue firmly in the minds of the SA young people.*

Weber and Schell (2001: 491) remind us that communication is a work in progress rather than a series of linear steps and that it involves 'negotiation of meanings', a process utilised in the focus groups convened for this research. A co constructive approach toward knowledge was adopted in this research and the author is of the opinion that these constructive dialogues with the students should be ongoing and continuous not just informing research objectives but broadening horizons and enriching and empowering the young lives of tomorrow's leaders and conservationists. Using the DUT facilities as a research base the author wants to partner with appropriate organisations such as SANBI and DEAT to explore the "Lets Talk Nature" concept further.

## **Conclusion**

This thesis has examined constructs of nature and demonstrated that humankind and biodiversity are inextricably linked. Our innate link with nature as described by the sociobiologists is beneficial to us on a physical, mental, emotional and spiritual level silently and quietly enriching our lives on a daily basis. This holds true regardless of our race, gender, culture and socioeconomic status. We have examined key dimensions of the biodiversity message and probed the historic and cultural differences and similarities between the Western and African paradigms toward

wilderness, biodiversity and science communication. A student population at a major South African University of Technology (UoT) has been sampled and their views and perceptions toward biodiversity examined both in statistical and quantitative terms as well through focus groups and the collection of qualitative data. While findings are of regional significance they may be generalised and extrapolated to a certain extent to other South African universities. The results demonstrated that students are not only concerned about biodiversity loss but they also have strong existing bonds with nature through traditional African and cultural linkages with medicinal plants. Future biodiversity messaging to Generation Y students must be mindful then of indigenous knowledge systems (IKS) to create linkages between the individual and local biodiversity. In order to communicate effectively with students biodiversity messaging must be highly visual and much potential exists in terms of television, video and film media and to a lesser extent emerging social media technologies (SMT's).

While there are real knowledge deficits regarding the problem of biodiversity loss an eagerness to learn more was displayed and the constructive value of honest dialogues was affirmed. The final end piece was penned by Victorian nature poet *Gerard Manley Hopkins* and was inserted into one of the student's interpretive posters.

### **The grandeur of God 1877**

The world is charged with the grandeur of God.  
It will flame out, like shining from shook foil;  
It gathers to a greatness, like the ooze of oil  
Crushed. Why do men then now not reckon his rod?  
Generations have trod, have trod, have trod;  
And all is seared with trade; bleared, smeared with toil;  
And wears man's smudge and shares man's smell: the soil  
Is bare now, nor can foot feel, being shod.

And for all this, nature is never spent;  
There lives the dearest freshness deep down things;  
And though the last lights off the black West went  
Oh, morning, at the brown brink eastward, springs —  
Because the Holy Ghost over the bent  
World broods with warm breast and with ah! bright wings.

Source: *Gerard Manley Hopkins: Poems and Prose* (Penguin Classics, 1985)

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## **Appendix 1: Selected highlights and influences shaping relationships between man and nature 16<sup>TH</sup> -21<sup>ST</sup> Century**

### **Introduction and purpose**

Selective extracts from Environmental history adds value to this study in that it demonstrates that modern environmentalism is not simply a recent fringe movement or fad, a religious persuasion or point of view reserved for the zealous few but is rather part of a greater historic narrative spanning centuries with man and nature as the principal role players, each acting on and influencing the other in ever oscillating pattern of a beneficence and malevolence. A historic narrative locates this specific study within the greater ambit of human endeavour providing context and meaning.

### **Environment and the Scientific Revolution**

The narrative begins with the so called Scientific Revolution in the latter portion of the sixteenth century which was initiated and led by English Renaissance philosopher and essayist **Francis Bacon (1561-1626)**. His writings established and popularized an inductive methodology for scientific inquiry, whereby knowledge was drawn from the natural world through experimentation, observation, and testing of hypotheses (Merchant, 1980; Oosthoek, 2005; Abram, 2005). In the context of his time, such methods were connected with the occult trends of alchemy (the ancient quest to transmute base metals into gold). Bacon has been credited as a causal agent for the **secularization of Western Life** sidelining theology by raising reason to the level of absolute authority (Merchant, 1980; Dunlap, 2004). **Baconian thinking** legitimised scientific method as analytical, experimental and reductionist dismantling the machine of Nature to its component parts (Oosthoek, 2005; Baarschers,1993; Pepper, 1996:125). Mathematics became the new language of expressing the measurable and Nature was harnessed to servitude in the march of man's progress (Pepper 1996:125). Similarly In 1644 philosopher **Rene Descartes** declared "I have described the earth and all the visible world, as if it were a machine." (Abram, 2005: 144).This metaphor or tradition of 'mechanical philosophy' is still with us today, now referred to as a **Cartesian duality** of Man and Nature. This separation of worlds and

the emphasis on the primacy of Reason over Emotion and superstition provided legal sanction for rapid and efficient extraction of natural resources.

### **An ordered Nature- the shift from the organic to mechanical world view**

As western culture became increasingly mechanised the female earth (*Natura* derived from the Latin feminine noun) was no longer seen as sacred, a nurturing mother, worthy of love and respect but was now to be subdued, an inanimate object made of particulate matter with infinite resources to be discovered and extracted through Science for the advancement of human progress. ***This shift in thinking that took place at the turn of the sixteenth century is crucial to understanding the complexities, origins and thinking prevalent in today's environmental crisis*** (Merchant, 1995; Cronon, 1995; Abram, 2005; Worster, 1993). Thomas Dunlap writes that the intellectuals of the seventeenth century, dubbed by the French as ***philosophes*** were actually **Naturalists** with the term scientist only appearing a century later (Dunlap, 2004: 40). Elevated to a philosophy the methods and assumptions of physics destroyed the notion of an organic universe; Newton's findings conferred a **divine order to Nature** and endorsed the concept of the world and the environment as a machine governed by rational laws (Dunlap, 2004:22; Merchant, 1980: 275-289). The mediaeval instruments of power, progress and technology as evidenced by advances in watch making, wind and watermill manufacture and other engineering prowess inspired Bishop Oresme (1370) to compare God to a divine clockmaker, an engineer constructing and directing the earth from the outside (Merchant, 1980: 225). Humanity not only had the opportunity to imitate God but also had the possibility of **earthly dominion**. For Descartes the mathematical world of geometry, the natural world, human bodies and the cosmos all operated according to the same mechanical laws as the other machines (Merchant, 1980: 226).

## **Classifying and plundering Nature's bounty**

Another genius from the age of Enlightenment was Swedish taxonomist **Carl Linnaeus (1707-1778)** who obeyed the biblical injunction of giving names to all the plants and animals by inventing a classification system of **binomial nomenclature** currently used by botanists and zoologists throughout the world. His system published as *Systema Naturae* in 1735 provided a rational base for the assessment of biodiversity and a scientific categorization of all life (Fry, 2004: 228; Bryson, 2003: 436). The Linnean system opened up the way for an orderly cataloguing of the myriad plant and animal specimens that were soon to reach the shore of Great Britain and Europe (Howes, 1997: 16).

The age of commerce and colonisation would continue unabated as each successive Naval Power marked their territory on the world's stage; Spanish galleons followed Portuguese caravels, the Dutch East India Trading Company dominated the Indian and Pacific oceans only to be subjugated by the might of the British Navy. As history unfolded exotic foods arrived from the New World to tantalise jaded European palettes; beans, corn, tomatoes, potatoes, pineapples, peppers, peanuts, and chocolate (Fry, 2004; 197). The cultivation and dependence on these plants changed the course of nations, enslaved millions and wiped out entire civilisations. The environmental and human toll was enormous. The age of independence and industry that characterised the nineteenth century also witnessed extensive paradigm shifts in terms of environmentalism, theology and world views toward nature (Fry, 2004; Dunlap, 2004). The greatest schism between science and theology was undoubtedly the publication of Darwin's *Origin of the Species* in 1859 whose first edition of 1250 copies sold out in the first day (Bryson, 2003: 462; Howes, 1997: 26). Darwin's detailed observations on the unique shape of finches beaks, each adapted to feed on different diets at different island locations as well as variations between appearance in the tortoises of the Galapagos region led him to believe that successive generations of species could alter their characteristics to suit their environment until theoretically new species were formed with only the fittest and strongest surviving (Howes, 1997: 25). These notions rocked the Victorian scientific world and coincided with the release of findings by Austrian monk Gregor Mendel (1865) who

demonstrated that different physical characteristics could also be generated through plant breeding and a predictable mathematical pattern of inheritance could be observed over successive generations (Howes, 1997:30). Combined the two discoveries demonstrated key aspects of genetic and phenotypic change in Nature over as period of evolutionary time, a concept accepted by biologists today as the basis for all scientific endeavours.

### ***The American wilderness and the rise of the Romantics***

The environmental narrative continues on American soil subsequent to the emancipation of the slaves and the punishment of the secessionist Southern states by the Yankee North in the American Civil war of 1861-1865 (Fry, 2004: 285). Inserted into this violent and exciting age three literary giants emerged who were to lay the foundations of modern Western environmental thought defining the relationship between Man and Nature and stimulating a call for action to preserve sublime and virginal wilderness from the grasping capitalists. **Ralph Waldo Emerson (1803-1882)** was a central figure of the American **Transcendental movement**, defining its ideas and values in a little book, *Nature* published in 1836, that represented some ten years of intense study in philosophy, religion, and literature (Leary, 1980; 30; Dunlap, 2004; 66). Part poet and romantic he blended theology and nature experience into a Pantheistic form of Transcendentalism that was to directly influence fellow Nature worshippers Henry Thoreau and John Muir, together they formed a crucial voice in shaping the modern American environmental movement in the late nineteenth century (Cronon, 1995; Worster, 1993; Budiansky, 1996). The Emersonian Universe was composed of Soul and Nature in that order, Soul being the primary component and Nature or the material world the secondary. Nature for Emerson was regarded as the radically 'Other' and the gateway to ourselves- it stands outside of us but it is also part of us and calls to us (Dunlap, 2004:66).

Dunlap noted that the rise of Emersonian nature in American culture began with the growth of cities; as wilderness and the wild country dwindled so Emerson and Thoreau became **spiritual exemplars of Nature** for many Americans (Dunlap, 2004:66). **Henry David Thoreau** moved to Walden Pond in 1845 and built his cabin on land owned by Emerson (Woodlief, nd). In 1854 he published *Life in the Woods* or *Walden*. Ann Woodlief records how Thoreau was an avid naturalist; twenty voluminous Journals attest to minute observations of the flora and fauna around his Walden pond shack. He also analysed aspects of forest ecology and urged farmers to plant trees in natural patterns of succession. Dying of tuberculosis in 1862, at the age of 44 Thoreau's enduring legacy to environmentalism was his address to the Concord Lyceum declaring that "In wildness is the preservation of the World." This proclamation soon became misquoted and with the word 'wilderness' inserted the phrase passed into the holy writ of Environmentalist scripture (Cronon, 1995: 89; Dunlap, 2004: 49). Dunlap points out that Transcendentalism incorporated natural sciences which unlike modern biological sciences looked beyond the facts for ultimate meaning (Dunlap, 2004: 50).

The final figure in the Transcendental trio was **John Muir (1838-1914)**, founder of the Sierra Club and apostle and high priest of the late nineteenth century **preservation movement**.(Marquis, 2007; Cronon, 1995). He influenced the American president Teddy Roosevelt to create the **U.S. Forest Service** and founded the National Parks of Yosemite and Yellowstone. Muir cofounded the Sierra Club, which helped establish several new national parks years after his death, and now boasts 1.3 million members (Marquis, 2007). Nature for Muir was not only a place to find God, Nature was God. Dunlap remarks that he shifted the focus of awe and admiration from Nature's God to Nature so gently no one noticed (Dunlap, 2004: 71). Muir's vision was truly **biocentric**, the plants, rocks and streams were all God's creatures and man their equal not their superior (Cronon, 1995, Dunlap, 2004). Sublime wilderness had to be protected from the grasping hand of man, it was a sacred refuge, a spiritual cathedral and source of renewal from which the world weary pilgrim could drink and thus return refreshed to society. In this Muir espoused a purely **preservationist ethic** however Cronon maintains that these sublime places worthy of protection all had a

remarkably similar signature- vast landscapes, mountain top, chasm, waterfall all typical of the first national parks to be chosen; Yellowstone, Yosemite, Grand Canyon, Rainer and Zion (Cronon, 1995:73).

### ***Optimism and despair, New Deals and the Land Care Ethic***

Considered as the father of wildlife management and of the United States' wilderness system Aldo Leopold's famous land care ethic which considered nature as an organized landscape, a complex system of ecosystems and ecological processes. The most important objective he believed was to maintain these natural systems with man playing an integrated and complementary role (Primack 1993). In 1949 his observations and thoughts were published in the *A Sand County Almanac* widely regarded as conservation and environmental milestone (Worster, 1993; Thayer, 1994; and Budiansky, 1996). Leopold's work presents a significant shift in roles, man moves from conqueror of the land community to plain member and citizen of it, in order to change ones ethics there had to be a corresponding internal in our loyalties, affections and convictions (Leopold in Dunlap, 2004: 84). Like other modern writers mentioned in this thesis he emphasised value of love and respect for nature.

*It is inconceivable to me that an ethical relationship [with land] can exist without love, respect, admiration, and a high regard for its value.*

*Leopold in: A Sand County Almanac (1949: 262)*

### ***The Green Revolution and the Silent Spring***

The fifties was a time of massive agricultural and industrial expansion in America, higher crop yields were made possible through the use of improved fertilisers and the introduction of new herbicides and chemicals for crop protection increased profitability. This green revolution came at a price, soil poisoning, depleted aquifers, the release of carcinogenic chemicals and concentrations of industrial chemicals in rivers so high they actually caught fire (Dunlap, 2004:115). It was up to a government biologist and Nature writer **Rachel Carson** to shine a public spot light on the environmental ills. The *Silent Spring* published in 1962 heralded the birth of the

modern environmental movement and saw a flurry of legislation aimed at environmental protection. In impassioned prose Carson described the environmental impacts of DDT chemicals that accumulated in the tissues of top predators (especially birds) thus threatening their existence, she suggested such chemicals were carcinogenic and posed a direct threat to human health (Carson, 1962). She preached that we had to understand our place in the world, change our values and change our hearts (Carson, 1962: 23). As Dunlap explains it her view was that we needed nature to live a more fully human life (Dunlap, 2004:34). A less well known piece of Carson's writing was an article entitled *Help yourself to Wonder* published in 1956 whose sentiments have relevance for this thesis. She declares "the lasting pleasures of contact with the natural world are not reserved for scientists but are available for anyone who will place himself under the influence of earth, sea and sky and their amazing life." (Carson, 1999: 11). *Silent Spring* inflamed the corporate establishment and the National Agricultural Chemicals Association in particular. As Victor Scheffer noted "the poisoning of America by chemicals did more to galvanize the environmental movement than another demonstration of man's failure to understand the natural order." (in Baarschers, 1996: 42). Carson was charged with opposing science, progress and Western Civilization, her opponents saw a denial of the primacy of Reason and a rejection of the economic values of the time.

Though Carson died in 1965 her writings sparked a revolution in society and a **powerful but ill defined** ideology was born. Jeremiad warnings by **Paul Ehrlich** in his book *The Population bomb* (1968) predicted massive famine and the death of millions between 1970 and 1985. Ehrlich argued that the prime cause of the crisis was easily ascribed to overpopulation "Too many cars, too many factories too much detergent, too many pesticides ...too little water, too much carbon dioxide –all can be traced easily to TOO MANY PEOPLE (Ehrlich, 1968: 67). **Garett Hardin** too saw overpopulation as a root cause for environmental ills and published his landmark *Tragedy of the Commons* in 1969, taking inspiration from an English clergyman Thomas Malthus who lived in the late eighteenth century. Malthus believed that since human populations increased geometrically and food sources arithmetically that mankind would always be pushing the limits of available resources and so be forever

subject to famines, epidemic disease and war (Ellis, 1995: 259). Both publications were highly influential in shaping the **reformed branch of environmentalism** prevalent in the 1960's and 1970's. In Vancouver a more radical brand of environmentalism was developing with the formation of **Greenpeace** in 1967, originally founded as a Quaker peace group (Environmental history.org). In the same year **Lynn White's essay "Historical roots of our ecological crisis,"** appeared in **Science** magazine, a treatise that placed the blame for environmental ills squarely at the door of the Judeo-Christian religion and strangely concluding by proposing Francis of Assisi as the patron saint of Ecology. This essay underscores the ***schism between the sacred and the secular in environmental thought, a notion that persists into the 21<sup>st</sup> century.***

### ***Legislation, activism and global conventions***

**Barry Commoner** identified the root cause of the environmental crisis as technology run amok and that the 'greedy accumulation of wealth' and 'the machines which we have built' were to blame (Commoner, 1971:13). His book *Closing the circle* also entered the canon of environmental scripture and in February 2, 1970 Commoner was hailed by Time magazine in a cover story as the "Paul Revere of Ecology." Under President Nixon and later Gerald Ford the American federal and state bureaucracies then proceeded to issue a flurry of environmental laws beginning with the **National Environmental Policy Act** in 1969 to the enactment of the **Endangered Species Act** in 1973 and the introduction of **CITES** (Convention for International Trade in Endangered Species) in 1975 (Ellis, 1995:262). Both pieces of legislation have been crucial in slowing but not halting biodiversity loss, the first in America and second exerting a global influence. Environmentalism which originally began as a social movement in America in the 1950's and intensified in the 1960's was now becoming respectable (Ellis, 1995:262). A collective of environmentalists established **Earth Day**, the world's largest secular holiday event supported by over one billion people around the planet (Earthday.org). The decade closed with **James Lovelock's** release of *Gaia: A New Look at Life on Earth* (1979) which theorized that the earth is a self-regulating entity unconsciously maintaining optimal conditions for

life. The use of **Gaian theory** as a scientific construct and influential metaphor is examined elsewhere in this work.

