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Education for Sustainable Development: Local and Non-Governmental Organizations in Gauteng – Practices

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DECLARATION

This research project is entirely my own work and has not been previously submitted as a research project, dissertation or thesis at any other university.

……
University of Witwatersrand, 2010

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ABSTRACT

There is much debate about the concepts of environmental education (EE) and education for sustainable development (ESD) amongst practitioners, researchers and organizations. This study examines the diverse notions of environmental education and education for sustainable development by drawing on findings from semi-structured interviews. The aim of this study is, to explore the interpretation and practice of environmental education and education for sustainable development. The United Nations declared the years 2005-2015 as the Decade for Education for Sustainable Development (DESD). In the midst of the United Nation's Decade of Education for Sustainable Development, this research will be able to gauge whether organisations in Gauteng have embraced education for sustainable development and the implications this has had on their environmental programmes. Interviews were conducted with two non-governmental organisations and two local government organisations that are implementing environmental education. Thematic content analysis was used to analyse interview data. The findings in this study correspond to the findings in the literature that when environmental education is implemented there is very little focus on environmental action. The concepts of environmental education and education for sustainable development are not clearly understood by participants in this study. This finding concurs with the findings of the UNESCO (2009) review of the Decade of Education for Sustainable Development.

PREFACE

There is very limited research on the practice of education for sustainable development in South Africa. This research report examines the practice of environmental education and education for sustainable development among local government and non-governmental organisations in Gauteng.

In **Chapter one** the research context, purpose and the rationale for the study is set out. The Decade of Education for Sustainable Development (2005-2015) as proposed by UNESCO is discussed.

In **Chapter two** debates on environmental education, sustainable development and the new paradigm of education for sustainable development are reviewed. Comparisons between environmental education and education for sustainable development are made.

In **Chapter three** the research design and research methods used to conduct the research are explained, Qualitative research (using semi-structured interviews and an analysis of learning materials) was used to collect data for this study. Thematic content analysis was used to analyse the interview data.

In **Chapter four** the analysis of results from interviews and findings from learning materials are illustrated. The findings in this study indicated that environmental education is being implemented whilst there is very little implementation of education for sustainable development.

In **Chapter 5** the recommendations and concluding remarks for the implementation of environmental education and education for sustainable development are summarized.

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Chapter 1 – The Start of the Decade

Introduction

Bonnet (1999) reveals that environmental education should embrace the concepts of environmental action and sustainable development in current times. International reports use the term sustainable development as if it is a mantra. Sustainable development is seen as an answer to "socio-ecological, socio-political, socio-economic and other problems experienced by humanity at the start of the 21st Century" (Lotz-Sistika, 2004, 2). Environmental education should be re-oriented towards the new paradigm of education for sustainable development (UNESCO, 2004). This study will review the interpretation and practice of environmental education and education for sustainable development amongst local government and non-governmental organisations in Gauteng. This chapter outlines the context, the purpose and rationale for the study.

1.1 Problem Statement

Environmental degradation, unequal and over-consumption, poverty and depleted resources are some of the many challenges that society faces (Hopkins and McKeown, 2003). To overcome these challenges there is a need to change education towards achieving education for sustainable development. It is suggested that additions to current environmental education curricula will not ensure the goals of education for sustainable development are met (UNESCO, 2004).

There has been extensive research on environmental education and education for sustainable development in schools in Australia and Canada (Sauvé 1996, 2002, 2005; Jickling 1997, 2005; Hesslink *et al*., 2000). In South Africa there is very limited research on education for sustainable development. Research has been undertaken by Lotz-Sistika *et al*., (2006) which led to the compilation of "*ESD Practice in Southern Africa: Supporting participation in the UN Decade of Education for Sustainable Development."*

This research will examine a local South African perspective on environmental education and education for sustainable development in Gauteng. Partnerships and networking are objectives designed to ensure that education for sustainable

development is implemented. The United Nations has declared that goals of education for sustainable development can be achieved if there are partnerships between the different stakeholders involved in education for sustainable development. Each partner will contribute to education for sustainable development in their context (http://unesdoc.unesco.org). This research seeks to determine the contributions made by partners such as local governmental and non-governmental organizations in achieving the goals of education for sustainable development. The purpose and rational for undertaking this study is explored in the next session.

1.2 Purpose of the Study

The purpose of this research is to explore the notion of environmental education and the recent paradigm of education for sustainable development (ESD) currently held by local government and non-governmental organisations in Gauteng. The United Nations declared the years 2005-2015 as the Decade for Education for Sustainable Development (DESD). The ultimate vision of the Decade for Education for Sustainable Development is to ensure that sustainable development is incorporated into formal and non-formal education thereby causing a positive change in behaviour. In the midst of the United Nation's Decade of Education for Sustainable Development, this research will be able to gauge whether organisations in Gauteng have embraced education for sustainable development and the implications this has for their environmental programmes. Local government and non-governmental organisations have been chosen for this study because these organisations implement non-formal education. According to UNESCO (2004), education for sustainable development should include all members of society. Non-formal education programmes are conducted for community members by the four organisations chosen for this study.

1.3 Rationale for the study

There is a global lobby for education for sustainable development to be implemented at all levels of education.

The main goal of the United Nations Decade is to ensure that education for sustainable development,

> "…is more than just a slogan. It must be a concrete reality for all of us

> – individuals, organizations, governments – in all our daily decisions and actions, so as to promise a sustainable planet and a safer world to our children, our grandchildren and their descendants… Education will have to change so that it addresses the social, economic, cultural and environmental problems that we face in the 21st century" (UNESCO, 2004, 2).

UNESCO urges that all participants respond to the Decade of Education for sustainable development by ensuring that education is transformed to include "social, economic, cultural and environmental problems"(UNESCO,2004,2). In implementing education for sustainable development, challenges that practitioner's face and are explored in this study. In the next part, the aims of this study are set out.

1.4 Aims of the Study

The aim of this study is:

1.3.1 To explore the interpretation and practice of environmental education and education for sustainable development amongst local government and non-governmental organizations in Gauteng

1.3.2 To determine whether changing international developments are influencing the practice of environmental education and education for sustainable development

The research questions stated below were conceptualized to ensure that the aims of the study were achieved.

1.5 Research Questions

1. How do organisations perceive and practice environmental education?

This question seeks to understand the practice of environmental education amongst the organisations interviewed. The United Nations has declared 2005-2015 as the Decade of Education for Sustainable Development. A name change from environmental education to education for sustainable development would not necessarily lead to social issues being addressed (Jickling, 2005). There are numerous questions as to whether the change in name from environmental

education to education for sustainable development has brought about change in practice (Robottom, 2007).

2. What is the understanding and practice of education for sustainable development in your organisation?

This question begins the process of determining the link between environmental education and education for sustainable development practice amongst the four organisations interviewed.

1.6 Structure of the Study

This study consists of five chapters: chapter one situates the context of this study; chapter two reviews literature on environmental education and education for sustainable development and chapter three focuses on the research design and methods used to conduct the research. Chapter four presents the results and analysis of the study. Chapter five presents the conclusion. An overview of this study is illustrated in Fig. 1. below.

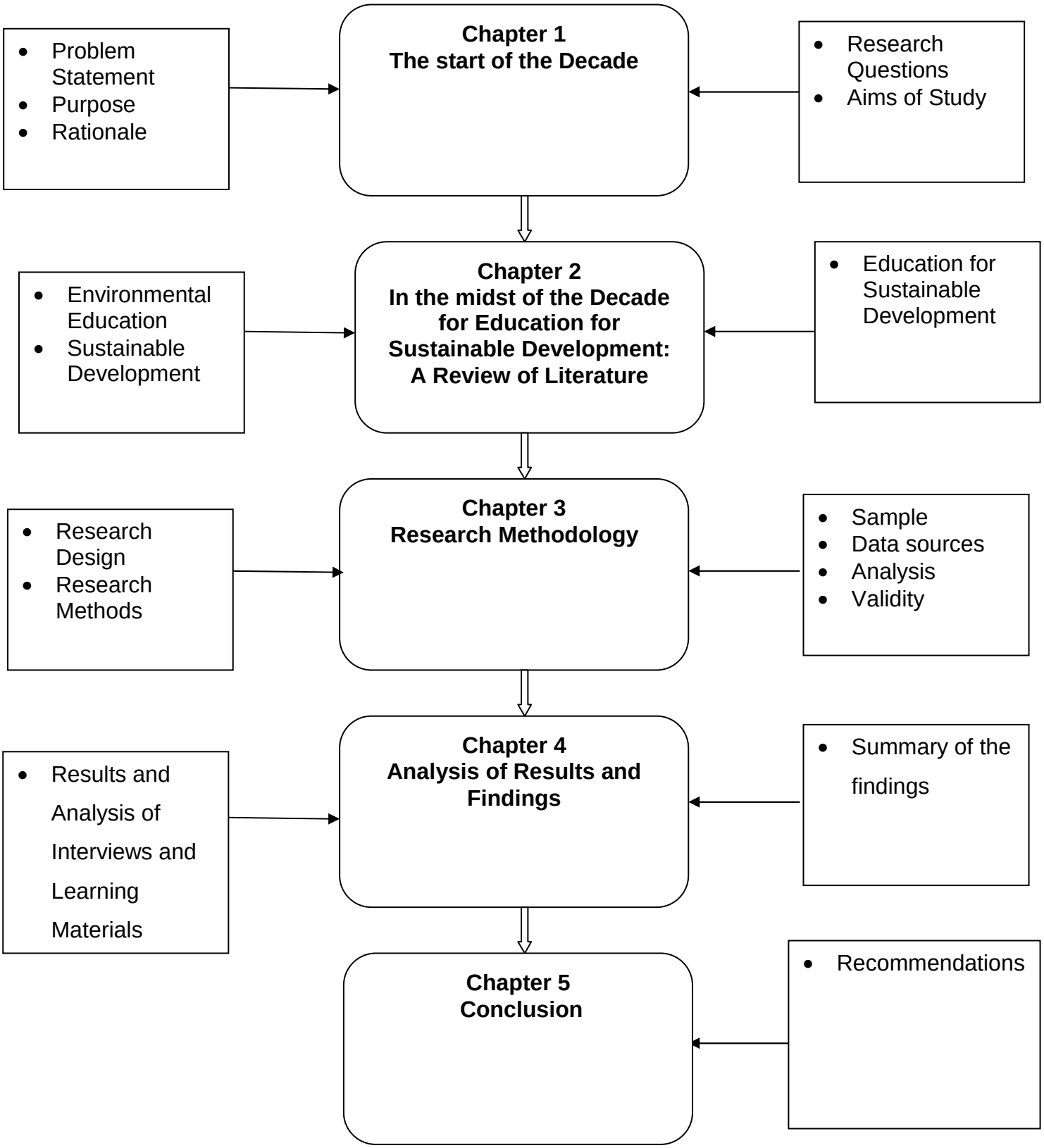


Figure 1 An overview of this study: Breakdown of Chapters

1.7 Summary

This chapter introduces the Decade of Education for Sustainable Development (2005-2015) as proposed by UNESCO. These goals of this Decade can be achieved through partnerships where each partner will implement education for sustainable development in their own context (http://unesdoc.unesco.org). This study aims to determine the contributions made by partners such as local government and non-governmental organizations during the Decade of Education for Sustainable Development with regard to environmental education and education for sustainable development.

An understanding of concepts in environmental education, sustainable development and education for sustainable development are critical in order to inform practice. The next chapter defines environmental education, sustainable development, education for sustainable development and puts forward the debates surrounding these concepts.

Chapter 2 - In the midst of the Decade of Education for Sustainable Development: A Review of Literature

Introduction

Climate Change and environmental degradation are some of the challenges that societies face. There is a need for education to empower communities so that they can over come the environmental problems that they are experiencing. There is much debate about environmental education and the new paradigm of education for sustainable development (ESD). Education for sustainable development has been given prominence with regard to definition, understanding and implementation by the United Nations through the declaration of the Decade of Education for Sustainable Development (DESD). This chapter is divided into five themes: the environmental crisis, environmental education, environmental education in South Africa, sustainable development and education for sustainable development. Thereafter comparisons between education for sustainable development and environmental education are made.

2.1 The Environmental Crisis

Environmental degradation occurs as a result of natural resources such as air, water and soil becoming depleted, eco-systems being destroyed and wildlife becoming extinct (http://en.wikipedia.org/wiki).Environmental degradation was a public concern in the late 1960s and the early 1970s. World governments held the Stockholm Conference in 1972 to discuss the environmental crisis. In response to the environmental crisis, environmental education was defined through a number of conferences and publications such as the 1975 Belgrade Charter and the 1977 Tbilisi Principles for Environmental Education, Our Common Future and the 1992 Agenda 21(Robottom, 2007). The environmental crisis remains and therefore world governments met in 2009 for the United Nations Conference on Climate Change in Copenhagen, Denmark. The aim of the conference was to chart a new commitment to reduce carbon emissions throughout the world. The next theme in this review focuses on the inception and the conceptual understanding of environmental education.

2.2 Environmental Education

To be a practitioner of environmental education the nature and scope of environmental education must be understood. Environmental education has been defined in various ways depending on the philosophical positions taken. Environmental education has numerous definitions and interpretations. The most commonly accepted definition internationally is that

> "Environmental education is a process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness, among man, his culture and his bio-physical surroundings. Environmental education entails practice in decision-making and self-formulation of code of behavior about issues concerning environmental quality" (IUCN, 1971,7).

Environmental education was defined in 1971 as a process of transmitting knowledge about the bio-physical surroundings as well as developing an appreciation and concern for the environment (O' Donoghue, 1993).Environmental education is not only about solving environmental problems or managing the environment. Environmental education should also encompass individual and societal growth through inter-actions with the environment. The diversity and opulence of the environment needs to be considered by educators to ensure there is no prejudice in environmental education towards a particular view of the environment (Sauvé, 2002). The environment is classified by Sauvé (2002, 1) as follows:

- "**environment as nature** (to be appreciated, respected and preserved), **environment as a resource** (to be managed, to be shared),
- **environment as a problem** (to be avoided, to be solved),
- **environment as a system** (to understand so as to improve decision-making), **environment as a place to live** (to get to know, to improve),
- **environment as the biosphere** (in which to live together over the long term) and **environment as a community project** (in which to become actively involved)".

Environmental education is often criticized because it appears to concentrate on nature conservation. Environmental education pedagogy should include the socio, political, ecological and economic dimensions of the environment (Cartea, 2005).

Environmental education may be classified into different 'currents' (Sauvé, 2002, 11). The different 'currents' in environmental education should not be seen in isolation but as 'currents' that can be linked to other 'currents' (Sauvé, 2002, 12). In designing the table 1 below, Sauvé (2005, 33-34) has assisted in characterizing fifteen useful currents in environmental education. Sauvé suggests these fifteen currents in environmental education should not be seen as prescriptive or all-encompassing.

Table 1 Characterisation of Fifteen Currents in Environmental Education (Sauvé, 2005, 33-34).

Current	**Conception of Environment**	**Aims of Environmental Education**	**Dominant Approaches**	**Examples of Strategies**
Naturalist	Nature	Reconstruct a link with nature.	Sensorial, Cognitive, Affective, Experiential, Creative/Aesthetic	Immersion; interpretation; Sensorial games; Discovery activities.
Conservationist/	Resource	Adopt behaviours compatible with conservation. Develop skills related to environmental management	Cognitive, Pragmatic	Guide or code of behaviours; 3 Rs set of activities; Environmental audit; Conservation project.
Problem-solving	Problem	Develop problem-solving skills: from diagnosis to action.	Cognitive, Pragmatic	Case study: issue analysis; Problem solving project.
Systemic	System	Develop systemic thinking: analysis and synthesis, toward a global vision. Understand environmental realities in view of enlightened decision-making.	Cognitive	Case study: environmental system analysis; Construction of ecosystem models.
Scientific	Object of study	Acquire knowledge in environmental sciences. Develop skills related to the scientific method.	Cognitive, Experiential	

Current	Conception of Environment	Aims of Environmental Education	Dominant Approaches	Examples of Strategies
Humanistic/ Mesological	Living Milieu	Know and appreciate one's milieu of life better; know oneself in relation to this living mileu. Develop a sense of belonging.	Sensorial, Cognitive, Affective, Experiential, Creative/Aesthetic	Itinerary; Landscape reading; Study of milieu; investigation
Value-centred	Field of values	Adopt eco-civic behaviours. Develop a system of ethics.	Cognitive, Affective, Moral	Analysis of values; Clarification of values; Criticism of social values.
Holistic	*Holos*, *Gaïa*, All, The Being	Develop the many dimensions of one's being in interaction with all aspects of the environment. Develop an "organic" understanding of the world & participatory action in and with the environment.	Holistic, Organic, Intuitive, Creative	Free exploration; visualization; Creative workshops; Integration of complementary strategies.
Bioregionalist	Place of belonging, Community Project	Develop competencies in/for local or regional community eco-development.	Cognitive, Affective, Experiential, Pragmatic, Creative	Exploration of our shared milieu; Community project; Project of local or regional eco-development.
Praxic	Locus of action/reflection	Learn in, by, and for environmental action. Develop reflexive skills.	Praxic	Action-research; Reflexive posture in activities or project.
Socially Critical	Object of transformation, Place of emancipation	Deconstruct socio-environmental realities in view of transforming them and transforming people in this process.	Praxic, Reflexive, Dialogic	Analysis of discourses; Case study, Debate, Action-research.
Feminist	Object of solicitude	Integrate feminist values into the human-environment relation-ship.	Intuitive, Affective, Symbolic, Spiritual, Creative/ Aesthetic.	Case study, Immersion, Creative workshop, Communication & exchange activity.

Current	Conception of Environment	Aims of Environmental Education	Dominant Approaches	Examples of Strategies
Ethnographic	Territory, Place of identity, Nature/culture	Recognize the close link between nature and culture. Clarify one's own cosmology. Valorize the cultural dimension of one's relationship with the environment.	Experiential, Intuitive, Affective, Symbolic, Spiritual, Creative\ Aesthetic	Fables, Stories and legends; Case study; Immersion; Modelling; Mentoring.
Eco-Education	Role of interaction for personal development, Locus of identity Construction	Experience the environment to experience oneself and to develop in and through it. Construct one's relationship with the "other than-human world".	Experiential, Sensorial, Intuitive, Affective, Symbolic, Creative.	Life story; Immersion; Exploration; Games; Introspection; Sensitive listening; Subjective/objective *alternance*.
Sustainable Development\ Sustainability	Resource for economic development, Shared resource for sustainable living	Promote economic development that takes care of social equity and ecological sustainability; Contribute to such development.	Pragmatic, Cognitive	Case study; Social marketing; Sustainable consumption activities; Sustainable living management project.

The currents in environmental education show the diversity and richness of the pedagogy of environmental education. The classification of the currents can be used as a resource to evaluate the relationship between the different currents thereby illustrating the relationship with the environment. The characterisation of the currents in environmental education enables educators to determine their choice of current and to explore this by adding to the richness of their choice of current (Sauvé, 2005). Environmental education programmes are often influenced by the type of current a particular educator favours. The technique used during environmental education programmes is dependant on the current chosen by an educator (Sauvé, 1996). The table of currents is an essential tool when classifying environmental education practices among organisations.

Since the inception of environmental education 30 years ago, there has not been a great improvement in the state of the environment globally. Numerous discourses in environmental education provide different methods of solving environmental

problems. Gee (1996,131) defines a discourse as, “a socially accepted association among ways of using language, other symbolic expressions and ‘artefacts’ of thinking, feeling, believing, valuing and acting that can be used to identify oneself as a member of a socially meaningful group or ‘social network’, or to signal (that one is playing) a socially meaningful ‘role’”. The discourses that contributed to the paradigms of environmental education are interpreted in the next section.

Approaches to Environmental Education

Environmental education consists of three forms namely education ‘*about’*, education ‘*in\through*’ and education *‘for’* the environment (Fien, 1993).

