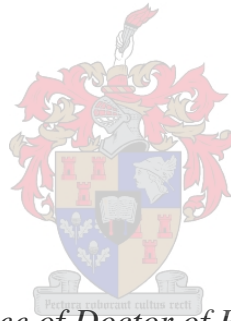


**Modernism, Environmental Assessment
and the Sustainability Argument:
Moving towards a New Approach to
Project-based Decision-making
in South Africa.**

by

Michelle Audouin



*Thesis presented for the degree of Doctor of Philosophy at the University of
Stellenbosch, South Africa*

*Supervisor: Professor Johan Hattingh (Department of Philosophy, University of Stellenbosch,
South Africa)*

*Co-Supervisor: Dr Alex Weaver (Council for Scientific and Industrial Research (CSIR),
South Africa)*

Submitted: 25 November 2009

DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

November 2009

Copyright © 2009 Stellenbosch University

All rights reserved

ABSTRACT

*Modernism, Environmental Assessment and the
Sustainability Argument:
Moving towards a New Approach to
Project-based Decision-making in South Africa.*

Through my research I have developed an alternative conceptual approach to project-level environmental assessment in South Africa, which begins to move beyond modernism in its philosophical, procedural and substantive aspects. This approach draws on the ideas of certain radical philosophers, and three innovative thinkers, namely: Bent Flyvbjerg, Amartya Sen and Paul Cilliers.

The overall purpose of project-level environmental assessment (i.e. Environmental Impact Assessment (EIA)) is to predict the impacts on the environment of proposed development, and to recommend ways to mitigate its negative consequences and enhance its positive effects. However, there are a number of recurring problems in the practice of EIA which include: achieving inter-disciplinarity in the assessment process; effectively undertaking stakeholder engagement; and accurately predicting the impacts of proposed developments. Addressing uncertainty and adequately considering the implications of cumulative and social impacts are also often poorly addressed in environmental assessment procedures.

In this thesis, I describe these problems as symptomatic of the modernist roots of environmental assessment, an argument, or similar, which has been made by others in related domains (e.g. philosophy), as well as in the international field of environmental assessment itself. I identify the following three main problematic assumptions of the modern worldview that are currently constraining the effectiveness of this field:

- A system can be understood by observing the behaviour of its parts;
- All processes flow along linear, deterministic, predictable and orderly paths; and

- Technical, objective, natural science-based information and processes are separate from, and superior to, non-technical, subjective, and value-based information and processes.

Drawing on my investigation of the core ideas of radical ecologists and of the work of Bent Flyvbjerg, Amartya Sen and Paul Cilliers, I challenge the modernist assumptions listed above and propose an alternative conceptual approach to environmental assessment, which involves the formulation of a 'sustainability argument'. I explain the philosophical tenets (for example, humans and nature are seen as part of an interrelated social-ecological system) and general principles on which this approach rests (for example, the normative nature of all knowledge of social-ecological systems should be recognised), as well as its key characteristics (for example, the team that undertakes the study should comprise disciplinary specialists, key stakeholders and at least one 'sustainability practitioner' who coordinates the development of the argument). These tenets, principles and characteristics are designed to guide the development of context-specific processes, for the formulation of a sustainability argument that informs project-level development decision-making.

The 'sustainability argument' approach moves beyond the human-nature (or development-environment) divide inherent in current environmental assessment, in which the impact of the former on the latter is determined. The focus is shifted to understanding how the social-ecological system is likely to alter, under different conditions, as a result of the proposed development, which is seen as a potential change in the system. In addition, the way in which the social-ecological system is likely to affect the implementation of this change is described. These effects are evaluated in relation to contextually defined sustainability values, which are identified by key stakeholders through a participatory process, and guided by the principles proposed as part of the sustainability argument approach. The principles include a view of humans and nature as part of an interrelated social-ecological system in which diversity, both human and natural, is valued as a pre-requisite to sustainability. Human needs are defined beyond the provision of basic goods and services, to include the promotion and enhancement of the valuable functionings and capabilities of an individual, as described by Sen (1988b). Nature is valued, not only for its role in enabling the achievement of these functionings and capabilities, but also for the fact of its existence, as part of the overall social-ecological system.

OPSOMMING

In my navorsing het ek 'n alternatiewe, konseptuele benadering tot omgewingsbeoordeling op projekvlak in Suid Afrika ontwerp, wat begin om verby die filosofiese, prosedurele en substantiewe aspekte van die modernisme te beweeg. Hierdie benadering berus op die idees van sekere radikale filosowe, en drie innoverende denkers, naamlik: Bent Flyvbjerg, Amartya Sen en Paul Cilliers.

Die oorkoepelende doelstelling van omgewingsbeoordeling op projekvlak (i.e. Omgewingsimpakstudie (OIS)) is om die impakte op die omgewing van voorgestelde ontwikkeling te voorspel, en om voorstelle te maak om die negatiewe gevolge daarvan te beperk en die positiewe gevolge te bevorder. Tog is daar 'n aantal herhalende probleme in die praktyk van OIS, wat die volgende insluit: Die bereiking van interdisiplinariteit in die proses van omgewingsbeoordeling; die versekering van effektiewe deelname van belangegroepe; en die akkurate voorspelling van die impakte van 'n voorgestelde ontwikkeling. Die hantering van onsekerhede en die voldoende oorweging van die implikasies van kumulatiewe en sosiale impakte word ook nie voldoende aangespreek in die ontwerp van omgewingsbeoordeling nie.

In hierdie tesis beskryf ek hierdie probleme as simptome van die modernistiese grondslag van omgewingsbeoordeling, wat 'n soortgelyke punt maak as die argument wat nie alleen deur ander in verwante velde (e.g. filosofie) ontwikkel is nie, maar ook in die internasionale veld van omgewingsbeoordeling self. Ek identifiseer die volgende drie problematiese kernaannames van die moderne wêreldbeeld, wat tans die doeltreffendheid van omgewingsbeoordeling beperk:

- 'n Sisteem kan verstaan word deur die gedrag van sy dele waar te neem;
- Alle prosesse volg liniêre, deterministiese, voorspelbare en geordende patrone; en
- Tegnieëse prosesse en objektiewe, natuurwetenskaplik-begronde inligting is apart van, en verhewe bo, nie-tegniese prosesse en subjektiewe en waardegebaseerde oorwegings.

Op grond van my ondersoek van die kernidees van radikale ekoloë, asook die werke van Bent Flyvbjerg, Amartya Sen en Paul Cilliers, daag ek die bogenoemde modernistiese veronderstellings uit, en stel 'n alternatiewe benadering tot omgewingsbeoordeling voor, wat die formulering van 'n 'volhoubaarheidsargument' insluit. Ek verduidelik die filosofiese uitgangspunte (byvoorbeeld dat die mens en die natuur, in onderlinge wisselwerking met mekaar, gesien moet word as deel van 'n geïntegreerde sosio-ekologiese sisteem) en algemene beginsels waarop hierdie benadering berus (byvoorbeeld dat die normatiewe aard van alle kennis van sosio-ekologiese sisteme erken behoort te word), asook die kenmerkende eienskappe daarvan (byvoorbeeld dat die span, wat die studie onderneem, saamgestel moet word uit kenners vanuit verskillende dissiplines, sleutelbelanghebbendes, en ten minste een 'volhoubaarheidspraktisyn' wat die ontwikkeling van die argument koördineer). Hierdie uitgangspunte, beginsels en eienskappe is ontwerp om die ontwikkeling van konteksspesifieke prosesse te stuur, en vir die formulering van 'n volhoubaarheidsargument wat besluitneming oor ontwikkeling op projekvlak informeer.

Die 'volhoubaarheidsargument' benadering beweeg verby die mens-natuur (of ontwikkeling-omgewing) onderskeid inherent aan die huidige praktyk van omgewingsbeoordeling, waar die impak van die eersgenoemde op die laasgenoemde bepaal word. Die klem verskuif na 'n begrip vir die manier waarop die sosio-ekologiese sisteem moontlik gaan verander, onder sekere toestande, as gevolg van die voorgestelde verandering, wat beskou word as 'n moontlike verandering in die sisteem. Boonop word die manier waarop die sosio-ekologiese sisteem waarskynlik die implementering van die verandering gaan beïnvloed ook beskryf. Hierdie effekte word geëvalueer met betrekking tot konteks-gedefinieerde volhoubaarheidswaardes, wat deur 'n deelnameproses geïdentifiseer word deur sleutel belanghebbendes, en gelei deur die beginsels wat voorgestel word as deel van die volhoubaarheidsargument benadering. Die beginsels sluit 'n beskouing van mense en die natuur as deel van 'n interverwante sosio-ekologiese sisteem waarin diversiteit, beide menslik en natuurlik, gewaardeer word as 'n voorwaarde vir volhoubaarheid in. Menslike behoeftes is gedefinieer as meer as net die voorsiening van basiese goedere en dienste om die bevordering en verbetering van die waardevolle funksioneringe en vermoëns van 'n individu, soos beskryf deur Sen (1988b), in te sluit. Die natuur word gewaardeer, nie slegs vir die rol wat dit speel om die verwesenliking van hierdie funksioneringe en vermoëns moontlik te maak nie, maar ook vir die feit van die natuur se bestaan, as deel van die algehele sosio-ekologiese sisteem.

ACKNOWLEDGEMENTS

I would like to gratefully acknowledge my two promoters, Professor Johan Hattingh and Dr Alex Weaver for their guidance and support in undertaking this research. My discussions with them have inspired me and significantly added to the enjoyment of exploring ideas, both within and outside, my usual spheres of research. I would also like to thank Dr Michael Burns for the time he spent in providing me with extremely useful comments on the first draft of this thesis. Engaging with these comments has helped me explore the ideas in this thesis in more detail and express them with greater clarity. In addition, I would like to acknowledge the external examiners of this thesis, whose tremendously helpful input enhanced the quality of this research.