The turbulent seventies in America also witnessed a period of disaffection from the excesses of politics (Watergate scandal and the termination of the Vietnam war) rampant capitalism and expansion (the American economy grew fourfold Post WW2) and a resurgence of **bio-regionalism**, those who wished to return to the land and establish their own slice of paradise (Fry, 2004; Dunlap, 2004; Ellis, 1995; Budiansky, 1996 and Sale, 1986). In the USA Radical environmental activists comprising diverse groups of hippies, returning veterans, academics and students now began to develop their ideological perspectives in earnest. **Deep ecology** was one such movement whose leading philosopher Arne Naess decried the reformist environmental agenda as “shallow”, anthropocentric and inadequate to the task of preserving the natural world (Naess, 1973: 95).

The environmental movement in the eighties saw a consolidation of **global conservation bodies**, more human induced environmental disasters of increasing magnitude and the emergence of environmental martyrs and heroes to the cause (Simmons, 1993). A **World Conservation Strategy** was produced in 1980 by International Union for Conservation of Nature and Natural Resources (IUCN), with the support of the United Nations Environmental Program (UNEP) and the World Wildlife Fund (WWF). A new concept was to enter the environmental arena, the notion of sustainable development. The idea was endorsed by Gro Harlem Brundtland former Prime Minister of Norway at the World Commission on Environment and Development in 1987 resulting in a publication called the Brundtland report (Baarschers, 1994; Dunlap, 2004). Critiqued as an oxymoron the concept suggested that wealthy industrial countries play a leading role in controlling overconsumption and overpopulation (Baarschers, 1994: 21). Sustainable development (SD) was an attempt to reconcile the polarized opposites of economic development and conservation concerns. Essentially the concept revolves around decoupling economic activity and resource use (Cutter and Renwick, 1999: 354). This philosophy was written into environmental management courses world wide and

applied to numerous planning disciplines for example sustainable landscapes, sustainable architecture but has since been superseded by new post modern approaches in the twenty first century.

### ***From 'Red scare' to 'Green scare'***

A new world was beginning to emerge as Communism in the USSR collapsed signaling the end of the Cold War and the isolation of the East European countries as the Berlin wall was removed (Fry, 2004). The opening of the last decade of the millennium too saw the twentieth anniversary of Earth day celebrated by 140 nations as a Gallup poll revealed that **76% of Americans consider themselves to be environmentalists**. Pressure from leading scientists such as E.O. Wilson and other environmental lobby groups led to the convening of the **Earth Summit** in June 1992 in Rio de Janeiro, Brazil. The main products from the global conference were the following five agreements:

- **Agenda 21** — Assistance to developing nations and access to environmentally sound technology.
- Rio Declaration — Intended as an “**Earth Charter**,” an attempt to reconcile conflicts over many issues.
- Statement of **Principles on Forests** — Initially seen as a binding convention of forest preservation, consensus broke down since the US wanted to confine the agreement to tropical rain forests.
- **Framework Convention on Climate Change** —This initiated the process that led to the **Kyoto Protocols**.
- **Convention on Biological Diversity** — Aims were to conserve biological diversity, plan for sustainable development and a fair share of benefits of biodiversity.

(Environmental history. org; CBD, 2014)

A 1990 UN report on **climate change** warned that global temperature rise might be as much as 2 degrees in 35 years and recommends reducing CO<sub>2</sub> emissions

worldwide. In 1994 the **United Nations Intergovernmental Panel on Climate Change (IPCC)** report confirmed the harmful role of greenhouse gases in the atmosphere and advocated a global strategy for the world's nations to reduce these harmful emissions (UNFCCC, 2014). To this end the **Kyoto Protocol** was drafted in 1997 and adopted by 121 nations, but significantly the Protocol failed to be ratified by U.S. Congress. American industry predicted “disaster” if CO<sub>2</sub> reductions were enforced and environmentalists were dissatisfied with weak goals of the treaty (Environmentalhistory.org; UNFCCC, 2014).

By the mid nineties Angela Mertig and Riley Dunlap declared that **Environmentalism is “one of the most successful contemporary movements** in the US and Western Europe.” Writing for the International Journal of Public Opinion Research this information was based in part on a 1990 Gallup poll conducted by Readers Digest where respondents from the USA and Europe ranked environmentalism ahead of other social concerns such as women's rights, animal rights and even nuclear disarmament (Mertig and Dunlap, 1995:145). Significantly the environmental movement saw a **generational shift in influence** with the appointment of 23 year old Sierra Club president Adam Werbach who by the end of his second term of office had reduced the average age of club members from 47 to 37 years old (Walsh, 1998).

### ***Terrorism, The Internet age and the spectre of climate change***

The new millennium opened amid widespread fears of global **Y2K corporate computer disaster**. These fears proved to be unfounded and were soon overtaken with the invention of the **internet** and world wide web by Tim Berners Lee. This method of hyperlinking and sharing information files was to herald a new globalized era in communication and interactivity forever changing the way people perceive the world (Fry, 2004). In South Africa Johannesburg 2002 world leaders were to gather for the **World Summit on Sustainable development** (also known as Rio + 10 or WSSD). The conference was a continuance of the UN Stockholm conference in 1972 and the 1992 Rio Earth Summit but failed to yield the desired global agreements.

Concerns regarding **climate change** continued to dominate both scientific and the popular press. In 2006 James Hansen of the U.S.'s National Aeronautics and Space Administration (NASA) reported that Earth's overall temperature has reached its highest level in 12,000 years (Rahmstorf, et al. 2007; Gore, 2009). Hansen warned that global warming of another two or three degrees Celsius would likely result in a dramatic rise in sea levels and the extinction of some species of plants and animals (Rahmstorf, et al. 2007; Gore, 2009; UNFCCC, 2014). In the same year Al Gore released his documentary *An Inconvenient truth* drawing public attention to the problem. In 2008 America's first black president Barack Obama is elected amongst high hopes of reversing environmental decline during the Republican administration (Environmentalhistory.org). The first decade of the 21st century ended with the **collapse of climate negotiations in Copenhagen as** representatives from 193 countries failed to reach a consensus on replacement for the 1997 Kyoto Protocol emissions treaty, set to expire in 2012. Nonbinding agreements however were reached between U.S., China, Brazil, South Africa and India (UNFCCC, 2014).

### ***COP 17, legacy projects and the climate wars***

Politicians, economists and scientists continue to grapple with the thorny problem of climate change, conferences are held in Durban in November 2011 with the seventeenth Conference of Parties (COP) releasing the **Durban Accord**. Significantly the Durban Conference is hosted and arranged by Durban's own environmental management branch now aptly renamed Environmental Planning and Climate Protection Department. **Public opinion on environmental issues in America remained deeply divided across religious and political lines.** Despite findings presented by the IPCC and NASA anti climate change skeptics continued to fuel media reports with dissident opinion based in part on alleged secrecy and lack of transparency by climate change scientists as well as the use of differing computer models to model the data (Clynes, 2012). This has led to the so called "**Climate wars**" that have turned particularly ugly (Clynes, 2012). Americans are still deeply polarised over environmental issue according to polls from Michigan State University and the Pew Center. McCright and Henion (2014) assert that while environmental issues united the country in the 1970s, the public became increasingly

divisive after the fall of the Soviet Union in 1991 when the “red scare” was replaced by the “green scare.”

### ***The search for Root causes and solutions***

Historian Jeffrey Ellis (1995) describes the American compulsion to simplify the environmental crisis and to condense the issues by finding and tracing a single root cause which can then be solved. Ellis reflects that environmental problems (Global warming, species extinctions, pollutions, habitat degradation and fragmentation) have increased in complexity over the last forty years, and are not only difficult to unravel scientifically but are compounded by their socio-political complexity (Ellis, 1995: 267). Sharman and Mlambo (2012) too present biodiversity loss as a wicked problem – solutions are not easily found and tackling the issue with conventional methods may be a futile exercise since only new, unprecedented and innovative solutions are required. **Since there are multiple causal agents for biodiversity loss similarly there is no one single solution** (Sharman and Mlambo, 2012; Millennium Assessment Goals, 2005; Ellis, 1995). In summation this historical narrative concludes with an appropriate description of mans impact on the environment from Rene DuBos and an expression of hope from a student responding to an address by Paul Ehrlich. Rene DuBos writes from his book *A God Within* (1972: 158-161)

*Erosion of the land, destruction of animal and plant species, excessive exploitation of natural resources, and ecological disasters, are not peculiar to the Judeo-Christian tradition and to scientific technology. At all times, and all over the world, mans thoughtless interventions into nature have had a variety of disastrous consequences... All over the globe and at all times in the past, men have pillaged nature and disturbed the ecological equilibrium. In fact, the Judeo-Christian peoples were probably the first to develop on a large scale a pervasive concern for land management and an ethic of nature.*

*Pennfield Jensen a student at San Francisco State College responded to Paul Ehrlich's address to a UNESCO Conference with the following statement:*

*The naiveté, enthusiasm and idealism of young people is not a thing to be scorned, for it is the raw material of constructive growth... We will stop the destruction of this planet even at the cost of our futures, careers and blood.*

*While DuBos demonstrates a mature view of environmental history and Pennfield Jenson the viewpoint of an enthusiastic activist these extracts encapsulate the motivating force behind this thesis, the imperative to sensitize young people to the value of Nature and halt its destruction.*

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## Appendix 2: Global and Local Biodiversity Surveys (2.1); Nature 2.00- The nexus of interpretation (2.2)

This data is included as it has acts as a benchmark and comparison for this research. It is also useful as reference and datum point for Chapters 5 Research Methodology, Chapters 6 and Chapter 7 Research findings and finally Chapter 8 Recommendations

Year	Title of project/survey	Countries	Respondents and outcome
2002,	The Biodiversity Project	America	Of the 1500 respondents surveyed 4 in 10 recognized and described the term biodiversity
2007	Attitudes toward biodiversity European Barometer	European Union	Only one third of respondents knew of the term biodiversity and could explain its meaning
2010	Attitudes toward biodiversity European 1,700 people were interviewed regarding topics ranging from their use of public parks to their participation in conservation poll	European Union	More than 27,000 randomly selected citizens, aged 15 years and older, were interviewed in the European Union's 27 member states Most Europeans see Biodiversity Loss as Serious Problem. A majority of EU citizens (70%) say they personally make an effort to protect biodiversity. Portions of this survey were adapted for this research (Phase one)
2010	Airbus report in support of the Convention Biodiversity(CBD)and the International Year of Biodiversity (IYOB)	World wide	The first Bio-Index, commissioned by Airbus and supported by the Secretariat of the United Nations Convention on Biological Diversity (CBD), questioned 10,000 respondents aged five to 18, across ten countries around the world, from Spain to Singapore, and the USA to UK. (South Africa excluded)
2011	UK report tabled by DEFRA (Department of Environment, Food and Rural Affairs) .	UK and British Isles	1,700 people were interviewed regarding topics ranging from their use of public parks to their participation in conservation
2010/11	Green gap Ogilvy Mather	American and Chinese	Advertising attempts to leverage more brand power by segmenting and differentiating their American and Chinese audience into various shades of green

2012	World Wide Views on Biodiversity	Biodiversity Fund, World Wide Views Danish Board of Technology,	3000 people interviewed simultaneously at 25 sites in different countries including a small number in South Africa. Respondents 'primed' with an initial day long workshop exposing them to biodiversity issues via DVD and print media. Issues discussed in controlled and directed focus groups. Seven out of ten respondents evidenced high levels of biodiversity concern.
2013	UEBT Biodiversity monitor	Barometer report launched by the Union for Ethical BioTrade (UEBT)	75% of consumers surveyed worldwide are aware of biodiversity, while 48% can give a correct definition of the term biodiversity. The validity of these statistics may be questioned since this was essentially a commercial brand survey of beauty products

**Table 2.1: *International Biodiversity surveys: A Review Of Significant Studies***

**Adapted from:** The Biodiversity Project, 2002; Flash Eurobarometer, 2010; DEFRA, 2011; Bennett and Williams, 2011; Navarro-Perez and Tidball, 2012; World Wide Views on Biodiversity, 2012; UEBT Biodiversity monitor, 2013

## 2.1 American and European Biodiversity surveys

### Overview of significant findings

In 2002, the **Biodiversity Project** carried out a national Survey of 1500 adults, 18 years old and older in the US to measure American attitudes towards biodiversity. Findings revealed that 4 in 10 Americans recognized and described the term biodiversity and 55% mentioned that maintaining biodiversity was important to them at a personal level. The Biodiversity Project concluded that basic eco literacy campaigns were needed to help people make the connection between why it is important to protect biodiversity and what actions to take (The Biodiversity Project, 2002). In 2007, the European Union via the Gallup Organization, held a survey "Attitudes towards biodiversity," in which 25,000 citizens above 15 years of age were interviewed. After more than 30 years of EU environmental legislation, the survey revealed that only 35percent of the people interviewed know the term and its meaning, while another 30 percent had heard of the term but did not know what it meant. The remaining 35 percent had never heard of the term. Five percent of those interviewed mentioned that their primary source for information on biodiversity came from the school or university (Navarro-Perez and Tidball, 2012: 14, Gallup Organization, 2007).

Surveys by **European Barometer (2010)** indicate some encouraging increase in levels of public awareness regarding sensitivity to Biodiversity issues. More than 27,000 randomly selected citizens, aged 15 years and older, were interviewed in the European Union's 27 member states (Manchin, 2010). A majority of EU citizens (70%) say they personally make an effort to protect biodiversity, and roughly half of these respondents say they would like to do more. Most of those who say they do not personally make efforts to protect biodiversity say it is because they do not know what to do. Having adequate information appears to have a considerable effect on individuals' expressed willingness to act. Those who feel very well informed about biodiversity are much more likely to say they make an effort to protect it (86%); among those who feel not at all informed about biodiversity, this proportion is 58%. Supported by the literature the author is of the opinion that interpretation can serve

as a clear link between visitors and members of the public to communicate global and local biodiversity issues. Navarro-Perez and Tidball (2012: 14) report however that education, outreach and public awareness strategies are failing to elicit the interest and motivation needed for people to act in favor of biodiversity conservation, and that the message of the importance of sustaining biodiversity is not getting across. These authors cite results from 2010 Global survey across 10 countries that sampled 10,000 children between the ages of five and eighteen. The study conducted by Survey Sampling International was sponsored by Airbus on behalf of the Secretariat of the CBD and revealed the need for increasing efforts to inform and empower future generations (**Airbus Report, 2010**). Results indicated that 40 percent of the young respondents ranked watching TV or playing computer games as a priority, compared to a mere 4 percent who considered that the environment came first. Additionally, only 9 percent ranked looking after animals as most important (CBD press release, 2010).

Commenting on public perceptions of the term 'Biodiversity' Brent (2011) noted that in a recent UK report tabled by **DEFRA** (Department of Environment, Food and Rural Affairs) 1,700 people were interviewed regarding topics ranging from their use of public parks to their participation in conservation. Brent concludes that it would be rash to draw the conclusion that people aren't concerned about biodiversity. In 2011, 92 per cent of respondents said it was fairly or very important for them to have public gardens, parks, commons or other green spaces nearby (DEFRA, 2011). In the same survey, 78% of respondents agreed that they "worry about changes to the countryside in the UK and loss of native animals and plants". Brent argues that while concern for organisms and their habitats is very much a part of the public consciousness; the term "biodiversity" clearly is not.

## Gaps between belief and action

A significant US study on sustainability behaviour and values of 1,800 Americans consumers of all ages was conducted by advertising giant Ogilvy Mather between September 2010 and February 2011 (Bennett and Williams 2011). The sample was chosen to be representative of the US adult population based on age, gender, and geography. Their data was based on the average responses on the following activities: Taking public transportation, walking or biking to work; purchasing locally grown food; using eco-friendly cleaning products and recycling bottles/cans/paper (Bennett and Williams 2011:23). The study pronounced a “**Green Gap**”, *that despite 82% of Americans having good green intentions that only 16% were really committed to action and fulfilling them.* Similarly, an EcoPinon survey conducted in 2007 found that while 90% of Americans state they value energy efficiency only 3% turn their PC off at night. Ogilvy Mather repeated their study in China and revealed significant differences between the two G2 superpowers namely that the gap between stated belief and action was lower (14%). In brief this difference was ascribed to the fact that Chinese cultural influences prioritize harmony with nature and deemphasize the accumulation of possessions. Unlike their American counterparts China’s emerging middle class does not yet have the luxury of overconsumption. Furthermore the researchers noted that the link between environmental health and human well-being was more clearly defined (Bennett and Williams 2011:123).

While not specifically targeting Generation Y students the findings are nevertheless instructive and relevant to the field of nature messaging. Marketing research typically segments populations, and describes them in popular easy to understand homogenous stereotypes that are compatible with the brand survey, in this case a profiling of Green consumer behaviour. Segments were created based on stated behaviour and response to attitudinal questions. Respondents were divided into three main groupings; Super Greens (16%), Middle greens (66%) and Green rejectors (18%) (Bennett and Williams 2011). Super Greens are community centric, optimistic and idealistic and are prepared to demonstrate a green lifestyle despite its inconvenience and cost. The so called Middle Greens were divided equally into

Upper Middle greens and Lower Middle greens. The former recognize the planet is in crisis, are generally female, altruistic and are prepared to change their consumer behaviour while the latter group would be generally male and driven by personal benefit (Bennett and Williams 2011: 26).

According to the Ogilvy- Mather report this divide between belief and action is caused in part by the following:

- a) The **curse of consciousness**. Consumers are suffering from the loss of blissful ignorance about the impact of everyday behaviors on the planet. This leads to excessive and unnecessary guilt;
- b) There are effective analogs for sustainability behavior in the developed and rapidly developing world alike. While the ethnographic specifics of geography, economics and culture may vary the understanding of the **common denominator of our humanity** is key to developing behavioural change;
- c) It's not easy being green. There are significant **practical and social impediments** to practicing sustainable behaviours;
- d) The high cost of being green. Sustainable products frequently carry a **price premium** and performance and trustworthiness may be questionable;
- e) A **skewed distribution of males and females** in the green movement. Findings indicated that 85 % of Americans viewed women as more involved in the Green Movement and finally;
- f) **Eco-suspicion and eco-confusion**. Doom and gloom proclamations coupled with muddled, impersonal messaging, and meaningless standards leave consumers cold and confused.

Adapted from Bennett and Williams (2011: 17).