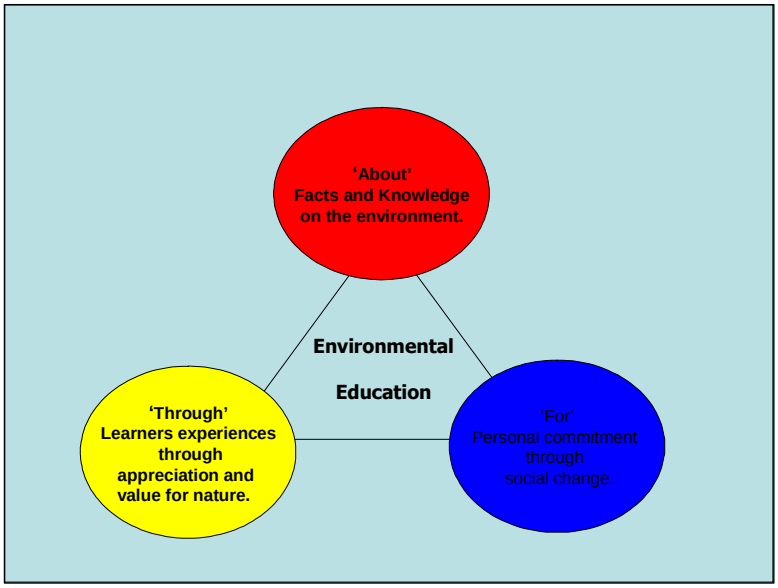


Figure 2 Three approaches to environmental education

Education *‘about’* the environment

Education *‘about’* the environment focuses on facts and knowledge pertaining to systems and processes in the environment. If learners gain knowledge of environmental matters then they may be able to deal with environmental problems much better, thereby causing a positive change in their environment (Le Grange, 2002).

A criticism of environmental education ‘about’ the environment is that environmental education should move away from imparting environmental knowledge (education ‘about’ the environment) and move towards solving environmental problems thereby making a difference to society (education ‘for’ the environment). Diagnosing an

environmental problem without finding a remedy is of no benefit to those that are affected by this environmental problem (Walker, 1997).

Education 'in\through' the environment

The second form of education 'in\through' the environment places environmental education in context by relating it to learner's experiences. Values of appreciation of nature and its laws are brought out in learners (Le Grange, 2002). Education 'in\through' the environment is meaningless if learners are not given opportunities to experience the value of nature but are merely informed about the value of the environment (Lucas, 1972).

Education *'for' the* environment

The third form of education *'for'* the environment allows for personal commitment by creating social change through involvement in solving environmental problems after exploration of social change. Gough (1987), Huckle (1987), Pepper (1987) and Fien (1993) in Jickling (1997, 96) describe the aims of education *'for'* the environment as follows:

- to develop critical thinking
- to examine ideologies which underlie human-environment relationships
- to criticize conventional wisdom
- to explore material and ideological bases of conventional wisdom
- to analyze power relationships within a particular society
- to engage students in cultural criticism and reconstruction
- to foster political literacy
- to focus on real-world problems and participate in real issues
- to open students' mind to alternative world views
- to work and live cooperatively and to realise that humans can act collectively to shape society

Environmental education should be free from any form of bias. Education *'for'* the environment has often been classified as an approach that is "instrumentalist and anthropocentric" (Le Grange, 2002, 85). Education 'for' the environment should not simply promote the goals of conserving the environment for the benefit of humans

but in addition ought to also consider the eco-centric perspective. In eco-centrism, the environment (human beings, animals, plants, etc.) have an important value and no specific living or non-living being has preference over the other. All living and non-living beings are interdependent. The implication is that nature should be conserved, not for the welfare of human beings, but because it has its own intrinsic value (Job, 1996).

Education 'for' the environment is often critiqued for not being implemented at schools. Jickling (1997) and Walker (1997) maintain that educators practising environmental education were finding it difficult to engage their student in taking action. Jensen and Schnack (2006) argue that imparting knowledge on environmental issues, or role plays, simulations and games cannot change behavior and attitudes or cannot lead to environmental action taking place. Fein (1993) asserts that environmental education 'about' the environment and environmental education 'through' the environment is beneficial only if it leads to the achievement of education 'for' the environment.

Jickling (1997, 91) criticises these three forms of environmental education as, "common slogans of the environmental education movement" and suggests that the three forms of environmental education have become 'prescriptive'. Jickling (1997) suggests that environmental education and its goals could be made broader and should not be confined to particular set of vocabulary.

Environmental Education in South Africa

As this study is situated in South Africa it is imperative that the state of environmental education in South Africa is reviewed. Environmental Education has been marginalized in formal education in South Africa. Early attempts to introduce environmental education in South Africa began in the 1970s and were concerned with 'conservation education' and 'outdoor education' (Irwin, 1990, 4). In 1992, the Environmental Education Policy Initiative (EEPI) was formulated to put together a policy for Environmental Education for South Africa. The EEPI put together a policy for environmental education. The White Paper was formulated in 1995 in an attempt to include environmental education in the curriculum. The guidelines of this White

Paper incorporated the decisions made at the international conference of Belgrade and Tbilisi (Le Grange, 2002). The South African Department of Education (1995) produced the White Paper on Education and Training which states,

> Environmental education, "involving an interdisciplinary,integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans,present and future, enjoy a decent quality of life through the sustainable use of resources." (South African, DoE, 1995, 18)

In 1995 there was a need for curriculum initiatives so that EE could become part of a new curriculum. This resulted in EEPI being replaced by the EE Curriculum Initiative (EECI).The inclusion of environmental education in the specific outcomes of outcomes based education (OBE) was a great achievement for EECI (Janse van Rensburg and Lotz, 1998). In 1997 when the South African Constitution was implemented, it included environmental rights and issues that were coupled with human rights and social responsibilities (http://www.enviropaedia.com). A new curriculum was proposed for South Africa to include the values of democracy. This was called the National Curriculum Statement and was developed during 1997 and 2001. In 2002, National Curriculum Statement for Grades R–9 (Schools) and Grades 10–12 (General) was implemented in South African schools (http://www.mml.co.za). The learning area statements of the National Curriculum Statement replicate the ideology of "social justice, respect for the environment and human rights as defined in the Constitution". (http://www.mml.co.za, 2009, 1). Sustainable development has become a buzz word and there is a notion the environmental education should be replaced by the new paradigm of education for sustainable development (Robottom, 2007).The term sustainable development and debates surrounding sustainable development follow in the next section.

2.3 Sustainable Development

Definition of Sustainable Development

The term sustainable development was initially used during the 19th century in German forest management and became popular during the 1980s (Le Grange and Loubsher, 2005). The World Commission on Environment and Development (WCED) developed the Brundtland Report which defines sustainable development as "development that meets the needs of the present without comprising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, 43). The concept of sustainable development gained momentum at the 1992 United Nations Conference on Environment and Development in Rio de Janiero and its status became more established at the World Summit on Sustainable Development in Johannesburg in 2002 (Jickling,2005). Many disagree with the Brundtland definition of sustainable development (Le Grange and Loubser, 2005) and these debates are explored below.

Sustainable Development and the promotion of human needs

Many authors (Bonnett 1999; Schreuder, Reddy and Le Grange 2002) claim that sustainable development is problematic and that it promotes anthropocentrism. Schreuder, Reddy and Le Grange (2002) maintain that sustainable development promotes human needs and not the fundamental value of nature. This idea is supported by Bonnett (1999) who contends that sustainable development causes anxiety between human needs and ecological needs but does not give a resolution to this dilemma. These interpretations of sustainable development urge that ecological needs should not be ignored whilst human needs are given preference (Selby, 2007). Le Grange and Loubser (2005, 114) express concern that sustainable development, "is not a monolithic entity and that a more nuanced understanding of the concept could incorporate values such as interspecies equity." The next part of the discussion focuses on the term 'development' which has numerous meanings in the context of sustainable development.

‘Development’ in Sustainable Development

Perez and Llorente (2005) identify with Bonnet (1999) that ‘development’ can promote either economic growth without considering environmental and social issues or ‘development’ can provide resources for the underprivileged communities.

Bonnet (1999) points out that sustaining economic growth is complementary to sustaining an eco-system which leads to ‘sustainability’. Perez and Llorente (2005) critique the texts compiled at the Rio-Summit indicating that economic growth is seen as an answer and not a setback to environmental problems thereby promoting economic growth through development. Gonzalēz-Gaudiano(2007,102) warns that “this is why, from the beginning many critiques of sustainable development have been directed against the noun ‘development’ considering that sustainable development is a largely self-indulgent phrase, due to its link to economic growth and with semantic overtones suggesting the failure of developmental policies.” Sachs (1999) and Disinger (1990) concur that the concept of sustainable living should replace the concept of sustainable development. Sustainable living does not give development precedence but ensures that environmental, social and economic aspects are integrated without any one aspect dominating the scene. The terms ‘sustainable’ and ‘sustainability’ are often used to imply the need to conserve. There is much controversy about conserving the environment for future generations.

Conserving Resources for the Future

Sustainable development focuses on conserving the environment for future generations but the needs of future generations cannot be predicted. The planet should be protected by minimising harm. The resources of this planet do not belong to present or future generations (Munslow *et al*., 1997). The debate about the sustainable development is ongoing however the understanding of sustainable development will be examined.

Public understanding of Sustainable Development

A study conducted by Andrew Darnton in the United Kingdom for the Department of Environment, Food and Rural Affairs (Jickling, 2005), found that householders and people in the workplace did not understand the meaning of ‘sustainable development’ as shown in table 2 below.

Table 2 Results of respondents understanding of sustainable development in Jickling (2005, 254).

Percentage	Sustainable Development
28%	Heard of the term sustainable development
16%	Defined sustainable development as "development that does not harm the environment".
11%	Defined sustainable development as being, "related to using renewable resources."

Jickling (2005) reveals that the public is grappling with the concept of sustainable development yet there is pressure to transform environmental education to education for sustainable development. Since the public is finding difficulty with understanding the concept of sustainable development, this study examines the understanding of sustainable development among the four chosen organisations. Jickling (2005) is apprehensive that education is being used as a driving force in achieving education for sustainable development since the term sustainable development is ambiguous. The concept of education in relation to sustainable development is examined in the next section.

Education: the Key to Sustainable Development?

Agenda 21 emphasises the importance of education in meeting the goals of sustainable development.

> "Education, including informal education, public awareness and training should be recognised as a process by which human beings and societies can reach their fullest potential. Education is critically for promoting sustainable development and improving the capacity of the people to address environment and development issues"(United Nations,1992, *Agenda 21,* Chapter 36, 3).

According to Sterling (1996, 18), education in general plays an important role in promoting both a “sustainable society” and an “unsustainable society.” Education sometimes transfers knowledge passively and does not cause a change in behaviour to take place. Education needs to change in order to ensure that societies become more sustainable (Sterling, 1996). The Commission on Sustainable Development met in 1996 and completed their gathering with the following decision:

> “In order to change unsustainable production and consumption patterns and lifestyles, it (is) essential to give great emphasis to the role of education for sustainable development, including environmental economics as well as environmental awareness” (http://portal.unesco.org/en/ev.).

Fien & Tilbury (2002) concur with Hopkins & McKeown (2002) that education for sustainable development may be implemented formally and non-formally through partnerships among the education sector, business, government, local government and non-governmental organisations, thereby getting society to work together to live sustainability. The change in environmental education should consider the local context in which the so-called changed education is being implemented. When education for sustainable development documents are interpreted in a local setting, there will be a certain amount of prejudice thereby not always meeting the goals of education for sustainable development (Fien and Tilbury, 2002).

2.4 Education for Sustainable Development (ESD)

Education for Sustainable Development Discourse

Education for Sustainable Development originates from the aim of the United Nation to ensure quality education and sustainable development. The idea of the United Nations Decade of Education for Sustainable Development (2005-2014) was brought to the discussions at the World Summit on Sustainable Development (WSSD) in 2002. The United Nations General Assembly adopted the resolution of the United Nations Decade of Education for Sustainable Development on December 2002 (Lotz-Sistika *et al*., 2006). The overall goal of the Decade of Education for Sustainable Development is to integrate the principles, values, and practices of sustainable development into all aspects of education and learning to encourage

changes in behaviour that allow for a more sustainable and just society for all (Lotz-Sistika et al., 2006).

> "Education for sustainable development demands a new vision of education, a vision that seeks to help people better understand the world in which they live, and to face the future with hope and confidence, knowing that they can play a role in addressing the complex and interdependent problems that threaten our future such as poverty, wasteful consumption, environmental degradation, urban decay, population growth, gender inequality, health, conflict and the violation of human rights (http:// portal.unesco.org/en/ev.php).

Significance of Education for Sustainable Development

Environmental crises are escalating, therefore education needs to take on a more radical approach and not merely inform, build value systems and create active thinkers. Education for sustainable development seeks to identify problems that are real and seeks to find solutions to these problems emphasising the inter-relatedness between social, economic, political and environmental issues (Disinger, 1990). Tilbury (1997, 107) calls for "environmental education for sustainability" which promotes sustainable living through environmental action and improvement. Knapp (2000) and Le Grange (2002) share the same sentiments of environmental education for sustainability as Tilbury (1997).

Criticism of Education for Sustainable Development

Education for sustainable development should be seen as a process through which learning takes place, and not as an outcome. Jickling (2005) argues that there are outcomes that have already been stipulated for education for sustainable development and that these outcomes may stifle alternate outcomes. Jickling (2005, 253) questions whether "it make sense to reduce education for sustainable development to a process? And is this process unnecessarily limited?" Jickling (2005) proposes that education for sustainable development can be beneficial if its limits are understood and transcended. These perspectives of education for sustainable development are unpacked in the next section.

Perspectives of Education for Sustainable Development

Many challenges and concerns about achieving sustainable development were raised and documented in Agenda 21 and the Johannesburg Plan of Implementation. These challenges and concerns have resulted in three broad perspectives which were broken down into a further 15 perspectives (http://portal.unesco.org).

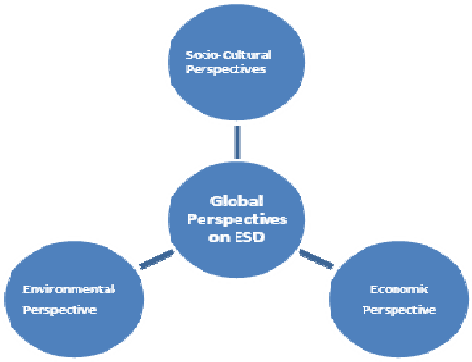


Figure 3 Global Perspectives of ESD (http://portal.unesco.org/en/ev.php.)

Table 3 Breakdown of Global Perspectives (http://portal.unesco.org/en)

Socio-Cultural Perspective	Environmental Perspective	Economic Perspective
Human Rights	Natural Resource	Poverty Reduction
Peace & Security	Climate Change	Corporate Responsibility
Gender Equality	Rural Development	Market Economy
Cultural Diversity	Sustainable Urbanization	
Health	Disaster Prevention & Mitigation	
HIV-Aids		
Health		
Governance		

2.5 Comparison between Environmental Education and Education for Sustainable Development

Is it merely a name change from EE to ESD?

Environmental Education often imparts knowledge without ensuring that environmental action takes place (Knapp, 2000). Educators often preach environmental education rather than create opportunities for environmental action to take place. Education for sustainable development is different from the naturalistic and scientific work that was carried out during the implementation of environmental education during the 1970s and 1980s. Education for sustainable development ensures that there is personal responsibility towards the environment through action oriented participatory approaches that allows for understanding of local and global issues (Tilbury, 1997). Jickling (2005, 254) disagrees with the above statements, "environmental education has, from its inception, been a movement with interests in social issues". A name change from environmental education to education for sustainable development would not necessarily lead to social issues being addressed (Jickling, 2005). There are numerous questions as to whether the change in name from environmental education to education for sustainable development has brought about change in practice (Robottom, 2007). A closer look at environmental education and education for sustainable development follows.

Resentment of Education for Sustainable Development

According to Gonzalēz-Gaudiano (2005), the image of environmental education was ignored and this has aggravated resentment against education for sustainable development. The ignoring of environmental education should not be the main concern but new opportunities should be seized (Gonzalēz-Gaudiano, 2005).

Fien (1998) cited in Fien and Tilbury (2002,9) states that education for sustainable development "differs substantially from those of litter, nature study and the planting of trees in the school grounds and other apolitical and aesthetic work that has often been the focus of much school-level environmental education in the past". There is a call for education to address issues such as "human rights, equity and democracy" which represent the heart of sustainable education. Education for sustainable

development should ensure that all people know their human rights and are able to lobby against development that is not sustainable (http://portal.unesco.org/en).

National Curriculum in South Africa and Human Rights

In South-Africa the constitution addresses the issues of human rights. However in the new education curriculum there is not enough emphasis being placed on human rights (Gough and Gough, 2004). When there is no peace, this leads to disharmony in the nation. This results in war and conflict thereby causing destruction to many lives. Education for sustainable development may impart values that promote peace. Women are discriminated against and are not given educational opportunities in some societies but have to bear the burdens of poverty. Education for sustainable development promotes gender equality through its programmes so that it can bring about changes in behaviour to eliminate discrimination against women. (http://portal.unesco.org/en/ev.php).

Social issues and Education for Sustainable Development

Hopkins and McKeown (2003) completed an in-depth study of the Belgrade Charter, the Tbilisi Declaration and Agenda 21 which resulted in them concluding that ESD places emphasis on the social and environmental dimensions by trying to improve the environment and the quality of life for all citizens. Environmental education played a dominant role in promoting the environment whilst marginalising social and economic issues. Education for sustainable development considers the social, environment and economic issues. Environmental education 'for' the environment promoted social and economic aspects however it was not implemented very often. Some educators and implementers of environmental education believe that there must be a change in the way the world functions to ensure that there is a positive change in people towards the environment (Hopkins and McKeown, 2003).

Environmental Education and Education for Sustainable Development:

A study of environmental education and education for sustainable development, commissioned by the International Union for Conservation of Nature and Natural Resources (IUCN), was undertaken by Hesslink *et al*. in (2000). This study was conducted through internet discussions. The moderators were chosen from different educational backgrounds such as researchers in environmental education and

education consultants. Participants that were known to the moderator were invited by the moderator to participate in this study through emails. Participants were found to have differing views on the link between environmental education (EE) and education for sustainable development (ESD) as illustrated in the figure 4 below (Hesslink *et al*., 2000).

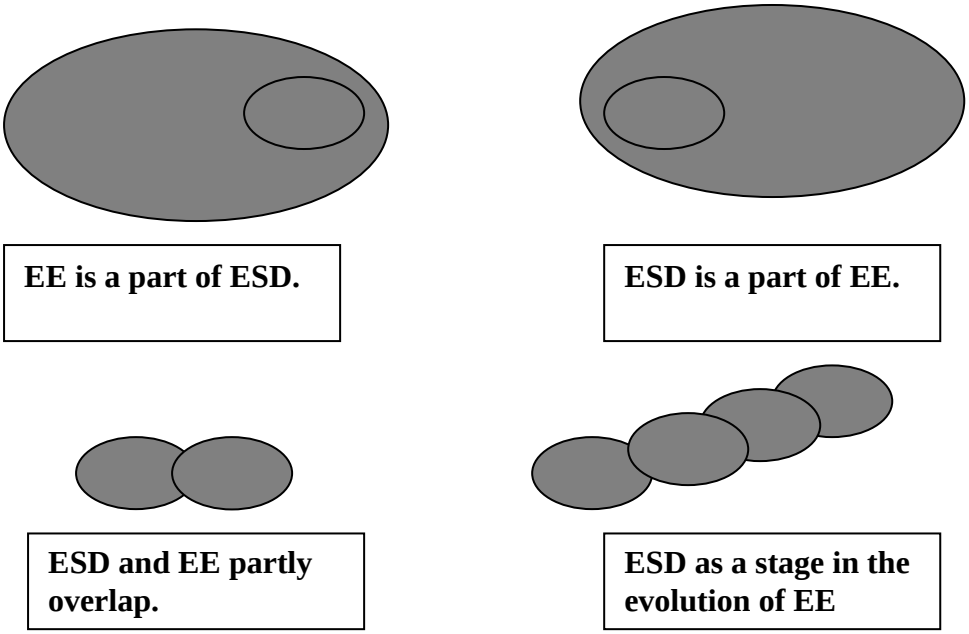


Figure 4 The relationship between ESD and EE (Hesslink *et al*., 2000).

The research on the relationship between ESD & EE suggested that most participants concluded that ESD is a stage in the evolution of EE (Cartea, 2005). The UNESCO *Draft International Implementation Scheme* (*Oct. 2004),* portrays EE and ESD differently compared with the findings of the study undertaken by Hesslink *et al*., (2000) in Cartea (2005).

> "Education for Sustainable Development should not be considered the same as Environmental Education. The latter is a well established discipline that concentrates on human relationships with the natural environment and in the ways to conserve and preserve it and adequately manage its resources. Sustainable Development therefore includes EE, situating it in the larger framework of socio-cultural factors and the socio-political aims of equity, poverty, democracy and quality of life" (UNESCO, 2004, 18).

Environmental education is a significant component of education for sustainable development and is not equal to education for sustainable development. Education for sustainable development is the incorporation of economic, social and human development with environmental concerns. This is not a simple switch from environmental education to education for sustainable development but calls for an in-depth focus (Hopkins *et al*., 1996).

Lotz-Sistika (2004) questions whether environmental education in southern Africa should follow the international norm of education for sustainable development. This research aims to partly address this question by investigating stake holders' understandings of the concepts of environmental education and education for sustainable development.