I am deeply grateful to the CSIR for providing me with the financial resources to undertake this doctoral study, without which this research would not have been possible. My friends and colleagues within this organisation, particularly those involved in *Sustainability Science* research, have provided me with tremendous encouragement and helped me shape, and re-shape, my ideas. For this, I extend a special thank you to them. I would also like to thank Karin Burns for formatting this thesis and assisting me in checking the finer editorial details.

Lastly, I would like to express my particular gratitude to Johann Verster for patiently walking with me on the road to healing, of which this thesis has been a part.

I dedicate this work to the Wild River of Life that lives in all of Us and never stops flowing.

ACRONYMS

AEAM	Adaptive Environmental Assessment and Management
ASGI-SA	Accelerated and Shared Growth Initiative - South Africa
BNA	Basic Needs Approach
CBO	Community Based Organisation
CEARC	Canadian Environmental Assessment Research Council
CEPA	Commonwealth Environmental Protection Agency (Australia)
CSI	Corporate Social Investment
DEA	Department of Environment Affairs
DEAT	Department of Environmental Affairs and Tourism
DEP	Deep Ecology Platform
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMP	Environmental Management Plans
GNP	Gross National Product
HIA	Health Impact Assessment
IAIAsa	International Association for Impact Assessment: South Africa
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPCC	Intergovernmental Panel on Climate Change
ISA	Integrated Sustainability Assessment
IUCN	International Union for Conservation of Nature
MATISSE	Methods and Tools for Integrated Sustainability Assessment
MDG	Millennium Development Goals
NEMA	National Environmental Management Act
NEPA	National Environmental Policy Act

NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NSSD	National Strategy for Sustainable Development
OECD	Economic Cooperation and Development
SAfMA	Southern African Millennium Ecosystem Assessment
SAIEA	Southern African Institute for Environmental Assessment
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SoER	State of the Environment Reporting
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
WCED	World Commission on Environment and Development
WIDER	World Institute for Development Economics Research

CONTENTS

	<i>page</i>
DECLARATION	i
ABSTRACT	ii
OPSOMMING	iv
ACKNOWLEDGEMENTS	vi
ACRONYMS	vii
CONTENTS	ix
TABLES	xiii
BOXES	xiii
APPENDICES	xiii

INTRODUCTION

<i>Introduction</i>	1
<i>Research Intent</i>	2
<i>Environmental Impact Assessment – A Brief Orientation</i>	2
<i>Research Approach</i>	5
<i>Structure of this thesis</i>	9
<i>A note on terminology</i>	10
<i>The use of text boxes and tables in this thesis</i>	11
<i>The publication of parts of this thesis</i>	12

CHAPTER 1. THE CONSTRAINTS TO EFFECTIVE ENVIRONMENTAL ASSESSMENT 13

1.1	Introduction	13
1.2	The Environmental Crisis	13
1.3	Evolution of Environmental Impact Assessment	19
1.3.1	International Evolution of Environmental Assessment	20
1.3.2	Evolution of Environmental Assessment in South Africa	28
1.4	Constraints to Effective Environmental Assessment in South Africa	33
1.4.1	Difficulties achieving inter-disciplinarity in environmental assessment	34
1.4.1.1.	Integration and inter-disciplinary work in environmental assessment	34
1.4.1.2.	Lack of cooperative governance	40
1.4.2	Difficulties in undertaking effective stakeholder engagement	42
1.4.2.1.	Inadequate inclusion of stakeholders and their views	42
1.4.2.2.	Lack of understanding of the purpose and value of stakeholder engagement	44
1.4.2.3.	Lack of on-going engagement	45

1.4.3	Difficulties in impact prediction	45
1.4.3.1.	Addressing uncertainty	46
1.4.3.2.	Addressing social issues	47
1.4.3.3.	Addressing cumulative impacts	49
1.5	Philosophical roots of the core constraints of EIA	52
1.6	Summary	53
 CHAPTER 2. MODERNISM, POST-MODERNISM AND THE ENVIRONMENTAL DEBATE		55
<hr/>		
2.1	Introduction	55
2.2	Modernism	55
2.3	Post-modernism	58
2.3.1	Negation of meta-narratives or totalising discourses	60
2.3.2	Negation of the myth of the pre-given and the subject-object divide	61
2.3.3	Negation of positivism	61
2.3.4	Negation of the mechanistic view of the world	62
2.3.5	Negation of the dominance of the profit-motive	63
2.4	The Current Situation	63
2.5	Modernism, Post-modernism and the Environmental Debate	64
2.5.1	Understanding of the human-nature relationship	66
2.5.1.1.	Technocentric understanding of the human-nature relationship	66
2.5.1.2.	Ecocentric understanding of the human-nature relationship	68
2.5.2	Mode of knowing the environment or gaining knowledge of it	83
2.5.2.1.	Technocentric mode of gaining knowledge of the environment	83
2.5.2.2.	Ecocentric mode of gaining knowledge of the environment	84
2.5.3	Mode of organising ourselves within the environment	87
2.5.3.1.	Technocentric mode of organising ourselves within the environment	87
2.5.3.2.	Ecocentric mode of organising ourselves within the environment	91
2.6	Key philosophical tenets for an approach to environmental assessment that addresses its current modernist constraints	94
2.7	Summary	95
 CHAPTER 3. ADDRESSING THE CONSTRAINTS OF MODERNISM IN ENVIRONMENTAL ASSESSMENT: IDEAS FROM OTHER DOMAINS		98
<hr/>		
3.1	Introduction	98
3.2	Enhancing the role of social science in planning and environmental assessment	99
3.2.1	Description of the problem	99
3.2.2	Improving the balance between instrumental and value-rationality	101

3.2.3	An evaluation of current environmental assessment theory and practice according to Flyvbjerg's proposals for a reformed social science	102
3.2.3.1.	Focus on values	103
3.2.3.2.	Placing power at the centre of analysis	105
3.2.3.3.	Getting close to reality	106
3.2.3.4.	Focusing on practice before discourse, studying cases and context and emphasising detail	108
3.2.3.5.	The inclusion of narratives	110
3.2.3.6.	Moving beyond agency and structure	112
3.2.3.7.	Dialoguing with a range of stakeholders	112
3.3	A view from Economics	113
3.3.1	Description of the problem	113
3.3.2	Sen's Development Ethics	122
3.3.2.1.	Functionings and capabilities	122
3.3.2.2.	Capabilities as positive freedom	123
3.3.2.3.	Rights and Justice	125
3.3.3	Implications for environmental assessment	126
3.3.3.1.	Sustainable development in the mainstream international arena	127
3.3.3.2.	Sustainable development in the South African National Environmental Management Act (NEMA) (No. 107 of 1998)	130
3.4	A view from Complexity Theory	131
3.4.1	Description of the problem	132
3.4.2	The Implications of Complexity Theory for Knowledge Generation	135
3.4.2.1.	Beyond reductionism	136
3.4.2.2.	Beyond objectivity	137
3.4.2.3.	Beyond universal determinism	139
3.4.2.4.	Beyond positivism	141
3.4.3	Implications for environmental assessment	144
3.4.3.1.	The environment as a complex system	144
3.4.3.2.	Beyond reductionism	147
3.4.3.3.	Beyond objectivity	149
3.4.3.4.	Beyond universality	154
3.4.3.5.	Beyond positivism	159
3.5	General principles for an approach to environmental assessment that addresses its current modernist constraints	167
3.6	Summary	167
CHAPTER 4. THE 'SUSTAINABILITY ARGUMENT': WEAVING THE THREADS TOGETHER		171
4.1	Introduction	171
4.2	Revisiting the Problem	171
4.3	The Philosophical Roots of Environmental Assessment	172

4.4	Deconstructing the assumptions of modernity within the field of environmental assessment	176
4.4.1	Re-examining the assumption that the system can be understood by observing the behaviour of the parts (i.e. reductionism)	176
4.4.2	Re-examining the assumption that all processes flow along linear, deterministic, predictable and orderly paths	179
4.4.3	Re-examining the split between technical, objective, natural science-based information and processes, and non-technical, subjective, value-based information and processes and the dominance of natural science-based rationality	180
4.5	An alternative conceptual approach to project-level environmental assessment	184
4.5.1	Philosophical tenets of the 'Sustainability Argument' approach	184
4.5.2	Principles on which the 'Sustainability Argument' approach is based	185
4.5.2.1.	The environment should be conceived as a complex social-ecological system that should not only be understood in terms of its component parts, but also in terms of the relationships between these parts	185
4.5.2.2.	Social-ecological systems should be understood both in terms of their interior, subjective aspects, as well as their exterior, objective ones	186
4.5.2.3.	The contextual and normative nature of all knowledge of social-ecological systems should be recognised	187
4.5.2.4.	A phronétic approach should be adopted to understanding social-ecological systems as well as to decision-making concerning such systems.	188
4.5.2.5.	A range of epistemologies should be used as appropriate to understand the various aspects of social-ecological systems and to make decisions concerning human activities within these systems	189
4.5.2.6.	The provisional and limited nature of our understanding of social-ecological systems and our predictions of their behaviour should be acknowledged	190
4.5.3	Formulating the Sustainability Argument	191
4.6	Addressing the problems being experienced in the current approach to environmental assessment in South Africa	195
4.6.1	Difficulties in achieving inter-disciplinarity in environmental assessment	195
4.6.2	Difficulties in undertaking stakeholder engagement	198
4.6.3	Difficulties in predicting social and cumulative impacts and in dealing with uncertainty	200
4.7	Back to the Beginning and Future Challenges	202

REFERENCES

206

TABLES

Table 1.1:	Key Stages in the World Wide Adoption of EA _____	22
Table 1.2:	Key Stages in the Adoption of EA in South Africa _____	31
Table 1.3:	Differences Between Natural and Social Science from an Idealist View. _____	39
Table 3.1:	Aristotle's Categorisation of Intellectual Virtues _____	101
Table 3.2:	Sen's Critique of Alternative Development Approaches _____	119
Table 3.3:	Cilliers' Interpretation of Lyotard's Properties of the Pragmatics of Science and the Pragmatics of Narrative Knowledge _____	142
Table 3.4:	Cashmore's Categorisation of EIA Models _____	161
Appendix Table B.1:	Summary of Radical Environmental Philosophies _____	231

BOXES

Box 1.1:	US National Environmental Policy Act (NEPA) of 1969 _____	20
Box 1.2:	Stages in the ISA process _____	27
Box 2.1:	Limits to Growth – Main Conclusions _____	89
Box 2.2:	Deep Ecology Principles and System for Deep Questioning _____	93
Box 3.1:	Basic Human Functional Capabilities as Identified by Nussbaum and Sen _____	125
Box 3.2:	Characteristics of Complexity _____	135

APPENDICES

APPENDIX A:	Schedule for Informal Interviews with Decision-Makers, Environmental Assessment Practitioners and Researchers _____	226
APPENDIX B:	Radical Environmental Philosophies _____	229

INTRODUCTION

Introduction

I began this research after working in the field of environmental assessment for about 10 years. What prompted me was an increasing sense of discomfort concerning the disparity between our highly structured, logical and uniform assessment processes and the more spontaneous, dynamic, political, diverse nature of reality. Often the celebrations following the completion of an intricate, well-planned, well-executed process had not yet ended, before the world had changed and many of the observations that we made had become invalid.