## **Appendix 2.2 Nature 2.00, a new communication format?**

### **Nature 2.00 - The nexus of interpretation and internet communication**

Braam Büscher believes that Web 2.00 and social media applications that allow people to share, co-create and rate online content are crucial new ways for conservation organizations to reach audiences. *He terms these and other examples Nature 2.00* (Büscher, 2014: 1). This overview adds value to the thesis providing international and local examples of how this technology can enhance biodiversity communication at the study sites. Markus Ruchter (2010) explored the use of hand held GPS navigation systems as an environmental communication tool together with the use of printed material and tour guide. The experiment took place at a floodplain conservation site in Germany with 185 school children and 76 adults participants taking a guided tour using different media the efficacy of each being monitored and evaluated. Following the interpretive principles of Tilden (1977) and Ham (1992) as mentioned in this thesis he programmed a custom designed Mobile Nature Guide (MobiNaG) to display a map of the natural area as well as the current position of the user. The route to be followed was highlighted and the system tracked the path taken by the user. Texts and images about the trees and related activities were presented automatically as location-based information upon arrival at the points of interest or stations (Ruchter, Klar and Geiger, 2010: 1054). This electronic tour guide was issued to a group of children and adults and mediated the outdoor learning experience combining elements of the virtual and actual in a novel way. These devices have potential in exciting children and adults alike about nature particularly those from urbanized environments that do not have regular access to open space areas. Similar interpretive devices are currently being used at Kew Botanic Gardens with great success. Significantly this study found that that environmental literacy did not depend on the type of interpretive medium employed for the intervention and that despite its novelty mobile learning systems are comparable to traditional media such as brochures, signs and a human guide (Ruchter, Klar and Geiger, 2010: 1063).

Other Nature 2.00 research taking place at Reading University in the UK has demonstrated the successful interaction of life science students using GPS and mobile internet based platforms to describe local biodiversity on campus (White *et al.*, 2015). A bespoke mobile recording app for collating records of biodiversity sightings on the Whiteknights campus at the University of Reading was created using readily available Google accounts and GPS recording platforms. These were integrated with scientific data of knowledge of plant and animal species on the 130 hectare campus which incorporates woodland, grassland and a lake (White *et al.*, 2015). Students also engaged in Bioblitz sessions photographing and recording their findings on SMT'S and recording reflective nature experiences on established campus blog sites (White *et al.*, 2015). Like Ruchter, Klar and Geiger's research the app encouraged a greater degree of interaction with actual local biodiversity while utilising the convenience of digital platforms. The importance of this mobile medium as a learning tool to university lecturers should not be discounted (Rossing *et al.*, 2012: 2). Used primarily as a teaching tool for large life science classes the concept has potential for development in Durban Universities, one of the constraints being the high cost of development which could be reduced through interfaculty cooperation from relevant departments as in the Whiteknights campus initiative. The arena of mobile learning is receiving much scrutiny internationally however practical challenges in rolling out this technology to South African students need to be considered. Social economic factors include a disparity in student income to purchase internet data bundles, variation in mobile phone models and operation, and the uneven quality of secondary school education on entering a tertiary institution (Thinyane, 2010; Sodien, 2010)..

The Durban Botanic Gardens (DBG) has designed a new Quick Response (QR) code plant label that is aimed at appealing to tech savvy youth who see their smart phones as communication gateways (Fuchs, 2014:1). Forty trees in the gardens are now equipped with these codes that when scanned with a smart phone link the user directly to the relevant plantzafrika web site. The website run by SANBI has been voted as the most popular and visited indigenous plant site in the country (SANBI plantzafrika site). Jody Fuchs the education officer hopes that the QR Code Plant

Labels will go beyond the more conservative botanical tree labels to excite young people to take an interest in trees in their local neighbourhoods and parks (Fuchs, 2014:2). The Royal Botanic Gardens, Kew, has similar cell phone applications that include QR coding, social networking, augmented reality, plant accession records, and a GPS driven map that enables the user to have a self-guided tour (Fuchs, 2014:2). QR codes are easily and cheaply set up and can guide the visitor to selected websites (H, McClarty, personal communication, July 2015). They thus have unlimited potential for interpretation at both study sites i.e. PVNR and DBG.

### **Bio blitz and citizen science enhance South African biodiversity conservation**

Citizen science plays an important role in European and North American biodiversity conservation programs (Krasny *et al.*, 2013; Navarro-Perez and Tidbold, 2012) and is slowly gaining momentum in South Africa. One such initiative is the adoption of a British internet program called iSpot whereby enthusiasts photograph local flora and fauna in the field and immediately identify and upload these images onto a web site accessed by other subscribers. The iSpot platform has been adopted by the Botanical Society of South Africa, with provincial coordinators in each province. Social groups of volunteers have formed around major centres under the SANBI banner: Custodians of Rare and Endangered Wildflowers or CREW. Regional bioblitzes are conducted usually around known centres of plant endemism<sup>22</sup> and species richness. A bioblitz invites a group of participants to a particular area where threatened species are known to occur and in this way rare flora can be located more quickly and effectively. Subscribers progress from 'novice' to 'expert' status as they develop their identification skills. The site has some 6000 subscribers to date. Scientific training is held on site or at the nearest herbarium and volunteers learn the basics of taxonomy and how to label specimens correctly citing environmental conditions as well as GIS locality. This work assists SANBI in cataloguing a more

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Hilton McClarty, personal communication. QR developer and owner ProGreen Landscapes.

Suvarna Parbhoo, personal communication Botsoc CREW co ordinator KZN.



## Appendix 3: Survey

### Informed Consent Form and Survey Questions

Howard College  
Private Bag X 54001  
Durban  
4000

**Informed Consent Form for**  
\_\_\_\_\_  
**(PRINT NAME and STUDENT NO in block capitals)**

**Principle Researcher:** Jonathan Foley

**Name of Institution:** Centre for Communication Media and Society (CCMS),  
University of KwaZulu-Natal

**Research Title:** Biodiversity Messaging to Generation Y students at the Durban  
University of Technology, KwaZulu-Natal.

#### **This Informed Consent Form has two parts:**

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form on request

### **PART ONE: Information Sheet**

#### **A Introduction**

Good day. My name is **Jonathan Foley** and I am a part time student at the UKZN Howard Campus pursuing a Doctoral degree at the Centre for Culture, Communication, and Media Studies (CCMS). I am currently undertaking research which will focus on **communicating the nature message to students currently studying at the DUT university**. This document consists of two parts, the first part describes the **nature of my study and the benefits of participation** and the second part is an **informed consent document** that is given to participants in the study, it is to be completed and signed and then returned to the researcher. *You will also be given a copy of the form for your records on request. I want to stress that your participation is entirely voluntary, there is no coercion or pressure to participate if you do not want to. You also have the freedom to choose to withdraw at any stage without disadvantage, penalty or prejudice.*

## **B Purpose of the research**

South Africa has one of the richest levels of plants and animals in the world. This is termed **biodiversity** and our country is ranked third in the world behind Indonesia and Brazil. This biodiversity is constantly under threat and exists only as fragmented forms in the city as urban green space, parks and gardens. Today's students of the Net generation or **Generation Y** those young people born between 1980 and 2000. This generation has the potential to make an enormous difference and together with civil society can let their voice be heard on how they feel about nature and conservation. Currently there is little or no research on how Generation Y students view biodiversity or nature. This study then will discover attitudes, perceptions and values toward nature and local biodiversity amongst Generation Y South Africans. It will also determine how Generation Y students would best prefer to connect with local biodiversity in the city; either through electronic, social and print media or through first hand encounters in nature reserves or botanic gardens.

## **C Benefits For Participation And Formats Of Sessions.**

*This study is concerned with examining how students of Generation Y feel, react and connect with Nature.* There are two phases. **Phase One** involves filling out a **survey of set questions** where you indicate your own current attitudes, opinions and perceptions to nature. There will be no payment or

reimbursement for your participation in this study however if the survey is satisfactorily completed in full you may be eligible to win a prize as described below. Respondents from **Phase One** are eligible to be entered into a draw for **an android cell phone provided the survey is completed in its totality.** The respondent's student number will be used in the draw. The time duration to complete the survey should not exceed 50 -60 minutes. Surveys will take place at lecture venues on the Durban University of Technology campus during working hours during 2015.

**Phase Two** involves **research within a structured focus group.** Here you will participate with other like minded students in discussing the topic. You will also be given an opportunity to make a short nature video that can be uploaded onto You tube and Social Media Networks such as a Facebook interest group. We will visit nature sites such as the Durban Botanic Gardens and Pigeon Valley Nature reserve in Glenwood. This is a fun and creative phase of the project which will enrich you personally and also give you an opportunity to showcase creative talent. It is also a great way to establish personal connections with the living world of local plants and animal around you.

Participants in **phase two** become eligible to be entered into a draw for a **Go PRO Video Cam provided they have fully participated and attended all three sessions.** The respondent's student number will be used in the draw. Sessions

will not exceed 2 hours duration and refreshments will be provided for participants. Typically sessions will involve the screening of a short nature film or clip followed by an honest discussion of the issues arising where you will be given an opportunity to express your own feelings and opinions. These focus group sessions will be recorded by means of video and audio recording. Sessions will be held at venues at the Durban University of Technology campus during working hours during the second semester 2015. At least one practical session will be held outdoors at the Durban Botanic Gardens and the Pigeon Valley Nature Reserve.

#### **D Selection of respondents**

Participants in Phase One will be given an opportunity to voluntarily respond to the survey at the DUT Steve Biko, MLS and Ritson Road campus during the period 2015. The invitation is open to all students from any Faculty. Post graduate students currently studying at the CCMS department at UKZN will be invited to participate voluntarily for the focus group activities for Phase 2 during the period 2015. Interested senior students from DUT may also respond.

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#### **E Rights of the respondent**

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- You have the right of **complete confidentiality** at all times. Your name will not be used in any publication without your express permission or if you prefer a pseudonym will be used. No personal details you submit will be divulged to a third party or published without your consent.

- Since the **entire process is voluntary** you have the **right to withdraw** at any time without experiencing prejudice.

**PART TWO: Informed Consent form to be completed by all respondents**

#### **A Statement by all participants**

I, \_\_\_\_\_ Student No \_\_\_\_\_

(PRINT FULL NAME AND STUDENT NUMBER IN BLOCK LETTERS) hereby confirm that

I have read and understand the content of the document and the nature of the research and consent to participate in this project. I have read and understood the nature of the draw in which I will be entered and understand that entries are only valid once surveys are fully completed. I also understand that I am at

liberty to withdraw from the project at any time should I so desire and will not be penalised or prejudiced in any way should I have to withdraw for any reason.

I will be involved in Phase \_\_\_\_\_ of the study (Fill in which phase you are participating in). I understand that my name may/may not be used in the research. (Please circle the option you are most comfortable with) Please print your name and sign this declaration to confirm your participation in this study.

**If I am involved in Phase Two of the project I consent to the following**

Audio recording of my interview/focus group discussion

Yes/No

Video recording

Yes/No

Use of my photographs (as acknowledged) for research purposes

Yes/No

Use of any AV content produced during the focus group for research purposes

Yes/No

Signature: \_\_\_\_\_

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Signed on this \_\_\_\_\_ day of \_\_\_\_\_ year \_\_\_\_\_

Witnesses1 \_\_\_\_\_ Witnesses 2 \_\_\_\_\_

**B Statement by person administrating survey (Where applicable for Phase 1)**

I \_\_\_\_\_ have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Signature: \_\_\_\_\_

Signed on this \_\_\_\_\_ day of \_\_\_\_\_ year \_\_\_\_\_

Thanking you for participating in this study.

Yours sincerely,

---

Jonathan Foley (Researcher) Cell 0833204335 email [jonathan@dut.ac.za](mailto:jonathan@dut.ac.za) Land  
line 0313735436 Prof Donal McCracken (Supervisor) email  
[Mccrackend@ukzn.ac.za](mailto:Mccrackend@ukzn.ac.za) Land Line 0312602899

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### Section A Please tell us about yourself

Please circle only ONE option and fill in the blanks

**A1 What is your age?** a) 17-21 b) 22-25 c) 26-30 d)31+

**A2 What is your gender** Male or Female ?

**A3 What racial group do you belong to?**

a) White, b) Indian, c) Coloured , d) Black, e)Other

**A4 What is your home language?**

a) English, b) Afrikaans, c) Zulu, d) Xhosa, e) Other African  
language

**A5 How would you best describe your home town?**

a) Suburb, b) City Centre, c) Township d) Small town, e)  
Village in a Rural Area

b)

**A6 What is the name of the diploma or degree are currently studying?**

\_\_\_\_\_

**A7 In which Faculty and Department are you studying?**

\_\_\_\_\_

### Section B Please give us your thoughts on nature and the environment .

Circle the most appropriate answer as instructed for each question

**B 1 Have you EVER heard of the term “biodiversity” BEFORE receiving this survey? Please circle only ONE option.**

YES or NO

**B2 It has been stated that Biodiversity is just another word for Nature. Bearing this in mind please circle the ONE option that you think BEST describes the concept**

- a) Biodiversity and climate change are essentially the same thing
- b) Biodiversity is the richness of plant and animal life on planet earth
- c) Biodiversity is the richness of plant and animal life on planet earth and includes diversity or differences between species at physical, genetic and ecosystems levels
- d) Biodiversity is only concerned with genetic engineering and stem cell research

**B 3 How would you best describe what "Nature/biodiversity loss " means to you? You may circle MORE than one statement if you wish.**

- a) Decline in natural habitats/less variety/—in general
- b) Forests will disappear /decline
- c) Certain animals and plants are disappearing/ will disappear
- d) Certain animals and plants are/will become endangered
- e) Loss of natural heritage like nature parks/endemic species/ natural landscapes
- f) Change of the climate
- g) Problems with the clean air, water/CO2 emissions
- h) Problems for the economy/Loss of material wealth
- i) Less opportunities for tourism
- j) Loss of potential for producing medicines, food and fuel
- k) Problems in my garden
- l) Other factors
- m) Don't care about this issue
- n) I'm unsure

**B4. How INFORMED DO YOU FEEL about the loss of Nature/biodiversity? Please circle only ONE option**

- a) Very well informed
- b) Well informed
- c) I'm unsure
  
- d) Not well informed
- e) Not informed at all

**B5 Please give us your personal opinion about WHY we should conserve and value Nature/biodiversity. Indicate whether you agree or disagree with the following statements. Please circle only ONE option**

**5.1 It is a moral obligation – because we have a responsibility to look after nature / biodiversity?**

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

**5.2 Our well-being and quality of life is based upon nature and biodiversity as it provides pleasure and recreation**

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

**5.3 Nature/Biodiversity is indispensable for the production of goods such as food, fuel and medicines**

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

**5.4 South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity**

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

**5.5 Protecting Nature and Biodiversity is essential in tackling climate change**

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

**B 6 HOW SERIOUS do you think is the decline and possible extinction of animal species, flora and fauna, natural habitats and ecosystems. Please circle only ONE option from each question.**

**6.1 How serious is this problem in South Africa?**

- a) Not a problem at all
- b) Not a serious problem
- c) I'm unsure
- d) A fairly serious problem
- e) A Very serious problem

**6.2 How serious is this problem in Africa?**

- a) Not a problem at all
- b) Not a serious problem
- c) I'm unsure
- d) A fairly serious problem
- e) A Very serious problem

**6.3 How serious is this problem globally?**

- a) Not a problem at all
- b) Not a serious problem
- c) I'm unsure
- d) A fairly serious problem
- e) A Very serious problem

**B7 Do you think that the decline and possible extinction of plant and animal species will have an impact on YOU personally? Please circle only ONE option for this set of questions.**

**7.1 Describe the impact of biodiversity loss to YOU at a personal level?**

- a) No, it will not have any effect
- b) No, not on me personally but on my children
- c) I'm unsure
- d) Yes, it will have an effect on me, but not now, later on
- e) Yes, I am already affected by the loss of biodiversity

**7.2 How important is conserving biodiversity/nature (by means of Nature Reserves, National Parks and Botanic gardens) to YOU at a personal level?**

- a) Not important at all
- (b) Some importance
- (c) Moderate importance
- (d) Important
- (e) Critical importance

**B8 Tell us about your knowledge and use of plants. Please circle only ONE option and insert information as required.**

**8.1 Do you make use of traditional medicine at home? YES or NO**

**8.2 If you use traditional medicine do you have any idea of what plants and animal parts are used in its preparation?**

- a) No idea at all
- OR
- (b) Some idea

**8.3 If you answered positively to the above provide the name of 2 plants that have been used in traditional medicine. Common names are acceptable but if you do know the scientific or traditional name include this as well in your response.**

\_\_\_\_\_ and \_\_\_\_\_

**8.4 Did your parents or extended family ever teach you about the importance of medicinal plants in your culture? YES or NO**

**8.5 Did you know that several varieties of indigenous plants in KZN are going to become extinct in the wild due to unsustainable harvesting for the medicinal plant trade? YES or NO**

**8.6 Do you make use of traditional plant food sources at home? YES or NO**

**8.7 Have you heard of the term invasive alien plants (IAP's)? YES or NO**

**8.8 If you answered positively to the above provide the common name of two plants that belong to this category**

\_\_\_\_\_ and \_\_\_\_\_

**Section C Tell us about some of your actual connections and experiences with Nature**

**C1 Visits to nature reserves** (eg. Pigeon Valley, Krantzkloof Reserve, Shongweni Reserve, Inanda Reserve)

**1.1 How often have you visited a nature reserve in the last year? Please circle only ONE option.**

a) Never, b) once in the year c) Once in 6 months d) once in 3 months e) Once in a month

**1.2 What activities would you like to engage in at a nature reserve? You may circle MORE THAN 1 OPTION**

a) Active Sports and recreation (water sports canoeing, swimming and sailing, fishing, mountain biking)

b) Relaxing with friends and family to picnic or braai

c) Go for walks and hikes

d) View wildlife

e) View plants

f) Overnight or holiday stay

**1.3 What are the possible reasons that might prevent you from visiting a nature reserve? You may circle MORE than 1 option**

a) Distance and lack of accessibility- just too far way

b) Transport costs

c) Cost of entry

d) There are no activities that interest me

e) Crime /Security issues

f) I have too many other things to do

## **C2 Visits to botanic gardens**

**2.1 How often have you visited Durban Botanic Gardens (DBG) in the last year? Please circle only ONE option.**

- a) Never, b) Once In The Year, c) Once In 6 Months d) Once In 3 Months e) Once In a month f) Twice a month or more