2.6 Summary

The study of the literature conveys ideas on the theoretical framework on environmental education, sustainable development and education for sustainable development. There are opposing views about education for sustainable development. Some authors (Jickling (2005), Lotz-Sistika (2004), Robottom (2007), Bonnet (1999) and Perez and Llorente (2005)) argue that the term sustainable development is problematic nevertheless there is still pressure to transform environmental education to education for sustainable development. Fien & Tilbury (2002) concur with Hopkins & McKeown (2002) that environmental education did not address social issues and therefore education for sustainable development should be implemented to remedy this omission.

In the next chapter the procedures that the researcher followed are presented.

Chapter 3 - Research Methodology

Introduction

This chapter provides an account of the research methods and fieldwork that was used to investigate the research questions. The research problem is to determine the understanding of environmental education and education for sustainable development practices among local government and non-governmental organizations. In undertaking this research, careful thought with regards to the choice of participants and the research procedure was undertaken. Validity, reliability of data and ethics when interacting with participants are also discussed in this chapter.

Data was collected using interviews with a staff member from two local government organisations: Johannesburg City Parks and the Johannesburg Zoo. Two staff members from the two non-governmental organizations that were interviewed were the Endangered Wildlife Trust and Eco-Access. The profile of the research participants and their contribution to the research topic is illustrated. Limited course material from each of the organizations was evaluated to determine whether there is dissonance between what the organisations claim to be doing and what the organisations are actually practising. Thematic content analysis was used to analyse the data collected from interviews. A diagrammatic representation of the research process is shown in figure 5 on the next page.

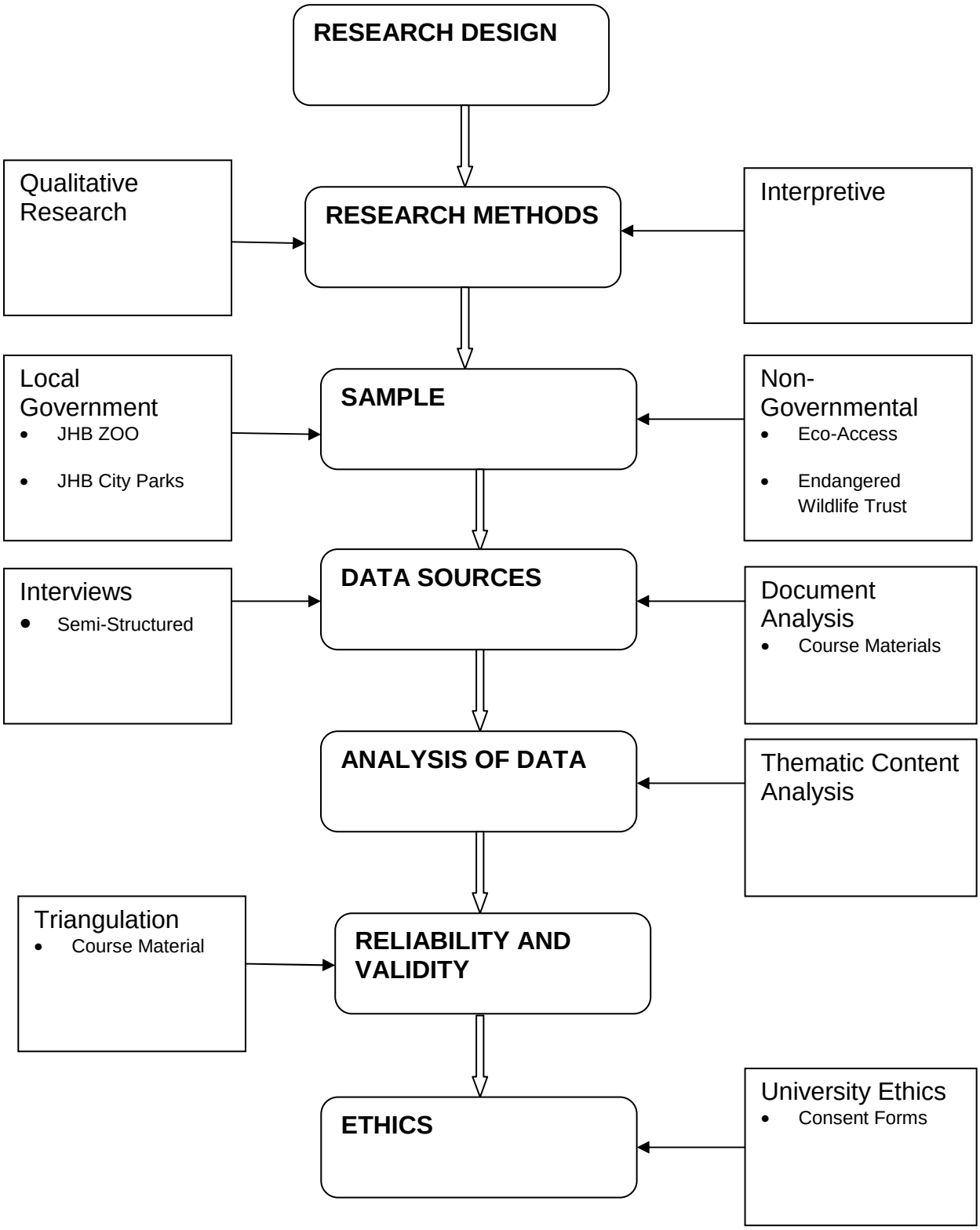


Figure 5 Overview of the Research Process

3.1 Research Design

This research was conducted using qualitative methods of interviews and document analysis. Thematic content analysis was utilized to analyze the data gathered from interviews.

3.2 Research Methods

> Everything that can be counted does not necessarily count;
> Everything that counts cannot necessarily be counted - Albert Einstein (www.brainyquote.com).

Research can be in the form of either qualitative or quantitative methods. The type of data that needs to be collected will determine whether research takes on the form of qualitative or quantitative methods. Quantitative methods are used to gather information through measurement and frequency (Patton, 1990). Qualitative methods are used to gather data such as people's experience and feelings (Cohen and Manion, 1994). When individual people interact with the world they make meaning of their world through social interactions. Qualitative research is a study of people and their interactions with the social world (Merriam, *et al*., 2002).

Qualitative Research Design

Qualitative researchers search for a detailed account of the social world and establish their results within the social world. Quantitative researchers do not place emphasis on details because the details would disrupt their method of creating a generality. Quantitative researchers do not pay attention to the social aspects of the world (Denzin & Lincoln, 2003).

The reason for choosing qualitative research is that this study explores understandings of environmental education and education for sustainable development, by drawing on detailed information from participants' experiences. The reason for using in-depth questioning (guided by the researcher) was to ensure detailed information was solicited to answer the research questions. The limitation of this form of qualitative research is that the data collected is from only a few participants and cannot be generalized to the entire population (Denzin & Lincoln,

2003). This research drew information from four participant organisations and cannot be generalized for all organisations implementing environmental education.

3.2.1 The Interpretive Paradigm

An interpretive qualitative approach is a study that interprets the natural world through the use of a variety of sources such as interviews, photography, case studies, conversations and recordings (Denzin & Lincoln, 2000). When a qualitative study is conducted, data is collected through interviews and evaluation of course materials. When using the interpretive qualitative approach, data is analyzed using inductive methods to recognize themes that are occurring frequently thereby producing an explanatory report of the results (Merriam, *et al*., 2002). This research project uses an interpretive paradigm as it seeks to determine people's understanding of environmental education and education for sustainable development. The interpretive methodology was used to collect detailed accounts from participants about how they experience and implement environmental education and education for sustainable development.

3.3 Sample

This research examined a South African perspective of environmental education and education for sustainable development amongst four organisations: two local government and two non-governmental organisations. The local government organizations that form part of this study are Johannesburg City Parks and the Johannesburg Zoo. The non-governmental organisations include Eco-Access and The Endangered Wildlife Trust. Senior personnel working in the organization for a minimum of five years were selected to be interviewed. Initially, the plan was to interview one environmental education manager from each organization. After conducting two interviews, with regard to the implementation of activities, it was revealed that the managers of these organisations were unable to provide information rich data. Consequently, one senior personnel from the four organisations were contacted to request their permission to be part of this study. Contact was made via emails or telephone calls requesting an interview and requesting that the interview be recorded. Prior to the interview, interviewees signed two consent forms, granting the interviewer permission to conduct the interview and to record the interview.

3.3.1 Participant Profile

A brief synopsis of each organisation taken directly from their websites is listed below.

Johannesburg City Parks

"Johannesburg City Parks is a section 21(non-profit) company of the City of Joburg. Their core business is to develop, maintain and conserve open spaces and cemeteries within the City of Joburg. The mission of Johannesburg City Parks is achieved through, conservation of natural areas, development of parks, planting of trees in streets, communities and schools through education and awareness" (www.jhbcityparks.com).

The Johannesburg Zoo

"Johannesburg Zoo is registered as a section 21(non-profit) company of the City of Joburg. The core business of the Johannesburg Zoo is the accommodation, enrichment, husbandry and medical care of wild animals." The Johannesburg Zoo conducts programmes in education, conservation, research and recreation (www.jhbzoo.org.za).

The Endangered Wildlife Trust

"The Endangered Wildlife Trust was established in 1973 and is registered as a Non-profit Organisation. The Endangered Wildlife Trust is dedicated to conserving threatened species and ecosystems in southern Africa to the benefit of all people. This is achieved through

- Initiating and implementing conservation research and action programmes;
- Preventing species extinctions and maintaining biodiversity and ecosystem functioning;
- Supporting sustainable natural resources and management;
- Communicating the principles of sustainable living and empowering people by capacity building, education and awareness programmes to the broadest possible constituency;

- Taking a strong leadership and advocacy role in promoting environmental and social justice" (www.ewt.org.za).

Eco-Access

Eco-Access creates opportunities for disabled and non-disabled children to participate in activities designed to break down barriers. While they focus on nature, they get to know each other as human beings and real change takes place in the attitudes of all concerned. Another important aspect of their work is encouraging schools for disabled children to set up environmental programmes, including vegetable gardening.

- "Eco-Access also encourages all people to take on the responsibility of caring for mother earth, and champions the right of disabled people to access wildlife areas. People who are blind, deaf, intellectually and/or physically disabled are often NOT considered in the planning and implementation of environmental programmes and facilities. Our work is based on the philosophy of inclusion, ensuring appropriate access for people of all ages and levels of ability" (www.eco-access.org).

The sample in this study is limited to these four organisations in Gauteng who were chosen because they are implementers of environmental education. The small sample size means that the researcher will not be able to draw conclusions that can be generalised to all the organisations or the entire population that implements environmental education (Davies, 2007). Interviewing a small sample allows research findings to be in depth and detailed information may be gathered from the sample (Davies, 2007).

3.4 Data Sources

The main data sources for this study are interviews and course materials produced by the four organisations. The interviews provided a rich source of information on the organisations' perceptions and practices with regard to environmental education and education for sustainable development. The course materials received from the

different organizations provided insights into the types of programmes that each organisation is implementing. Initially the course material provided by each organisation was limited to one set of materials. It was realized that analyzing one set of materials may not be a true reflection of the organisation's practice. Thus additional materials were requested from each organisation to gather more data to reflect on the organisation's practices.

3.4.1 Interviews

> "We cannot observe how people have organised the and the meanings they attach to what goes on in the world. We have to ask people questions about those things" (Patton, 1990, 34).

Interviews in qualitative research are a conversation about a specific topic that is of common concern to both parties (Guba & Lincoln, 1981; Kvale, 1996). The role of an interview is to gain an insight into the main subject matter that the respondents are familiar with (Kvale, 1996; Patton, 1990). Qualitative interviews assume that the interviewees are knowledgeable and can make significant contributions to the research process (Patton, 1990). Interviews can be used to collect data that is not observable, to develop new hypotheses and can be used in conjunction with other research methods (Cohen and Manion, 1994).

This research collected information using semi-structured interviews when participants shared their ideas and experiences of environmental education. The interview method was chosen for this research because semi-structured interviews allow for probing, in comparison to other methods of collecting data. Semi-structured interviews make use of questions and themes that are not fixed but can be changed to accommodate the interviewee's experience (Kvale, 1996). The interviewer must be alert and take any opportunity that arises during the interview to probe as this can lead to clarity and an abundance of information being elicited from the interviewee (Merriam, 1988). The outline of the topics to be covered and the suggested questions can be found in the interview guide in appendix I. According to Flick (2006) using an interview guide in all the interviews is beneficial because it intensifies the comparability of data and the data will be more structured. The interview questions were constructed in a simple language to get the interviewees to share their

experiences. It is important to use simple terms for interviews and questions whilst scientific concepts can be used when analysing data (Flick, 2006; Seale, 1999). The limitation of semi-structured interviews is that there is no means to determine whether or not the interviewee shared experiences that were true. To try and overcome this limitation, interviewees were requested to provide course materials for the programmes that are being implemented by their organization. The interviewer adopted a conversational style during the interview to ensure that the interviewees were relaxed which allowed the interviewees to give detailed accounts of their experiences. Prior to the interview, the purpose of the research, the purpose of the interview and consent procedures were discussed with participants.

3.4.2 Pilot Interview

Pilot interviews enable the researcher to review the questions and make the necessary changes to ensure that the questions may not yield information that is not relevant to the study (Merriam, 1998).

In undertaking this research project, a pilot interview took place to ensure that the interview questions were clear, appropriate and understandable. During the pilot interview, it was found that the interviewee did not give sufficient detail and probing had to take place. Some of the questions that were used to probe during the pilot interview were used during later interviews.

3.4.3 Interview Questions

The quality of data received from an interview is largely dependant on the type of questions that are asked during an interview (Merriam, 1998). According to Strauss, *et al.,* (1981 in Merriam, 1998) questions can be classified into four types, hypothetical, devil's advocate, ideal position and interpretive questions. Hypothetical questions engage the interviewee to predict thus resulting in the response being a narrative. Devil's advocate questions are used when the topic is contentious and the interviewee needs to give their own personal interview without any awkwardness. Ideal position questions extract contents and personal views which are used in many

different types of studies. Ideal questions most often feature in studies that undertake evaluations. Interpretive questions elicit the interviewee's interpretation of things as well as other information and personal views (Merriam, 1998).

Questions that lead to 'yes' and 'no' responses must be avoided as these questions do not elicit any information from the interviewee and allows the interviewee to take the easy way out (Merriam, 1998). Open-ended questions allow for flexibility and collaboration between interviewee and interviewer. The respondent's views can be assessed to a greater extent when using open-ended question (Cohen & Manion, 1994). This study used interpretive and ideal position questions so that information as well as personal opinions were obtained from the interviewee. Each interview consisted of questions that were specific to the goals of the organization that was being interviewed. The questions were open-ended and this allowed the interviewer to probe when appropriate to obtain clarity or more information during the interview.

3.4.4 Document Analysis

The second source of data was course material provided by each of the four organisations interviewed. Data can be gathered from documents such as, "public records, personal documents and physical materials" that the researcher can use in analysis (Merriam, *et al*., 2002). Analysis of documents can take place without imposing on research participants. They can be analyzed many times for reliability. Documents are a reliable source of information because they existed prior to the research and will not be affected by the researcher's being present (Merriam, *et al.*, 2002). In some instances, documents may have not been updated and may not reflect the current practice, therefore to avoid this, organisations were asked to submit materials that reflect their current practice.

The content of teaching and learning materials was explored in systematic ways to look for patterns and themes related to the research question. The teaching and learning materials were also used to verify the data that was collected during the interview.

3.5 Data Analysis

Thematic Content Analysis

Data collection and analysis should take place simultaneously for the research to be prolific (Ely, *et al*., 1997). During this study as soon as the interview was conducted, the data was analysed. Thematic content analysis was used to analyse interview data. Thematic content analysis is beneficial because it allows for findings from a diverse body of research to be summarized and organized. When analyzing data, using thematic content analysis, the researcher looks for themes. According to (Ely, *et al*., 1997, 206) a theme can be summarized, "as a statement of meaning that runs through all or most of the pertinent data or one in the minority that carries heavy emotional or factual impact." "Meta themes or overarching themes" (Ely, *et al*., 1997, 206) occur throughout the data set and are crucial because they provide information that can be mirrored against literature. In table 4 below, the steps used to categorise themes according to Ely (1997) are illustrated.

Table 4 Steps used in categorising themes (Ely, *et al*., 1997, 206)

1.	Study and re-study the raw data to develop detailed, intimate knowledge.
2.	Note initial impressions.
3.	List tentative categories
4.	Refine categories by examining results of steps 2 and 3 and returning to the entire database of step 1.
5.	Group data under the still-tentative categories and revise categories if needed.
6.	Select verbatim narratives to link raw data to the categories.
7.	Study results of step 6 and revise if needed.
8.	Write theme statements for each participant from my best attempt to speak from her\his point of view by linking data in and across categories.
9.	Integrate findings about each person
10.	Compare findings for all the persons for commonalities or patterns, differences and unique happenings.

Ely, *et al*., (1997) defines coding as a process of finding meaningful components which is accomplished when data is read many times and notes are made in the margins. Denzin and Lincoln (1998) propose that interview data be read numerous times. Data from interviews was read many times after which themes were identified. Each theme from all the interviews was studied in great detail and thereafter a synthesis of themes was created. Mouton (2006, 108) claims that data should be analysed, interpreted and synthesised by splitting data into, "manageable themes, patterns, trends and relationships." The procedures for coding have been contested (Coffey et al, 1996) but there is a consensus that reducing data is a crucial step in qualitative research (Lee and Fielding, 1996). Each interview transcripts was analysed by reading it for a minimum of three times. During the first read notes were made next to the response below in bold.

> "… it's more kind of orientated towards conservation. So in that it has enough in the sense that, 'in' the environment, 'about' the environment and 'for' the environment but there is a lot of focus 'in' the environment and 'about' the environment" (Johannesburg Zoo). **The respondent has a through understanding of the environmental education programmes at the Johannesburg Zoo.**

During the second reading, the interview transcripts were analysed for links between different parts of the interview transcript.

> "It is basically what the World Association for Zoos and Aquariums dictate. Say like last year was the year of the frogs so we focused on that. This year is the year of the shark and gorilla. We do not have any sharks so we are focusing on the gorilla…." (Johannesburg Zoo). **There is a link with the definition of the environmental education programmes at the Johannesburg Zoo and the practice of environmental education at the Johannesburg Zoo.**

During the third reading, themes were color coded. For example, the color green was used to high-light environmental education practice.

> "… It's more kind of orientated towards conservation. So in that it has enough in the sense that, 'in' the environment, 'about' the environment and 'for' the environment but there is a lot of focus 'in' the environment and 'about' the environment" (Johannesburg Zoo). **The respondent has a through understanding of the environmental education programmes at the Johannesburg Zoo.**

Mouton (2006, 109) refers to interpretation as a process of, “synthesis of one’s data into larger coherent wholes.” Thereafter, themes from across the different interviews transcripts were interpreted. The system of color coding was beneficial to identify themes easily.

3.6 Reliability and Validity

Reliability ensures that data is not gathered through unplanned situations and there is accuracy of findings (Silverman, 2004). The semi-structured interviews were audio-taped and transcribed verbatim. The transcriptions were then emailed to participants, who were asked whether the transcriptions were a true reflection of the interview. All participants emailed the transcriptions without any changes except for grammatical changes in a few instances. The researcher transcribed the interview with the grammatical errors to maintain the reliability of the instrument.

Triangulation is the use of more than one method in collecting data for a study so that the validity of data is increased. Triangulation would be used to verify the validity of the data collected. Wolcott (1988, 192) recommends triangulation, "for cross-checking, or for ferreting out varying perspectives on complex issues and events". Triangulation can aid in improving the quality of a research report by providing evidence for claims but triangulation does not necessarily mean assurance for validity (Silverman, 2004). Interview transcripts were given to interviewees to ensure that all the information gathered was a true reflection of the interviewee’s experiences. Course material was evaluated to determine practices that are used by the organizations to implement environmental education programmes.

3.7 Ethical Considerations

The proposal was submitted to the University with the necessary documentation to ensure that ethical processes were followed. Prior to conducting interviews, written permission was sourced from the different organizations. When permission was granted, appointments were scheduled to interview participant at a venue and time that was most suitable for the participant. Interviewees filled out consent forms granting the researcher permission to host the interview as well as record the interview. (See appendix 2 and 3)

3.8 Summary

In this chapter, a detailed account of the research strategy and methodology employed was presented. Semi-structured interviews provided the main source of data. Data was verified when learning materials from each of the four organisations were analysed.

In the following chapter the research results will be analysed. The findings from the semi-structured interviews and the analysis of learning materials will be presented.