Due to my town and regional planning background, I worked mainly in the area of Strategic Environmental Assessment (SEA), which involves the incorporation of environmental concerns into the spheres of policy and planning. To a lesser extent, I was involved in Environmental Impact Assessment (EIA), which involves incorporating these issues into project-level decision-making. I had a leading role to play in the development of South Africa's first guidelines for SEA, and therefore was instrumental in designing processes that were beginning to cause me uneasiness. Although my focus over the years was on SEA, this thesis relates to EIA. The reason for this is that SEA has evolved in various forms out of the EIA community, and in order to address in this thesis, some of the fundamental assumptions that still underlie the environmental assessment field, I have gone back to its classic mode.

During my work in environmental assessment, it also became very clear to me that sustainability is as much a value, as it is a scientific analysis about whether the environment will be degraded as a result of the proposed development. As such, it embraces values that people hold and which compete for attention in South Africa. This may all seem very obvious, but in my view we do not, as environmental practitioners, engage with value-systems deeply enough, despite the rhetoric that sustainability in this country concerns biophysical, social and economic issues – the latter two spheres being strongly value determined. More interestingly perhaps, there seems to be a general assumption that environmental practitioners and scientists themselves have a more-or-less shared idea of what sustainability means. However, since this group is also influenced by their belief-

systems, values and disciplinary background, among other factors, they are likely to associate a diverse array of meanings to this word.

My concerns about the environmental assessment process and the largely unexplored value-systems that influence it, led me to investigate its philosophical roots in order to better understand the foundations of my discomfort.

Research Intent

My research intent is to develop an alternative conceptual approach to environmental assessment in South Africa, which begins to move beyond modernism in its philosophical, procedural and substantive aspects. In particular I aim to investigate how the combined ideas of certain radical environmental philosophers and of three innovative thinkers and practitioners (i.e. Bent Flyvbjerg, Amartya Sen and Paul Cilliers) can assist in this task.

Environmental Impact Assessment – A Brief Orientation

The evolution of EIA is described in detail in Chapter 1. In this section, however, I will provide a brief overview of the process to orientate the reader to better follow the discussion pursued in this thesis.

The purpose of EIA is to "... predict both the positive and negative environmental impacts of a proposed project and find ways to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers" (Department of Environmental Affairs and Tourism (DEAT), 2004a: 11). EIA is considered one of the 'tools' in the environmental management 'toolbox' and is designed specifically to address project- and site-specific environmental decision-making (DEAT, 2004a). The EIA Regulations (DEAT, 2006a: 9) describe EIA as "... the process of collecting, analysing, interpreting and communicating information ..." that pertains to a development application. This information is provided to government authorities who then decide whether the proposed development should be approved, usually conditionally, or not.

An EIA process typically involves the following stages: screening, scoping, assessment and reporting (DEAT, 2004a; Hill, 2004), which are described below (Fuggle, 1994; Preston *et al.*, 1994; DEAT, 2002a; 2002b; 2004a; 2004b; 2006a; 2006b):

- **Screening:** This first stage of the EIA process involves determining whether an environmental assessment is required, and if so, the extent of this assessment; i.e. whether an initial or basic assessment is sufficient for decision-making, or whether the full EIA process should be followed. This decision is typically guided by regulated lists of activities (e.g. construction of power plants) and/or potentially affected environments (e.g. sensitive areas such as wetlands) for which either a full or initial assessment is required. An initial assessment does not typically involve scoping, but an authority can decide, based on the information provided in such an assessment, to send the development application down the 'full assessment' route, which begins with the scoping procedure.
- **Scoping:** This is the process of determining the spatial and temporal boundaries of the EIA, the alternatives to be assessed and the issues to be addressed. One of the key objectives of scoping is to focus the assessment on 'significant' issues. Scoping is undertaken with the participation of stakeholders, including government authorities and the development proponent. In South Africa an 'issues focused' approach (Weaver and Rossouw, 1998) to EIA is typically adopted, where the concerns raised by stakeholders in scoping become the core of the assessment and therefore shape the terms of reference provided to specialists in the assessment phase. The scoping phase is considered complete when a Scoping Report has been produced, reviewed by stakeholders and finalised in light of their comments. The Scoping Report usually provides an overview of the project, the environment, the issues and development alternatives to be considered in the assessment, the EIA process to be followed and the terms of reference for supporting specialist investigations.
- **Assessment and evaluation:** The purpose of the assessment stage, which is guided by the issues identified in scoping, is to provide government authorities with enough 'objective' information on both the positive and negative aspects of a proposed development, in order for them to decide whether it should be approved or not and, if

so, under what conditions. The core of the assessment is the evaluation of reasonable development alternatives, using methods that enable comparison of these alternatives. The emphasis is on 'objective' evaluation as stated by Fuggle (1994: 763) "... environmental evaluations must be free of sectoral or personal bias (as far as this is humanly possible)".

The impacts predicted through EIA are usually characterised in terms of the following: their nature (positive, negative, direct, indirect or cumulative); magnitude (high, medium or low); their extent; when they will occur (during construction, operation and/or decommissioning); their duration (short-term, long-term, intermittent or continuous); the extent to which they can be reversed or not; the probability of them occurring and their significance at various scales. Characterising impacts is typically undertaken using a variety of methods and techniques, such as physical and mathematical models, maps, with significance ratings based largely on professional judgement. The assessment stage also includes making recommendations for mitigating the potential negative impacts of the development and enhancing the positive ones. The evaluation of alternative development options is therefore undertaken with and without consideration of mitigation options.

The assessment stage is usually informed by studies in which specialists are tasked to investigate the issues identified in scoping that are most relevant to their particular domains and to characterise the potential impacts (as described above) pertaining to these issues. Meetings and workshops may be held where the specialists aim to coordinate their studies and to share information; however, most of their work is done separately from one another, with the environmental assessment practitioner integrating their findings into an Environmental Impact Report (EIR).

- **Reporting and decision-making:** The EIR typically comprises a description of the following: the proposed project; the affected environment; the terms of reference and approach to EIA; an assessment of the potential impacts of the development and its alternatives on the environment; the proposed mitigating measures; a comparative evaluation of the alternatives with and without mitigation; a description of the stakeholder engagement process; a record of the issues that were raised in this

process and how they were addressed; gaps in knowledge; the underlying assumptions; the adequacy of prediction methods; and uncertainties encountered in compiling the report. The draft EIR is sent for review by stakeholders and is then finalised for submission to the environmental authorities for approval.

Stakeholders, including the proponent, authorities and interested and affected parties, are involved in various stages of the EIA process. Most importantly, perhaps is the scoping phase where they contribute to the issues to be addressed. They also contribute various forms of information to the process and comment on draft reports before they are finalised. The participatory process associated with an EIA is often coordinated by a stakeholder engagement practitioner, who is subcontracted to the lead EIA consultant.

Research Approach

I began this research by identifying constraints to effective environmental assessment, investigating its modernist roots in order to do so. Based on my exposure to the field, I made a list of what I believed these constraints to be. Thereafter, I undertook a series of interviews with selected government officials, environmental assessment practitioners, environmental researchers and members of Non-Governmental Organisations (NGOs), to gain an understanding of whether these concerns were shared by others. I selected the interviewees based on my knowledge of the leading practitioners and organisations in environmental assessment in South Africa and on an identification of certain key environmental decision-makers in provincial and national government in this country¹. The interview questions are included as Appendix A. It is important to note that the purpose of these interviews was not to inform an empirical analysis, or to form the central component of the research approach that I adopted, but rather to enhance and support the discussion I present in this thesis. The investigation of the constraints to EIA was also informed by a review that I undertook of numerous papers presented at the annual conferences of the International Association for Impact Assessment: South Africa (IAIAsa)² since 1996.

¹ I interviewed six experienced and respected practitioners in the field of environmental assessment in South Africa; three individuals that provided an NGO perspective; four officials in environmental government departments and two leading environmental researchers.

² IAIAsa is the professional body for environmental assessment practitioners in South Africa and is an NGO.

I then investigated the modernist roots of environmental assessment in more detail, identifying three main philosophical assumptions to which the problems described for EIA could be attributed. These assumptions are deconstructed at the end of the thesis before an alternative conceptual approach to environmental assessment is proposed. This was informed by an investigation of the post-modern worldview aimed at understanding its potential contribution to the environmental debate, at least at a philosophical level. The purpose of this was not only to identify the modernist assumptions supporting the current practice of EIA in more detail, but also to begin developing an alternative philosophical basis for the practice of environmental assessment. In undertaking this latter task, I investigated the views of certain radical ecologists (i.e. the deep ecologists, social ecologists and eco-feminists), as they seem to provide the strongest post-modern response to the modern, technocentric roots of EIA.