**2.2 If you have visited the DBG what is the purpose of your visit ? You may circle MORE than 1 option**

- a) Enjoy nature in its various forms
- b) Be alone with my partner
- c) Learn more about plants
- d) Birding
- e) Attend a function or conference
- f) Attend a musical event
- g) For exercise /walking /health reasons
- h) Relax and seek peace and tranquillity

**2.3 What are the possible reasons that might prevent you from visiting the Botanic Gardens. You may circle MORE than 1 option**

- a) Distance and lack of accessibility- just too far way
- b) Transport costs
- c) There are no activities that interest me

d) Crime /Security issues

e) I have too many other things to do

## **Section D Connecting with nature through media (Virtual connection)**

**Please circle only ONE option for this set of questions and fill the blanks as required.**

### **D1 TV use**

**1.1 Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV?**

YES or NO

**1.2 If your answer was yes how frequently do you watch ?**

a) Hardly ever b) once every 6 months c) once a month d) twice a week e) Daily

**1.3 Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly broadcast?**

YES or NO

**1.4 If your answer was yes how frequently do you watch ?**

- a) Hardly ever b) once every 6 months c) once a month d) twice a week

**1.5 What is your favourite nature program from both SABC and DSTV and why?**

**D2 Internet Use**

**2.1 Do you ever watch nature related You tube content? This can be any item related to Earth and the universe or concerning plants and animals**

- a) Never, b) once every 6 months c) once a month d) twice a week e) Daily

**2.2 If you do view nature content on You tube is this done from your;**

- a) Cellphone at a Wifi spot b) Laptop computer using an internet bundle  
c) Desktop computer using ADSL line d) At an internet café

**2.3 Do you ever visit nature related web sites to view images, blogs or text articles?**

- a) Never, b) once every 6 months c) once a month d) twice a week e) Daily

**E Cell phone use and social media platforms**

**E1 I use my cell phone every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and What's app**

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

**E2 I would like to receive and access nature related web content or news updates on my cell phone**

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

**F Print and visual media : Newspapers, Magazines, Posters and Signage, Films**

**F1 I buy and read the local newspaper (Isolezwe, Post, Sowetan, Daily News, Mercury , Sunday Tribune)**

- a) Hardly ever b) once every 6 months c) once a month d) twice a week  
e) daily

**F2 I have read a nature or environmental related article from the newspaper or magazine**

- a) Never, b) once in the last 6 months c) once in the last month d) once in the last week

**F3 I think I would learn more about nature from Posters and Signage than newspapers and magazines**

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

**F4 I have watched a nature or environmentally related DVD or film (other than TV) at least once in the last two years YES or NO**

Thank you most sincerely for your time and effort completing this survey.

Yours in Nature

Jonathan

## Appendix 4: Ethical and procedural clearances



30 June 2014

Mr Jonathan Bernard Foley (982206877)  
School of Applied Human Sciences – CCMS  
Howard College Campus

Protocol reference number: HSS/0504/014D  
Project title: *Biodiversity messaging to Generation Y students at two Durban universities, KwaZulu-Natal*

Dear Mr Foley,

### Full Approval – Expedited Application

In response to your application dated 07 May 2014, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

**PLEASE NOTE:** Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Professor D McCracken and Prof H Balj Nath  
Cc Academic Leader Research: Professor D McCracken  
Cc School Administrator: Ms Ausie Luthuli

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Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

Postal Address: Private Bag X54001, Durban 4000

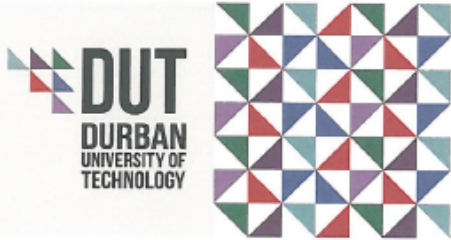
Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: [ximbap@ukzn.ac.za](mailto:ximbap@ukzn.ac.za) / [stmsnm@ukzn.ac.za](mailto:stmsnm@ukzn.ac.za) / [mahuno@ukzn.ac.za](mailto:mahuno@ukzn.ac.za)

Website: [www.ukzn.ac.za](http://www.ukzn.ac.za)



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24<sup>th</sup> April 2014

Mr Jonathan Bernard Foley  
c/o School of Applied Human Sciences, College of Humanities  
University of Kwa-Zulu Natal

Dear Mr Foley

**PERMISSION TO CONDUCT RESEARCH AT THE DUT**

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research Committee (IRC) has granted permission for you to conduct your research at the Durban University of Technology. However, kindly note, that the committee requires you to provide proof of ethical clearance prior to you commencing with your research at the DUT.

We would be grateful if a summary of your key research findings can be submitted to the IRC on completion of your studies.

Kindest regards,  
Yours sincerely

A handwritten signature in black ink, appearing to read 'S. Moyo', is written over a horizontal line.

**PROF. S. MOYO**

**DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT**

## Appendix 5: Data collection - Phase One (Survey)

### Appendix 5.1: Survey validity and reliability

#### On reliability

- Reliability: Cronbach's alpha score
- Factor analysis: Kaiser-Meyer-Olkin test (KMO) and Bartlett's test
- Principal factor analysis using Varimax rotation with Kaiser Normalization.

#### Survey reliability and validity

The importance of these two constructs was mentioned in the Research Methodology section on Statistical analysis. Reliability is computed by taking several measurements on the same subjects ensuring the survey is not confusing or has multiple interpretations. The use of Cronbach's alpha measures reliability to acceptable levels. A reliability coefficient of 0.60 or higher is considered as "acceptable" for a newly developed construct. Table 5.1 reflects the Cronbach's alpha score for all the items that constituted the questionnaire.

**Table 5.1 Cronbach's alpha score**

QB5

Reliability Statistics	
Cronbach's Alpha	N of Items
0.852	5

QB6

**Reliability Statistics**

Cronbach's Alpha	N of Items
0.653	3

The reliability scores for all sections exceed the recommended Cronbach's alpha value. This indicates a degree of acceptable, consistent scoring for these sections of the research.

**Factor Analysis**

Factor analysis is a statistical technique whose main goal is 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. Factor analysis is done only for the Likert scale items and uses matrix tables. Two tests are pertinent here the Kaiser-Meyer-Olkin test (KMO) and Bartlett's test. The requirement is that Kaiser-Meyer-Olkin Measure of Sampling Adequacy should be greater than 0.500 and Bartlett's Test of Sphericity less than 0.05. In all instances, the conditions are satisfied which allows for the factor analysis procedure. This is explained below in the rotated component matrix.

**Table 5.2: KMO and Bartlett's Test**

**QB5 KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.850	
Bartlett's Test of Sphericity	Approx. Chi-Square	859.916
	Df	10
	Sig.	0.000

**QB6 KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.615	
Bartlett's Test of Sphericity	Approx. Chi-Square	189.991
	df	3
	Sig.	0.000

**Table 5.3 Rotated Component Matrix**

B5	Component 1
It is a moral obligation – because we have a responsibility to look after nature / biodiversity?	0.836
Our well-being and quality of life is based upon nature and biodiversity as it provides pleasure and recreation	0.845
Nature/ Biodiversity is indispensable for the production of goods such as food, fuel and medicines	0.728
South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity	0.779
Protecting Nature and Biodiversity is essential in tackling climate change	0.779

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

B6	Component 1
How serious is this problem in South Africa?	0.787
How serious is this problem in Africa?	0.834
How serious is this problem globally?	0.677

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

With reference to the table above:

- The principle component analysis was used as the extraction method, and the rotation method was Varimax 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.
- Items of questions that loaded similarly imply measurement along a similar factor. An examination of the content of items loading at or above 0.5 (and using the higher or highest loading in instances where items cross-loaded at greater than this value) effectively measured along the various components.

It is noted that the variables that constituted Sections B5 and B6 loaded perfectly along a single component. This means that the statements that constituted these sections perfectly measured what it set out to measure. In summation the survey questionnaire has proved to be a valid instrument.

### **Appendix 5.2: On analysis**

- Frequency testing (Descriptions and figures in main text)
- Pearson's Chi Squared test to determine significant associations, confidence values (p) and cross tabulations used for hypothesis testing
- Spearman's Coefficient testing to determine correlations

### Pearson Chi-Square Tests

		What is your age?	What is your gender?	What racial group do you belong to?	What is your home language?	How would you best describe your home town?	What is the name of the diploma or degree are currently studying?	In which Faculty and Department are you studying?
Have you EVER heard of the term "biodiversity" before receiving this survey ?	Chi-square	19.835	7.186	8.004	14.649	4.152	72.165	41.439
	df	3	1	3	4	4	14	5
	Sig.	.000*	.007*	.046*	.005*	0.386	.000*	.000*
It has been stated that Biodiversity is just another word for Nature. Bearing this in mind please circle the ONE option that you think BEST describes the concept	Chi-square	32.630	1.891	7.671	7.973	7.464	75.237	34.793
	df	9	3	9	12	12	42	15
	Sig.	.000*	0.595	0.568	0.787	0.825	.001*	.003*
How informed do you feel about the loss of Nature/ biodiversity?	Chi-square	26.391	8.068	11.397	14.131	9.920	111.486	51.043
	df	12	4	12	16	16	56	20
	Sig.	.009*	0.089	0.495	0.589	0.871	.000*	.000*
It is a moral obligation – because we have a responsibility to look after nature / biodiversity?	Chi-square	6.931	6.121	8.632	11.751	11.353	74.367	26.261
	df	12	4	12	16	16	56	20
	Sig.	0.862	0.19	0.734	0.761	0.787	0.051	0.157
Our well-being and quality of life is based upon nature and biodiversity as it provides pleasure and recreation	Chi-square	12.859	0.978	13.630	21.852	8.852	69.846	31.289
	df	12	4	12	16	16	56	20
	Sig.	0.379	0.913	0.325	0.148	0.919	0.101	0.051
Nature/ Biodiversity is indispensable for the production of goods such as food, fuel and medicines	Chi-square	4.226	4.525	13.499	13.414	17.383	81.298	35.537

	df	12	4	12	16	16	56	20
	Sig.	0.979	0.340	0.334	0.642	0.361	.015*	.017*
South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity	Chi-square	13.814	4.781	11.895	21.771	18.697	78.896	38.992
	df	12	4	12	16	16	56	20
	Sig.	0.313	0.311	0.454	0.151	0.285	.024*	.007*
Protecting Nature and Biodiversity is essential in tackling climate change	Chi-square	15.532	4.272	9.228	21.084	13.238	69.883	20.565
	df	12	4	12	16	16	56	20
	Sig.	0.214	0.37	0.683	0.175	0.655	0.101	0.423
How serious is this problem in South Africa?	Chi-square	7.993	3.926	15.304	25.781	14.907	93.048	52.851
	df	12	4	12	16	16	56	20
	Sig.	0.786	0.416	0.225	0.057	0.531	.001*	.000*
How serious is this problem in Africa?	Chi-square	3.253	2.583	9.786	11.252	30.251	83.480	59.090
	df	12	4	12	16	16	56	20
	Sig.	0.993	0.63	0.635	0.794	.017*	.010*	.000*
How serious is this problem globally?	Chi-square	11.779	2.213	18.913	16.336	14.357	66.673	27.237
	df	12	4	12	16	16	56	20
	Sig.	0.464	0.697	0.091	0.43	0.572	0.156	0.129
Describe the impact of biodiversity loss to YOU at a personal level?	Chi-square	11.554	3.822	9.703	18.882	19.766	95.309	49.174
	df	12	4	12	16	16	56	20
	Sig.	0.482	0.431	0.642	0.275	0.231	.001*	.000*
How important is conserving biodiversity /nature (by means of Nature Reserves, National Parks and Botanic gardens) to YOU at a personal level?	Chi-square	9.024	4.489	11.280	35.267	11.168	63.772	38.552
	df	12	4	12	16	16	56	20
	Sig.	0.701	0.344	0.505	.004*	0.799	0.222	.008*

Do you make use of traditional medicine at home?	Chi-square	0.698	3.619	15.942	8.276	19.682	15.293	4.906
	df	3	1	3	4	4	14	5
	Sig.	0.874	0.057	.001*	0.082	.001*	0.358	0.427
If you use traditional medicine do you have any idea of what plants and animal parts are used in its preparation?	Chi-square	1.026	5.196	6.930	5.265	3.088	27.946	10.831
	df	3	1	3	4	4	14	5
	Sig.	0.795	.023*	0.074	0.261	0.543	.014*	0.055
Did your parents or extended family ever teach you about the importance of medicinal plants in your culture?	Chi-square	3.606	0.360	8.303	1.207	5.117	17.540	3.202
	df	3	1	3	4	4	14	5
	Sig.	0.307	0.548	.040*	0.877	0.275	0.229	0.669
Did you know that several varieties of indigenous plants in KZN are going to become extinct in the wild due to unsustainable harvesting for the medicinal plant trade?	Chi-square	3.075	0.618	1.730	7.079	2.485	29.190	3.509
	df	3	1	3	4	4	14	5
	Sig.	0.38	0.432	0.63	0.132	0.647	.010*	0.622
Do you make use of traditional plant food sources at home?	Chi-square	3.736	3.446	22.723	34.743	26.759	24.870	11.140
	df	3	1	3	4	4	14	5
	Sig.	0.291	0.063	.000*	.000*	.000*	.036*	.049*
Have you heard of the term invasive alien plants (IAP's)?	Chi-square	1.424	2.319	28.890	33.982	34.723	53.543	35.215
	df	3	1	3	4	4	14	5
	Sig.	0.7	0.128	.000*	.000*	.000*	.000*	.000*
How often have you visited a nature reserve in the last year?	Chi-square	10.592	6.459	40.112	38.840	42.376	49.221	16.045
	df	12	4	12	16	16	56	20
	Sig.	0.564	0.167	.000*	.001*	.000*	0.727	0.714
How often have you visited Durban Botanic Gardens (DBG) in the last year?	Chi-square	14.949	1.745	25.010	28.437	33.524	136.622	62.718
	df	15	5	15	20	20	70	25

	Sig.	0.455	0.883	.050*	0.099	.030*	.000*	.000*
Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV?	Chi-square	1.433	2.483	8.989	11.236	9.938	17.217	1.791
	df	3	1	3	4	4	14	5
	Sig.	0.698	0.115	.029*	.024*	.041*	0.245	0.877
If your answer was yes how frequently do you watch?	Chi-square	17.882	7.397	16.704	35.669	30.063	63.956	22.046
	df	12	4	12	16	16	56	20
	Sig.	0.119	0.116	0.161	.003*	.018*	0.217	0.338
Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted?	Chi-square	2.065	1.582	10.308	12.385	19.741	14.729	9.593
	df	3	1	3	4	4	14	5
	Sig.	0.559	0.208	.016*	.015*	.001*	0.397	0.088
If your answer was yes how frequently do you watch?	Chi-square	8.311	5.735	13.653	26.892	16.727	33.154	14.128
	df	9	3	9	12	12	42	15
	Sig.	0.503	0.125	0.135	.008*	0.16	0.834	0.516
Do you ever watch nature related You tube content?	Chi-square	24.010	43.295	24.567	18.667	10.640	94.422	24.557
	df	12	4	12	16	16	56	20
	Sig.	.020*	.000*	.017*	0.286	0.831	.001*	0.219
If you do view nature content on You tube is this done from your	Chi-square	12.651	6.539	6.913	13.384	25.199	66.898	32.692
	df	9	3	9	12	12	42	15
	Sig.	0.179	0.088	0.646	0.342	.014*	.009*	.005*
Do you ever visit nature related web sites to view images, blogs or text articles?	Chi-square	60.471	17.544	24.844	31.264	16.458	81.648	19.873
	df	12	4	12	16	16	56	20
	Sig.	.000*	.002*	.016*	.012*	0.422	.014*	0.466
I use my cell phone every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and	Chi-square	26.295	8.955	14.379	11.183	19.752	69.512	14.866

Whatsapp	df	12	4	12	16	16	56	20
	Sig.	.010*	0.062	0.277	0.798	0.232	0.106	0.784
I would like to receive and access nature related web content or news updates on my cell phone	Chi-square	8.581	7.007	19.710	16.539	25.754	70.215	33.944
	df	12	4	12	16	16	56	20
	Sig.	0.738	0.136	0.073	0.416	0.058	0.096	.027*
	Chi-square	8.621	2.269	25.091	29.780	56.827	45.572	19.423
I buy and read the local newspaper (Isolezwe, Post, Sowetan , Daily News, Mercury , Sunday Tribune)	df	12	4	12	16	16	56	20
	Sig.	0.735	0.687	.014*	.019*	.000*	0.839	0.495
I have read a nature or environmental related article from the newspaper or magazine	Chi-square	7.935	0.570	19.958	22.954	24.344	52.527	25.191
	df	9	3	9	12	12	42	15
	Sig.	0.541	0.903	.018*	.028*	.018*	0.128	.047*
	Chi-square	9.959	8.014	22.337	20.460	15.281	63.066	34.168
I think I would learn more about nature from Posters and Signage than newspapers and magazines	df	12	4	12	16	16	56	20
	Sig.	0.62	0.091	.034*	0.2	0.504	0.241	.025*
I have watched a nature or environmentally related DVD or film (other than TV) at least once in the last two years	Chi-square	5.314	1.015	7.117	6.422	3.451	16.512	3.531
	df	3	1	3	4	4	14	5
	Sig.	0.15	0.314	0.068	0.17	0.485	0.283	0.619

**Note:** Cells marked with an asterisk are highlighted in yellow and demonstrate significance at  $p < 0.05$ . Selected cross tabulations were carried out for various groupings of questions the results of which depicted below.