Chapter Four - Analysis of Results and Findings

Introduction

This chapter begins with the analysis of results from interviews. Thereafter, the findings from the learning materials are set out. The framework of analysis used in this study is:

- the three forms of environmental education namely education '*about'*, education '*in\through*' and education *'for'* the environment (Fien, 1993)
- classification of environmental education into currents (Sauvé, 2005)

4.1 Results of Interview Analysis

From the interpretation and synthesising of the interviews, the following major themes emerged:

4.1.1 Discrepancy between Interpretation and Practice of Environmental education

4.1.2 Perceptions of Sustainable Development held by the four organisations

4.1.3 Implementation of Education for Sustainable Development

Firstly an introduction to themes is given, thereafter the findings of each organisation with respect to the theme are analysed.

4.1.1 The Discrepancy between the Interpretation and Practice of Environmental Education

The first theme that emerged from this study was environmental education. Environmental education interpretation and practices amongst the organisations interviewed was examined. With respect to the interpretation and practices of environmental education by the organisations sampled in this research, no consensus across the organisations was found. The organisations interpret environmental education in different ways. In this study, it was found that each organization understands environmental education differently.

The Discrepancy between the Interpretation and Practice of Environmental Education at Eco-Access

There is very little evidence of the environmental education paradigm that informs the practice of Eco-Access.

> "We believe in the concept of universal design where we would like the environment to be accessible to each and every person. Environmental education does not matter to who you are, what language you speak, so it should be accessible to everyone, so we make it accessible to everyone"(Eco-Access).

Eco-Access interprets environmental education as being available to all members of society. Their focus is on ensuring that disabled people be part of environmental education programmes. Eco-Access does not seem to follow the paradigms of environmental education in their practice. Eco-Access plans their environmental programmes by consulting with stakeholders to understand the needs of their customer prior to their programmes being developed and implemented.

> "It depends on the communities needs. Before *we* implementing any program we rely on the school, they will tell us what challenges they are facing and together we can guide them" (Eco-Access).

Prior to implementation of environmental education programmes, a needs analysis is done by Eco-Access. The interpretation and practice of environmental education at Endangered Wildlife Trust will be analysed next.

The Discrepancy between the Interpretation and Practice of Environmental Education at the Endangered Wildlife Trust

According to the Endangered Wildlife Trust, environmental education is a concept which evolves over time. It is evident that The Endangered Wildlife Trust keeps abreast of current trends in environmental education and that their understanding of environmental education is consistent with the literature on environmental education.

> "….it is a process opposed to a thing or something that you teach and recognise that is has undergone a lot of changes over the years. It has evolved from education, 'about' the environment to education 'in' the environment to education 'for' the environment and then going onto education for sustainable development but it is a process"(Endangered Wildlife Trust).

This quote shows that Endangered Wildlife Trust understands the three forms of environmental education viz. education 'in' the environment, education 'about' the environment and education 'for' the environment.

The Endangered Wildlife Trust claims that their programmes are based on the needs of their communities.

> "Most of ours is reactive things when we are addressing the issues. It is very much because we are living in the community and working with that community. We are not coming from outside and imposing environmental awareness on the community but we are part of the community and the community action that comes from activities is from the community so they identify their own issues and just with guidance and assistance from staff members having links to the greater organization…."(Endangered Wildlife Trust).

The Endangered Wildlife Trust is clearly of the opinion that people who work with them are from the community and therefore would be able to identify the environmental issues within their community.

The Discrepancy between the Interpretation and Practice of Environmental Education at the Johannesburg Zoo

At the Johannesburg Zoo, environmental educators give prominence to conservation.

> "…it's more kind of orientated towards conservation. So in that it has enough in the sense that, 'in' the environment, 'about' the environment and 'for' the environment but there is a lot of focus 'in' the environment and 'about' the environment" (Johannesburg Zoo).

It seems that the environmental education programmes at Johannesburg Zoo places emphasis on education 'in' the environment and 'about' the environment whilst little emphasis is placed in education 'for' the environment. The finding by Cartea (2005) that environmental education is mainly focused on conservation education is very evident in the practice of Johannesburg Zoo.

> "We do not have very many projects with schools for the environment so that is still to come. It is still not quite there yet. So it is about, 'in' and 'about' the environment but it is not fully holistic in the sense of our environmental education should be" (Johannesburg Zoo).

With regards to this quote, environmental education at Johannesburg Zoo does not lead to action taking. Jickling (1997) and Walker (1997) maintain that educators practising environmental education find it difficult to engage their students in action programmes and projects. This is evident in the practice of the Johannesburg Zoo. Diagnosing an environmental problem without finding a remedy is of no benefit to those that are affected by this environmental problem (Walker, 1997).

At Johannesburg Zoo the programmes are solely determined by the World Association for Zoos and Aquariums and there is no consultation with customers (visitors or school learner's) to determine their needs.

> "It is basically what the World Association for Zoos and Aquariums dictate. Say like last year was the year of the frogs so we focused on that. This year is the year of the shark and gorilla. We do not have any sharks so we are focusing on the gorilla…." (Johannesburg Zoo).

The environmental education practice at the Johannesburg Zoo is influenced greatly by it's mandate which is, "the accommodation, enrichment, husbandry and medical care of wild animals" (www.jhbzoo.org.za).

The Discrepancy between the Interpretation and Practice of Environmental Education at Johannesburg City Parks

Environmental education at Johannesburg City Parks is coupled with action projects.

> "… understands environmental education as something that has to bring about change but change in the sense that it gives skills to people. With those skills they will be able to solve their environmental issues or problems in communities. Projects that you can see that they are sustainable, there is action in place and people know how to deal with issues in general. So it is education that involves action not only talk and talk and theory" (Johannesburg City Parks).

Environmental education at Johannesburg City Parks results in some environmental problems being solved through action projects. Fein (1993) asserts that environmental education 'about' the environment and environmental education 'through' the environment is beneficial only if leads to the achievement of education

'for' the environment. Fein (1993) suggests that environmental education should move away from only imparting environmental knowledge (education 'about' the environment) and move towards solving environmental problems thereby making a difference to society (education 'for' the environment).

The environmental education programmes of Johannesburg City Parks are not restricted to the mandate of the company but also consider the needs of the customers and the national curriculum statement for grade R to grade 12.

> "We are a municipal owned entity and the objectives are the open space Management company so first of all our programmes are determined by what we do as our core business of the company. So they are influenced by the needs, curriculum statements and our mandate of the company" (Johannesburg City Parks).

The quote indicates that Johannesburg City Park's environmental education programmes are a result of their mandate, customer needs and documentation.

Summary: The Discrepancy between the Interpretation and Practice of Environmental Education

The four organizations interviewed interpret and practice environmental education differently. Eco-Access places emphasis on the needs of the customer and does not consider the environmental education paradigms whilst Endangered Wildlife Trust considers the different environmental education paradigms in their practice as well as the needs of the community. The Johannesburg Zoo mandate places emphasis on conservation and this influences the practice of environmental education whilst education 'for' the environment is ignored. At Johannesburg City Parks, the environmental education programmes are interpreted and practiced by following the mandate, customer needs and the curriculum for school learners. There is no consensus on the interpretation and practice of environmental education amongst each organization and this can be attributed to differing mandates amongst the four organisations.

4.1.2 Perceptions of Sustainable Development held by the four organisations

The second theme that emerged during this study is that of sustainable development. According to Bonnett (1999, 313), sustainable development became popular after it featured in a number of important reports such as the, "Brundtland Commission, *Our Common Future* (World Commission on Environment and Development, 1987) and the Rio Earth Summit's *Agenda 21* (United Nations, 1992)". Sustainable development is defined as "development that meets the needs of the present without comprising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, 43). The literature study showed that there is much debate with regards to the term sustainable development. Many people do not understand the meaning of sustainable development. The public is grappling with the concept of sustainable development yet there is pressure to transform environmental education to education for sustainable development (Jickling, 2005). A deeper discussion on each organisation's understanding of sustainable development is set out.

Perceptions of Sustainable Development at Eco-Access

The definition of sustainable development according to Eco-Access below was contextualized to the daily practices of Eco-Access. If a school is able to implement an environmental project successfully without the help of Eco-Access, then that project at the school is sustainable

> "…when we talk of sustainable development we talk about total independence like teaching people to be self-sustainable especially like our schools we don't want to be in schools every day. We want to start a project and the school to take ownership and to run it sustainable that is what we understand by sustainable development" (Eco-Access).

The interpretation of sustainable development by Eco-Access is that their customers should be able to take responsibility and manage their environmental projects. A study conducted by Andrew Darnton in the United Kingdom for the Department of Environment, Food and Rural Affairs (Jickling, 2005), found that householders and

people in the workplace did not understand the meaning of 'sustainable development' which is also evident in Eco-Access.

Perceptions of Sustainable Development at the Endangered Wildlife Trust

In understanding sustainable development, the Endangered Wildlife Trust considers the environment and the needs of people. In the definition of sustainable development below environmental, social and economic aspects are considered.

> "We all have to understand there is development that is required for our own needs with responsible decision making and responsible actions. A win-win situation can be created it out of most opportunities and we would say something in line were we would have to consider both needs of the environment as well the biodiversity that is utilizing that area as well as the people that are living off the resources in that area" (Endangered Wildlife Trust).

The interpretation of sustainable development by Endangered Wildlife Trust is eco-centric and therefore does not promote anthropocentrism. Sachs (1999) and Disinger (1990) concur that the concept of sustainable living should replace the concept of sustainable development. Sustainable living does not give development precedence but ensures that environmental, social and economic aspects are integrated without any one aspect dominating the scene.

Perceptions of Sustainable Development at the Johannesburg Zoo

The Johannesburg Zoo defines sustainable development by making reference to the Brundtland definition of sustainable development.

> "I think it is the standard definition that we need to save now for future generations. This is sustainable development in the zoo context" (Johannesburg Zoo).

In the understanding of sustainable development, the Johannesburg Zoo places emphasis on future generations. According to (Munslow *et al*, 1997) emphasis is placed on present generations and future generations whilst we should try to decrease the impact on our environment because the resources of this planet do not belong to present or future generations.

Perceptions of Sustainable Development at Johannesburg City Parks

Johannesburg City Parks identifies with the Brundtland definition of sustainable development.

> "I think our organization understands sustainable development as development that caters the need of the current society without jeopardizing the needs of the future generation. I will give an example is that currently what they do is that they are embarked on this project called,The Greening of Soweto Project. That project addresses the needs of now because the people of Soweto are living in an environment that is not green. They are living in an environment where there are no trees at all. So are addressing what they need now is now but also that need will not only addressed for the current but it will go for the future. The more the trees are planted growing then the future generations will look and say vow, look what the past generations has done for us so that is the kind of sustainable development looking on. Something that addresses now and also in future (Johannesburg City Parks).

The definition of sustainable development by Johannesburg City Parks promotes development provided that it does not interfere with the needs of future generations.

Summary: Perceptions of Sustainable Development

Three organizations that are Endangered Wildlife Trust, The Johannesburg Zoo and Johannesburg City Parks understand sustainable development by making reference to the Brundtland definition of sustainable development. Although the above-mentioned organizations use the Brundtland definition, the interpretations of sustainable development among the three organisations differ. It is clear that the participant interviewed at Eco-Access is not familiar with the Brundtland definition of sustainable development but perceives sustainable development to be achieved if a project that they started with a school or community can continue to exist without assistance from Eco-Access than they are achieving sustainable development. If there is no accord amongst practitioners of environmental education on sustainable development, the question that arises is what the implications for education for sustainable development are. The next part explores the implementation of education for sustainable development amongst the four organisations interviewed.

4.1.3 Implementation of Education for Sustainable Development

The third theme that features in this study is education for sustainable development. There are different interpretations of the relationship between environmental education and education for sustainable development.

> "For some, sustainable development is the ultimate goal of environmental education: the term *environmental education "for" sustainable development* (EEFSD) is proposed. For others, sustainable development refers to specific objectives, which should be added to those of environmental education: therefore, they use the expression *education for environment "and" sustainable development*. According to the document proposed by UNESCO (1992) at the ECO-ED Conference. EE is just one of many thematic educations that contribute to the overall *education for sustainable development*. For others still, the term *environmental education* implicitly includes *education for sustainable development* and it is therefore pointless to change the terminology; quite the contrary, this could lead to confusion and might have a negative impact on EE" Sauvé(1996, 18).

This quote indicates that there is dissonance with the relationship between environmental education and education for sustainable development. Hopkins and McKeown (2003) is of the opinion that although there are difference and similarities between environmental education and education for sustainable development, environmental education and education for sustainable development compliment each other. The interview analysis of the interpretation and practice of education for sustainable development among the four organisations interviewed follows in the next section.

Implementation of Education for Sustainable Development at Eco-Access

Eco-Access supports the notion that sustainable development and environmental education are linked.

> "I see education for sustainable development and environmental education are related because environment is in everything we talk about" (Eco-Access).

The understanding of education for sustainable development at Eco-Access is simply to ensure that the projects are sustained by the stake-holders that Eco-Access works with. Theoretical knowledge of education for sustainable development is not visible in the practice of Eco-Access.

> "When we start a programme, the main aim is for the programme to continue running or sustaining itself. I can say especially under our green school project, we got for example a school Pretoria Prince, where we got a tunnel farm. The main idea was most of the learners are in hostels. The children hardly eat. That tunnel supplies the kitchen with vegetables" (Eco-Access).

When stakeholders that work with Eco-Access are able to manage a project over time without much assistance from Eco-Access, then that is viewed as sustainable development.

Implementation of Education for Sustainable Development at the Endangered Wildlife Trust

The Endangered Wildlife Trust is of the opinion that there is no difference between environmental education and education for sustainable development.

> "I would say that they are pretty much the same. For us there is no really difference in any education. The term arose out of a number of international meetings and been the focus on over a couple of decades. Yes, I do see a difference between the two. It is obviously the actual focus or the outcome is just slightly different." (Endangered Wildlife Trust).

The interpretation of the relationship between environmental education and education for sustainable development by the Endangered Wildlife Trust is that environmental education and education for sustainable development is similar. The Endangered Wildlife Trust perceives that the difference in environmental education and education for sustainable development is in the outcomes.

The Endangered Wildlife Trust classifies their programmes as awareness and training which they claim is based on the principles of environmental education and education for sustainable development.

> "Yes, I think with my answer before. When we talk we do not really confine ourselves to environmental education or education for sustainable development, we use the rather bland one of awareness and training but having said that we hold those

> principles dear in our application or our presentation of those principles and ethics are adhered or portrayed when we do our presentation. We basically adhere to the principles of environmental education and education for sustainable development" (Endangered Wildlife Trust).

The programmes at Endangered Wildlife Trust are environmental awareness programmes that are classified either as environmental education or education for sustainable development by the staff members of Endangered Wildlife Trust.

Implementation of Education for Sustainable Development at the Johannesburg Zoo

The opinion of Johannesburg Zoo is that environmental education and education for sustainable development are similar.

> "I mean the relationships between them are actually kind of similar. It is almost like a progression from outdoor education to conservation education to now education for sustainable development" (Johannesburg Zoo).

Johannesburg Zoo concludes that environmental education has evolved with time and that environmental education is similar to education for sustainable development.

Although Johannesburg Zoo knows about education for sustainable development they do not implement programmes that promote education for sustainable development.

> "No, like I said in essence we do not have a program labelled or a program about sustainability or something like that" (Johannesburg Zoo).

Implementation of Education for Sustainable Development at the Johannesburg City Parks

The relationship between environmental education and sustainable development is described by Johannesburg City Parks as being almost the same, but incorporates the aspect of environmental concern. Johannesburg City Parks accentuates the needs of people when defining sustainable development but accentuates the needs of the environment when defining education for sustainable development.

> "I think that the relationship between education for sustainable development

> and environmental education is that they are not far apart. The principle is the same. Education in terms of sustainable development takes all the principles but then it considers action inside for the environment" (Johannesburg City Parks).

Johannesburg City Parks implement environmental education projects that they classify as education for sustainable development. The programmes at Johannesburg City Parks place emphasis on the environmental aspect of education for sustainable development whilst the social perspective and economic perspective of education for sustainable development is being implemented on a very small scale.

> I think it is true, because I just mentioned programmes for education for sustainable development. Yes, we are implementing projects for education for sustainable development apart from the propagation programme" (Johannesburg City Parks).

Summary: Implementation of Education for Sustainable Development

Eco-Access does not understand the concept of education for sustainable development which indicates that they do not keep abreast with changing paradigms in environmental education. The Endangered Wildlife Trust, The Johannesburg Zoo and Johannesburg City Parks consider environmental education as being similar to education for sustainable development and they claim that they are practicing environmental education and education for sustainable development. When the materials are analysed in next section, conclusions can be drawn to determine whether organisations are implementing education for sustainable development.

4.2 Analysis of Learning Materials from the four organisations interviewed

Initially, this study was to collect data using semi-structured interviews. During the implementation of interviews, the researcher decided to triangulate the interview data by evaluating a set of learning materials from each of the organisation's interviewed. This study explores the key attributes of environmental education and education for sustainable development by assessing environmental materials that inform environmental education practice in the organisations interviewed. In table 5 below,

materials from the different organisation's sampled are analysed. The actual materials can be found in appendix 4.

Table 5 Analysis of Materials from the Organisations sampled

Organisation	Education 'ABOUT' the environment	Education 'IN' the environment	Education 'FOR' the environment	Education for Sustainable Development
Eco-Access	The theme for the materials is animals. The activity allows learners to classify animals into different categories.	This activity examines the picture of animals on the South African currency. A momentary value is associated with the animals. Learner's engage in a game to determine the value of animals.	There is no activity that promotes education 'for' the environment.	The only perspective covered is environment and the feature is natural resource.

Organisation	Education 'ABOUT' the environment	Education 'IN' the environment	Education 'FOR' the environment	Education for Sustainable Development
The Endangered Wildlife Trust	The material consists of a large amount of theoretical knowledge about trees. The learning area focus is predominantly natural science except for one activity on using a compass to find direction.	Some activities contribute to learners' understanding the value of nature. Learners are exposed to making pressings as part of the herbarium work.	There is no activity that promotes taking action for a better environment. The activities test learners' understanding of scientific knowledge. There is a statement that encourages learners to plant trees.	The global perspectives of education for sustainable development by UNESCO is socio-cultural perspective; environmental and economic perspective. In these materials only the environmental perspective was considered. The most prominent feature of the environmental perspective in this set of materials was natural resource. The other features of the environmental perspective such as climate change, rural development, sustainable urbanization, disaster prevention and mitigation was not found in these materials.

Organisation	Education 'ABOUT' the environment	Education 'IN' the environment	Education 'FOR' the environment	Education for Sustainable Development
The Johannesburg Zoo	The learning programme is based on frogs. Factual knowledge on the definition of amphibians and frogs are present. The classification worksheet tests learners' understanding of classification of birds, mammals, reptiles, fish and amphibians.	The activity on scientific investigation illustrates to learner's the importance of frogs in our eco-system.	There is no activity that supports taking action to conserve frogs or the environment.	The only perspective of education for sustainable development from UNESCO that is visible is the environmental perspective. There is a focus on natural resource feature of the environmental perspective leaving out the others.
Johannesburg City Parks	The programme theme is Trees in my Backyard. Classification of trees activity looks at deciduous and coniferous trees. In this activity focus is on natural science.	Learners engage in an activity on the uses of different parts of a tree. This activity focuses on the social, economical and bio-physical aspects of the environment.	There is no activity that leads to an action for a better environment.	The environmental perspective focusing on natural resource is prominent in these materials.

Summary: Analysis of Learning Materials from the four organisations interviewed

The global perspectives of education for sustainable development are socio-cultural perspective, economic perspective and environmental perspective. (http://portal.unesco.org). In analysing the materials from the four organization sampled in this study it was found that these organisations only focused on the environmental perspective of education for sustainable development although they claim that they are implementing education for sustainable development. This can be ascribed to the fact that these organisations do not have a clear understanding of education for sustainable development.

4.3 Summary of Findings

4.3.1 Classification of Environmental Education

Environmental education literature indicates that there are divergent discourses and practices with regard to environmental education (Sauvé, 2005). Therefore to address the diversity of environmental education discourse and practice Sauvé (2005, 12) classifies environmental education into different 'currents'. Sauvé (2005) suggests these 15 currents in environmental education are not prescriptive or all encompassing. In examining table 6 shown below by Sauvé (2005), there are fifteen currents with each having different aims of the environmental education. The characterisation of the fifteen currents in environmental education by (Sauvé, 2005, 33-34) would be used as a framework to classify the environmental education practice of the organisations interviewed in this study. In table 6 below, the currents that the organizations use in their practice of environmental education have been highlighted in red.

Table 6 Characterisation of Fifteen Currents in Environmental Education (Sauvé, 2005, 33-34).