After identifying, in the first part of the research, a number of key philosophical tenets for an approach to EIA that can move it beyond its modernist basis, I investigated the work of three leading researchers, namely: Amartya Sen, Bent Flyvbjerg and Paul Cilliers, who are thought leaders in the fields of economics, development planning and complexity theory, respectively. The purpose of this investigation was again to search for ideas that could assist in formulating an alternative, more effective approach to EIA practice. The researchers were selected according to the following criteria:

- Their work responds to some critique of modernism and relates in particular to the problems facing development and the environment;
- Although they may not phrase it in this way, they address concerns related to the subject/object divide within modernism (e.g. they look at integrating some aspect of subjectivity into knowledge within their domain);
- They make practical proposals that can be directly applied to the practice of environmental assessment in this country;
- They each come from different parts of the world and have different professional backgrounds (Flyvbjerg is based in Denmark; Sen is from India and Cilliers from South Africa). Flyvbjerg has a planning background, Sen is an economist, and Cilliers is a philosopher; and
- They are recognised as innovative and leading thinkers within their respective domains.

After gaining an understanding of the core ideas of these researchers, as they pertain to addressing the assumptions of modernity that I (and others) had identified as problematic, I investigated the relevance of these ideas to environmental assessment as it is currently practiced in South Africa. Although I drew quite extensively on international literature in this investigation, the focus was on understanding the implications of the researchers' ideas for EIA in this country. I completed this stage by listing a number of general principles to guide the development of a new, conceptual approach to environmental assessment.

Finally, drawing on the research undertaken throughout, I deconstructed the three problematic modernist philosophical assumptions described at the beginning of my study, namely that:

- A system can be understood by observing the behaviour of its parts;
- All processes flow along linear, deterministic, predictable and orderly paths; and
- Technical, objective, natural science-based information and processes are separate from, and superior to, non-technical, subjective, and value-based information and processes.

I then developed the conceptual approach to environmental assessment based on the philosophical tenets and guiding principles already identified.

I have related the proposed approach to the point in the decision-making process at which traditional EIA is currently undertaken in South Africa (i.e. once the defining characteristics of a potential development have been determined and information is required on whether the development should be approved or not, and under what conditions). However, it is possible, with some adaptation, to formulate the proposed 'sustainability argument' in tandem with the *design* of the potential development. In other words, the formulation of the argument can proactively inform the nature of the development, guiding it towards a sustainable trajectory. Such an adaptation of the proposed approach would need to be undertaken in context, as it would be strongly influenced by the design process and environment to which it relates. The philosophical tenets, principles and characteristics presented in this thesis could guide such adaptations of the sustainability argument.

A particular challenge in this research was obtaining information on the experiences and views of environmental assessment practitioners, rather than depending on the theoretical and academic

literature, both in South Africa and internationally, in this regard. Besides the interviews that I conducted, finding this information necessitated an extensive review of the 'grey literature' in this field, as this is where environmental assessment practitioners typically publish. I have therefore drawn from this literature extensively, particularly in Chapter 1. I acknowledge that there is a vast amount of formal literature within the international arena on best practice in environmental assessment. However, it is despite this knowledge that many problems continue to be experienced in practice. Therefore, instead of focusing on this literature, although it has informed my perception of the problems within this field, I turned my attention to the fundamental philosophical underpinnings of environmental assessment, with the aim of addressing the causes of the problems, rather than their symptoms. My suggested alternative to project-level environmental decision-making, therefore, rests on a different philosophical foundation. As such, it extends the debate beyond recent variations to traditional environmental assessment approaches (e.g. sustainability assessment), that have emerged in the international debate, but which do not significantly challenge the philosophical foundations of the field.

It is also important to note that, while the problem statement in this thesis emerged from my (and others') experiences in practice, my focus on the philosophical foundations of environmental assessment, led this study to a critical exploration of ideas and philosophical positions, rather than an empirical analysis. Although a conceptual alternative to project-level environmental decision-making is proposed, refining this approach for practice, and testing its robustness in addressing the problems identified, is outside the scope of this thesis. Such testing should be undertaken in a context-specific manner, in future research.

I am aware of the existence of literature from spheres of knowledge, such as resource economics and ecological design, which have not been included in this thesis. The reason for this, is that the aim of my research is to address the problems of environmental assessment at the level of their philosophical roots and to respond to these problems at the level of principles and conceptual ideas. Therefore, I drew primarily on the work of three leading thinkers (i.e. Flyvbjerg, Sen and Cilliers), whose research can be directly related to the philosophical assumptions that underpin the mainstream approach to project-level environmental decision-making.

I am also aware of the extensive literature on traditional cultural philosophies and practices. However, I had to draw on Western philosophy to characterise the modernist roots of

environmental assessment, which originated in the United States. In doing so, I gained a greater understanding of the critique of modernism (i.e. post-modernism), that if effectively incorporated into the debate on environmental assessment, could assist in providing a more appropriate philosophical base for the field. Therefore, I focused my attention on the work of researchers and practitioners, from both the developed and developing world, whose work can be directly related to a critique some aspect of modernism. This is not to say that the literature on traditional cultural philosophies cannot contribute extensively to addressing the constraints of modernism in the environmental assessment field. However, the inclusion of this vast body of knowledge would require a further study and is outside the scope of this particular thesis.

This research is generally informed by the 10 years that I have worked in the field of environmental assessment at the CSIR. My ideas have also been strongly influenced by my recent work in the emerging field of sustainability science within this organisation and my discussions with colleagues on this topic. I have, however, also drawn quite extensively on the views of researchers and practitioners from other institutions and countries. From a more philosophical perspective, my perceptions have been influenced by a deep personal interest in the work of Ken Wilber, Fritjof Capra, Carl Jung and Alan Watts, among several others.

Although described as having being undertaken in clear consecutive stages, my research approach has rather been of an iterative nature, as learning from each stage typically altered my perceptions of what I had learnt and concluded in previous ones. As a consequence, my understanding of the subject of my research has progressively deepened, resulting in my views having changed and/or expanded over time.

Structure of this thesis

Looking forward now, to the structure of this thesis, Chapter 1 begins with a description of the current environmental problématique from an international, regional, sub-regional and national perspective. Thereafter, the international evolution of environmental assessment is presented as a response to this problématique, followed by a description of its development within South Africa. The focus of the second half of this chapter is on describing the current constraints to EIA in South Africa, which are attributed, from a philosophical perspective, mainly to three assumptions within the modern worldview.

In Chapter 2, the characteristics of modernism and post-modernism are described in more detail. Thereafter, the influence of these philosophies on the environmental debate, are presented in terms of O’Riordan’s (1981) categories of technocentrism and ecocentrism. The description of ecocentrism focuses on the views of the social ecologists, deep ecologists and the eco-feminists and has the dual purpose of presenting post-modern responses to the global environmental crisis, as well as providing a source of ideas for an alternative philosophical basis for environmental assessment. This philosophical basis is presented in the form of a number of tenets listed at the end of Chapter 2.

Flyvbjerg, Sen and Cilliers’ critique of some aspect of modernism is presented in Chapter 3. Their ideas to overcome the modernist constraints within their fields are also described in the chapter, as well as the implications of these ideas for environmental assessment in South Africa. Chapter 3 concludes with a list of principles, based on the work of Flyvbjerg, Sen and Cilliers, to guide the formulation of a new approach to environmental assessment.

In Chapter 4 the three problematic assumptions of modernism are deconstructed using the ideas of radical ecologists and those of three researchers discussed in the previous chapter. The philosophical tenets for an alternative conceptual approach to environmental assessment are listed again, but now slightly expanded. The guiding principles for the design of such an approach are then elaborated upon before a particular alternative approach to environmental assessment is proposed. Finally, the way in which this proposal addresses the constraints currently being experienced in the practice of EIA, as presented in Chapter 1, is discussed.

A note on terminology

The problems and characteristics of environmental assessment, as it is currently practiced, is the starting point of my research. Therefore, I have used the recognised terminology within this field in my original research intent, as well as in Chapters 1-3 of this thesis. However, as my research progressed, it became evident that this terminology would not be the most appropriate for use in my final proposal, which is presented in Chapter 4, section 4.5. In this proposal, I suggest that practitioners shift the focus from attempting to undertake ‘objective assessments’ to developing a ‘sustainability argument’ that encompasses a range of values and epistemologies. Therefore in Chapter 4, section 4.5., instead of using terms such as ‘environmental assessment’, ‘environmental

assessment practitioner' and 'environmental assessment team'; I use the terms 'sustainability argument', 'sustainability practitioner' and 'sustainability team'.

In this thesis I use the term 'environmental assessment' interchangeably with EIA and refer to 'environmental management' in a broad sense to include a range of 'tools', such as EIA, SEA, environmental reporting and environmental management plans (EMPs). Unless otherwise stated, I have also used the term 'environment' in its widest sense to include social, ecological and biophysical concerns (DEAT, 2004a). Following Therivel *et al.* (1992) and Audouin and Hattingh (2008), I have used the concept of 'sustainability' in a way which can include the notion of 'sustainable development', but not the reverse. This is because 'sustainable development' includes the assumption that sustainability and development are compatible, whereas this assumption is not inherent to the concept of 'sustainability' (Therivel *et al.*, 1992; Audouin and Hattingh, 2008). I have not provided a particular definition of 'sustainability' as the meaning of this concept should be determined within particular contexts, as shown in Chapter 3 and 4 of this thesis. It would therefore contradict my final proposal, which is presented in Chapter 4, to explain sustainability as a fixed point of reference.

Finally, I have used the term 'project-level decision-making' to refer to the decision, that EIA typically informs, of whether a proposed development project should proceed or not, and under what conditions. However, the 'sustainability argument' approach that I propose can be applied, with some modification, to the earlier stages of project design.

The use of text boxes and tables in this thesis

In instances where I believe that the discussion will benefit from detailed information presented in a particular report, or provided by a single author or organisation (e.g. the principles of deep ecology listed by Devall and Sessions (1985) and the characteristics of complexity identified by Cilliers (2005a)), I have placed this information in boxes, so as not to disrupt the flow of the integrated text. In most cases, the tables have been used to summarise a large amount of information, from a particular author, which is critical to the orientation of the reader in the integrated discussion that follows.