## Significant cross tabulations

### On loss of Biodiversity and climate change

#### B3 Change of the climate \* What racial group do you belong to? Cross tabulation

			What racial group do you belong to?				
			White	Indian	Coloured	Black	Total
Change of the climate	Yes	Count	6	24	3	114	147
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%
Total		Count	6	24	3	114	147
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%
		Total cohort count (n)	11	75	9	333	428

This topic was fairly low on the student agenda with just over one third responding positively to the linkage of the two topics. The results were spread fairly evenly over the races. Within the larger student cohort 34% of Blacks flagged this option, 33% Coloureds, 32% of Indians and 55% of Whites. Underexposure to environmental media may be the problem as well as conflicting opinions voiced by prominent scientists giving the sceptics more power (See climate wars in Appendix 1). Evidence presented in the literature review provides a compelling case for anthropogenic induced climate change (Butcher *et al.*, 2010; EPLC, 2014)

**Problems for the economy/Loss of material wealth \* What racial group do you belong to?**

		What racial group do you belong to?				
		White	Indian	Coloured	Black	Total
Problems for the economy/Loss of material wealth	Yes	2	23	1	50	76
	Count					
% within What racial group do you belong to?		100.0%	100.0%	100.0%	100.0%	100.0%
Total	Count	2	23	1	50	76
	% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%
Total cohort count (n)		11	75	9	333	428

Within the larger student cohort only 15% of Blacks flagged this option, 31% of Indians and 50% of Whites. This points to lack of knowledge concerning the benefits of biodiversity goods and services as described by prominent state institutions such as SANBI as well as local government efforts on public education by the Ethekewini Environmental Management department

**Problems with the clean air, water/CO2 emissions \* In which Faculty and Department are you studying? Cross tabulation**

			In which Faculty and Department are you studying?						
			Accounting&Informatics	Applied Science	Arts and Design	EBE	Health	Management Sciences	Total
Problems with the clean air, water/CO2 emissions	Yes	Count	1	79	14	31	9	29	163
	% within In which Faculty and Department are you studying?		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total	Count	Count	1	79	14	31	9	29	163
	% within In which Faculty and Department are you studying?		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Here students attending the Faculty of Applied Science were able to make the link between biodiversity loss and air and water quality with nearly 50% responding to this option. Strangely only 9 out of the 26 Environmental Health Diploma students responded positively where this topic forms a core theme in their course.

## On visits to Nature Reserves

### C 1.1 How often have you visited a nature reserve in the last year? \* What racial group do you belong to?

			What racial group do you belong to?				
			White	Indian	Coloured	Black	Total
How often have you visited a nature reserve in the last year?	Never	Count	4	14	2	133	153
		% within What racial group do you belong to?	36.4%	18.7%	22.2%	40.5%	36.2%
	Once in the year	Count	2	21	5	120	148
		% within What racial group do you belong to?	18.2%	28.0%	55.6%	36.6%	35.0%
	Once in 6 months	Count	1	21	0	31	53
		% within What racial group do you belong to?	9.1%	28.0%	0.0%	9.5%	12.5%
	Once in 3 months	Count	3	12	2	31	48
		% within What racial group do you belong to?	27.3%	16.0%	22.2%	9.5%	11.3%
	Once in a month	Count	1	7	0	13	21
		% within What racial group do you belong to?	9.1%	9.3%	0.0%	4.0%	5.0%
	Total	Count	11	75	9	328	423
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%

Of the total student cohort surveyed one in three (36%) had not visited a nature reserve in the last year. Nearly 41% of these were Black learners and only 19% were Indian students. A substantial percentage of whites (36%) had not visited a reserve either this may be due in part to the marginal numbers of this population group surveyed (n=11) Taking visitor frequencies of once in six months or more into account Indian learners proved to be the most frequent visitors at 53% while the Black students registered a figure of 23%.

**C1.1 How often have you visited a nature reserve in the last year? \* How would you best describe your home town?**

			How would you best describe your home town?					
			Suburb	City Centre	Township	Small town	Village in a Rural Area	Total
How often have you visited a nature reserve in the last year?	Never	Count	27	8	54	35	27	151
		% within How would you best describe your home town?	22.0%	50.0%	39.4%	42.7%	43.5%	36.0%
	Once in the year	Count	37	4	54	28	25	148
		% within How would you best describe your home town?	30.1%	25.0%	39.4%	34.1%	40.3%	35.2%
	Once in 6 months	Count	31	1	13	6	2	53
		% within How would you best describe your home town?	25.2%	6.3%	9.5%	7.3%	3.2%	12.6%
	Once in 3 months	Count	19	2	11	9	7	48
		% within How would you best describe your home town?	15.4%	12.5%	8.0%	11.0%	11.3%	11.4%
	Once in a month	Count	9	1	5	4	1	20
		% within How would you best describe your home town?	7.3%	6.3%	3.6%	4.9%	1.6%	4.8%
	Total	Count	123	16	137	82	62	420
		% within How would you best describe your home town?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Of those who had not visited a reserve in the last year the greatest percentage were drawn from the city centre (50%) followed by rural areas (44%) and small towns (43%) The greatest number of student visitors were drawn from the suburbs (78%). This data corresponds with the literature where it is generally the affluent middle class that visit nature reserves. A visitor survey conducted at Durban’s largest nature reserve Shongweni Resources Reserve showed this to be the case and the racial composition was largely white (Foley, 2011). Focus groups revealed a substantial amount of resistance by Black students to visit nature reserves since they saw no need to pay cash on entry to view what was perceived to be common currency on the farm and bush. See Chapter 7. In terms of age a younger set (17-25 years) had claimed to have visited at least once a year or more. This percentage was 65% as opposed to the 56% recorded by slightly older students of 26-30 years.

**C1.1 How often have you visited a nature reserve in the last year? \* What is your age?**

			What is your age?				
			17-21	22-25	26-30	31+	Total
How often have you visited a nature reserve in the last year?	Never	Count	85	55	11	2	153
		% within What is your age?	35.1%	35.7%	44.0%	100.0%	36.2%
	Once in the year	Count	80	61	7	0	148
		% within What is your age?	33.1%	39.6%	28.0%	0.0%	35.0%
	Once in 6 months	Count	37	15	1	0	53
		% within What is your age?	15.3%	9.7%	4.0%	0.0%	12.5%
	Once in 3 months	Count	28	16	4	0	48
		% within What is your age?	11.6%	10.4%	16.0%	0.0%	11.3%
	Once in a month	Count	12	7	2	0	21
		% within What is your age?	5.0%	4.5%	8.0%	0.0%	5.0%
	Total	Count	242	154	25	2	423
		% within What is your age?	100.0%	100.0%	100.0%	100.0%	100.0%

## Activities at the reserve

Active sports were favoured by the younger students 17- 21 years which accounted for 58% of the 221 respondents that ticked this option. Older students proved more sedentary with 36 % favouring active sports in the 22- 25 years and only 5% participating in the 26-30 year bracket. Hiking activities followed a similar trend

### Active Sports and recreation (water sports canoeing, swimming and sailing, fishing, mountain biking) \* What is your age? Cross tabulation

		What is your age?			Total	
		17-21	22-25	26-30		
Active Sports and recreation (water sports canoeing, swimming and sailing, fishing, mountain biking)	Yes	Count	129	81	11	221
		% within What is your age?	100.0%	100.0%	100.0%	100.0%
Total		Count	129	81	11	221
		% within What is your age?	100.0%	100.0%	100.0%	100.0%

### Go for walks and hikes \* What is your age? Cross tabulation

		What is your age?				Total	
		17-21	22-25	26-30	31+		
Go for walks and hikes	Yes	Count	116	61	11	1	189
		% within What is your age?	100.0%	100.0%	100.0%	100.0%	100.0%
Total		Count	116	61	11	1	189
		% within What is your age?	100.0%	100.0%	100.0%	100.0%	100.0%

**Go for walks and hikes \* What racial group do you belong to? Cross tabulation**

			What racial group do you belong to?				Total for this option
			White	Indian	Coloured	Black	
Go for walks and hikes	Yes	Count	7	59	7	116	189
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%
Total		Count	7	59	7	116	189
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%
		Total cohort count (n)	11	75	9	333	428

Hiking was not in the top 3 listed activities but when examining the total cohort of respondents proved more popular with Indian students (78%) than black students (35%). Most white and coloured students enjoyed the activity.

**On DSTV nature program content**

**D1.1 Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV? \* What racial group do you belong to?**

			What racial group do you belong to?				Total
			White	Indian	Coloured	Black	
Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV?	Yes	Count	8	71	7	266	352
		% within What racial group do you belong to?	72.7%	94.7%	77.8%	81.3%	83.4%
	No	Count	3	4	2	61	70
		% within What racial group do you belong to?	27.3%	5.3%	22.2%	18.7%	16.6%
Total		Count	11	75	9	327	422
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%

**D1.1 Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV? \* How would you best describe your home town?**

			How would you best describe your home town?					
			Suburb	City Centre	Township	Small town	Village in a Rural Area	Total
Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV?	Yes	Count	111	15	113	64	46	349
		% within How would you best describe your home town?	90.2%	93.8%	82.5%	78.0%	75.4%	83.3%
	No	Count	12	1	24	18	15	70
		% within How would you best describe your home town?	9.8%	6.3%	17.5%	22.0%	24.6%	16.7%
Total		Count	123	16	137	82	61	419
		% within How would you best describe your home town?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

**D1.2 If your answer was yes how frequently do you watch? \* What racial group do you belong to?**

			What racial group do you belong to?				
			White	Indian	Coloured	Black	Total
If your answer was yes how frequently do you watch?	Hardly ever	Count	2	4	2	26	34
		% within What racial group do you belong to?	22.2%	5.6%	25.0%	9.5%	9.3%
	Once every 6 months	Count	1	7	1	48	57
		% within What racial group do you belong to?	11.1%	9.7%	12.5%	17.5%	15.7%
	Once a month	Count	3	15	0	55	73
		% within What racial group do you belong to?	33.3%	20.8%	0.0%	20.0%	20.1%
	Twice a week	Count	0	22	2	87	111
		% within What racial group do you belong to?	0.0%	30.6%	25.0%	31.6%	30.5%
	Daily	Count	3	24	3	59	89

	% within What racial group do you belong to?	33.3%	33.3%	37.5%	21.5%	24.5%
Total	Count	9	72	8	275	364
	% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%

Indian students claim to watch the most DSTV nature content(94%) as opposed to Black (83%) and White (73%) students. Furthermore Indian students watch more TV than Blacks in the higher frequency range (daily – once per month). The figure for Asians is nearly 85% while frequency for blacks is 73%. Minority groups such as Whites watch a lot less nature content at just over 66% while Coloureds watch the least at 62%.

### On SABC nature program content

#### D 1.3 Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted? \* What racial group do you belong to? Cross tabulation

			What racial group do you belong to?				
			White	Indian	Coloured	Black	Total
Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted?	Yes	Count	4	28	5	184	221
		% within What racial group do you belong to?	36.4%	37.3%	55.6%	56.6%	52.6%
	No	Count	7	47	4	141	199
		% within What racial group do you belong to?	63.6%	62.7%	44.4%	43.4%	47.4%
Total	Count	11	75	9	325	420	
	% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%	

**D 1.3 Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted? \* How would you best describe your home town?**

			How would you best describe your home town?					
			Suburb	City Centre	Township	Small town	Village in a Rural Area	Total
Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted?	Yes	Count	49	5	77	43	44	218
		% within How would you best describe your home town?	40.2%	31.3%	56.6%	53.1%	71.0%	52.3%
	No	Count	73	11	59	38	18	199
		% within How would you best describe your home town?	59.8%	68.8%	43.4%	46.9%	29.0%	47.7%
Total	Count	122	16	136	81	62	417	
	% within How would you best describe your home town?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

SABC TV Nature content is most popular in rural areas with viewing at 71% contrasted with city centre viewing at 31% and suburban viewing at 40 %. The reasonable explanation is the higher cost of satellite TV is unaffordable in rural areas and only available for the affluent. Black Student respondents also complained about the higher cost of DSTV content. Similarly a significantly higher percentage of Blacks (57%) as opposed to White (36%) and Indian (37%) students watch SABC TV content presumably on affordability.

**D 1.3 Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted? \* What racial group do you belong to?**

			What racial group do you belong to?				
			White	Indian	Coloured	Black	Total
Do you watch a dedicated conservation program on any of the SABC channels	Yes	Count	4	28	5	184	221
		% within What racial group do you belong to?	36.4%	37.3%	55.6%	56.6%	52.6%
such as 50/50 or one of the NG slots that are regularly flighted?	No	Count	7	47	4	141	199
		% within What racial group do you belong to?	63.6%	62.7%	44.4%	43.4%	47.4%
Total		Count	11	75	9	325	420
		% within What racial group do you belong to?	100.0%	100.0%	100.0%	100.0%	100.0%

## Chi - Squared tests

	Chi-Square	df	Asymp. Sig.
What is your age?	360.579 <sup>a</sup>	3	0.000
What is your gender?	5.841 <sup>b</sup>	1	0.016
What racial group do you belong to?	662.804 <sup>a</sup>	3	0.000
What is your home language?	572.210 <sup>c</sup>	4	0.000
How would you best describe your home town?	112.118 <sup>d</sup>	4	0.000
Have you EVER heard of the term "biodiversity" before receiving this survey ?	279.710 <sup>b</sup>	1	0.000
It has been stated that Biodiversity is just another word for Nature. Bearing this in mind please circle the ONE option that you think BEST describes the concept	1009.028 <sup>a</sup>	3	0.000
How INFORMED DO YOU FEEL about the loss of Nature/ biodiversity?	171.977 <sup>c</sup>	4	0.000
It is a moral obligation – because we have a responsibility to look after nature / biodiversity?	460.009 <sup>e</sup>	4	0.000
Our well-being and quality of life is based upon nature and biodiversity as it provides pleasure and recreation	417.251 <sup>f</sup>	4	0.000
Nature/ Biodiversity is indispensable for the production of goods such as food, fuel and medicines	292.169 <sup>g</sup>	4	0.000
South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity	256.559 <sup>g</sup>	4	0.000
Protecting Nature and Biodiversity is essential in tackling climate change	393.176 <sup>d</sup>	4	0.000
How serious is this problem in South Africa?	365.106 <sup>d</sup>	4	0.000
How serious is this problem in Africa?	419.493 <sup>g</sup>	4	0.000
How serious is this problem globally?	666.300 <sup>g</sup>	4	0.000
Describe the impact of biodiversity loss to YOU at a personal level?	359.892 <sup>g</sup>	4	0.000
How important is conserving biodiversity /nature (by means of Nature Reserves, National Parks and Botanic gardens) to YOU at a personal level?	336.541 <sup>d</sup>	4	0.000
Do you make use of traditional medicine at home?	37.443 <sup>h</sup>	1	0.000
If you use traditional medicine do you have any idea of what plants and animal parts are used in its preparation?	29.762 <sup>i</sup>	1	0.000
Did your parents or extended family ever teach you about the importance of medicinal plants in your culture?	9.846 <sup>j</sup>	1	0.002
Did you know that several varieties of indigenous plants in KZN are going to become extinct in the wild due to unsustainable harvesting for the medicinal plant trade?	15.385 <sup>j</sup>	1	0.000
Do you make use of traditional plant food sources at home?	56.137 <sup>k</sup>	1	0.000
Have you heard of the term invasive alien plants (IAP's)?	.087 <sup>l</sup>	1	0.768

How often have you visited a nature reserve in the last year?	178.265 <sup>m</sup>	4	0.000
How often have you visited Durban Botanic Gardens (DBG) in the last year?	87.953 <sup>n</sup>	5	0.000
Do you watch a channel with nature related content such as the NG channel (NAT Geo Wild, NG or Animal Planet) or Discovery world on DSTV?	188.445 <sup>o</sup>	1	0.000
If your answer was yes how frequently do you watch?	47.758 <sup>p</sup>	4	0.000
Do you watch a dedicated conservation program on any of the SABC channels such as 50/50 or one of the NG slots that are regularly flighted?	1.152 <sup>q</sup>	1	0.283
If your answer was yes how frequently do you watch?	10.833 <sup>r</sup>	3	0.013
Do you ever watch nature related You tube content?	284.258 <sup>s</sup>	4	0.000
If you do view nature content on You tube is this done from your	59.370 <sup>t</sup>	3	0.000
Do you ever visit nature related web sites to view images, blogs or text articles?	262.726 <sup>u</sup>	4	0.000
I use my cell phone every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and Whats app	465.938 <sup>v</sup>	4	0.000
I would like to receive and access nature related web content or news updates on my cell phone	174.656 <sup>w</sup>	4	0.000
I buy and read the local newspaper (Isolezwe, Post, Sowetan , Daily News, Mercury , Sunday Tribune)	109.440 <sup>w</sup>	4	0.000
I have read a nature or environmental related article from the newspaper or magazine	17.154 <sup>x</sup>	3	0.001
I think I would learn more about nature from Posters and Signage than newspapers and magazines	183.348 <sup>v</sup>	4	0.000
I have watched a nature or environmentally related DVD or film (other than TV) at least once in the last two years	37.470 <sup>k</sup>	1	0.000