Current	Conception of Environment	Aims of Environmental Education
Naturalist	Nature	Reconstruct a link with nature.
Conservationist/	Resource	Adopt behaviours compatible with conservation. Develop skills related to environmental management
Problem-solving	Problem	Develop problem-solving skills: from diagnosis to action.
Systemic	System	Develop systemic thinking: analysis and synthesis, toward a global vision. Understand environmental realities in view of enlightened decision-making.
Scientific	Object of study	Acquire knowledge in environmental sciences. Develop skills related to the scientific method.
Humanistic/ Mesological	Living Milieu	Know and appreciate one's milieu of life better; know oneself in relation to this living milieu. Develop a sense of belonging.
Value-centred	Field of values	Adopt eco-civic behaviours. Develop a system of ethics.
Holistic	*Holos*, *Gaïa*, All,The Being	Develop the many dimensions of one's being in interaction with all aspects of the environment. Develop an "organic" understanding of the world & participatory action in and with the environment.
Bioregionalist	Place of belonging, Community Project	Develop competencies in/for local or regional community eco-development.
Praxic	Locus of action/reflection	Learn in, by, and for environmental action. Develop reflexive skills.
Socially Critical	Object of transformation, Place of emancipation	Deconstruct socio-environmental realities in view of transforming them and transforming people in this process.
Feminist	Object of solicitude	Integrate feminist values into the human-environment relation-ship.
Ethnographic	Territory, Placeof identity,Nature/culture	Recognize the close link between nature and culture. Clarify one's own cosmology. Valorize the cultural dimension of one's relationship with the environment.
Eco-Education	Role of interaction for personal development, Locus of identity. Construction.	Experience the environment to experience one-self and to develop in and through it. Construct one's relationship with the "other than-human world".
Sustainable Development\ Sustainability	Resource for economic development, Shared resource for sustainable living.	Promote economic development that takes care of social equity and ecological sustainability; Contribute to such development.

Some organisations may focus on one current whilst other organisations may focus on many currents. The Johannesburg Zoo places emphasis on conservation whilst Johannesburg City Parks focus on problem solving, conservation and sustainable development. Sauvé (2002) states that there should be no bias against any particular view in environmental education but all aspects should be integrated. Environmental education pedagogy should include the socio, political, ecological and economic dimensions of the environment (Cartea, 2005). This study found that only six currents of environmental education out of fifteen currents were mentioned. The six currents are:

- Naturalist
- Conservationist
- Problem Solving
- Value Centered
- Ethnographic
- Sustainable Development or Sustainability

The reasons for environmental education organization's only implementing some currents in environmental education can be attributed to the organization's mandate, customer needs, curriculum requirements and funding. An organization such as Johannesburg Zoo, implements programmes on conservation of animals which is in keeping with their mandate. Non-governmental organizations rely on funding from donors for their environmental education programmes which influences the type of programmes that they implement. If environmental education is limited to a few currents due to organisation's mandate, customer needs and national curriculum requirements, then where is the opportunity for education for sustainable development to manifest itself?

4.3.2 Sustainable Development, is it merely a mantra?

There is no consensus on the definition of sustainable development by the different organisations interpreted. The local government organisations (Johannesburg Zoo and Johannesburg City Parks) placed emphasis on the Brundtland report that defines sustainable development as "development that meets the needs of the present without comprising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, 43). Some organizations are familiar with current theoretical knowledge and paradigm shifts and keep abreast with national and international thinking on environmental education whilst other organisations do not.

The understanding of sustainable development by local government organisations places emphasis on the needs of people. Schreuder, Reddy and Le Grange (2002) maintain that sustainable development promotes human needs and not the fundamental value of nature. This idea is supported by Bonnett (1999) who contends that sustainable development causes anxiety between human needs and ecological needs but does not give a resolution to this dilemma.

There is no consensus among the different departments within the Endangered Wildlife Trust on the definition of sustainable development.

"Again, that is a big question, big and I loathed to answer on behalf of the organization, our side we are looking at more responsible calculated development" (Endangered Wildlife Trust).

The education and training department at the Endangered Wildlife Trust stated that they could not define sustainable development on behalf of other departments within their organisation. The interpretations of sustainable development within an organisation differ and this creates much difficulty in accessing a particular organisation's interpretation of sustainable development.

Hattingh (2002) claims that the sustainable development narrative as an impact on the theory and practice of environmental education. If there is no consensus on the meaning of sustainable development, then this would have an influence on the theory and practice of environmental education. The public is grappling with the concept of sustainable development yet there is pressure to transform environmental

education to education for sustainable development (Jickling, 2005). The findings of Jickling (2005) in the United Kingdom are consistent with findings in this study that the term 'sustainable development' is not properly understood by the different organisations. A study on sustainable development engagement by an environmental centre conducted by Pillay (2008) found that there is no single definition of sustainable development which is consistent with the literature on sustainable development. The findings from this research are congruent with the findings of Pillay (2008).

4.3.3 Education for Sustainable Development

The overall goal of the Decade of Education for Sustainable Development is to integrate the principles, values, and practices of sustainable development into all aspects of education and learning to encourage changes in behavior that allow for a more sustainable and just society for all (Lotz-Sisitka et al., 2006). A study of environmental education and education for sustainable development was undertaken by Hesslink et al., (2000) that was commissioned by the International Union for Conservation of Nature and Natural Resources (IUCN). The findings stated that education for sustainable development is a stage in the evolution of environmental education (Cartea, 2005). The different relationships between environmental education and education for sustainable development are represented diagrammatically below.

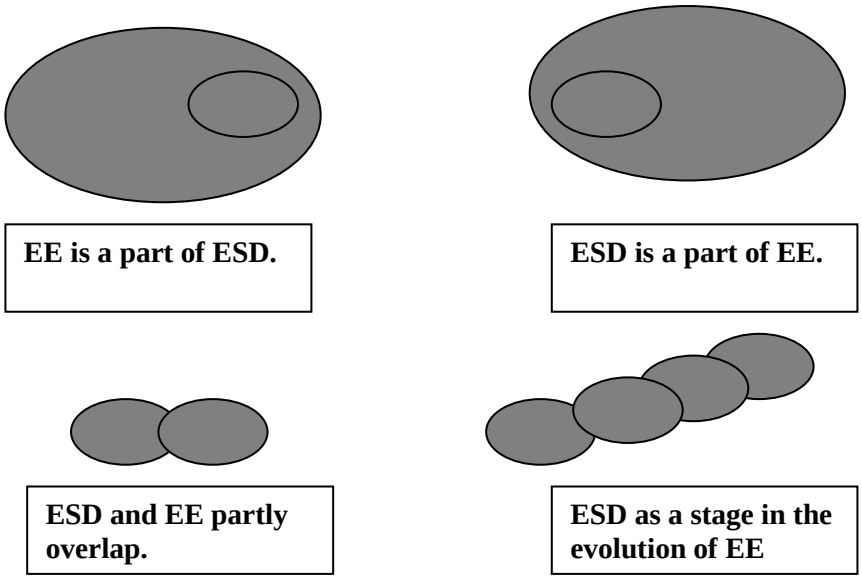


Figure 6 The relationship between ESD and EE (Hesslink et al, 2000, 12).

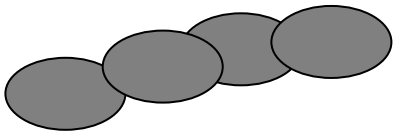
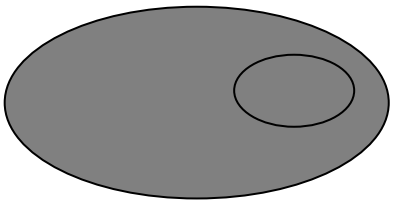
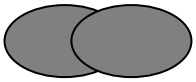
The United Nations declared the years 2005-2014 as the Decade of Education for Sustainable Development. The Draft *International Implementation Scheme* (*Oct. 2004)* developed by UNESCO describes strategies that the decade should follow. The UNESCO *Draft International Implementation Scheme* (*Oct. 2004),* portrays environmental education and education for sustainable development differently compared to the findings of the study undertaken by Hesslink et al., (2000) in Cartea (2005). UNESCO's belief is that environmental education is not the same as education for sustainable development. Environmental education is a part of education for sustainable development (UNESCO, 2004).

> "Education for Sustainable Development should not be considered the same as Environmental Education. The latter is a well established discipline that concentrates on human relationships with the natural environment and in the ways to conserve and preserve it and adequately manage its resources. Sustainable Development therefore includes environmental education, situating it in the larger framework of socio-cultural factors and the socio-political aims of equity, poverty, democracy and quality of life" (UNESCO, 2004, 18).

Comparisons between findings on education for sustainable development

Table 7 below illustrates the perceptions of the relationship between environmental education and education for sustainable development by Hesslink et al.,(2000); UNESCO and this study.

Table 7 Findings on the Relationship between environmental education and education for sustainable development adapted from (Hesslink et al, 2000).

Participant Profile	**Relationship between Environmental Education and Education for sustainable development**
Environmental Education Academics (Hesslink et al, 2000)	 **ESD as a stage in the evolution of EE**
United Nations Environmental Scientific Organization (UNESCO, 2004, 18).	 **EE is a part of ESD.**
Environmental Education Practitioners in this study	 **ESD and EE partly overlap.**

In comparing the findings from Hesslink et al, (2000), UNESCO (2004) and this study, there is no agreement on the relationship between environmental education and education for sustainable development. This research found that environmental practitioners describe environmental education and education for sustainable development as being similar. The implementation plan of UNESCO (2004) states that environmental education is part of the bigger frame which is education for sustainable development (UNESCO, 2004).The perceptions of environmental education and education for sustainable development vary amongst different stakeholders and this would influence the practice of education for sustainable development amongst different stakeholders.

This research aimed to determine whether the organisations practised education for sustainable development and whether their practice of education for sustainable development is different from environmental education by analysing the interview responses of stakeholder's sampled and the materials that they use to implement programmes.The Endangered Wildlife Trust, Eco-Access and Johannesburg City

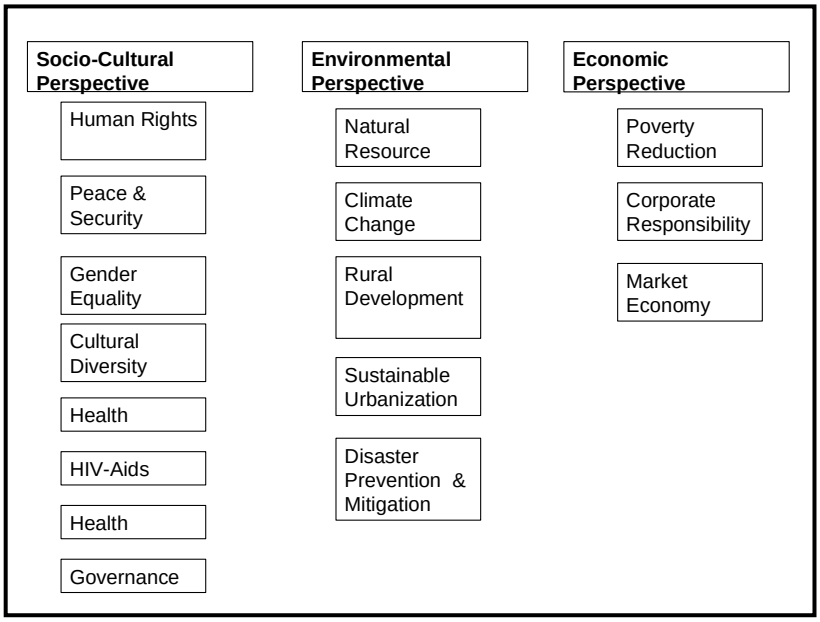
Parks confirmed that their organisations practiced education for sustainable development. When the materials from these organisations were evaluated, if was found that none of these organisations are implementing education for sustainable development. In examining the materials of this study and the definitions of education for sustainable development below, it was found that the programmes are focused on natural science and do not include aspects of solving environmental problems.

> "Education for sustainable development demands a new vision of education a vision that seeks to help people better understand the world in which they live, and to face the future with hope and confidence, knowing that they can play a role in addressing the complex and interdependent problems that threaten our future such as poverty, wasteful consumption, environmental degradation, urban decay, population growth, gender inequality, health, conflict and the violation of human rights (http://portal.unesco.org/en/ev.php).

4.3.4 Partnerships in achieving the goals of Education for Sustainable Development

The United Nations has declared that goals of education for sustainable development can be achieved if there are partnerships between the different stakeholders involved in education for sustainable development. Each partner will contribute to education for sustainable development in their context (http://unesdoc.unesco.org). Fien & Tilbury (2002) concur with Hopkins & McKeown (2002) that education for sustainable development may be implemented in the formal and non-formal through partnerships with the education sector, business, government, local government and non-governmental organisations thereby getting society to work together to become sustainable. The table 8 below taken from UNESCO's website describe the three perspectives of education for sustainable development and the themes that could be covered for each perspective.

Table 8 Breakdown of Global Perspectives (http://portal.unesco.org/en)



In examining the global perspectives of education for sustainable development as laid down by UNESCO, this study concludes that the practice of education for sustainable development among the different organizations is mainly focused on the environmental perspective. There is very little focus on the economic aspect or the socio cultural perspective.

4.3.5 Analysis of Materials

This study found that the outcomes were not stipulated in the learning programmes according to the national curriculum statements. In the Revised National Curriculum Statement in South Africa, the environment is present in the principles and in every learning area statement. The finding by O' Donoghue and Russo (2004) that environmental education materials do not reflect the outcomes and grade-specific topics as laid out in the revised national curriculum statements is consistent with the findings in this study.

In all the four sets of materials analysed, there was no indication of the global perspectives of education for sustainable development being implemented except for the environmental perspective. This is evident in that orgainsations are still using

environmental education materials but claim that they are implementing education for sustainable development. According to UNESC0 (2009), a review that was conducted to evaluate the progress of the Decade of Education for sustainable development found that there is insufficient materials to promote education for sustainable development.

> "While some reference materials are available, many countries have to resort to documents that address general SD issues or resort to more traditional EE content and methods. The availability of ESD-specific methods and innovations in teaching and learning needs to be improved" (UNESCO,2009,6).

The findings in this study are congruent with UNESCO's findings on insufficient materials for education for sustainable development and environmental education.

Summary

This chapter has analysed the research findings and made various conclusions as a result of these findings. An analysis of interview data and learning materials found that there is a considerable amount of work being done in the name of environmental education whilst very little work is being done in education for sustainable development.

The next chapter provides recommendations for the implementation of environmental education and education for sustainable development.

Chapter 5 – Conclusion

The final chapter presents the conclusions and recommendations. These conclusions and recommendations provide perspective and guidance for environmental education practitioners. The Decade of Education for Sustainable Development was declared from 2005 to 2015. In the year 2010, it is still evident that there is not enough that is being done to meet the goals of education for sustainable development. The four environmental education programmes still have a strong focus on the bio-physical aspects of the environment. There is very little or no focus on the social and economic aspects of the environment. Some of the factors that contribute to the focus on the bio-physical in the education programmes are the mandate of the organisation and a lack of understanding of education for sustainable development. The practitioners sampled in this study were trained in environmental education and there appears to have been no formal training regarding education for sustainable development. UNESCO encourages partners in government, business and non-governmental organisations to contribute to education for sustainable development in their context (http://unesdoc.unesco.org). It is recommended that UNESCO develops a training course that could be implemented for all partners so that they can play a significant role in achieving the goals of education for sustainable development.

During the past twelve years there has been a global focus towards moving environmental education to encompass the principles of education for sustainable development (Lotz-Sisitka, 2004). International reports such as the Brundtland Commission *Our Common Future* (World Commission on Environment and Development, 1987) and the Rio Earth Summit's *Agenda 21* (UNCED, 1992) are proposing the notion of sustainable development . Amidst the global plea for sustainable development to be implemented through education for sustainable development, this study found that practitioners are implementing environmental education with great focus on bio-diversity whilst the social and economic dimensions of the environment are being ignored. Lotz-Sisitka (2004, 57) proposes that environmental education in southern Africa has “a key role to play in both

investing in human development, and in protecting environments to ensure sustainable livelihoods and safe environments for all". If environmental education practitioners were to realign their programmes then the social, ecological and economic aspects of the environment could be considered.

The findings in this study indicate that environmental education is being implemented with very little focus on environmental action. Although practitioners understood the paradigm education 'for' the environment, it was evident that education 'for' the environment was given very little or no attention. The findings in this study resonate with the findings in the literature (Jickling, 1997, and Walker, 1997).

There is no clarity on the meaning of environmental education and education for sustainable development among the different organisations sampled. According to the UNESCO (2009) review of the Decade of Education for sustainable development found that there is tension between the terms environmental education and education for sustainable development.

> "In several regions, there is a call for the explicit articulation of the relationship between ESD and Environmental Education (EE) in order to create greater synergy between the two. The expected resulting process of reciprocal enrichment is to resolve existing tensions and is likely to contribute to an improved conceptualization and institutionalization of both(UNESCO,2009)."

The findings in this study concur with the findings by UNESCO (2009) on the definitions of environmental education and education for sustainable development

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Appendix 1

Interview Guide

- What are the objectives of your organisation?
- What does your organisation understand by environmental education?
- Is your organisation taking any action to address environmental education?

- What determines the type of environmental education programme that your organisation implements?
- Are there any challenges that your organisation is facing in addressing environmental education?

- What does your organisation understand by sustainable development?
- What does your organisation understand by education for sustainable development?
- How would you describe the relationship between EE & ESD?
- Are you implementing programmes on education for sustainable development?
- What types of programmes are you implementing for education for sustainable development?

Appendix 2

Information and Interview Consent Form

Dear Participant,

The purpose of this research is to explore environmental education and education for sustainable development among local government and non-governmental organization.

The research will use qualitative techniques to interview one participant per organization. The intention is to understand the relationship between environmental education and education for sustainable development and the nature of the programmes implemented by organisations.

In order to assist with the research I would like to invite you to participate in this study. You will not be penalized for not participating, and you have the right to withdraw from the study at any time. It is also important to let you know that there will be no payments for participation. Efforts will be made to safeguard your privacy (actual names and contexts will be disguised) so that issues remain anonymous. The information that you give during the research process will be written down, however, your names will not be disclosed. All data will be destroyed.

If you require more clarity on this research or have any questions, feel free to ask and I will try and answer your queries where possible.

Thank you for taking the time to consider participating in the study.

Kogie Moodley
Student at Wits University School of Geography, Archaeology and Environmental Studies

Consent Form for Participation in the Research

I agree to take part in the research project and agree to allow Kogie Moodley to interview me. I understand the purpose, conditions and procedures of the study as they have been explained to me. I understand that I am not going to get paid for my participation and that I have the right to withdraw from the study at any time during the study without a penalty. I understand that my identity will be protected.

Name of participant: ……

Date: ……

Signature: ……

I …….. have explained the procedures, purpose and conditions of the study to my participants. I have explained to the participants what their rights are with regard to participation in the study as well as the limitations of confidentiality. I agree with the above mentioned conditions and will adhere to them.

Date: 05/02/2009

Signature of the researcher: Kogie Moodley

Appendix 3

Audio-taping Consent Form

Dear Participant
You are invited to participate in this research process by participating in open-ended audio-taped interviews with the researcher. All data will be destroyed.
Thank you for your participation,

Kogie Moodley
Student at Wits School of Geography, Archaeology and Environmental Studies

Consent Form for Audio-taping of Interviews

I …… hereby willingly consent to the taping of my interviews as part of the research in environmental education.. I understand that all taped data will be destroyed.

Name of participant: ……

Date: ……..

Signature: ……..

Appendix 4

Learning Materials

Learning Materials

from

Endangered Wildlife Trust

A Conservation Training Programme Publication

Dear learner

The content of this practical field module has been carefully selected and laid out to assist you with your studies. There is no deliberate duplication of any of the UNISA materials but cross references to your UNISA Study Guides have been provided where appropriate. This publication was not developed to replace your UNISA Study Guides but rather to be used by the selected Conservation Training Programme (CTP) learners and should not be used as a preparation material for any UNISA examinations.

"Southern African Trees – a practical field module" was specifically designed and written for use during organised camps for selected UNISA CTP learners to gain valuable field experiences. However, it may be useful to all UNISA learners who are not associated with the Conservation Leadership Group (CLG) of the Endangered Wildlife Trust (EWT), but who are studying Plant Studies. Learners who are able or fortunate enough to visit some of South Africa's many wonderful game reserves, national parks and natural areas can make use of this practical field module and the many activity sheets it contains.

All selected CTP learners are expected to bring their copy of "Southern African Trees – a practical field module" to all the CTP camps. If this publication is accidentally mislaid, a replacement copy can be ordered from the CLG at the expense of the learner.