The publication of parts of this thesis

An earlier version of sections of this research was published in Burns and Weaver (2008) as a chapter entitled *Moving Beyond Modernism in Environmental Assessment and Management*. My primary supervisor, Johan Hattingh, was co-author of this chapter, which includes ideas and summaries from the following parts of this thesis: Chapters 1 and 2; as well as sections 3.2 and 3.5; and sections 4.5.1 and 4.5.2. However, the final approach to environmental assessment proposed in this book chapter varies in a number of significant ways, to that presented in this thesis.

In addition, this research will be an input into the development of a CSIR *Research Guide on Sustainability Science*, as well as an input into the development of a framework for *Applied Integrative Sustainability Thinking*.

CHAPTER 1.

THE CONSTRAINTS TO EFFECTIVE ENVIRONMENTAL ASSESSMENT

1.1 Introduction

In this chapter, I will describe the environmental crisis from a global, regional, sub-regional and national perspective. Thereafter, I will present an overview of the evolution of the field of environmental assessment, which is a response to this crisis, from both an international and South African viewpoint. I then change focus to the problems that are currently being experienced in the implementation of EIA in South Africa, which I argue are due to its modernist roots. Finally, I will conclude the chapter with a brief description of three problematic assumptions inherent to the modern worldview, which is then discussed in Chapter 2.

1.2 The Environmental Crisis

On a global scale, the proportion of people living in extreme poverty³ is beginning to decrease, however this general trend is strongly influenced by Asian economic growth, with the benefits flowing to that continent (United Nations (UN), 2007). Sub-Saharan Africa remains the region in the world in which the poor are most economically disadvantaged, illustrated for example, by the fact that the number of people that lack basic sanitation has increased over the last 14 years (UN, 2007). This is in spite of a reduction in the region, of the percentage of people living on less than a dollar a day. The global trend towards increasing pressure on the world's already strained ecological systems persists, illustrated by the findings of the Intergovernmental Panel on Climate Change (IPCC) who report with certainty that human activities are driving changes in the world's climate (UN, 2007). These trends continue regardless of the efforts made within many realms of society, including the political, scientific and industrial spheres, to incorporate the concept of sustainable development into policies and actions.

The mainstream response to the environmental crisis over the last 10-15 years has centred on the concept of sustainable development and has been applied on an international, regional, national

³ Extreme poverty is defined as living on less than \$1 per day.

and local scale. Sustainable development, as defined by the Brundtland Commission in their report *Our Common Future*, involves "... meeting the needs of the current generation without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development (WCED), 1987: 24). Although this definition was widely popularized through *Our Common Future*, it had already gained purchase, for example, through its use in the *World Conservation Strategy* (International Union for Conservation of Nature (IUCN), 1980).

The aim of achieving sustainable development on an international scale was central to the purpose and outcomes of the *United Nations Conference on Environment and Development* (UNCED) held in Rio de Janeiro in 1992, and the follow-up conference that was held in Johannesburg in 2002. The first UNCED conference led to a set of principles for sustainable development (*The Rio Principles*) and to a report entitled *Agenda 21* (United Nations, 1992). In this report a plan of action for implementing the principles of sustainable development within various spheres, such as energy, natural resource conservation, urban development, agriculture and poverty, is presented (WCED, 1987). Several cities implemented a Local Agenda 21 programme and the concept of sustainable development was included in the policies and legislation of many countries. Despite these initiatives, however, it was reported at the closing of the second UNCED Conference held in Johannesburg 10 years later that "... it was hardly a secret – or even a point in dispute – that progress in implementing sustainable development has been extremely disappointing since the 1992 Earth Summit, with poverty deepening and environmental degradation worsening" (UN, 2003: <http://www.un.org/jsummit/>, accessed 29/08/08).

The key output of the second UNCED conference was the *Johannesburg Plan of Implementation* which reaffirms the international community's commitment to, *inter alia*, the *Rio Principles* and *Agenda 21* (UN, 2002). The *Johannesburg Plan* also builds on the accomplishments of the Rio conference, aiming to expedite the achievement of the remaining goals through concrete actions at all levels of governance. In addition the global community's commitment to the *Millennium Development Goals* (MDGs) was re-enforced in this plan. These eight goals were formulated and accepted by leaders from every country seven years ago. The purpose of the MDGs is to provide a global framework for development to reduce poverty, hunger and disease, and create a healthier environment (UN, 2006). More specifically, the goals are to (UN, 2006):

- Eradicate extreme poverty and hunger;
- Achieve universal primary education;
- Reduce child mortality;

- Improve maternal health ;
- Combat HIV/AIDS, malaria and other diseases;
- Ensure environmental sustainability; and
- Develop a global partnership for development.

The targets set under each of these goals are extremely challenging and include, for example: halving, between 1990 and 2015, the proportion of people who suffer from hunger; reducing by two-thirds, during the same period, the under-five mortality rate; and integrating the principles of sustainable development into country policies and programmes, while reversing the loss of environmental resources (UN, 2006).

Progress has been made in achieving the international sustainable development agenda, but it is insufficient. For example, the latest MDG progress report⁴ states that there are improvements in several areas, such as the number of children enrolled in primary schools and the number of women participating in political life; malaria and tuberculosis are increasingly under control; and the rates of poverty and child mortality are beginning to decrease (UN, 2007). In addition, significant success has been achieved in protecting the ozone layer. The consumption of ozone depleting substances has been drastically reduced following the Montreal Protocol of 1987; however, the UN (2007) states that further decreases are needed if the ozone layer is to heal completely and ultraviolet radiation is to stop harming human health, crop productivity and wildlife.

Despite these positive trends, several targets are unlikely to be met, such as halving, by 2015, the proportion of the world's people without sustainable access to safe drinking water and basic sanitation. Fifty percent of the developing world's population still lacks access to such sanitation and according to current trends about 600 million people will be affected. The MDG progress report also points out that in some sectors, particularly health and education, certain countries may be achieving the targets, but with the persistence of disparities between geographical areas and societal groups. Remote rural areas, poorest households and children of mothers with no formal education remain at a severe disadvantage (UN, 2007).

From an ecological point of view the UN (2007) states that the proportion of species threatened with extinction continues to grow despite an increase in the number of protected areas. It is

⁴ The review period reported on in the 2007 UN report varied among the targets set, but ranged generally from 1990 to 2004, 2005 or 2006.

concluded that: “Unprecedented efforts will be required to conserve habitats and to maintain ecosystems and species in a sustainable way if the rate of species loss is to be significantly reduced by 2010” (UN, 2007: 23). This report also states that deforestation continues at the extremely rapid rate of about 13 million hectares per year.

On a regional scale, the MDG progress report (UN, 2007) shows that sub-Saharan Africa is among the regions in the world with the biggest challenge in meeting almost every target set. The region is not on track to halve poverty by 2015 and, after southern Asia, continues to have the highest proportion of children suffering from hunger. Child survival rates are worst in sub-Saharan Africa and the largest percentage of urban population without adequate shelter is found in this region. Rates of deforestation are among the highest in the world. The negative trends, reported by the UN (2007) exist despite efforts on the part of African leaders, for example, through the *New Partnership for Africa's Development* (NEPAD)⁵, to realise the vision and conviction that “... they have a pressing duty to eradicate poverty and to place their countries, both individually and collectively, on a path to sustainable growth and development, and, at the same time, to participate actively in the world economy and body politic” (NEPAD, 2001: 1).

On a sub-regional scale, the *Southern African Millennium Ecosystem Assessment* (Scholes and Biggs, 2004) reveals that southern Africa is placed in the lowest quarter of global ratings of human well-being. Although biodiversity in the sub-region is relatively well conserved, with 80% of the region existing in a natural or semi-natural state, threats to ecosystems are increasing (Scholes and Biggs, 2004). These threats include climate change, conversion of ecosystems into croplands, land degradation, the impact of alien invasive plants, and overgrazing and overharvesting, which explain the serious impacts on biodiversity in the region (Scholes and Biggs, 2004).

Corresponding to the international, regional and sub-regional trends, positive progress has been made by South Africa in its commitment to the principles of sustainable development within all spheres of government, civil society and industry. Despite this, however, the general condition of the environment is deteriorating (DEAT, 2006c). In this regard, the water sector provides an excellent example. There have been significant innovative developments in the management of water since 1994, many of which involve the implementation of the progressive National Water Act (No. 36 of 1998); however, the quantity and quality of water that can be allocated has still

⁵ NEPAD is a pledge that outlines, *inter alia*, the main concerns for sustainable development in Africa, initiatives to mobilize resources and priorities for project implementation.

decreased (DEAT, 2006c). Despite South Africa's increased participation in international environmental governance, its increased attention to issues such as cleaner production and renewable energy, DEAT (2006c) reports that this country's natural capital is still being depleted.

The South African Constitution provides everyone with the right (Chapter 2, section 24) "... to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations ...". (Republic of South Africa, 1996). Numerous national Acts have been passed that aim to promote this right, such as the *National Environmental Management Act (NEMA) (No. 107 of 1998)* and the *Mineral and Petroleum Resources Development Act (No. 28 of 2002)*, and the various Acts and regulations promulgated under NEMA, for example, the *National Forests Act (No. 30 of 1998)*, the *National Water Act (No. 36 of 1998)* and the *Environmental Impact Assessment Regulations* (DEAT, 2006d). South Africa has also committed to implementing the MDGs and is in the process of developing a *National Strategy for Sustainable Development (NSSD)*. In addition, a number of sustainability initiatives have been undertaken at the municipal level, such as Local Agenda 21 programmes in the cities of Johannesburg, Cape Town and Durban. Civil society, business and industry have also implemented sustainable development initiatives (DEAT, 2006d), related for example, to waste management, sustainability reporting, corporate social investment (CSI) and the implementation of ISO14 000 programmes.