## Spearman's test Correlations

		How informed do you feel about the loss of Nature/ biodiversity ?	It is a moral obligation – because we have a responsibility to look after nature / biodiversity ?	Our well-being and quality of life is based upon nature and biodiversity as it provides pleasure and recreation	Nature/ Biodiversity is indispensable for the production of goods such as food, fuel and medicines	South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity	Protecting Nature and Biodiversity is essential in tackling climate change	How serious is this problem in South Africa?	How serious is this problem in Africa?	How serious is this problem globally?	I use my cell phone every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and Whats app	I would like to receive and access nature related web content or news updates on my cell phone	I think I would learn more about nature from Posters and Signage than newspapers and magazines
How INFORMED DO YOU FEEL about the loss of Nature/ biodiversity?	Correlation Coefficient	1.000											
	Sig. (2-tailed)												
	N	428											
It is a moral obligation – because we have a responsibility to look after nature / biodiversity?	Correlation Coefficient	-0.062	1.000										
	Sig. (2-tailed)	0.201											
	N	424	424										
Our well-being and quality of life is based upon nature and	Correlation Coefficient	-0.072	.554**	1.000									
	Sig. (2-tailed)	0.140	0.000										
	N	427	424	427									

biodiversity as it provides pleasure and recreation													
Nature/Biodiversity is indispensable for the production of goods such as food, fuel and medicines	Correlation Coefficient	-.097 <sup>*</sup>	.413 <sup>**</sup>	.410 <sup>**</sup>	1.000								
	Sig. (2-tailed)	0.046	0.000	0.000									
	N	426	423	426	426								
South Africa's economic wealth will increase if we conserve our Natural resources and biodiversity	Correlation Coefficient	-0.042	.479 <sup>**</sup>	.468 <sup>**</sup>	.297 <sup>**</sup>	1.000							
	Sig. (2-tailed)	0.391	0.000	0.000	0.000								
	N	426	423	426	425	426							
Protecting Nature and Biodiversity is essential in tackling climate change	Correlation Coefficient	-0.060	.486 <sup>**</sup>	.422 <sup>**</sup>	.381 <sup>**</sup>	.431 <sup>**</sup>	1.000						
	Sig. (2-tailed)	0.214	0.000	0.000	0.000	0.000							
	N	425	422	425	424	425	425						
How serious is this problem in South Africa?	Correlation Coefficient	-0.087	.183 <sup>**</sup>	.174 <sup>**</sup>	.130 <sup>**</sup>	.238 <sup>**</sup>	.107 <sup>*</sup>	1.000					
	Sig. (2-tailed)	0.072	0.000	0.000	0.008	0.000	0.027						
	N	425	422	425	424	424	423	425					
How serious is this problem in Africa?	Correlation Coefficient	-.211 <sup>**</sup>	.210 <sup>**</sup>	.166 <sup>**</sup>	.155 <sup>**</sup>	.152 <sup>**</sup>	.174 <sup>**</sup>	.521 <sup>**</sup>	1.000				
	Sig. (2-tailed)	0.000	0.000	0.001	0.001	0.002	0.000	0.000					
	N	426	423	426	425	425	424	425	426				
How serious is this	Correlation Coefficient	-0.082	.116 <sup>*</sup>	.116 <sup>*</sup>	0.018	0.089	.130 <sup>**</sup>	.271 <sup>**</sup>	.361 <sup>**</sup>	1.000			

problem globally?	Sig. (2-tailed)	0.092	0.017	0.017	0.705	0.067	0.007	0.000	0.000				
	N	426	423	426	425	425	424	425	426	426			
I use my cell phone every day to stay in touch with my friends via Facebook, SMS, Twitter, BBM and Whats app	Correlation Coefficient	-0.001	.109 <sup>*</sup>	.141 <sup>**</sup>	0.095	.147 <sup>**</sup>	.142 <sup>**</sup>	.099 <sup>*</sup>	0.038	0.057	1.000		
	Sig. (2-tailed)	0.976	0.026	0.004	0.053	0.003	0.004	0.043	0.435	0.242			
	N	417	414	417	416	416	415	416	417	417	417		
I would like to receive and access nature related web content or news updates on my cell phone	Correlation Coefficient	-.121 <sup>*</sup>	.216 <sup>**</sup>	.167 <sup>**</sup>	0.070	.253 <sup>**</sup>	.131 <sup>**</sup>	.237 <sup>**</sup>	.262 <sup>**</sup>	.167 <sup>**</sup>	0.058	1.000	
	Sig. (2-tailed)	0.013	0.000	0.001	0.152	0.000	0.007	0.000	0.000	0.001	0.236		
	N	418	415	418	417	417	416	417	418	418	417	418	
I think I would learn more about nature from Posters and Signage than newspapers and magazines	Correlation Coefficient	-0.060	.217 <sup>**</sup>	.131 <sup>**</sup>	0.058	.109 <sup>*</sup>	.131 <sup>**</sup>	0.004	0.003	0.053	.170 <sup>**</sup>	.097 <sup>*</sup>	1.000
	Sig. (2-tailed)	0.220	0.000	0.007	0.234	0.027	0.008	0.942	0.947	0.277	0.001	0.047	
	N	417	415	417	416	416	415	416	417	417	416	417	417

**Note: Significant correlations are indicated in yellow and marked with a single or double asterisk**

## **Annexure 6: Phase Two - Focus groups**

*6.1 Focus Group One Transcripts 2015 Video Technology 2<sup>nd</sup> years 9 September 2015*

*6.2 Focus Group Two Transcripts 2016 Horticulture 3<sup>rd</sup> years 9 May 2016*

*6.3 Focus Group Three Transcripts 2016 Child and Youth Care 2<sup>nd</sup> years 5 May 2016*

*6.4 Focus Group Four Transcripts 2016 Maritime Studies 1<sup>st</sup> years 23 August 2016*

### **6.1 Focus Group One Transcripts: Video Technology 2<sup>nd</sup> years Wednesday 9<sup>th</sup> September 2015**

#### **Q 1 Which video clip impressed you the most and why?**

The group felt all three videos were relevant but were unanimous in their selection of shorter more graphically stimulating clips as contrasted with the lengthy but informative documentary style.

#### **Q 2 What attracts you personally to nature and how do you connect to nature?**

One respondent noted that she enjoyed the use of natural venues such as the DBG as a great stress reliever just to be quiet and still. Others mentioned visiting the farm, going to the beach, enjoying one's home garden, while other respondents stated he enjoyed camping particularly in the Transkei.

Great debate centred on the role and purpose of nature reserves. Many black respondents saw no need to visit a reserve or park – "I can see forests on the farm." "I grew up on the farm, I saw birds and wildlife on a regular basis, I see no need to visit nature reserves and pay money to see the same things." "The people with the money have the leisure time to visit nature reserves, the majority of Africans are out there working for money to survive."

High entrance fees were seen as part of the problem but visits seemed pointless for some respondents since nature could be encountered free of charge in the rural environment. Another student disagreed stating that she visited Paradise Valley

Nature reserve in Pinetown regularly just to enjoy the aesthetic beauty and colour of the plants and the surroundings and that this was different to the farm environment. A similar point of view was expressed by Rose.

*Visiting a nature reserve grounds me. The air smells different. It restores my energy levels. The development there is sympathetic to the natural pristine environment, the links between biodiversity are clear... that for me is the big difference between visiting a nature reserve and a farm where nature has been manipulated*

These opinions have been articulated in the literature and reflect two clear views of nature, in the first nature is seen as pristine and unspoilt (autarky) and humans are part of this system while in the second view humans are separate from nature and the latter is viewed purely as a resource existing for the sole benefit of humankind (Buijs *et al.*, 2008: 71).

**Q 3 How important do you think local biodiversity is for your everyday life?**

*Realistically for Black people it's not that important it comes last, people need to be fed*

*It's not that we don't care it's just it's the least of our worries*

*Every group has financial cares and needs, we need to have a balance so we need to give attention to conservation*

One of the respondents posed the concept of the need to protect the environmental commons for the greater good. She posed a hypothetical suburban problem and asked the group to imagine removing the entire PVNR to make way for low cost housing, a scenario which would benefit the recipients of the housing however the resultant loss of the forest would affect the local microclimate adversely for all residents in the vicinity. Local research has claimed that temperature at PVNR is 2 degrees lower than the Southern Freeway two kilometres distant (Hemson, 2015:167). In summation biodiversity was given greater prominence by Asian, coloured and white respondents and the group agreed that biodiversity benefitted all citizens regardless of their socio economic standing

**Q 4 How and where would you best like to connect with local biodiversity?**

Addressed in Q 2

**Q 5 Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?**

Not addressed specifically in the allotted time

**Q 6 What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?**

Not addressed specifically in the allotted time

**Q 7 What role do you think race and culture plays in an individual's perception of nature?**

This question provoked a lengthy and spirited debate with good levels of participation.

The focus group agreed that issues of race and culture play a key role in determining and shaping an individual's perception of nature. A key issue was the use of traditional African medicine by most South Africans. Black student respondents were united in their support of the validity of this treatment and demonstrated first hand experience of being forced to drink 'unpalatable' plant medicines by an aunt or grandmother conceding it led to an actual improvement in health. They differentiated in the use of plants for healing properties as administered by the traditional herbalist (*isinyanga*) and the use of plants in the magical paranormal realm as applied by the *sangoma*.

A specific example was cited of spitting out a plant concoction with the express purpose of attracting a past lover, a story corroborated in the literature (Mc Kean *et al.* 1995). The plant *Ansellia gigantea* (Leopard orchid) is readily obtainable at the Warwick Avenue *muthi* market literally a five minute walk from the campus. An Asian respondent opined that traditional herbalists took advantage of indigenous peoples perceptions by 'milking' the system making ordinary healing remedies appear more mystical and secretive than they really are. In discussing the fact that traditional medicinal plants are under threat in the wild considerable heated debate was generated.

A black respondent (Pamela) felt that (white) conservationists were hypocritical in asserting this view since White owned pharmaceutical companies extracted high volumes of plants from the wild to use in their drugs which were sold at high profit while in her experience black herbalists only extracted small portions of plant parts from the wild. She stated her aunt who was a traditional healer believed in harvesting the authentic plants from the wild to avoid the use of 'fake plants'. While the scientific veracity of these claims may be successfully challenged<sup>23</sup> the perception that was

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<sup>23</sup> The respondent was unaware that multinationals generally harvest plant extracts from monoculture nursery and farm stocks and that forestry companies such as SAPPI create single species plantations not forests

strongly held was one of 'eco hypocrisy' on the part of the multinationals. These issues she felt were related directly to the economics of money and power. Pointing to another issue of hypocrisy one of the respondents resented the fact that Blacks were criticised by the conservation movement for rural hunting for food while white hunting in selected areas was sanctioned.

## **6.2 Focus Group Two Transcripts: Horticulture 3<sup>rd</sup> years 9 May 2016**

### **Q1 Which video clip impressed you the most and why?**

The first video impressed me the most since I realised that what is happening to animals (extinction) could happen to us humans in the long run. [The award winning emotive video "*We're all in this together*" was produced for the UNEP Year Of Biodiversity in 2010. The closing lines of the video concluded: "Today it was the sparrow tomorrow it could be you." Some took this literally and wrote that sparrows are diminishing due to human activities]

The video on the sparrow had a strong message at the end which leaves one thinking (repeated likes)

It can appeal emotionally to anyone causing them to rethink everything and start conserving nature

I liked the video *Introduction to biodiversity* by the Danish Council for the Environment that showed the number of known organisms on earth

For me I thought the clip from Vancouver Film School (VFS) with its high graphic content would be most attractive to communicate with SA Youth. The icons and pictures were well used to communicate the message (repeated likes)

The VFS clip amazed me for example we have 80 000 food plants in the world but we only use 30 of these

The VFS clip shocked me how ruthless human beings are

I like the 11<sup>th</sup> Hour video by Leonardo di Capriccio that tells us it's the new generation's chance to change the world. I realise I can make a difference to my community through reducing electricity use and introducing solar energy

### **Q 2 What attracts you personally to nature?**

Creation itself is unlimited and able to bounce back... it amazes me as an individual how God has created and connected everything

I like the perfection of plants their functional and aesthetic qualities

It's unlimited, the complexities of design and interaction between species

The beauty of nature attracts me... the set up of landscapes and how everything fits together without any human involvement (sublime and pristine nature)

It's pure and untouched giving an individual a therapeutic effect when stressed

The ability of nature to endure damage and repair itself (resilience)

The colour green gives me peace... it paints a picture I my mind

*[Note: The beauty, tranquillity and peace reflected in nature was a common theme together with an admiration for the complexity and resilience of biodiversity]*

### **Q 3 How important do you think local biodiversity is for your everyday life?**

Local biodiversity provides our country with spectacular scenery and wildlife viewing as well as natural products and medicines that can economically benefit the community

The products of biodiversity are used to supply Food and nutrients, medicine and building materials

The services biodiversity supplies such as water, air purification and solar energy

It's actually my life the oxygen we breathe, the food we eat

Local biodiversity gives you a sense of belonging and brings you back to your roots because its local and not foreign.

Local biodiversity is overlooked ... our local biodiversity defines us- if its healthy we will be healthy too

I can even say it is part of my life, what I eat, what I wear, where I live

*[Note: Many respondents gave generalised answers very few gave examples from local biodiversity but answered by describing ecosystem products and services]*

### **Q 4 How and where would you best like to connect with local biodiversity?**

I like visiting the Lion Park at Mpushini as well as the SANBI national gardens In Pietermaritzburg

I go to the rural area where everything is natural

I like going to the Drakensburg, that's where I connect with nature, mountain hiking and sleeping in caves

Going to the beach, swimming and watching the waves gives me hope (repeated several times)

I would like to be a landscape designer and install indigenous plants into domestic and commercial gardens and remove alien weeds

I like walking in the forest, enjoying the silence and calm, I like to feel part of it taking pictures making connections

In the garden where there is peace and green

Camping in the mountains which are larger than life

Camping in the bushes where there is limited technology, no networks or interference with the outside world... Actual connection to nature is better than virtual connection.

In my back garden climbing by opening the window

Gardening...working with the soil, touching the worms and snails kinda makes me fearless. Wherever I am with nature I get a feeling of finding myself

Hiking and climbing mountains, I like to exercise and view the nature clearly

I like to connect with nature personally rather than watching on TV.( Nevertheless most respondents watched DSTV programs such as Nat Geo Wild on a regular basis)

I like to connect with local biodiversity by going to the botanic gardens.

The best area to visit would be the closest such as D'Moss and Pigeon Valley where I would get a direct connection rather than watching it on TV

*[Note: Wilderness (Sublime nature) getaways were preferred; beach, bush and burg with actual nature experiences taking precedent over virtual vicarious experiences such as TV. Experiencing the joys of gardening and viewing plants at the Durban Botanic Gardens]*

**Q 5 Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?**

Yes it does- looking at the words 'bio' meaning life and 'diversity' which refers to variety, for me the term is explanatory and does have relevance

The word has relevance since it's the best combination of life and variety and people already know what you are talking about.

Biodiversity is not a new concept... Blacks hunted and kept livestock and knew they were dependent on nature for survival so it's really a matter of interpretation

My opinion is that the average person cannot relate to scientific jargon. Even if they have an interest they will feel like it is 'for experts only'. The term biodiversity creates the idea it's about plants and animals when in fact it includes the whole system including the built environment

Yes there are many definitions and meanings but for me "it's the variety of plants and animals in the world or in a particular habitat and their interactions." This says it all

Most people in the rural areas are less concerned about biodiversity, some because of a lack of information and others because they don't want to be educated

Most people in Africa are uneducated and not really concerned about scientific messages/adverts about biodiversity they are more concerned with survival

I don't think biodiversity has meaning to the average person since it's a scientific word which is difficult for the average person to understand. For scientists to communicate with average people the government must be involved.

No, it has no relevance to the average person, only to scientists and educated people

No I don't think it has any relevance to the average person who thinks the use of the term is for educated people. Therefore action should be taken to change this mentality

No people won't understand unless you teach them, the word nature should be used instead

The term has become 'lost in translation', possibly 'nature' is a simpler word to understand, for example Ezemvelo Nature Conservation Services in KZN

Scientists are not trying to force their views but the term itself is scientific and not easily understood by the layman.

It has to be made clear, when miscommunication occurs the word loses its meaning

With proper implementation the term can be brought to everyone's attention

*[Note: Most respondents believed that the term had value but only once it had been explained fully. They felt it was inaccessible to the average uninformed person and that the word nature was a more understandable substitute]*

**Q 6 What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?**

I don't think these can play a large role since if a person is not interested in Biodiversity they can just skip these messages, rather use celebrities to promote biodiversity in soaps and movies

Social media can play a huge role to those who are already informed about biodiversity. The uninformed will however ignore these messages even if they were posted to their FB wall

Adverts on social media could be used to spread the biodiversity message however these could be easily ignored

Almost everyone has a cell phone so people can be educated through them

Yes, Social media is very influential on youth for better or worse and catching them with a medium where they spend the most time could point them in the right direction. (*The question is HOW??*)

It's not playing a role yet but they (unnamed) should create apps on cell phones because everyone carries them around ... the app should have some sort of information about nature (*The question is who?*)

It's a great communication tool to raise awareness on biodiversity

Modern media via cell phones can create an awareness of biodiversity loss... individual stories about biodiversity need to be shared and how to conserve nature for the future

Modern social media with the likes of FB, You tube, Twitter can be vital in communicating the biodiversity message to young people of today since that is where they spend most of their time.

Communication through Social Media may aid a clearer understanding as most people are massive on technology gadgets and sites and word would spread easily

Open a chat group about why biodiversity is so important

Social media can raise biodiversity awareness... post pictures with small amounts of text

Social media is a source that can be used to develop an understanding of biodiversity for young people

Social media can raise Biodiversity awareness on a daily basis

*[Note: Most respondents believed social media could play an important role in spreading the biodiversity message but failed (apart from a few excellent ideas) to spell out HOW OR WHO, WHERE AND WHEN this process would roll out]*

**Q 7 What role do you think race and culture plays in an individual's perception of nature?**

Rural blacks are not exposed to ideas of biodiversity (the word ignorant was used frequently)

History has much effect to us blacks. Our upbringing plays a large role, for example in the rural areas we are taught to kill a snake before it attacks you.

Most Zulus don't believe in going to hospitals they prefer using *inyangas* and traditional medicinal plants for healing

Black people living in rural areas know and respect nature, the problem starts when they move to the cities and they are caught in between the influence of their Black culture and the new Western Culture

Black people cut down trees for two reasons, they believe some trees attract lightning and in rural areas trees are cleared traditionally for visibility to spot the enemy

Black individuals prefer living on a site which has a cleared environment

Swazi home owners keep their living areas clear of all wild plants and animals since most of these bring bad luck and are dangerous

Traditional African rules for nature conservation should be used today

The present (Black) generation is more aware and informed of nature than the previous generation – the racial and cultural perceptions have changed as technology advances

Rural people conserve the biodiversity they use for example medicinal plants and firewood

Why is there a stigma or perception that only some type of people (whites?) should conserve?

In urban areas Black people remove trees since they are believed to harbour snakes and crack buildings.