We hope and trust that you will enjoy the learning experiences provided by the EWT during the year and that they will assist you in becoming one of South Africa's future leaders in Conservation.

Originally written by
André Van Zyl and Edward Farrell

Adapted and expanded by
Graeme Wilson

Edited by
Kirsty Brebner

Design and layout by
Graeme Wilson

Text credits
To Braan van Wyk and Piet van Wyk. Your 'How to Identify Trees in southern Africa' formed the foundations for our Introduction to Trees section

Photo credits
All photographs in this publication belong to Graeme Wilson if not credited on the photo itself

Illustration credits
All illustrations in this publication were recreated by Graeme Wilson from other sources. Credits are given on each illustration

Special thanks to
André Van Zyl and Edward Farrell for researching and drafting the first edition of this module in 2004

Kirsty Brebner for editing this publication

To all the researchers, specialists and wildlife artists whose work has inspired the development of this publication for education purposes.

Introduction

How to make the most of this module
The CTP plans and hosts a number of focused experiential camps during the course of a year. One of these camps focuses on trees and their identification. This module is one of the resources that has been developed to support this particular camp. Although all the issues associated with trees cannot be covered in a single camp or in this module, it will assist you with gaining some of the relevant experiences associated with tree identification.

The module has been loosely divided into six sections, thus allowing the module to support the tree camp programme and providing you, the CTP learner, with a living document that will support you on the camp and grow with you throughout the year. The module contains a number of pages that may assist you well after the end of the camp. Remember that it is not there to replace your study materials and it is recommended that you bring with you your corresponding study guides to each camp.

Section one: Introduction to trees
The first section of the module focuses on introducing the trees and its importance in southern African conservation. Included in this section is a glossary of botanical terms related to trees. Remember that this module has been developed to assist and facilitate debate and discussions on trees during the focused CTP camp and is therefore not intended to be comprehensive in nature in any way.

Section two: Tree planting
The second section of the module focuses purely on how to collect seeds, germinate and care for them in a nursery to the point where you would like to plant out your tree.

Section three: Herbarium management and specimen collection
In this section, as the title implies deals with a number of key elements related to herbarium work and the collection and storage of specimens.

Section four: Direction finding and compass use
Mapping and the use and understanding on how a compass works is an important skill to muster. This section contains information and a number activities that would aid and assist students to learn about mapping and compass work and practice this newly gained understandings through the activities.

Section five: Tree identification
This section covers various botanical terms associated with trees. Many illustrations have been used to cover these terms. Also contained in this section is a short tree reference guide of some of the more common tree species most likely to be encountered while participating in this camp.

Section six: Assessment
This section deals with assessment requirements for this module.



Introduction to trees

Practical task
Take thirty minutes and choose and identify an example of an old well established tree and sit and examine it in detail. In the box provided draw and label the tree and all the associated organisms you observe. Example of some of the labels would be things like: Canopy, Black Sunbird, Lichens and Ants

Tree Name:_____

Labels

In the space provided give your definition for the following:
Old growth forest:

(4)

New growth forest:

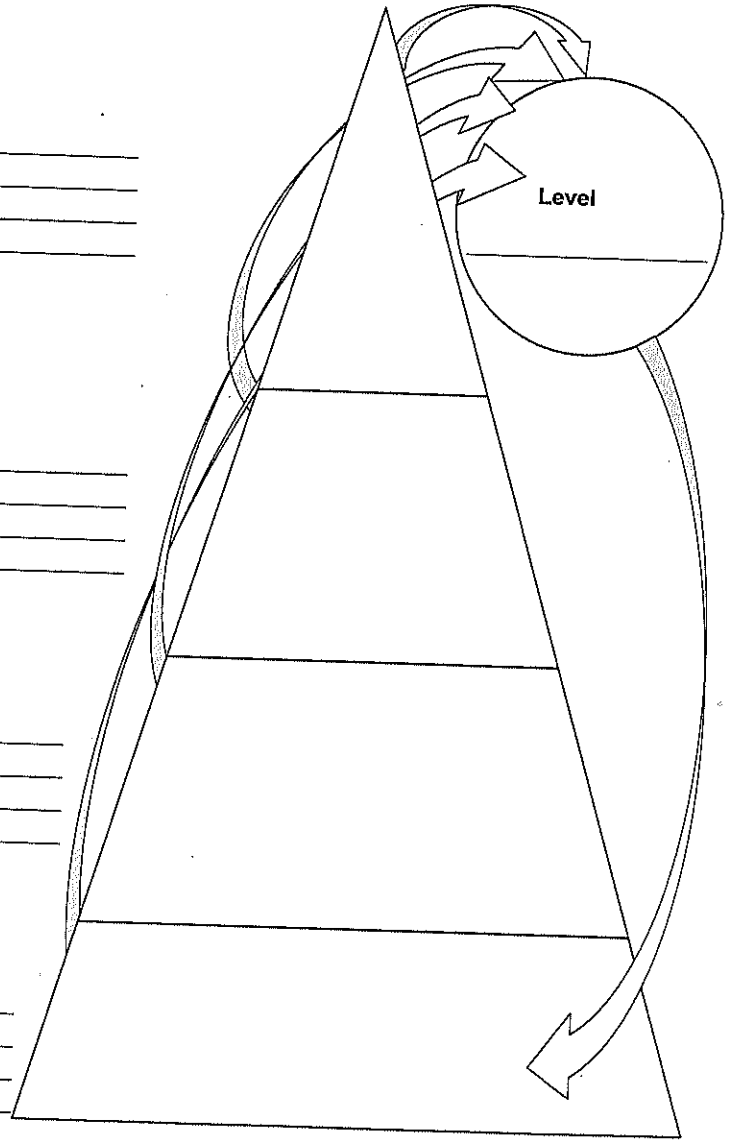
(4)

Introduction to trees

A tree supported energy pyramid
Explain the term, Trophic level:

(3)

In the pyramid illustration provided, list all the organisms occupying the various levels and provide a recognised name for each level, together with a general organism occupying each level:



(25)

Introduction to trees

Uses of trees
As mentioned earlier, trees are essential for human survival. A great deal of products are generated from trees. Under the headings provided list the tree products used, from indigenous trees only.

Nutritional
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____ (6)

Medicinal
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____ (6)

Cultural
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____ (6)

Other
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____ (10)

Do you know which trees are protected by law? Yes ☐ No ☐

(if not you should take the time and find out which ones are protected)

What is South Africa's National Tree? _____ (1)

Introduction to trees

The biomes of South Africa
There are six recognised South African biomes.
Provide a definition for a biome:

_____
_____ (4)

Explain how climate influences biomes

_____
_____
_____
_____ (6)

List the six major biomes of South Africa
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____ (6)

Provide characterising features for each of these biomes (ensure you include both biotic and abiotic factors)
1. _____
_____
_____
2. _____
_____
_____
3. _____
_____
_____
4. _____
_____
_____
5. _____
_____
_____
6. _____ (6)
_____
_____

Introduction to trees

Community energy pyramids over a 24 hour period
The various interactions you have observed during your thirty minute practical task (a few pages back) is only the very tip of a much larger and more elaborate web of life. Now take a few minutes and think of the various animals and their niches and how these change with the onset of night. Fill in the table below.

DAY		NIGHT	
Level 1	Stays the same	Level 1	Stays the say
Level 2		Level 2	
Level 3		Level 3	
Level 4		Level 4	

When trees die, are they really dead?
You have possibly heard this statement on numerous occasions but can you briefly explain what is meant by it in the space provided below?

(10)

Provide a list of organisms that would aid in the decomposition of a tree stump

(10)

Introduction to trees

Locating tree species
Trees occupy specific areas and fulfil specific functions within these areas. With a bit of background reading and understanding of the various habitat requirements of the many tree families, you would be able to predict fairly accurately the location of certain tree species on a piece of land.

Mountain slopes play a major part in the creation and maintenance of a micro-climate in a region. Gathering information on the orientation, height and proximity to other slopes would provide further valuable information when wanting to locate certain tree species i.e. the height of a mountain can generally increase local rainfall which could add to a cooler and moister condition in the region.

A slope which is orientated more or less towards the north or west is generally hot and dry and as a result will support fewer trees, which are also spaced further apart from one another. These tree species would be the types of trees which are adapted to these hot and dry conditions.

Give five tree species which are considered to be adapted or suited to living in hot and dry conditions.

1.
2.
3.
4.
5.

(5)

A slope which faces more or less south or east, is generally cooler and moister than north or west facing slope. This would also indicate that the area would support trees which would thrive in surroundings that are moister and cooler and would usually grow closer together.

Give five tree species which are considered to be adapted or suited to living in cool and moist conditions.

1.
2.
3.
4.
5.

(5)

There are always exceptions to these general rules which would lead to a contradiction in observations. On occasions fewer or more trees than expected will be observed in an area, which could usually be attributed to human interventions on the land, such as:

1. The amount of fire in the area over a extended period of time restricts tree growth
2. The amount of grazing and agriculture in the area over a extended period of time
3.
4.
5.

(3)

Or natural conditions, e.g.:

1. The location of other mountain slopes can offer unusual protection to a certain slope
2. Unusual or unique soils on a particular slope can provide an alternative or range extension for some trees

Field observation tips
On your first observation of a tree community on a slope; look at the leaves of the most dominant groups of trees on the slope to determine whether they are broad-leaved or fine leaved.
This will assist you when identifying different plant communities when doing a vegetation survey

Why do you think there is a difference in leaf structure?

(4)

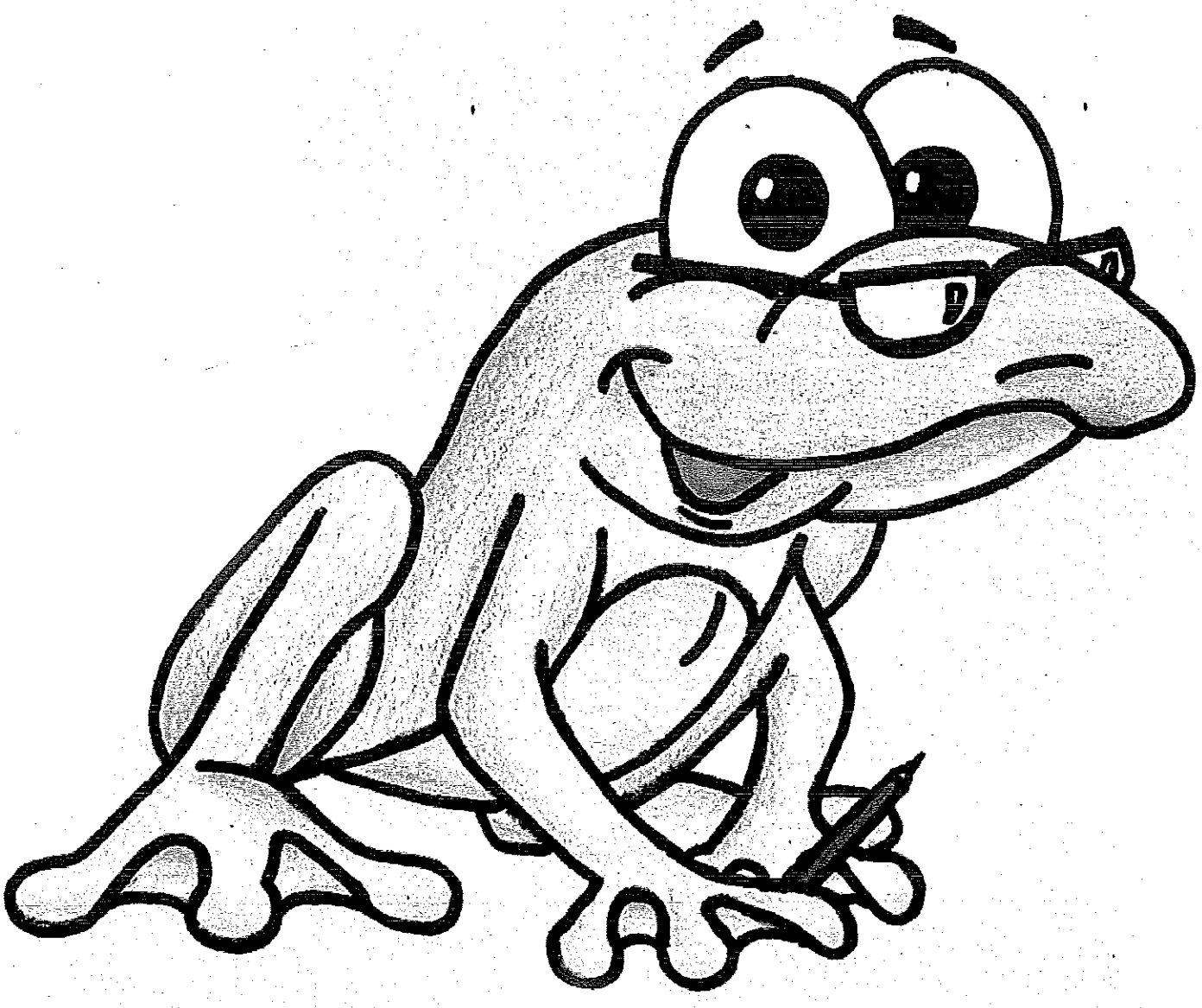
Learning Materials

from

The Johannesburg Zoo

Fabulous Frogs

The Educator's Guide



Joburg

a world class African city

amphibian ark

2008 YEAR OF THE FROG

JOHANNESBURG ZOO

Compiled by Louise Matschke

WELCOME TO JOHANNESBURG ZOO!

This guide has been developed for you, to help you make your visit to Johannesburg Zoo as fun and educational as possible. Thus encouraging your learners to explore the natural world and in particular frogs.

Guidelines to make your day at the Zoo successful:

- Show respect towards the animals. Don't bang on the glass, yell at the animals, throw things into the exhibit or chase any animal.
- Help your students learn and explore. The following pages include activities to use around the Zoo.
- Respect the Zoo grounds. Please don't litter, write on the walls, climb on exhibits or do anything else that will damage Zoo property.

Joburg
a world class African city

amphibian ark
2008 YEAR OF THE FROG

JOHANNESBURG ZOO

JOHANNESBURG ZOO

Classification Worksheet

Vertebrate Classes

AMPHIBIANS

_____ have moist skin. They go through a _____ but do lay _____. They live in_____ and on _____. They are _____ - blooded

BIRDS

Birds are _____ -blooded animals covered in _____, that breath with _____ and lay _____.

FISH

_____ are covered with wet, slippery scales. Breathes through _____ and are _____ - blooded and live in _____.

REPTILES

Reptiles are covered with _____, are Cold-_____ and breath with _____. Live on _____ . They lay _____.

MAMMALS

Mammals are covered with _____, breath with _____ and live mainly on _____ but also in the _____. They give live _____ and are warm-_____.

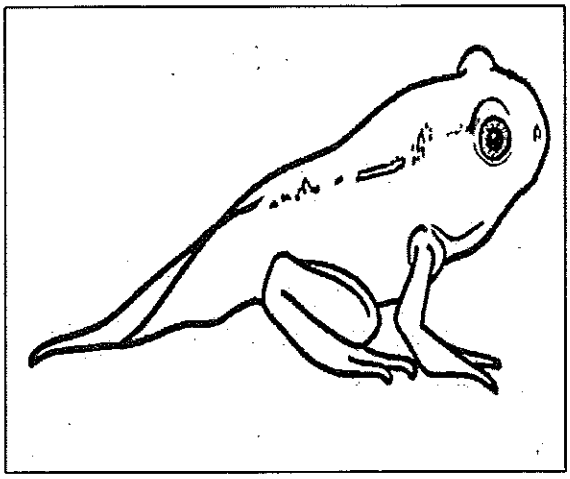
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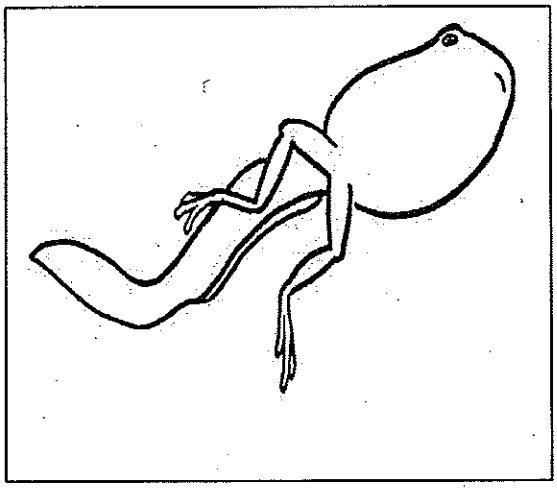
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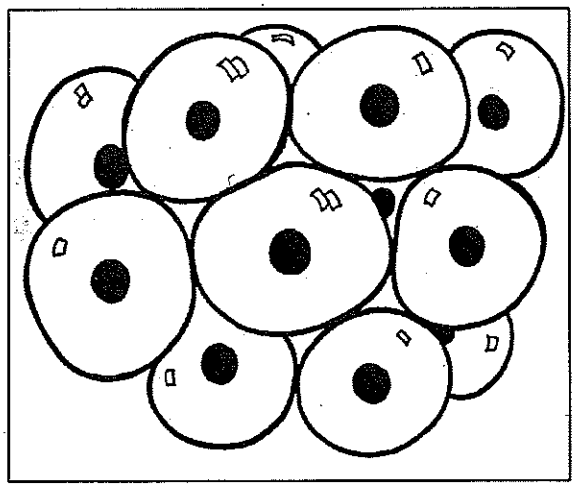
LIFE CYCLE CARDS

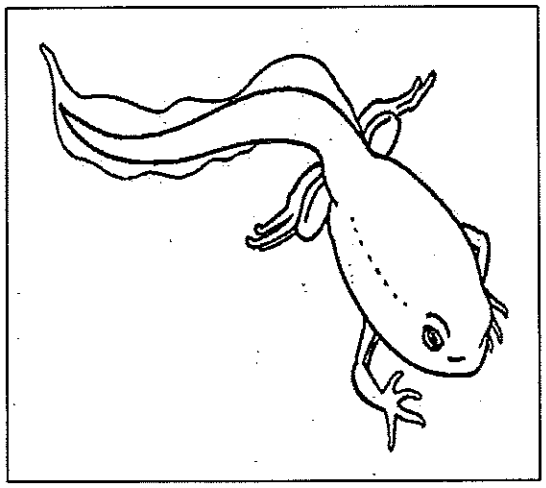
JOHANNESBURG ZOO

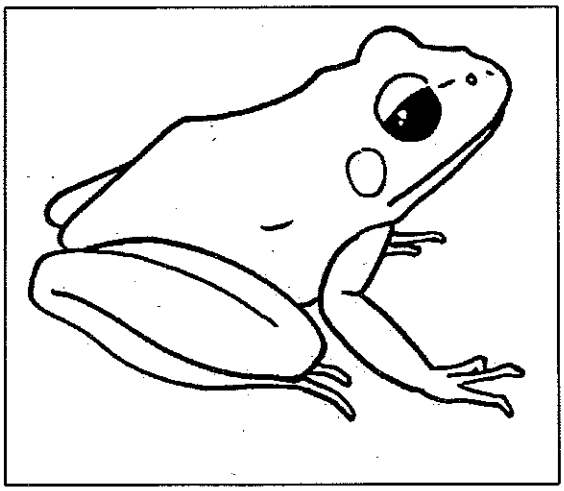
Cut out these cards and stick and them onto another page in the correct sequence. You could also use the cut out cards to make a flip book, with the cards in the correct sequence.

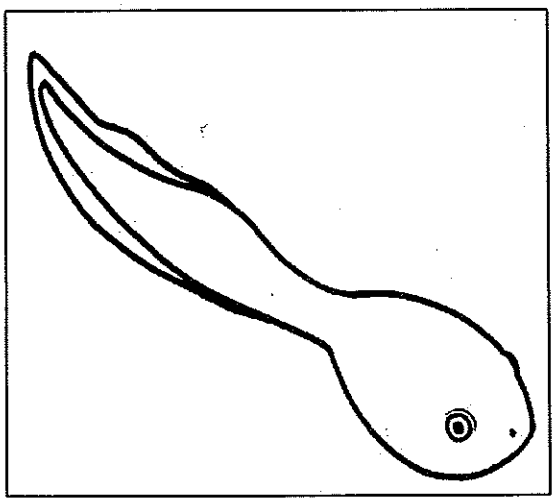












FROGS AND WHAT THEY MEAN TO HUMANS?

Amphibians profoundly enhance our lives and our world in countless ways.

They provide vital biomedicines, including refined compounds used for antibiotics, depression, stroke, seizures, Alzheimer's, and cancer. The Australian red-eyed treefrog (*Litoria chloris*) and relatives give us a compound capable of preventing HIV infection, the cause of AIDS.