In reporting to the MDG Summit in 2005, the South African government listed a number of positive trends. These include an increase in school enrolment, a decrease in gender inequalities in relation to access to education, and an increase in access to safe water (DEAT, 2006d). The MDG progress report also suggests that the number of people living in poverty in South Africa dropped by 3.1 million between 2000 and 2004, mainly due to the issuing of social grants. However, many other indicators related to poverty, show a negative trend. Hunger among the poor, for example, remains a persistent problem despite interventions. DEAT's 2006 *State of the Environment Report* also records an increase in the amount of households without access to good basic services (between 1996 and 2001), as well as increases in general human vulnerability, due to factors such as climate change, the rapid spread of HIV/AIDS and a decline in the quality of natural resources, such as water and air.

Both the 2005 MDG reporting and the 2006 *State of the Environment Report* conclude that, although patterns vary across the country, South Africa's biodiversity and ecosystem health is generally declining. Biodiversity loss is increasing, with 34% of the country's terrestrial ecosystems,

82% of main river ecosystems, 36% of freshwater fish, 10% of birds and frogs and 20% of mammals now categorized as threatened DEAT, 2006c; 2006d). It has also been estimated that 50% of the wetlands in South Africa have been destroyed (DEAT, 2006d). DEAT (2006c: 2) states that: “The message is clear: we need to act now, both individually and collectively as a nation, to reverse environmental deterioration. If we do not act decisively, we run the risk of losing the environmental services that we all depend upon.”

One of the key challenges listed in the proposed NSSD, one which I believe to be fundamental to many others, is the tension between the need for optimal resource use in sectors such as mining and agriculture, and the protection of the natural resources on which such sectors are dependent. On a broader scale, the tension is expressed in the report as between achieving the national “... economic growth targets set in *ASGI-SA* and the ability of the environment to sustain growth that is coupled to intensified use of natural resources but fails to appreciate the value of ecosystem goods and services and the potential environmental and social costs associated with promoting high levels of quantitative economic growth” (DEAT, 2006d: 71).

One of the primary ways in which we currently aim to manage this tension, is through procedures for environmental management. However, negative trends have persisted on all scales despite these interventions. The argument supported in this thesis, is that there are fundamental philosophical problems which underlie the concept of sustainable development, and particularly the current mainstream approaches to environmental management that aim to promote this concept in practice. Similar or related arguments have been made by several authors in South Africa (e.g. Burns, 2002) and internationally (e.g. Jay *et al.*, 2007).

As environmental management is a very broad field, I will focus on the domain of environmental assessment within South Africa, to further examine these concerns. To provide a context for this discussion, the evolution of environmental assessment internationally and in South Africa, will be presented in the section that follows.

1.3 Evolution of Environmental Impact Assessment

The field of environmental assessment has evolved internationally over approximately the last 40 years and over the last 25 years in South Africa. The effectiveness of environmental assessment in this country has recently been questioned, when in 2006, the public spotlight was placed on EIA, as a result of concerns expressed by senior politicians, that the process was constraining development (Weaver and Sibisi, 2007). Such concerns were directly or indirectly expressed by past President Thabo Mbeki in his media briefing on the cabinet meeting in July 2006, and by the former Minister of Housing, Ms L.N. Sisulu in her 2006/07 budget vote speech to the National Assembly (Weaver and Sibisi, 2007).

Frustrations with the EIA process have not only been voiced by political commentators, but also by EIA practitioners themselves. For example, one of the leading founders of EIA in South Africa, Professor Richard Fuggle, in his keynote address to the International Association for Impact Assessment: South Africa's (IAIAsa) 2004 conference stated that:

During the past 12 months professional activities related to impact assessment have taken me to 12 different countries and five continents. From the world's poorest to its richest, from the most corrupt to the most honourable, from South to North and East to West. I have come into contact with politicians and peasants; rich and poor; scientists and sociologists; international and local NGOs [Non-Governmental Organisations], CBOs [Community Based Organisations] of various types; the world's largest impact assessment consultancies and one person consultancies; some of the world's largest businesses as well as small village based self help schemes; international financial institutions and small micro-credit schemes. Why tell you this? Because, in my personal experience, everywhere and across the entire spectrum of persons there is a common theme: disillusionment with measures designed to promote sustainable development and scepticism that impact assessments are leading to better decisions, be they environmental or economic, health or heritage, social or strategic in nature (parenthesis added).

In the sections that follow I will present an overview of the evolution of environmental assessment both internationally and in South Africa to the point where failure has begun to manifest.

Thereafter, I will describe the practical challenges facing the field within the context specifically of its philosophical underpinnings.

1.3.1 International Evolution of Environmental Assessment

Environmental Impact Assessment (EIA) was first legislated in the United States through the *National Environmental Policy Act (NEPA) of 1969*, which significantly influenced the development of EIA in other parts of the world (Sadler, 1996; Glasson *et al*, 2005). The purpose of NEPA, as stated in section 2, is: “To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality”. Among the requirements in NEPA is that federal agencies should use a “... systematic, inter-disciplinary approach [that ensures that] presently unquantified environmental values may be given appropriate consideration in decision making along with economic and technical considerations” (section 102) (Sadler, 1996: 24, parenthesis added). Sadler (1996) identifies this requirement as central to most, if not all, definitions of environmental assessment and statements of its purpose. The key elements of NEPA are summarised in Box 1.1 below.

Box 1.1: US National Environmental Policy Act (NEPA) of 1969

NEPA is broadly divided into two parts:

- **Title I:** which presents the Congressional Declaration of National Environmental Policy that outlines the need for the preservation and enhancement of the environment; lists objectives in relation to the man and nature interface; and stipulates requirements for procedures to determine the impact of legislation and other major Federal actions that significantly affect the quality of the environment. This Title will form the focus of the discussion of NEPA that follows.
- **Title II:** that deals with the establishment of a Council on Environmental Quality and its roles and responsibilities.

Section 101 (a) of Title I states, *inter alia*, that the Congress recognises the impact of man's activities⁶ on the natural environment and the need to restore and maintain environmental quality for the welfare and development of man. It is therefore the policy of the Federal Government to use all

⁶ The following human activities are mentioned in particular: population growth, high-density urbanization, industrial expansion, resource exploitation, and expanding technological advances (NEPA, section 2).

practical means "... to create and maintain conditions under which man and nature can exist in productive harmony, and fulfil the social, economic, and other requirements of present and future generations of Americans (section 101 (a))."

The values or objectives underpinning NEPA are evident in section 101 (b) which states that it is the responsibility of the Federal Government to use all practical means to improve and coordinate Federal plans, programs and functions in order to:

- "fulfil the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
- achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources".

The Congress also recognises that each person should be able to enjoy a healthy environment and that they also have a responsibility to contribute to its maintenance and enhancement (section 101(c)).

The procedural requirements listed in section 102 (2) require the Federal Government to administer the policies, regulations and public laws of the country according to the approach set out below:

- (A) "utilize a systematic, inter-disciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment;
- (B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by Title II of this Act, which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations;
- (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on:
 - (i) the environmental impact of the proposed action;
 - (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented”.

(<http://www.nepa.gov/nepa/regs/nepa/nepaeqia.htm>, accessed 29 August, 2008)

Subsequent to the promulgation of NEPA, the concept of environmental assessment spread widely, in various forms, to other parts of the world. Canada, Australia and New Zealand were the first countries to emulate NEPA; through the adoption of EIA procedures in 1973 and 1974, followed by a number of other industrial and developing countries (Sadler, 1996). Key milestones in the development and spread of EIA include the *European Community Directive 85/337/EEC* passed in 1985, which set minimum requirements for EIA within member states; and the inclusion of environmental assessment in Principle 17 of the *Rio Declaration of the Rio Earth Summit* in 1992 (Sadler, 1996). A summary of the diffusion of environmental assessment globally is provided in Table 1.1 below.

Table 1.1: Key Stages in the World Wide Adoption of EA

Year/Period	Key milestone in development of environmental assessment
Pre-1969	Consideration of the environmental consequences of projects is limited. Mostly technical and economic aspects considered.
1969	Enactment of the National Environmental Policy Act (NEPA) in the United States.
1973 and 1974	Canada, Australia and New Zealand are the first to adopt environmental assessment procedures. Canada and New Zealand establish administratively-based procedures, while Australia passes environmental assessment legislation.
During 1970s	Other countries, both in the industrial (e.g. France, Germany and Ireland) and developing world (e.g. Philippines, Colombia and Thailand), introduce formal or informal EIA procedures, or elements thereof (e.g. requirements for impact statements as part of planning applications for development approval). Also within this period, the Organisation for

<i>Year/Period</i>	<i>Key milestone in development of environmental assessment</i>
	Economic Cooperation and Development (OECD) recommend that member states adopt EIA procedures.
1985	The European Community Directive (85/337/EEC) on EIA is passed, stipulating minimum requirements for assessment procedures within member states.
1989	The United Nations Environment Programme (UNEP) recommends that member countries introduce EIA principles and procedures. Environmental Assessment becomes a standard requirement for all World Bank financed projects and other development banks and donors introduce similar requirements. As a result of the need for borrowing countries to comply with this, EA processes became widely used in the developing world.
1991	The Espoo Convention on EIA, which requires the consideration of the transboundary effects of development, is passed.
1992	Principle 17 of the Rio Declaration, signed at the Rio Earth Summit, states that EIA will be introduced at the national level for proposed activities that may have a negative impact on the environment and for which national government approval is required. Also, capacity building programmes are initiated by various multilateral and donor agencies, promoting the further spread of environmental assessment worldwide. Generally, in the 1990s, there is a rapid growth in environmental assessment training and cooperation activities.
1996	More than 100 countries have EIA systems.
1999	The World Bank updates its guidance on EIA.
2002	The Johannesburg Earth Summit is held. The Plan of Implementation of the World Summit on Sustainable Development, which is the main output of this Summit, states that all relevant authorities should be encouraged to take sustainable development considerations into account in decision-making through, inter alia, the use of environmental impact assessment (Chapter 3, section 19(e)).
2007	At least 120 countries have EIA systems.