Traditional healers only remove a portion of the bark as to keep the tree alive, not all trees are removed for firewood some are retained, not more than one python may be killed at a time. Conservation in rural areas has been traditionally practised for years

Race, religion and culture play a big role in an individual's perception of nature

*[Note: Again this elicited much debate with respondents generally divided into rural and city dwellers indicating some form of cultural tension informed versus ignorant. A clear sense of identity centred around upbringing, cultural norms and place]*

### **6.3 Focus Group Three Transcripts: Child and Youth Development 2<sup>nd</sup> years 5<sup>TH</sup> May 2016**

#### **1 Which video clip impressed you the most and why?**

The colourful graphics of the VFS clip helped me understand the biodiversity concept in depth

I liked the video *Introduction to biodiversity* by the Danish Council for the Environment. It was informative and explained the concept clearly, now I understand the term

The colourful graphics of the VFS clip helped me understand the biodiversity concept in depth

I like the 11<sup>th</sup> Hour video because I saw real events that I can relate to like draught, poverty thirst and malnutrition

*Note : The majority of this group favoured the emotive IYOB video clip followed by the colourful and fast paced VFS clip and found the WWW Danish clip too slow and boring.*

## **Q 2 What attracts you personally to nature?**

The ocean fascinates me, how much water there is, the living sea creatures and the damage it can do when angry

The fact that the waves do not exceed their limits like at the Sun Coast Beach. Why is that?

The resilience of nature – it's able to look after itself... such as the sea

Nature is not attractive ...it's addictive

What fascinate me is the interaction of components for example the photosynthetic process where the plant uses its green leaves to create food

The resilience of nature – it's able to look after itself... such as the sea

The water attracts me, the way it moves, the sound it makes and most of all the spiritual healing it has on me

I like the way that nature smells, the fresh air in the forest

The sound of the river or sea attracts me, there I can easily connect to myself

Nature shows me how powerful and Great God is with his glorious creation

The smell of rain on tar

Flowers know just when to open at sunrise and close at sunset

*[Note: The beauty, tranquillity and peace reflected in nature was a common theme together with an admiration for the complexity and resilience of biodiversity]*

## **Q 3 How important do you think local biodiversity is for your everyday life?**

It sustains the health of that country or community

Without biodiversity our lives would be incomplete

Nature supplies us with life (repeated)

I believe biodiversity contributes to the country's economy

Each organism has its own role to play and contributes to the survival of the other

*[Note: Many respondents gave generalised answers very few gave examples from local biodiversity but answered by describing ecosystem products and services]*

**Q 4 How and where would you best like to connect with local biodiversity?**

By camping I'm able to witness waterfalls and view new animals

In the forest because that is where the most species are found and it is so peaceful there.

I like the mountains of the Eastern Cape such as Mt Ayliffe

I like gardening at home and buy plants from Tropical Nursery. I enjoy my domestic animals. I feel unsafe when I see rats or frogs. i am scared of them

I normally go to the farm where I can go to the river and swim or go to the forest and collect fruits

*[Note: Wilderness (Sublime nature) getaways were preferred; beach, bush and burg with actual nature experiences taking precedent over virtual vicarious experiences such as TV. Experiencing the joys of gardening and viewing plants at the Durban Botanic Gardens]*

**Q 5 Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?**

It's too scientific and sounds too serious like a difficult module or subject

I think I'm close to understanding the biodiversity concept

It's intimidating and causes anxiety I prefer the word nature

**I think I prefer the term nature because when you hear the term biodiversity it makes you think long and hard. Like what is this now? What has it got to do with me?**

Yes the scientists are forcing views, why don't they use a simple word like nature?

It can have meaning for the average person since everything we have comes from biodiversity

No the name itself is scientific, one needs to Google it first before trying to answer any question related to it

The meaning of the term makes sense. Bio for life, diverse for different

It becomes relevant only after you understand the term (repeated)

No the average person would prefer the term nature (repeated)

It doesn't have meaning without explanation but the core concept is easy to follow

People tend to ignore biodiversity because they do not find it interesting and choose to focus on other things rather than learning about nature and life on earth and how to preserve it

Yes It can have meaning and relevance to the average person it depends on how you approach and deliver the message to people

Yes, it has meaning, the information given to us by scientist's means that each of us can contribute to the life of each organism

*[Note: Most respondents believed that the term had value but only once it had been explained fully. They felt it was inaccessible to the average uninformed person and that the word nature was a more understandable substitute]*

**Q 6 What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?**

It's a convenient place to share ideas and chat about biodiversity (repeated)

Get the cell phone networks to sponsor a biodiversity advert that appears as a welcome screen each time you switch on your cell phone (repeated)

Develop biodiversity games or apps that will teach the young ones while having fun

A game can be developed where people can earn money or tokens for saving the environment

We can share inspirational videos on FB

We need more TV Adverts that emphasise the importance of nature

By sharing and talking about things that affect people in terms of biodiversity, how it is tarnished and how to make it right

Because most people engage in social media it will spread the message faster

We could use all the social networks to pass the message on

*[Note: Most respondents believed social media could play an important role in spreading the biodiversity message but failed (apart from a few excellent ideas) to spell out practicalities HOW OR WHO WHERE WHAT WHEN would do this]*

**Q 7 What role do you think race and culture plays in an individual's perception of nature?**

Yes, blacks use medicinal plants for home remedies, the beach as a baptism venue and believe that God created everything

Black people are not that crazy about the environment. They are never taught how they can sustain the earth

Children are not taught the importance of nature and how to conserve it

One can choose to differ from what you have been taught as a child

It's our God given right to use the natural resources around us. It's part of our upbringing and I never heard anything different. That thinking gets passed on to each generation. How we are raised creates our perceptions (repeated)

Black people are scared of lightning and whites are not

White people treat their animals (dogs) better treating them like humans while blacks generally mistreat them [Note: This is contested ground depending on context and background. Young Zulu men taking part in traditional hunting breed and care for their animals, the best dogs fetching high prices]

I personally think that whites are more concerned about nature than black people. I think we need to adopt this way of thinking because it's important to take care of nature (repeated)

The way some cultures use nature is inappropriate, for example *sangomas* use medicinal plants that they know are rare

Some cultures (white) believe that animals have nothing to do with luck while other cultures (black) see certain animals as bringing bad luck and associate them with witchcraft

Ritual slaughter of cows is not approved by other cultures and races

*[Note: The overwhelming feeling in this group was that whites are more interested in caring for the environment than black people. The group believed the session had raised their personal levels of biodiversity awareness of and felt this enriched them as human beings.]*

## **6.4 Focus Group Four Transcripts: Maritime studies focus group 23 August 2016**

### Verbatim

#### **Q 1 Which video clip impressed you the most and why?**

The first video (IYOB) was touching and very deep (repeated)

The first clip was filmed in grey since without biodiversity we have no hope. It showed the real impact which is urbanisation

The message of the IYOB video was straight to the point and very understandable (repeated)

I liked the video *Introduction to biodiversity* by the Danish Council for the Environment. It was informative and explained the concept clearly, now I understand the term

#### **Q 2 What attracts you personally to nature?**

The fact that nature is capable of achieving engineering feats, for example the redwood grows so tall and outlives humans

I am personally linked to nature because I am from Nature

I enjoy the tranquillity and peace nature gives us. With our busy and hectic fast lives it's so easy to get overwhelmed by the world. However the peace of nature puts us in a tranquil space where we can relax and be caressed by it. (repeated)

It is the role that it plays in traditional medicine as it is one of the undiluted things that is held dearly by the Africans

It's the ability to sustain and regenerate itself (repeated)

Nature is beautiful it gives me the knowledge that God is alive (repeated)

To me nature is proof God exists because of its marvellous balanced systems

Nature can repair itself... even my life is tied to nature

*Glory was given to the Creator for an intricate, complex and resilient life support system and students were able to make the textbook linkages regarding their dependency on biodiversity for its benefits, goods and services*

**Q 3 How important do you think local biodiversity is for your everyday life?**

Climate change affects our plants. I remember in December the mango trees would be full of ripe fruit. There used to be so many fireflies as well. Because of climate change this never occurs any more

At night my dog Spike keeps watch and in the morning birds sing very nicely

**Q 4 How and where would you best like to connect with local biodiversity?**

I like to sleep in a garden of tall plants like the botanic gardens and close my eyes when thinking about the future

I connect by gardening and farming, cultivating crops and removing weeds

At home in the countryside (rural areas)

I visit EpheZulu wildlife zoo in Pinetown

Its more effective and stimulating to engage with nature physically such as in a garden or nature reserve

Visiting the Nature reserve at Imbali

I go surfing like the whites, feeling the sea breeze

I like to go fishing

I connect with nature by hunting and fishing at Uthukelariver. There I see many plants and animals and fresh fruits

Engaging with nature physically is always the best way. Going to rural areas is always best. There the biodiversity is untainted and pure (repeated)

I like to visit the wetlands particularly the Great St Lucia Wetland, to see Crocodile creek and the snakes, birds and wildlife ecosystems of uMtubatuba

I pray on the mountain or in the forest to connect with God

**Q 5 Do you think the term has any relevance or meaning to the average person or is it just scientists trying to force their views on the public?**

Nature is for everyone- it's just that the awareness is not there.

The term has relevance in urban areas, in the rural areas it's not relevant since people there still have their bond with nature

It just defines what I've been seeing my whole life – the variation of plants and animals

The term is too technical, a person in accounting would not know what biodiversity means

It's a good term when you are taught about it then it becomes more clear

It's just a technical term which has no effect on the average person. I was not in the science stream so I disliked scientific words just like any normal or average person

An average person is just trying to survive and accumulate wealth and doesn't really care about the environment as long as he/she gets what they want .

**Q 6 What role do you think modern social media (FB, You tube, Twitter) and cell phones can play in communicating the biodiversity message?**

Social media should have more pages dedicated to nature. Nature conservation students should tag their friends and educate them about nature

Social media is a great way of connecting teenagers to biodiversity

Social media is very effective and influential. Celebrities get paid to endorse brands and clothing on line. Using social media would reach a lot of people at the same time

It can't communicate the biodiversity message since you need to feel nature – it's a physical process

Videos on you tube could educate people about biodiversity

People can use social media to chat about biodiversity

I don't want to connect to nature via these media because if that's the case you wouldn't go outside to connect with the real nature

It won't play any role since people active on social media are trying to get away from the world's problems. Bringing biodiversity to social media will really irritate them

I would rather interact with nature directly than look at pictures or text

I prefer connecting with nature physically using my senses (repeated)

Well the youth of today are fixated on technology so maybe we can use these tools to get the biodiversity message across. This is not only time efficient but cost effective.

Social media takes away the opportunity of today's generation to experience and observe nature. We are always so glued to our phones that we don't even pay attention to nature

No, I prefer to connect and bond with nature directly not using social media (repeated)

Cell phones already play a role in capturing pictures of nature

Scientists can post biodiversity update on social media

### **Q 7 What role do you think race and culture plays in an individual's perception of nature?**

It plays a large role since race and culture shapes a different respect for nature and its uses (repeated)

Blacks take nature for granted for example in my community they cut and sell trees for firewood since there is no electricity

Blacks use plants for traditional medicine while whites cut down trees for roofing

Zulus conserve *umhlankosi* trees – in Zulu culture plants can carry a dead person's spirit. This tree is conserved and not cut down (repeated)

I think we need to be united because nature involves all of us and leave behind this mentality that says Zulu's destroy nature and it belongs to the Whites only

This is a trick question. South Africans need to be united in conserving nature and leave racial issues behind us

If we continually see things in racial terms we will not make progress in conserving nature, we need to share our knowledge

### Traditional superstition is absolute nonsense

Nature is very powerful and can be used for evil. You would not believe me if I told you a person could actually direct the path of lightening

Black people appreciate plants since they use these for medicinal purposes

Africans conserve nature for its medicinal benefits while the western population conserves nature for its beauty

### Nature is important regardless of our pigmentation

I personally think that the perception of nature changes through each generation. There is always this perception that race or cultures think differently trying to separate us.

Perceptions are taught. People growing up in rural backgrounds have a different understanding of nature. They think of Zulu herbs, practising witchcraft and healing people as well as building shelters. When they see buck they think of hunting. They grew up in families that share the same perceptions

Different races have different preferences. Some consider conserving nature for future generations while others just get by to survive and don't consider future generations

We conserve nature differently as regards racial backgrounds and cultural purposes. Some people conserve nature for the purpose of harvesting medicinal plants others conserve for economic benefit

White people like to think they conserve nature whereas they went around colonizing and urbanizing other people's areas and changing their way of living. Black people have a bond with nature. White people feel guilty because of destroying nature then they tell us about biodiversity.

Yes – It's through your upbringing that you perceive how nature works. We were told to kill snakes, now we understand that they are part of nature

Since I grew up in a rural area I was taught about nature by planting crops.

### Discussion and analysis

*Glory was given to the Creator for an intricate, complex and resilient life support system and students were able to make the textbook linkages regarding their dependency on biodiversity for its benefits, goods and services. Physical not virtual*

*connections with nature were emphasised with many students preferring the benefits of rural farm life, as one respondent expressed it; “Engaging with nature physically is always the best way. Going to rural areas is always best. There the biodiversity is untainted and pure.” Students were divided on the use of the term biodiversity with some expressing their dislike of scientific words and others feeling it was a great concept once fully explained to them.*

*The use of Social media also had its dissenters with many students feeling it had little or no place in spreading the biodiversity message. Techno nature or virtual nature they felt could never replace the sensory enjoyment of direct experiences with nature. One student lamented the fact that her generation was “glued to their cell phones” and felt this technology kept them away from the real nature. A few respondents felt the technology had potential as an economic and effective way to spread the biodiversity message. Discussion on how race and culture influenced biodiversity perceptions again provoked some refreshingly honest and conflicting comments. Perceptual differences were attributed to diverse childhoods in either rural or urban areas with the former having stronger bonds to the “real nature”. The use of traditional medicinal plants emerged as a strong unique cultural feature of how Africans interacted with biodiversity. One black student confided he knew someone who could direct lightning at will while another older black student rubbished African superstitions as pure nonsense. He felt that ritual washings at funerals with Isiqungaor Lemon grass (*Cymbopogon nardus*) was pointless. This echoes Shumba’s assertion of the conflict between traditional and modern thought in African scientific paradigms (1999, 2011). Others in the group felt that as young South Africans issues of race and culture were divisive and that a united effort should be made to conserve biodiversity regardless of pigmentation. Stereotypical perceptions of blacks destroying nature and whites conserving it had no place. Another respondent blamed colonialisation for the destruction of biodiversity stating blacks had a strong existing bond with nature. In his own words “White people feel guilty because of destroying nature then they tell us about biodiversity.” The value of direct student discussions and engagement in this thesis has therefore been instructive in constructing an accurate picture of student perceptions of biodiversity.*

## 6.5 Focus Group Briefs

### 6.5.1 Brief for Grp 1 Video technology focus group

“My own personal Botanic Gardens”  
Lets Talk Nature



#### Purpose and background

The purpose of this focus group is to **explore different dimensions of the human-nature relationship**. Scientists use the term biodiversity to describe the immense variety of plant and animal life, some of which are displayed at the Durban Botanic Gardens (DBG) literally 10 minutes from the city campus. These gardens are many different things to their visitors, some hold picnics, you will have bird watchers, tourist and school groups and of course plant fanatics. Finally others come just to escape city life and its stresses. Each has a different motivation for their visit and each establishes some sort of personal connection with nature.

#### Task

Your task is to reflect and capture **your OWN personal encounter** with the gardens and record it in an edited video clip of between 3.50 and 5 minutes. Visual material must include some plant and animal element. Visuals may include graphics, line drawings or paintings. (Sources must be acknowledged in the credits). There must be a soundtrack or narrative with the piece. This may take the form of a script, poem or song – it's up to you. This is not a documentary piece on the gardens it **shows your own unique encounter and feelings toward nature**. We are looking for a WOW factor, something exciting that will attract the youth. You can keep a copy for your portfolio or post it on your social media sites after I have received a copy of the final piece by 14<sup>th</sup> October. All satisfactorily completed projects will be entered into the draw for the Hero 3 GoPro prize.

Good luck and if you have any questions at all please email me [jonathan@dut.ac.za](mailto:jonathan@dut.ac.za) or phone me at 0833204335 Thank you for taking the time and effort to participate.

Jonathan

## 6.5.2 Brief for Focus groups 2-4 “My own personal biodiversity” A2 Posters



### Focus Group “Let’s Talk Nature” Making posters and story boards ‘My own personal biodiversity’

- You are required to make an A 2 colour story board /poster that reflects YOUR personal interaction with local biodiversity at either a nature reserve (Pigeon Valley) or public garden (Durban Botanic Gardens) The group will be divided equally for each trip.
- You may work in pairs for this brief
- 90 % of Images must be your own. Pictures can be taken with your cell phones. Internet images must be acknowledged
- IMAGE QUALITY (clear in focus), neither too light nor too dark and definitely not stretched or pixelated) is very important as is the LAYOUT of the story board (not jumbled or squashed) with a good flow, colourful and creative
- A ratio of 70 % image and 30% text is suggested. We suggest you work in PP or Microsoft Publisher
- Choice of images plants or animals is entirely up to you – it must connect with your main theme or story
- In terms of theme the poster MUST reflect your understanding of biodiversity and what it means to YOU PERSONALLY...you can do some internet research on the site but remember this piece is not a documentary. Suitable quotations, appropriate song lyrics and poems (your own or gathered) will enhance your piece. ***Find and describe your own connection to the site and its plants, animals and unique features.***
- Posters must be submitted by \_\_\_\_\_ in hard copy with electronic copies (pdf) mailed to [jonathan@dut.ac.za](mailto:jonathan@dut.ac.za) by this date

## 6.6 Selected Focus group posters

N.B MDLALOSE – 21638489  
 B.N NDEBELE – 21640636  
 M.S NXUMALO – 21632318  
 S.N THUSI – 21609378

# MARINER'S BIODIVERSITY CHART

- BIODIVERSITY IS THE LIVING OF DIFFERENT PLANTS & ANIMALS IN ONE AREA.
- IT IS UNDER THREAT BECAUSE OF ALIEN PLANTS, AMONG OTHER THINGS.
- PLACES LIKE BOTANIC GARDENS CONTRIBUTE IN PRESERVING BIODIVERSITY.