Amphibians' thin skins help them drink and breathe, but also make them susceptible to environmental contaminants, particularly agricultural, industrial, and pharmaceutical chemicals.

Amphibians have been likened to canaries in the coal mine: just as miners used sensitive canaries to warn them of toxic gases in the mines, amphibians might be warning us of unsafe environmental conditions that could eventually seriously impact our health.

Amphibians are also vital components of their ecosystems. It was estimated that a single population of 1,000 frogs could consume almost five million invertebrates in one year. In areas of the world where amphibians have declined, there has been an increase in invertebrate pests that damage crops and that carry human diseases like mosquitoes.

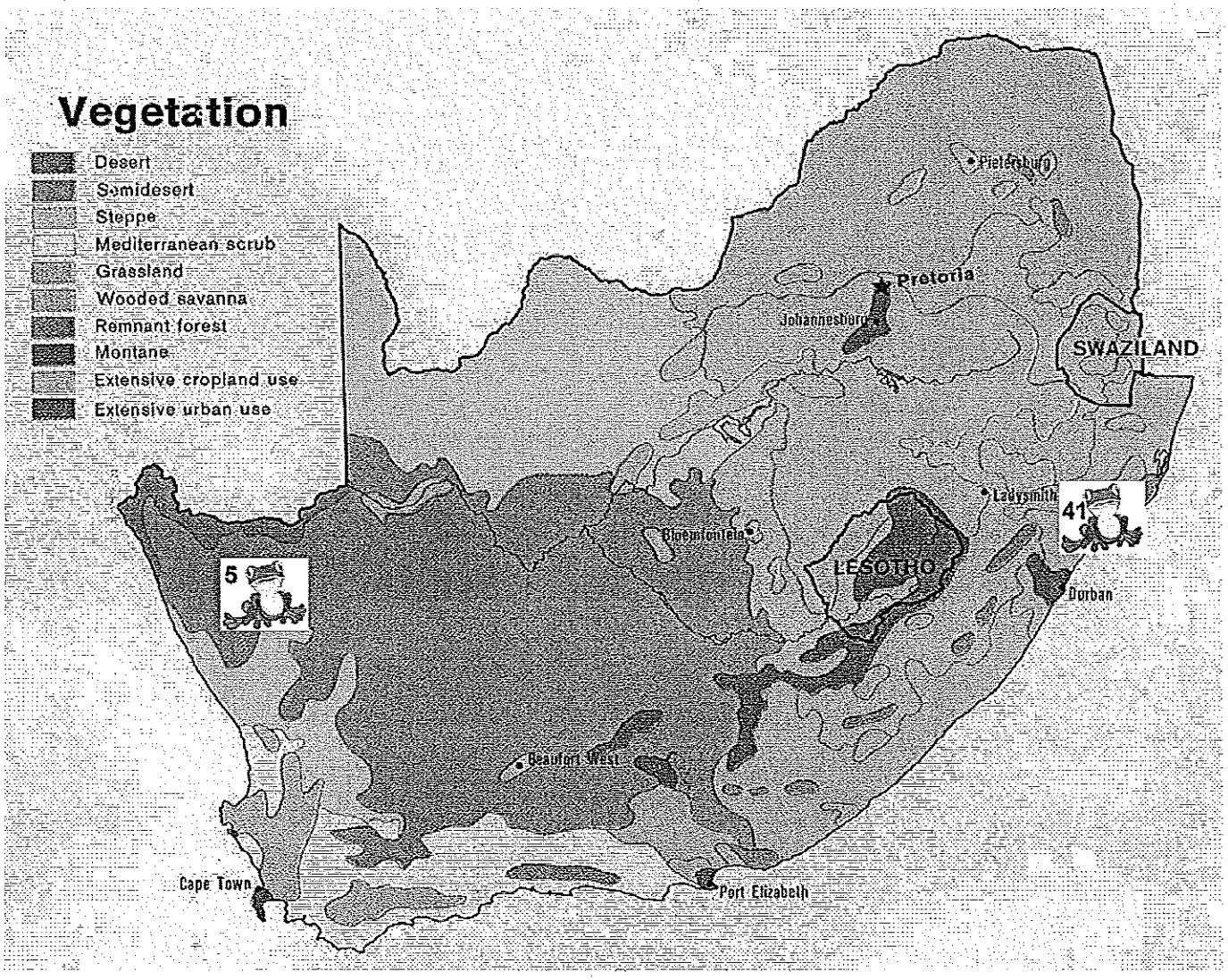
Amphibians have also played a vital role in human culture. While in some cultures frogs and toads have been despised and regarded as evil, other cultures have embraced them as life-giving keepers of the rains or agents of fertility and good luck. Some simply use them for food, they are also used for traditional medicine and are part of folk stories.

Compiled by Louise Matschke

Compiled by Louise Matschke

FROGS HABITAT IN SOUTH AFRICA

Frogs and toads occur throughout southern Africa, even in the Namib desert. However, due to their porous skin, they prefer to live in areas that are warm and damp like the eastern regions of southern Africa. They like the high rainfall and the all-year-round warm temperatures. High numbers of frogs are found in these areas, 41 of the 130 species are found in St Lucia whereas only 5 species occur in arid area of Springbok, see the below map.



The preferred habitat of frogs and toads differ from one species to another, with each occupying a niche in different habitats from shallow rain pools to fast flowing streams. Prime real estate for amphibians include leaf litter, rocks, logs, easy access to food and of course a source of water.

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YOU CAN CONSERVE FROGS – MAKE YOUR OWN FROG BOG

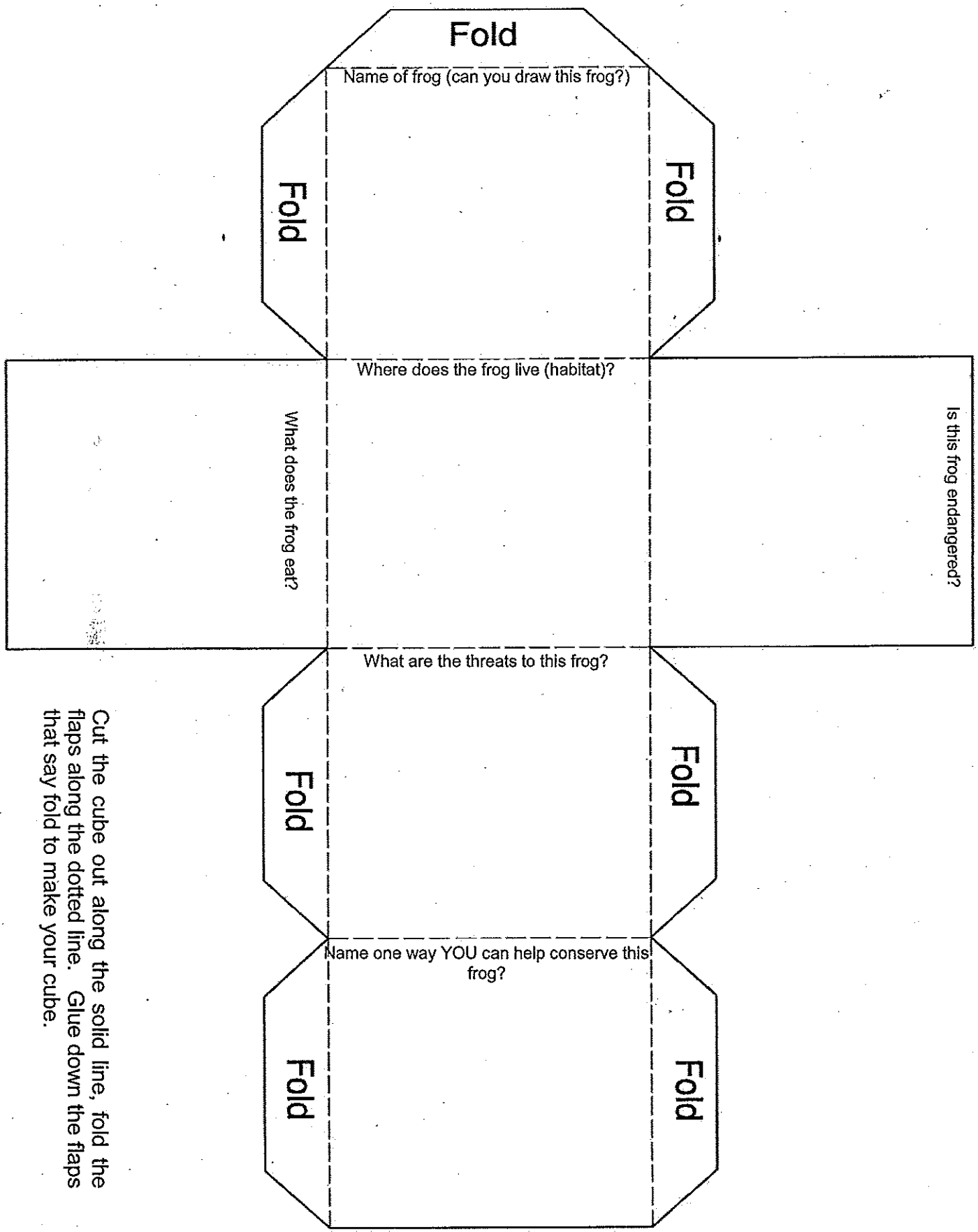


1. Your frog bog needs shallow water and deeper water (at least 30cm deep) so that tadpoles can find cool spots. Altogether, you need at least 1 cubic metre of water so the tadpoles don't get crowded.
2. Set it up in a partly shady spot so that sunlight can help algae grow in the water to feed the tadpoles. Leaves from trees and shrubs nearby fall into the water, sink to the bottom and decompose, also providing food for tadpoles.
3. Do not put too many floating plants like duckweed in the water because they can take oxygen out, making it hard for the tadpoles to breathe.
4. Adult frogs need shelter surrounding the pool: rocks, leaf litter, shrubs, low plants and logs.
5. Do not put fish in the pond: most eat tadpoles!
6. Don't spray the bugs: frogs eat them!
7. You won't need to catch frogs, its also illegal... **Frogs will find their own way to your frog friendly habitat.**

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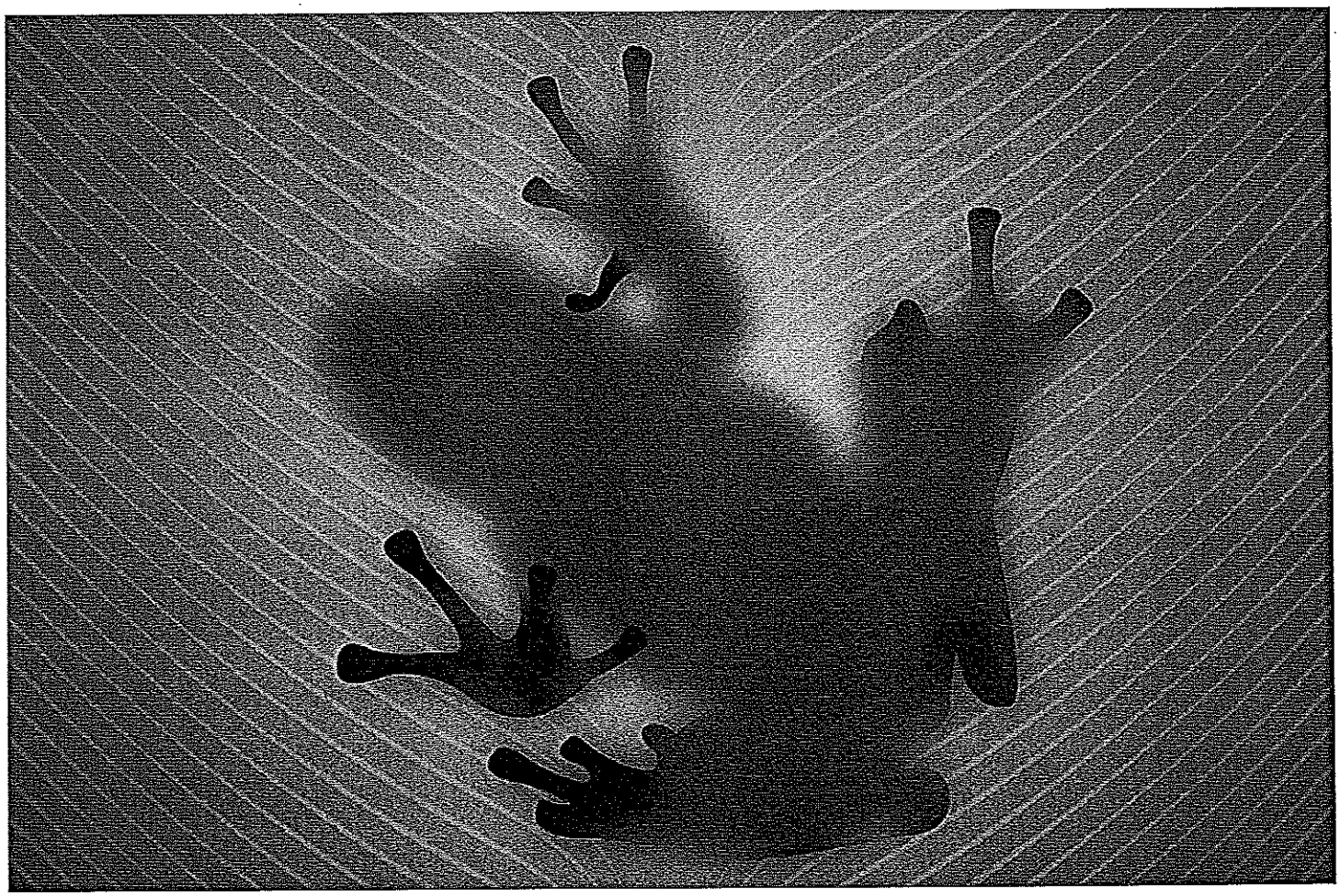
ROLLING THE DICE ON ENDANGERED ANIMALS!

Topic Conclusion activity: use this worksheet to complete your learning programme on frogs.



Cut the cube out along the solid line, fold the flaps along the dotted line. Glue down the flaps that say fold to make your cube.

HAPPY FROGGING



Joburg

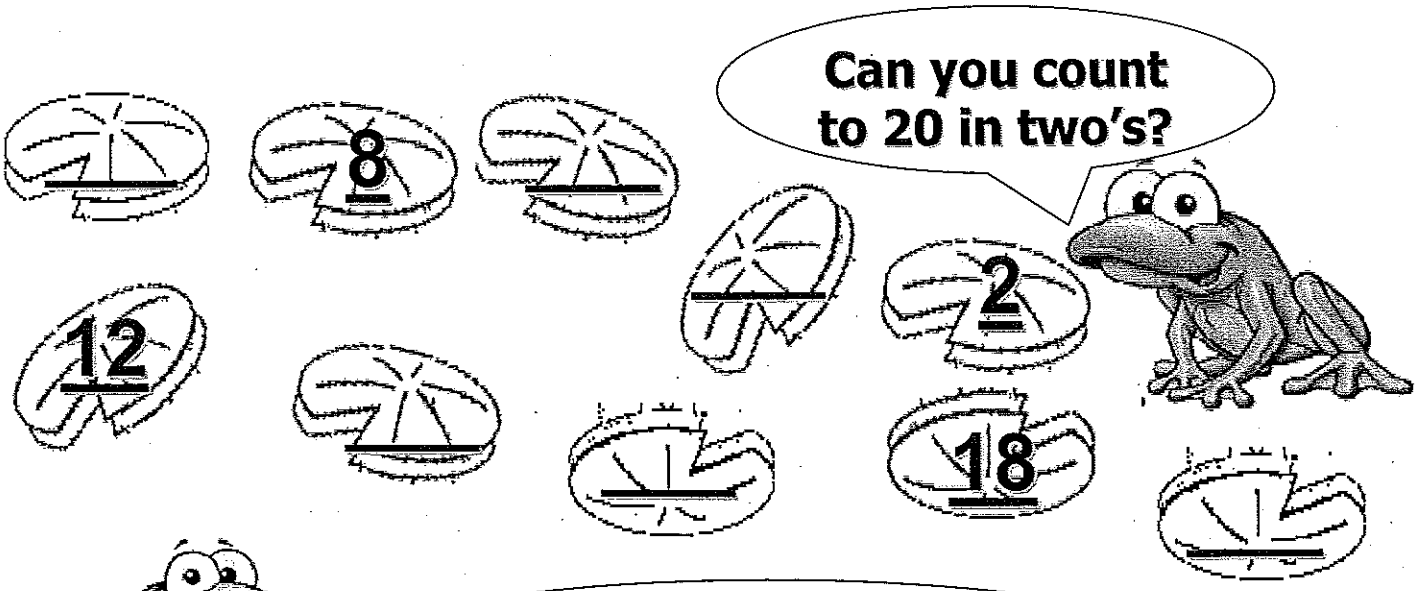
a world class African city

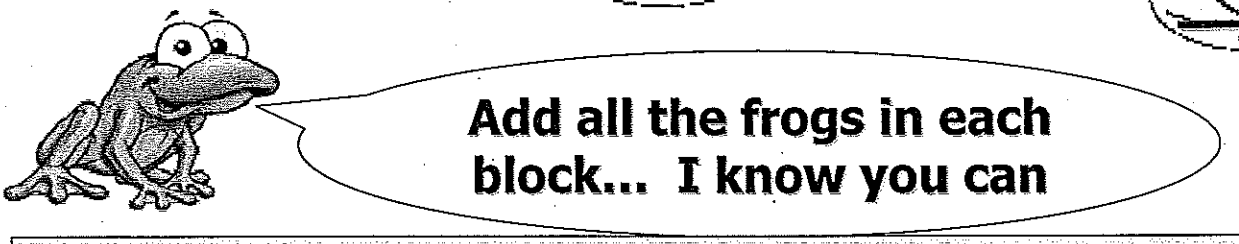
amphibian ark
2008 YEAR OF THE FROG

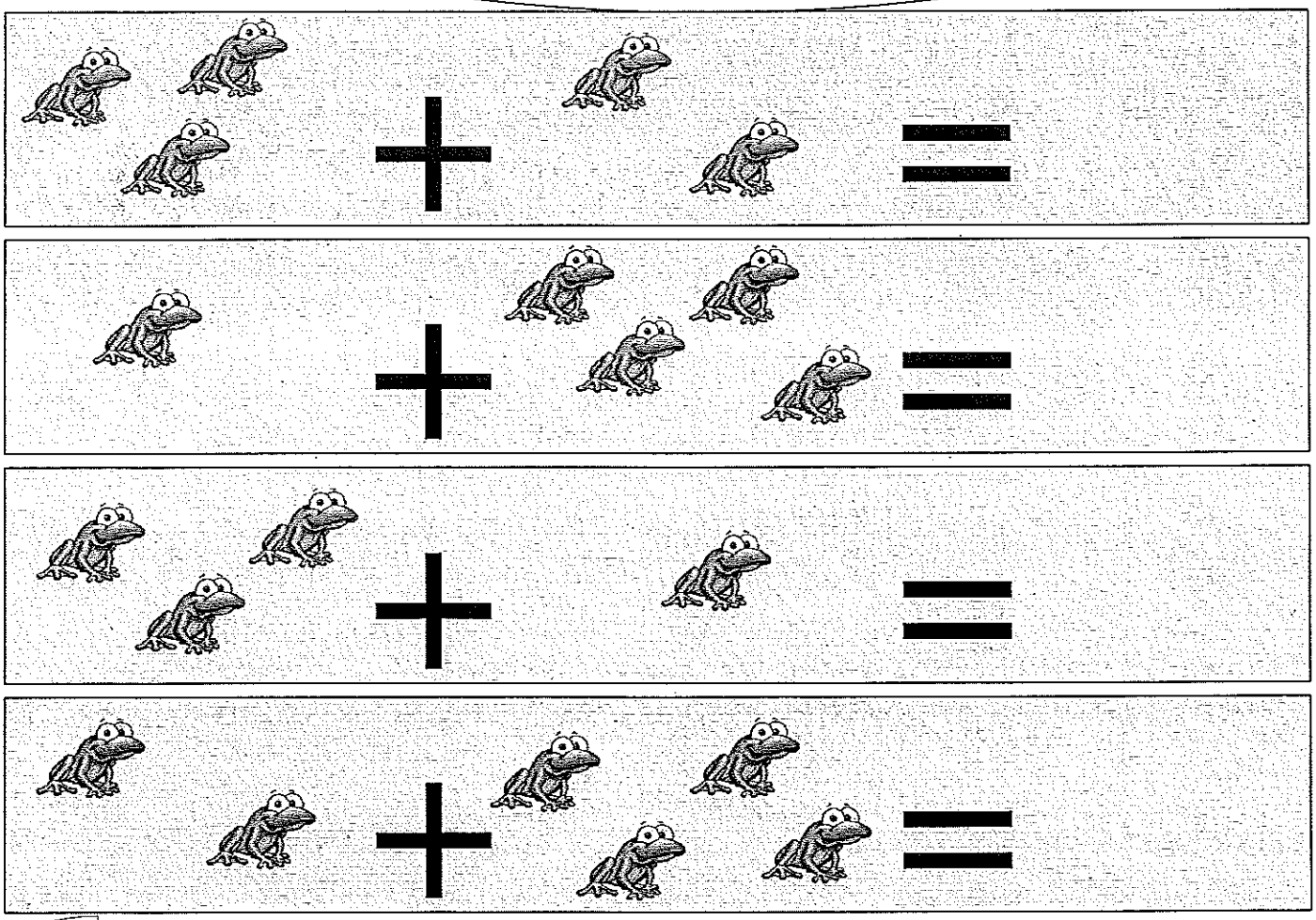
JOHANNESBURG ZOO

Frog Fun

Grade 1 - 3







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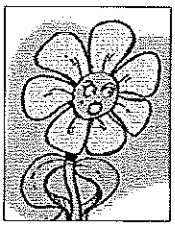
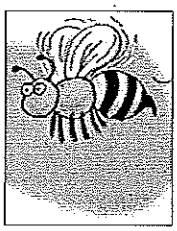
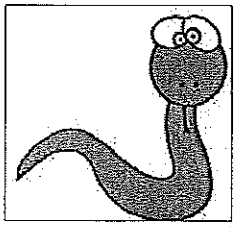
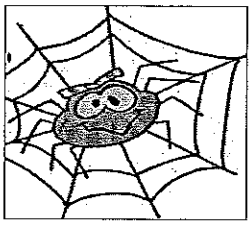
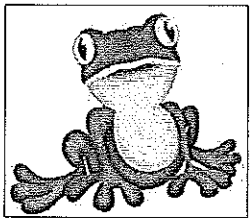
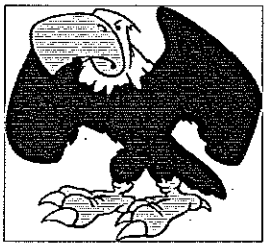
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JOHANNESBURG ZOO

Frog Fun

Grade 4 - 6

Do you know who eats who? Make a food chain with the following pictures (just use arrows).