(Sadler, 1996; UN, 2002; Wood, 2003; Glasson et al., 2005)

The historical evolution of the nature of environmental assessment procedures, clearly illustrates an increasing awareness of the interconnectedness of the biophysical, social and economic aspects of the environment, resulting in attempts to reconnect these previously compartmentalised components. Modak and Biswas (1999: 6) make the observation that "... as the understanding of the environment and its multidimensional interdependent nature matured, so did the size and scope of environmental legislation".

Prior to NEPA, project review focused mainly on engineering, technical and economic aspects (Sadler, 1996). In the 1970s methods were developed for undertaking impact assessments (e.g. checklists and matrices) before a development was given permission to proceed. These assessments focused primarily on the project level of decision-making and included recommendations for mitigation measures to alleviate or reduce the significance of potential negative impacts of a proposed development. The EIAs undertaken at this time mainly focused on biophysical aspects, which were separated into categories such as air, land, water and biodiversity, with a category for socio-economic aspects sometimes being included (Sadler, 1996; Weaver and Rossouw, 1998). Burns (2002) argues that this fragmentation of the environment was part of the general trend within EIA, at this stage of its development, to simplify the process as much as possible. Consistent with this was the identification of mainly first-order cause-effect relationships, focusing EIAs on immediate impacts, with less emphasis on secondary or cumulative effects (Burns, 2002).

During this early stage in the development of EIA, social concerns were rarely included directly (Taylor *et al.*, 1990; Burns, 2002). Public participation was often confused with Social Impact Assessment (SIA) (Taylor *et al.*, 1990), with SIA itself, in many instances, replaced with economic assessment. If expanded to include social issues, analysis in EIA was mostly confined to the quantifiable effects of development, population changes and the need for community services (Taylor *et al.*, 1990). However, from the late 1970s and early 1980s social issues were more effectively integrated into EIAs and public participation become an integral part of the development process (Sadler, 1996; Burns, 2002). Modak and Biswas (1999) attribute this expansion of EIA to an increased understanding of the interrelationship between the various dimensions of the environment.

Also in the late 1970s, the need to expand the application of EIA to regional plans was acknowledged, as the transboundary and cumulative impacts of development were increasingly recognized (Modak and Biswas, 1999). It was realised, for example, that industrial emissions can

affect an entire region, and that while a particular industry's emissions may be within acceptable limits, when combined with emissions from others, the cumulative total may exceed the safe assimilation limits for the region (i.e. have a negative cumulative impact). From the mid-1980s onwards attempts were therefore made to address such cumulative effects in environmental assessment (Sadler, 1996). A further consequence of the recognition of regional impacts fairly early in the development of EIA was the emergence of Health Impact Assessment (HIA). Although health issues were considered as an integral part of an EIA, their significance was raised through the development of HIA (Modak and Biswas, 1999).

The 1980s saw another shift in the development of EIA, from a focus on the fragmented parts of the environment, to the evaluation of ecosystem wholes (Sadler, 1996; Burns, 2002). The development of ecological impact assessment led to the consideration of overall ecosystem composition, structure and functioning (Burns, 2002). However, Burns (2002) argues that this tool is rarely extensively used at the project level, notwithstanding the potential he identifies for ecological assessment to inform more long-term planning and policy-making.

It was mainly in the 1990s that the application of environmental assessment to the policy, plan and programme levels of decision-making gained momentum (Dalal-Clayton and Sadler, 2005). Although provisions were made in NEPA (section 102) for environmental assessment at these levels of decision-making, this occurred to only a limited degree in practice (Dalal-Clayton and Sadler, 2005). In the 1990s, however, a range of different forms of environmental assessment at the policy, plan and programme level emerged and were instituted in a number of countries worldwide and by several international organisations (Dalal-Clayton and Sadler, 2005). In July 2004, the European *Strategic Environmental Assessment (SEA) Directive* (Directive 2001/42/EC) came into force, stipulating requirements for the development of SEA processes within member states (Dalal-Clayton and Sadler, 2005). Dalal-Clayton and Sadler reported in 2005 that more than 25 countries and jurisdictions had SEA systems in place.

With the increased international allegiance to sustainable development in the late 1980s and early 1990s, EIA was viewed as a means of achieving this goal (Sadler, 1996). This led to more attention being paid to sustainability issues in the environmental assessment process, and consequently to the links between social, economic and biophysical aspects of the environment (Sadler, 1996). This trend was reflected in SEA, which in some cases developed beyond a mere extension of EIA to the policy, plan and programme levels of decision-making (EIA-based SEA), to

a way of implementing the principle of sustainability through the identification of context-related sustainability objectives for guiding development (i.e. sustainability-led SEA) (Therivel *et al.*, 1992).

The evolution of environmental assessment has therefore led to a proliferation of approaches (e.g. HIA, SIA, Risk Assessment, Heritage Assessment and SEA) that focus on a particular stage in the decision-making process, or on a particular aspect of the environment. Each of these has developed either under the umbrella of EIA, or as non-mandatory specialised assessment procedures, alongside financial, economic, environmental and other appraisals (Lee and Kirkpatrick, 2000). Lee and Kirkpatrick (2000) presume that this proliferation of procedures is due to a concern that certain impacts are either being overlooked or insufficiently analysed, or that the incorrect techniques are being used to assess these impacts. However, this tendency has led to a number of problems, which include: difficulties in synchronising the various appraisals with each other and with the planning of the proposed project; a greater chance of inconsistencies arising in the appraisal techniques used in each assessment; an increase in the likelihood of the interdependencies between impacts being overlooked; an increase in the time and other resources needed to manage and coordinate separate appraisals; and an increase in the difficulty of compiling the overall assessment for decision-makers (Lee and Kirkpatrick, 2000). More integrated approaches to development decision-making are being investigated internationally in response to the inadequacies and confusion associated with the existence of a multitude of environmental assessment processes (Lee and Kirkpatrick, 2000).

Sustainability assessment is an example of such an approach which has recently emerged in the environmental assessment arena. A range of methods to implementing this tool are promoted in the literature; however, its general aim is to expand the scope of environmental assessment beyond the biophysical, to include the social and economic consequences of decisions in an integrated way (Pope *et al.*, 2004). According to Dalal-Clayton and Sadler (2005: 368) this tool aids "... an integrated assessment of the environmental, social and economic effects of proposed actions at all levels of decision-making, from policy to projects, which is undertaken against a national or international framework of sustainability principles, indicators or strategies". Dalal-Clayton and Sadler (2005) have identified numerous processes being undertaken under the umbrella term of sustainability assessment; however, in the view of Pope *et al.* (2004) there are few examples internationally of its effective implementation.

A related development within the field is the emergence of Integrated Sustainability Assessment (ISA)⁷. ISA pertains specifically to the policy-level of decision-making and aims to address multiple aspects of integration within policy formulation. These aspects include, for example, the various dimensions of sustainability, the qualitative and quantitative tools used in policy-making and the different knowledge and values of a range of stakeholders, policymakers and experts (Weaver and Rotmans, 2008). The stages in the ISA process are listed in Box 1.2 below.

Box 1.2: Stages in the ISA process

The stages in the cyclical ISA process include briefly:

- The conceptualisation of the problem and the social-ecological system to be addressed;
- The formulation of a vision for the sustainable future of the system;
- The identification of pathways (e.g. scenarios) and policy proposals to achieve the vision;
- The qualitative assessment of the positive and negative impacts of the preferred pathways to sustainability and the policy options identified;
- The use of experiments that employ tools such as computer modelling to test the vision, policy proposals and the assumptions that underlie these (in terms of their consistency, adequacy, robustness and feasibility); and
- The explicit identification of lessons learnt through this process in order to adjust the problem definition, vision and policy options as appropriate.

(Weaver and Rotmans, 2008)

ISA contains some changes to the assessment of policy processes, that are similar to those that emerged in this thesis (Chapters 3, 4 and 5) for an alternative conceptual approach to project-level environmental assessment in South Africa (e.g. the view of the environment as a social-ecological system and the more extensive use of narrative in evaluations). However, its applicability specifically to the policy-level of decision-making, limits its usefulness in providing ideas for the alternative conceptual approach sought in this thesis. In addition, the development of ISA did not include a comprehensive re-evaluation of the philosophical assumptions underlying the environmental assessment field itself. Therefore, in my view, many of the problems resulting from

⁷ A European research project entitled MATISSE (Methods and Tools for Integrated Sustainability Assessment) was undertaken to formulate and demonstrate the theory and practice of this approach (Weaver and Rotmans, 2008). The description of ISA in this section is drawn primarily from Working Paper 1 (Weaver and Rotmans, 2008), which was completed as part of this research project.

the modernist base of the field, as described in section 1.4 of this chapter, are not addressed in a fundamentally new way.

1.3.2 Evolution of Environmental Assessment in South Africa

Environmental assessments were practiced in South Africa well before the promulgation of EIA in legislation in 1997. As early as the 1970s, EIAs were being undertaken voluntarily, or at the discretion of authorities, with this practice gaining momentum in the 1980s (Sowman *et al.*, 1995; Barbour and Brownlie, 2002). The need to incorporate environmental concerns into project planning and decision-making was recognized in the 1980 *White Paper on a National Policy Regarding Environmental Conservation*, which formed the basis for the *Environmental Conservation Act (No. 100 of 1982)* (Sowman *et al.*, 1995). This Act did not explicitly require EIA, but made provision for the establishment of a statutory *Council for the Environment* to advise the Minister on environmental issues (Sowman *et al.*, 1995). This Council formed a committee in 1984 to recommend a strategy to ensure that environmental concerns were incorporated into development planning and project implementation (Preston *et al.*, 1994). The extensive research and consultation process that followed resulted in the publication of a document on Integrated Environmental Management (IEM) in South Africa (Preston *et al.*, 1994; Sowman *et al.*, 1995). Sowman *et al.* (1995: 51) point out that the term IEM was chosen as it implied the integration of environmental issues into all stages of the development process, from planning to post-assessment monitoring; as opposed to EIA, which appeared to be "... too limited in scope, reactive, anti-development, too separate from the planning process, and often the cause of costly delays".