GREEN



## SYZYGIUM CORDATUM

- ALSO KNOWN AS UMDONI.
- BELONGS TO THE MYRTACEAE FAMILY.
- AN OVERGREEN WATER LOVING TREE, FOUND IN EXTREMES.
- WE USED TO EAT ITS FRUIT WHEN WE HERDED COWS, AS HOME WAS TOO FAR FROM THE FIELDS.
- ALSO HELPS THE RESPIRATOR AILMENTS AND TB.
- FOUND IN KZN



MYRTACEAE  
 Syzygium cordatum  
 Umdoni Tree, umdoni  
 KZN to Tropical Africa



**CONCLUSION**

- THE ENVIRONMENT WHERE BIODIVERSITY EXISTS NEEDS TO BE TAKEN CARE OF PROPERLY.
- DOING IT TOGETHER WILL HAVE A HUGE IMPACT
- THIS ENSURES THE SUSTAINABILITY OF BIODIVERSITY

HOLDING HANDS IN BIODIVERSITY



# Cycads

E Brophy-Tintinger 21642210 AP Ntombela 21600339 TS Masango 21633635 N Moshesh 21608007 B Sabela 21640194



Cycads can be 1000s of years old. In respect to traditional beliefs, they contain ancestral powers. In the Zulu culture the *Encephalartos woodii* (Wood's cycad) *isigqiki somkhovu* is said to protect the family against bad spirits and burglars.

South Africa is a HOTSPOT for diversity. It has 38 cycad species (37 species of ENCEPHALARTOS and one species of STRANGERIA) our aim was to explore the wonders of this indigenous species.



Cycads do not produce flowers. Male and female reproductive organs develop on separate plants (DIOECIOUS). Male plants produce egg-shaped cones that are usually yellow to brown in color. Female plants develop ovules and seeds on leafy structures called sporophylls.



An original poem:

The Cycad, Bot Gardens Granddad, *Encephalartos woodii*  
As big as a tree

# GOD'S PRESENCE IN NATURE AND DIVERSITY

Natures beauty is said to be the masterpiece of God. This is how we connect with God and get to appreciate all that we are. Our local Botanical Garden showcases all the different variety of the almighty's creations. The diverse range of Flora and Fauna within their own biological families and without shows us truly the power and effect that Gods grandeur brings forth.

"But ask the animals, they will teach you, or the birds in the sky, and they will teach you;

or speak to the earth, and it will teach you, or let the fish in the sea inform you. Which of all these does not know that the hand of the LORD has done this? In his hand is the life of every creature and the breath of all mankind." Jobe 12 v7-10



The varieties of different families of this orchard house consist of Phalaenopsis family (Harlequin Phalaenopsis; Phalaenopsis Hybrid; Phalaenopsis Join Grace; Phalaenopsis Penang Girl; KV Charmer; Phalaenopsis Amabilis) Cattleya Family; Encyclia brassavola; Schombolaelia Summit; Ctt. Portia Coerulea; Guarianthe skinneri) Oncidium Family (Oncostele Wildcat; Oncidium Golden Afternoon etc.) and many more.



"God's Grandeur" (1877)

The world is charged with the grandeur of God.  
It will flame out, like shining from shook foil;  
It gathers to a greatness, like the ooze of oil  
Crushed. Why do men then now not reck his rod?  
Generations have trod, have trod, have trod;  
And all is seared with trade; bleared, smeared with  
toil;  
And wears man's smudge and shares man's smell:  
the soil  
Is bare now, nor can foot feel, being shod.  
And for all this, nature is never spent;  
There lives the dearest freshness deep down things;  
And though the last lights off the black West went  
Oh, morning, at the brown brink eastward,  
springs—  
Because the Holy Ghost over the bent  
World broods with warm breast and with ah! bright  
wings.



**OUR OWN PERSONAL BIODIVERSITY**

In a world of buildings and roads your beauty gives us a different view  
In a world of ups and downs the calm waters calms us down  
In a world of uncertainties you give us stability and peace  
In a world polluted by industries, cars and dirt you give us a fresh pure fragrant  
In a world where it is all about taking and taking you teach us to take to give  
In a world of lost hope you give us hope biodiversity...  
(poem by Sithabile)  
Sithabile Buthelezi 21353515  
Nokuthula Shezi 21439417



# OUR OWN PERSONAL BIODIVERSITY

PARADISE FLY CATCHER



THIS TREE IS A POLLINATOR



FICUS SUR

CUSSONIA SPHAERO-CEPHA FOREST CABBAGE TREE



Cussonia sphaerocephala is the largest of the South African cabbage trees



PURPLE CRESTED LOURIE

KING FISHER



WHEN DINGANE AND HIS MEN WERE IN WAR THEY USED TO EAT FRUITS FROM THIS TREE



DINGANT'S APRICOT/ CHAETAENE-ARRSTATA/ UMQOKOLO

WORK DONE BY NTOKOZO SHEZI AND THEMBSA NGCIBO

BUCK WEED



These plants form dense colonies in the understory of forests where they provide food and shelter to many animals.



NATAL ROBIN

CAPE GLOSSY STARLING



BEING AT PIGEON VALLEY MADE ME REALISE HOW IMPORTANT NATURE IS. THE AIR AT THE FOREST WAS SO REFRESHING AND IT GAVE ME TIME TO THINK BECAUSE IT WAS SO QUIET AND I COULD SMELL THE FRESH AIR WHICH HAS NOT YET BEEN AFFECTED BY POLLUTION OF GASES. FROM NOW ON I WILL TAKE CARE OF THE NATURE FOR MY OWN BENEFIT.(T.NGCIBO). BIODIVERSITY IS THE VARIETY OF PLANTS AND ANIMALS IN THE WORLD.BIODIVERSITY BEAUTIFIES OUR WPRLD AND WE ARE HIGHLY DEPENDANT ON IT.THEREFORE I FEEL THAT WE SHOULD PRESERVE THE NATURE AND COME TO UNDERSTAND WHAT IT MEANS TO HUMAN NATURE.(N.SHEZI)

USED TO HOLD UP FLAMES WHEN THE BUSH IS ON FIRE.



THORNY ROPE/ DALBERGIA

## My Own Personal Biodiversity



Nosipho Sibiyi. 21200459

I was truly blessed by the connection I had with the nature at the Pigeon Valley. I saw trees I have never seen in my life. The forest cabbage tree, figs, the thorny rope. I was also inspired to see the buck weed. Pigeon valley is one of the 25 nature reserve managed by Durban parks. Beautiful birds I encountered were the flycatcher, king fisher and the cape glossy starling. There was so much peace while I connected.

# B - O D - I V E R S -

## ZONKE AND LINDELWA GETTING IN TOUCH WITH LOCAL BIODIVERSITY.

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As we stepped into the world of nature, we experienced the Divine connectedness that once was in God's creation, in the Garden of Eden... Qhhi how we long to enter that sacred space once again, with the help of understanding our local biodiversity.



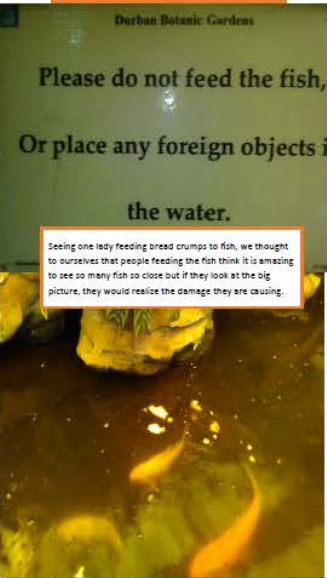
It is amazing how the bruises we see on nature can symbolize our internal and external personal bruises. Various abuse suffered by women, mostly physical, should be exposed as this camphor tree (Earth Mother) for the whole world to see.



As we came across this dry tree, we were reminded that whenever we go through different seasons in life, we should not despair but look at nature and learn that each season passes with time.



Dear butterfly...I have missed you, I remember my childhood days and how we used to be best friends walking side by side. Our walks vanished as trees and flowers were cut down when roads, houses and more big building developed...Now we meet again and my heart is pleased, I have missed you.



Durban Botanic Gardens

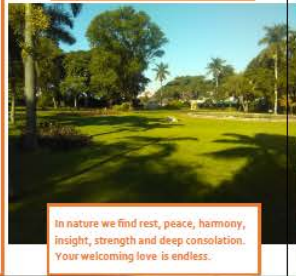
Please do not feed the fish,  
Or place any foreign objects in  
the water.

Seeing one lady feeding bread crumbs to fish, we thought to ourselves that people feeding the fish think it is amazing to see so many fish so close but if they look at the big picture, they would realize the damage they are causing.

The humbling effects of the tallest tree in the garden...  
From the day we arrive on the planet  
And blinking, step into the sun  
There's more to see than can ever be seen  
More to do than can ever be done  
There's far too much to take in here  
More to find than can ever be found  
But the sun rolling high  
Through the sapphire sky  
Keeps great and small on the endless round  
It's the Circle of Life  
And it moves us all  
Through despair and hope, Through faith and love  
Till we find our place  
On the path unwinding on the Circle  
The Circle of Life:  
[www.lionking.org/lyrics/OMPS/CircleofLife.html](http://www.lionking.org/lyrics/OMPS/CircleofLife.html)



Black and white in harmony...we see no discrimination in animals. We should learn that we are members of the same



In nature we find rest, peace, harmony, insight, strength and deep consolation. Your welcoming love is endless.

# B - O D - I V E R S -

CREATED BY ZONKE HLONGWANE (21554885) AND LINDELWA MKHIZE (2090378)

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## My Own Personal Diversity

### Nation Without Me

Imagine the Nation without Me!

I provide you with everything you need yet you still cruel towards me.

I'm the paper you reading, I'm the food you eating, I'm your shelter, I'm the air you breathing, Look at the tourists I'm bringing yet you fail to take care of me.

Look at the waterfalls, listen to the singing birds, not to mention the scent of the flowers mmmmmm...



Imagine the Nation without Me!

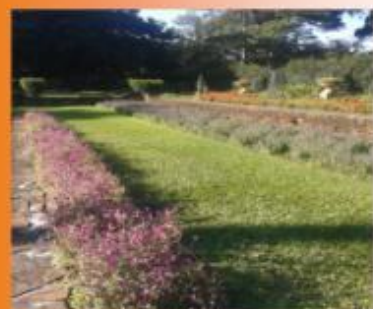
This is not only about You!! Think of the Beauty you Depriving your future generations, the greatness the Freshness They will never witness!

Start today and be a hero, protect me from dirt, stop abusing wild life, stop rhino pouching.

I am slowly dying somebody save me and I promise to give all life.



Imagine the Nation without me



## 6.7 Interviews and transcripts

Various people were contacted during the course of this study for their opinions and are cited in text as personal communication. In addition to this three key players<sup>24</sup> were interviewed in greater depth to elicit their views on the topic.

### **6.7.1 Transcriptions: Interview with Ms Mbali Mkhize UKZN CCMS Masters student at 4 September 2015**

#### **Explain your understanding regarding the role of culture and race in perceptions of nature**

*Biodiversity is not a huge focus for young blacks in the country since SA is a currently a developing country and the emphasis is on transformation, 'reconfiguring the system' with economic factors being prime indicators of success. Black youth are generally uninformed about biodiversity, there is a lack of information at the local level since larger issues dominate the cultural landscape. Historic Segregation via township systems and Bantu education systems have possibly limited exposure to the term. I remember learning about biodiversity in primary school (Margate Primary) and then as an active member in an ecoclub while at high school which was also a former Model C school (Port Shepstone High).*

*Studying within a university environment at UKZN meant that I was exposed to global issues such as climate change and was aware of the COP17 conference and its significance in Durban. So for me the term biodiversity has meaning however this could be the product of my advantaged educational background. English Language issues may also play a limiting role since for most South Africans since it is a second language. English speakers have a greater chance of a general understanding the term even if they cannot explain or define the term in great scientific accuracy. People can't contribute via civil society if they aren't informed and it appears that Government is not getting the biodiversity message through to the average South African.*

#### **On virtual nature and biodiversity communication**

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<sup>24</sup> These reflect opinions from a) A mature post grad student b) Botanical Education Officer c) Biodiversity Information and Policy Director

*As a person in my 20's most of the nature messages I receive come via electronic media. The packaging of the biodiversity message for the youth then needs to be appropriate to their interests and desires. Material items and their acquisition are of paramount importance to this age group (a view reiterated within the DUT focus group and within marketing literature of Naidoo etc 'Black Diamonds'). In formulating the biodiversity message consideration should be given to adapting the communication to the different age groups. Preference for online usage is via Wifi enabled cell phones so the role of social media is persuasive. One way to encourage the viewing of nature related You tube content could be to have 'mini trailers' that appear as adverts on other sites. These adverts have a captive audience and always take a few seconds for the viewer to close so by that time the seed has been sown.*

Note: Mbali reinforced the notion that the internet content of social media is both informed and created by the public (the 'prosumers' described by Goveas Malka, 2012) If one were to make the biodiversity message more appealing it would have to be packaged according to the known Lifestyle interests of its target market to hold attention.

## **6.7.2 Transcription Interview: Jody Fuchs Education Officer Durban Botanic Gardens 3 May 2016**

### **Theme One: Your career trajectory**

**Please explain briefly how you entered the horticultural profession.**

*Both my parents love to garden and this rubbed off onto me.*

**What were your major influences in high and junior school?**

**Junior School:** *My mother would water the garden daily after work and I would watch her. Also we would go to Southbroom on holidays and she would always fill the car with indigenous plants on the way back. We always had a beautiful garden at home. My father has always grown vegetables. He loves to compost his kitchen waste and eat from the garden. **High School:** My friend, Jonathan Da Canha's father used to take us bonsai hunting in Berea on weekends. We would scout for stunted *Ficus natalensis* in the bowls of street trees. We would wait till after it rained as they were easier to remove. I had a large collection of about one hundred bonsais in Std 7.*

**How did these shape your connection with Nature on a personal and professional level?**

*I have always felt connected to nature, it was how I was brought up.*

**How would you advise young people in high school on a career within the green industry?**

*I would advise them to spend time in nature with people who love nature.*

**Theme Two: Interpretation and biodiversity communication**

**It has been claimed that interpretation and environmental education are separate but linked disciplines. The former is a voluntary activity while EE has a captive audience. What is your view and how could they work together?**

*I view them both as modes of expression to communicate environmental values. In this sense they are similar. In the garden we weave interpretation in our programs but I have seen learners run to a sign while I was trying to communicate to them an environmental principle. I used their interest to exploit a learning opportunity based on the sign. In many ways the best learning opportunities are serendipitous.*

**The interpretive method and package as described by practitioners in the USA, UK and Europe is fairly formulaic and summarised in the EROT acronym. (Interpretation should be Enjoyable, Recreational, Organised and Themed) Isn't there something deeper than this surface treatment and how would you incorporate this practically into modern interpretation?**

*I think modern interpretation should capture somehow the language of nature and make it accessible to its subject. If structure prevents this than it potentially robs the viewer of an opportunity to connect with nature. However if structure provides this than there is no harm done.*

**How do you think we can influence today's young people ("Generation Y" 18-35 yrs) to a new fascination with plants and the wild when there are some many other competing attractions ?**

*I would advise them to spend time in nature with people who love nature.*

**What role do you see the social media playing in the above?**

*I am not entirely sure I can presume that social media can be a causal link to the development of environmental values in today's youth.*

**How do you think we can overcome the phenomenon of plant blindness?**

*Spend time in nature with people who love nature.*

**Do you think people (rank and file) can readily understand the word 'biodiversity' or should we use another term that is more easily understood?**

*I think they can. The difference is in degree not kind. What I mean is that biodiversity can be as simple and complex as you make it. We have made the concept of biodiversity accessible to Grade R's as well as graduates from Walter Sisulu and challenged learners from Golden Steps in Mahlabatini.*

**Theme Three : Interpretation and biodiversity communication at DBG**

**What are your future plans concerning biodiversity interpretation in the gardens**

*Linguistic accessibility is very important so I have started translating signs into isiZulu. Also I have a temporary sign project that aims to capture significant, yet brief, botanical events in the garden as they happen.*

**What overarching themes do you wish to convey to the visitors?**

*Active citizenship, Biodiversity, Ecology and Conservation*

**Would you like to see research on the efficacy of plant interpretation being carried out?**

*More isiZulu content*

**Any final thoughts on the topic?**

*"There is grandeur in this view of life" (Darwin, C. 1859:489)*

### **6.7.3 Transcription Interview with Kristal Maze 1 September 2016**

**Do you think the average South African can readily understand the word 'biodiversity' or should we use another term that is more easily understood like Nature?**

*During the roll out of MTC and in the course of discussions with the ad agency we held a lot of workshops with Cabinet Ministers and government officials from all levels .The general consensus was to proceed with using the term and to build understanding along the way.*

***Branding Nature can it really be done? Ad agencies promote fast and glib straplines appealing directly to the ego largely to sell products we don't need***

**but surely Nature itself is not a package we buy off the shelf. Biodiversity – (like SPAR) it's good for you. Your thoughts .....**

*The use of ad agencies is expensive and the original strap line of “Biodiversity Powering the green economy” remains in place. This was seen as providing a link with biodiversity that would be easily understood in the bid to mainstream the biodiversity concept to those in government. I'm not sure exactly what the answer is to the branding question, perhaps there are multiple solutions, people create their own valid meanings and constructs as to what biodiversity is, they do this by drawing on their own contexts and stories. It's not easy to break through the sector barriers. SANBI is now focussing on socio - ecological linkages promoting the concept of “healthy ecosystems develop healthy communities” emphasising the role of cleaner water systems, working with Umgeni Water and Wf Water.*

**Are govt responding to the MTC strategy with more funding for the Green Economy and is this translating into jobs?**

*Government Budgets in this sector are severely constrained and the MTC strategy has come to an end. New SANBI partnerships with the GEF are reliant on donor funding and the focus is not on mass communication.*

**How do you think we can influence today's young people ('Generation Y' 18-35 yrs) to a new fascination with plants and the wild when there are some many other competing virtual attractions and voices, entertainment, fashion, conspicuous consumerism etc?**

*Perhaps biodiversity should be placed alongside Lifestyle marketing, I think the idea of celebrity endorsement has potential to reach young people*

**Most Nature content on TV pushes the popular mega fauna as well as smaller fauna of every description. How can we market /promote plants in a more appealing way?**

*As a botanist I understand this is a perennial problem. My child likes the nature swop cards Pick n Pay are promoting to their shoppers perhaps a similar thing with plants would be effective .The students connection with medicinal plants is interesting as I found a similar thing with one of the Cabinet ministers reading our policy documents*