Frog Word Search

S	T	Y	J	K	A	H	P	W	I	I	C	Z	B	T
G	N	A	E	H	T	T	M	A	G	R	N	U	T	U
E	O	A	D	A	I	E	U	I	O	S	L	L	I	G
G	F	R	I	P	A	W	J	A	R	J	T	L	M	S
G	N	L	F	B	O	J	K	A	F	U	W	R	G	E
P	O	N	D	M	I	L	S	N	L	N	B	E	E	J
G	S	B	J	D	V	H	E	X	L	G	L	K	F	E
L	E	O	P	A	R	D	P	A	U	L	J	J	V	Y
K	V	R	X	I	Z	V	X	M	B	E	B	T	Z	E
S	I	S	O	H	P	R	O	M	A	T	E	M	C	K

There is a spotted hunter hiding in this word search, can you find it? Clue... it's a cat!

amphibians
bullfrog
croak
egg
frog
gills
goliath
jump
jungle
legs
metamorphosis
pond
tadpole
tree

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JOHANNESBURG ZOO

Frog Fun

Grade 7 - 9

Frog Word Search

F	R	O	G	S	C	A	S	L	A	C	O	V	G	A
R	L	E	C	R	O	L	D	U	B	L	O	O	O	S
N	D	A	O	E	R	D	W	F	H	I	W	C	H	T
A	M	A	N	E	S	E	A	R	N	I	S	E	T	I
I	K	H	T	D	E	D	O	O	L	B	D	L	O	C
B	A	A	T	G	T	A	F	L	W	R	O	O	G	K
I	W	S	G	B	A	O	O	O	E	D	Y	P	T	Y
H	E	S	M	P	R	P	E	C	B	R	A	D	T	T
P	O	N	D	S	B	U	R	E	B	I	S	A	T	O
M	H	E	S	A	E	M	E	A	E	S	T	T	H	N
A	E	S	U	C	T	I	O	N	D	I	S	K	S	G
T	E	M	P	N	R	E	R	A	F	T	W	U	P	U
R	E	S	U	U	E	R	R	O	E	U	I	N	A	E
D	I	R	N	G	V	S	T	R	E	A	M	S	E	F
R	G	H	I	B	E	R	N	A	T	E	O	G	L	S



AMPHIBIAN
PONDS
COLD BLOODED
CROAK
STICKY TONGUE
STREAMS
EGGS
SUCTION DISKS
SWIM
GRUNT
TADPOLE
HIBERNATE
VERTEBRATES
LAND
VOCAL SAC
LEAPS
WATER
WEBBED FEET

Class table!

Can you complete this table on the classification on the vertebrate classes?

	Amphibians	Reptiles	Fish	Mammals	Birds
Body Covering				Skin covered with fur/ hair	
Parental Care				Parents take care of young	
Breathing organ(s)				Breath through lung	
Reproduction				Give live birth	
Body temperature				Warm-blooded	

What are the similarities between amphibians and reptiles?_____

_____

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JOHANNESBURG ZOO

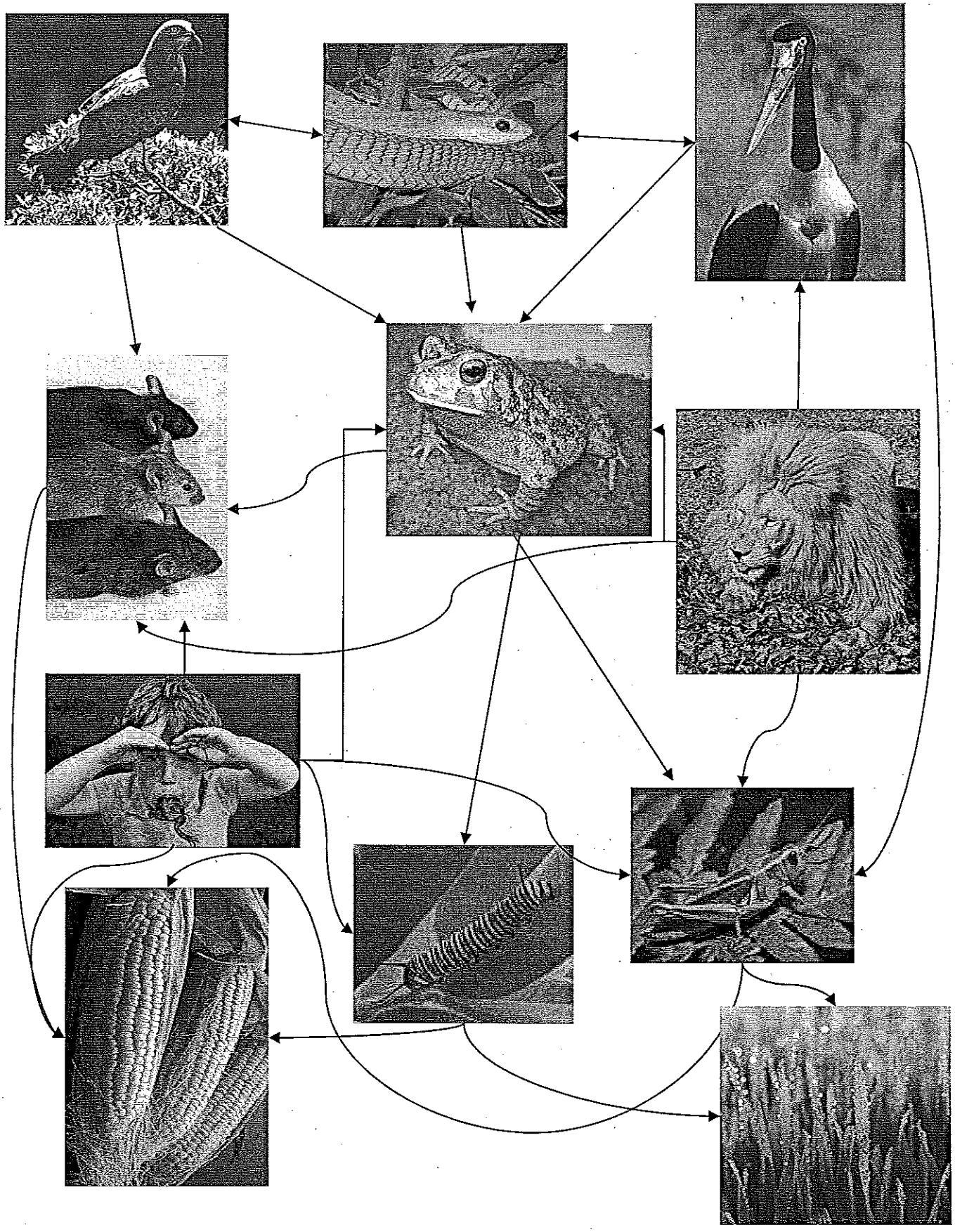
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CREATE A FOOD WEB?

JOHANNESBURG ZOO

Get your learners to complete a food chain or food web similar to this.



Learning Materials

from

Eco-Access



The Eco- Access Animal Scramble



Your aim is to find as many animals as possible and fit them into the following categories. Remember you may not have more than one animal per category

Animal Scramble
Explanation Sheet
For use by blind and partially sighted participants
Intermediate and senior phase

Equipment and materials

- Picture cards, labelled in Braille amount depending on number of teams
- Worksheets explaining the activity and giving the categories (2 pages)
- Rope circles 1 per team
- Pencil and score pad, 1 for the facilitator

Aim of the activity

- For the participants to correctly categorise as many as possible

Objectives of the activity

- The participants should understand the following Concepts:
  Grazer, Browser, Predator, Scavenger, Omnivore, Ape-like animal, Endangered species
- They should also learn the value of team work

Explanation

- The information attached is presented to the learners
- They are given the worksheet and time to go through the worksheet and ask questions
- It is then explained to them that they must find pictures of the animals that belong in the different categories
- They may only take one animal per category and will have points taken off if they have extra animals
- They will get points for every animal correctly placed in its category
- They must then each hold onto the rope circle provided, they must also be told that they will be penalised if anybody lets go of the rope circle during the activity
- The learners must then move with their team in search of the pinks tags with the pictures of the animals on them
- They have a time limit to do this.
- At the end of the time limit the learners must lay out their animals according to the categories
- The scorer must then go to each group and score the categories

Safety

- The learners must work as a team when holding onto the rope circle.
- No running is allowed
- If a person falls they must stop and help the person before continuing

Animal Category Sheet
Intermediate and senior

The animals can be put into different categories. The following is a list of the animals and which categories they can fit into.

Animal	Category	Category	Category
Warthog	Grazer		
Vulture	Scavenger		
Chimpanzee	Ape- Like animal	Omnivore	Predator
Wild Dog	Predator	Endangered animal	
Cheetah	Predator	Endangered animal	
Buffalo	Grazer		
White Rhino	Grazer	Endangered Species	
Zebra	Grazer		
Parrot	Exotic animal		
Red Panda	Exotic animal		
Baboon	Omnivore	Ape like animal	

Animal scramble Mark sheet Intermediate and senior phase

Team name					
Category					
Exotic animal (5)					
Grazer (10)					
Browser (10)					
Predator (15)					
Scavenger (15)					
Omnivore (20)					
Ape Like animal (30)					
Endangered animal (50)					
Total					

**** Write the points under the team name and next to the category if a team does have the correct animal in the correct category. Add up the total points at the end.

Categories

1	Exotic animal	5 points
2	Grazer	10 Points
3	Browser	10 Points
4	Predator	15 points
5	Scavenger	15 Points
6	Omnivore	20 Points
7	Ape like animal	30 Points
8	Endangered Animal	50 points

Learning Materials

from

Johannesburg City Parks

JOHANNESBURG CITY PARKS

ENVIRONMENT CONSERVATION DEVELOPMENT

PROGRAMME: TREES IN MY BACKYARD

GRADE 7

THE IMPLEMENTATION PROCESS OF THE PROGRAMME:

Resources required:

1. Programme Background
2. Activity Sheets
3. School Garden/yard where plants by JCP were planted

DURING THE PROGRAMME:

PART A:

Learners are in the classroom or the school hall and this are the steps to follow:

(i) Welcome and introduction

Introduce yourself and the facilitator/s. Explain what JCP is and its core business. Explain the objectives of the programme and the programme procedures. Discuss Health and Safety rules that learners have to adhere to for the two hour duration of the programme and the consequences of not adhering to H & S rules.

(ii) Background on Values of trees

Discuss with learners the different values of trees/plants, how to take care of trees that were planted in their homes and at the school. Learners need to understand why JCP has planted this trees and what their role is in sustaining the planted trees.

PART B:

Programme/lesson orientation:

Once the introductions and programme background are done, the programme will commence for two hours:

After part A, take learners outside into the school Garden or where JCP has planted trees and do the following activities:

ACTIVITY 1: Plants Quiz

Here learners have to indicate the correct answer by ticking it. Give learners the information cards to read and get correct answers for this activity.

ACTIVITY 2: Life in a tree activity

As a buildup to making learners understand the value of trees, divide learners into a group of 5 and give them this activity where they will answer the questions asked. Learners should then discuss what would happen if the trees are cut down. Give feedback after the activity.

ACTIVITY 3: Keeping/cutting trees

In this activity, learners are given statements that describe actions that support cutting down of trees and those that encourage preservation of tree. Learners has to write each statement in the correct column by writing the

number only and once that is done, answer with practical experiences of local situations be discussed with learners.

TREES IN MY BACKYARD

Overview:

The goal of this thematic unit is to develop an understanding of the many types of plants and their characteristics. It will include learners learning about the importance of trees and how to care and sustain trees.

Objectives:

Students will be able to:

• identify ways trees "work" to protect our natural resources.

• estimate the economic value of urban trees to individuals and to a community.

• describe several ways trees enhance human environments, and natural ecosystems.

PROGRAMME BACKGROUND:

General Information on Plants:

- Plants are multicellular green organisms.
- Plants are living things that do not move from place to place.
- Plants usually make their own food.
- Plants are very important to the Earth and to our lives.
- Plants range in size from small mosses to giant redwood trees.
- Plants are used by humans for food, shelter, and drugs.

Discover What Trees Do For You and Your Community

BENEFITS OF TREES/PLANTS

Plants form the basic food staple for all life forms. They are the major source of food and oxygen on earth, since no animal can supply these necessary components without plants. The cattle we eat as beef, feed on grasses and the fish we eat, consume algae and are therefore dependent on plants for well being. Other important uses of plants include:

- providing shelter for animals,
- providing materials for clothing (cotton fibers), paper products, medicines and other chemicals,
- producing coal from once living plant material,
- reducing wind speed and noise levels, and
- reducing soil erosion and water runoff.

There are many different types of cash crops that produce money for farmers. Olive oil comes from olives, corn oil comes from corn, and peanut oil comes from peanuts. Typical agricultural products like corn, wheat, rye, and rice are all considered cash crops. Coffee plants produce beans that are used to make coffee; coca plants give us chocolate; vanilla plants grow long thin beans that are used to produce vanilla flavoring. Many drinks and beverages, like cola and tea, come from plants. Rubber from trees is also a cash crop, as is lumber, fruit, vegetables, and cotton.

Plants are also used in agriculture to help reduce wind speed. Planting trees in a row prevents the wind from blowing away the valuable topsoil. In the forest, trees act as shelter for many organisms.

Plants are also important for the overall ecology of an area. Roots help to stabilize soil and prevent erosion by water run off (soil conservation). Plants are also important in our atmosphere because they use carbon dioxide and give off oxygen while they undergo photosynthesis.

Plants are also used in the urban setting to reduce noise, produce shade, and to beautify an area. Trees add value to homes and communities.

Encourage learners to take care of plants that were planted in their suburb as well as in their school. Use the information card on what can a tree do for you and how to take care of threes to stress care and maintenance issues. Distribute this bookmark to learners.

Healthy eating keeps your body healthy and free of infectious diseases

9:00	**Introductions and H &S rules**	**Sinah**
9:10	**Brief Background on Plants**	**Mosa**
10:00	**Activity 1: Plants Quiz**	**Mosa & Sinah**
10:30	**Activity 2: Life in a tree**	**Mosa & Sinah**
11:00	**Activity 3: Keeping/cutting trees**	**Mosa & Sinah**
11:30	**Tree pledge, Feedback & Evaluations**	**Mosa & Sinah**

Healthy eating keeps your body healthy and free of infectious diseases

ACTIVITY 1: PLANTS QUIZ

Read the information cards provided and tick the correct answer

1. Are trees plants
    - o Yes
    - o No

2. All trees that loose their leaves in autumn are called:
    - o Coniferous
    - o Deciduous
    - o Califerous

3. All trees loose their leaves in autumn
    - o True
    - o False

4. Tree that do not loose their leaves in autumn are called:
    - o Coniferous
    - o Deciduous
    - o Califerous
5. Coniferous trees hold the seed in
    - o Cones
    - o Cups
    - o Cradles

6. Deciduous trees have leaves that are

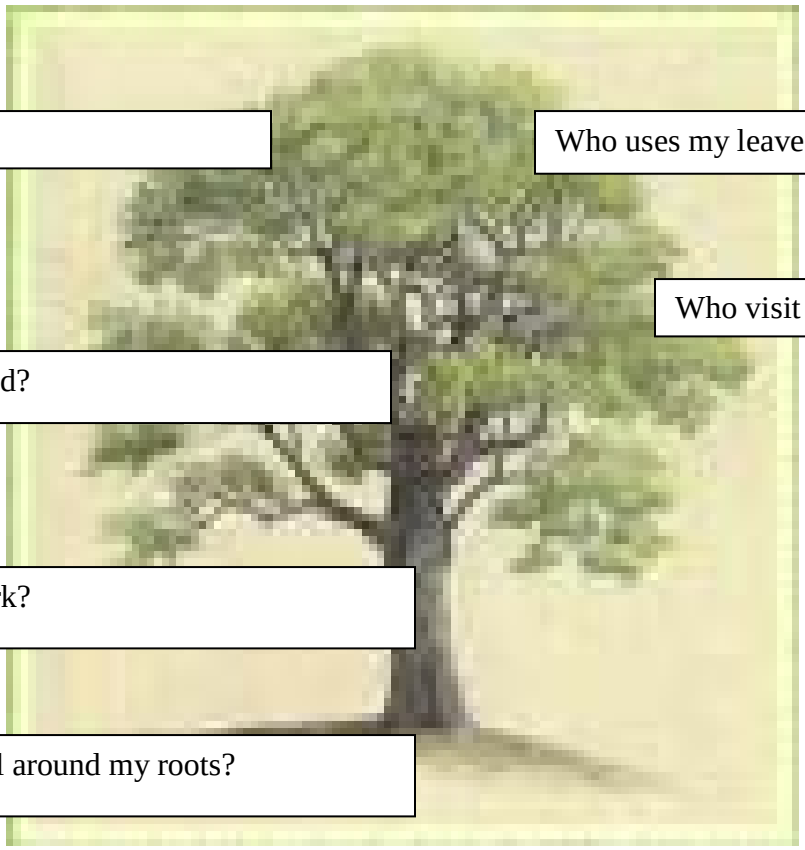
o Broad shaped

o Thin needle-shaped

Healthy eating keeps your body healthy and free of infectious diseases

ACTIVITY 2: LIFE IN A TREE

LOOK AT THE PICTURE BELOW AND ANSWER THE QUESTIONS IN THE BOXES.



Who uses my branches?

Who uses my leaves?

Who visit my flowers?

Who uses my wood?

Who grows on my bark?

Who lives in the soil around my roots?

EXPLAIN WHAT WOULD HAPPE IF ALL TREES THAT ARE IN THE SCHOOL AND THE COMMUNITY WERE CUT DOWN?

……

……

……

……



Healthy eating keeps your body healthy and free of infectious diseases

KEEPING/CUTTING TREES

The key to understanding trees is to treat them as living organisms, struggling for survival in a hostile world. During development of suburbs or townships, more trees are being removed to build house. The statement below could be used to support the preservation/destruction of trees. Decide which side of the argument each statement belongs to and write the letter in the correct box:

a. provide oxygen for breathing
b. lets more lights into the building
c. clears land for crops
d. provide habitats for birds and insects
e. dead leaves provides nutrients to the soil
f. increases risks for flooding
g. make space for road and houses
h. use of wood for making furniture
i. provide chemicals for medicine
j. provide shelter for large mammals
k. use wood for burning
l. prevent soil erosion
m. provide food/fruits
n. lowers carbon dioxide in the air
o. cleans the air by filtering harmful pollutants e.g. dusts particles, ammonia etc.

Healthy eating keeps your body healthy and free of infectious diseases

Reason for cutting down trees	Reason for keeping trees