Although the international evolution of environmental management and assessment, particularly the enactment of NEPA, encouraged South African policy-makers to consider the possibilities of introducing such a process in this country, IEM was specifically designed to meet the needs of South Africa as part of the developing world (Preston 1995). Hill and Fuggle (1988)⁸ argued in a paper to the 1988 *Annual Transportation Convention*, that the US concept of EIA had not succeeded in developing countries because of the difference in priorities and values in these countries to those in the United States. In general, the authors argue that a fundamental

⁸ Dr Richard Hill was a member of the team that compiled the *IEM Guidelines* and Professor Richard Fuggle was the chairman of the *Committee for Environmental Impact Assessment* that was established by the *Council for the Environment* (DEA (Council for the Environment, 1988; Department of Environmental Affairs), 1992).

assumption built into the American approach to environmental assessment was that environmental conservation was a high voter priority and a concern that would be seriously taken into account by decision-makers. This priority, they argued, was borne out of a concern for the long-term sustainability of the environment which was being threatened by human activities. In addition, the aesthetic, scientific and educational value of the natural environment was considered important in development decision-making in the United States. Lastly, Hill and Fuggle (1988) argue that the US EIA process depended on an open system of government and the wide disclosure of information, a context which did not exist in apartheid South Africa.

Contrary to the situation in the United States, meeting basic human needs, such as food and housing are priorities in many developing countries (Hill and Fuggle, 1988). Hill and Fuggle (1988) point out that in such countries, the environment is often seen as a threat to humans, rather than humans as a threat to the environment. This perception is the result of extreme events such as floods and droughts. Under such circumstances meeting basic human needs is the immediate priority rather than, for example, aesthetic issues or the interests of future generations (Hill and Fuggle, 1988). For these reasons, South Africa's IEM procedure aimed to *guide* rather than constrain development and focused on making such development environmentally acceptable through, for example, the mitigation of negative impacts (Preston *et al.*, 1994; Sowman *et al.*, 1995). The main emphasis was on establishing a compromise that would respond to development needs, while minimising environmental degradation; rather than on informing a single decision-point, late in the planning process, at which permission to proceed with development was either granted or not (Hill and Fuggle, 1988). Moreover, rather than attempting to integrate a range of separate assessment procedures, the IEM approach included a broad definition of the environment, which comprises social, economic and biophysical aspects (Preston *et al.*, 1994). However, considerable difficulty in integrating these elements within assessment procedures is still being experienced, as discussed in section 1.4.1.1.

The IEM approach recommended by the committee established by the *Council for the Environment* was published in a series of documents in 1989 (Sowman *et al.*, 1995). Changes to the proposed process were made later in 1992 in the light of experience gained through its practical application (Sowman *et al.*, 1995) and a series of revised guideline documents was produced. IEM was never legislated, although it was generally adopted, formally or informally, by authorities, business and many environmental practitioners (Sowman *et al.*, 1995).

IEM was criticised on a number of accounts. For example, Lloyd (1995: 333) stated that: “The whole IEM procedure has emerged as cumbersome, time-consuming, expensive and totally antithetical to the spirit of development and job creation. It could be a vehicle for environmental protection; it may not be a suitable vehicle for ensuring sustainable development”. Another critique focused on the institutional context and procedure for IEM, stating that: “Part of the problem in South Africa is the institutional context of EIA studies, which does not address the theoretical and procedural questions which have been acknowledged internationally. For example, many EIA studies adopt the IEM policy guidelines of the Council for the Environment, which endorse a simplistic positivist approach and are certainly inappropriate for social scientists” (Quinlan, 1993: 106).

EIA regulations were promulgated in 1997 in terms of the *Environment Conservation Act (No. 73 of 1989)*. These regulations related specifically to the environmental assessment of proposed development projects, excluding the assessment of policies, plans and programmes that IEM had included. Based on the experience gained in the implementation of these first EIA regulations, a revised set was published in 2006 in terms of NEMA. The definition of the environment currently guiding environmental assessment in South Africa has narrowed from the broad IEM definition, which included social, economic and biophysical aspects, to the definition in NEMA which centres on the natural environment and its physical and cultural properties that affect human health and well-being (Republic of South Africa, 1998).

In South Africa, as in most countries, the practice of SEA emerged independently of EIA. Key concepts underpinning SEA were articulated in a Primer and Protocol, produced in 1996 and 1997 respectively (Council for Scientific and Industrial Research (CSIR), 1996; DEAT, 2004c). These documents aimed to inform the local debate and present the benefits of SEA, but did not include a specific approach, as there was little practical experience in this area at the time upon which to base this (Rossouw *et al.*, 2000). Concurrent with the production of these documents, SEAs were first undertaken in practice (DEAT, 2004c). Based on this experience, DEAT published guidelines for SEA in South Africa in 2000 (DEAT, 2000). The approach adopted in these guidelines did not merely replicate international SEA procedures, but were adapted to the conditions of resource constraints experienced in this country. South Africa is now generally regarded as a leading developing country in terms of SEA practice (Retief *et al.*, 2004).

In 2007 the DEAT SEA guidelines were updated, based on further experience in implementing SEA in South Africa. Three alternative approaches to SEA are described, with the relevance of

each dependent on whether the assessment is commissioned before, during or after the development planning process (DEAT, 2007). A particular approach to SEA has not been legislated in South Africa; however, legal provision is made for the tool to be applied in several sectors including urban development and port planning.

Retief *et al.* (2004) report that, between 1996 and 2003, 50 SEAs were conducted in South Africa. Most of these relate to development planning procedures and therefore address social, economic and biophysical issues. Of those that are sectoral SEAs, most pertain to the conservation and biodiversity sector; however, strategic assessments were also undertaken within the industrial, transport, port planning, energy, mining and economic sectors (Retief *et al.*, 2004).

A summary of the key stages in the evolution of environmental assessment in South Africa is provided in the table below.

Table 1.2: *Key Stages in the Adoption of EA in South Africa*

<i>Date/period</i>	<i>Key milestone in the development of environmental assessment</i>
1982	The Environment Conservation Act (No. 100 of 1982) is promulgated. This Act contains limited provisions for the regulation of activities that have a negative impact on the environment. It is mainly concerned with governmental coordination of environmental concerns and the establishment of a Council to advise the Minister of Environment Affairs.
1983	The Council for the Environment is established in terms of the Environment Conservation Act (No. 100 of 1982).
1984	The Council for the Environment establishes a committee to make recommendations for the consideration of environmental issues in development approval processes. The approach recommended by this committee is described as Integrated Environmental Management (IEM).
1989	The Environment Conservation Act (No. 73 of 1989) is promulgated. This Act provides for the regulation of activities that may have a negative impact on the environment and for environmental impact reports to be required. No specific regulations in this regard were passed for a number of years. Also in 1989, the Council for the Environment recommends a procedure for IEM. This procedure is developed through an extensive process of research and consultation. It is adopted both formally and informally by businesses, authorities and professionals, but is not legislated.

<i>Date/period</i>	<i>Key milestone in the development of environmental assessment</i>
1992	The practical experience in implementing IEM is used to refine the procedure. The revised procedure and a series of guideline documents are published.
1996	An SEA Primer is produced by the CSIR, highlighting the limitations of project-specific SEA and the need to integrate environmental issues into the strategic levels of decision-making (i.e. into policies, plans and programmes). Although a specific SEA process is not presented in the Primer, some characteristics of SEA are explained. SEA is undertaken in the country on a voluntary basis.
1997	EIA regulations are promulgated in terms of the Environment Conservation Act (No. 73 of 1989). This Act introduces the process as a mandatory requirement for particular projects within certain listed environments.
1998	The National Environmental Management Act (No.107 of 1998) (NEMA) is promulgated. This Act (Chapter 5, section 23(1)) provides for "... the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities". Although this statement refers to environmental management in general, the focus of the Act is on predicting the potential impacts of proposed activities. In so doing, NEMA places the emphasis on environmental assessment specifically, as this is the main environmental management tool used to make such predictions.
2000	DEAT publishes the first Guidelines on SEA in South Africa. In addition, the Municipal Planning and Performance Regulations (Department of Provincial and Local Government, 2001) are published in terms of the Municipal Systems Act No. 32 of 2000. These Regulations (Chapter 2, section 2(4)(f)) require strategic assessment of the environmental impacts of Integrated Development Plans (IDPs). The Regulations do not stipulate a specific procedure to be followed in these assessments.
2006	EIA regulations are passed in terms of Chapter 5 of NEMA. These regulations replace those passed in 1997 in terms of the Environment Conservation Act (No. 73 of 1989).
2007	Revised guidelines on SEA in South Africa are published based on experience gained in the application of this process in practice.

(Fuggle, 1994; Sowman et al., 1995; CSIR, 1996; Barbour and Browlie, 2002; Rossouw et al., 2000; Department of Provincial and Local Government, 2001; DEAT, 2004c; 2006a).

1.4 Constraints to Effective Environmental Assessment in South Africa

Currently, there are a number of persistent problems constraining the effectiveness of environmental assessment in South Africa. In the discussion below, I will present examples of those problems which, for reasons that will become evident later in the chapter, relate to the following three themes:

- Difficulties in achieving inter-disciplinarity in environmental assessment;
- Difficulties in undertaking stakeholder engagement; and
- Difficulties in impact prediction and dealing with 'uncertainty'.

As far as possible, I have described the constraints from a South African practitioners' perspective. As explained in the introduction to this thesis, I initially listed these issues as I perceive them, based on my years of working in the field. I then undertook a series of interviews⁹ and a review of the 'grey literature' (e.g. IAIA's annual conference proceedings since 1996), where such practitioners typically publish, in order to determine whether my views were generally shared by others. I have not described individual environmental assessment processes, as a review of the literature (e.g. Brownlie, Walmsley and Tarr, 2006), the interviews which I conducted and my own experience, indicates that there are consistent trends and recurring problems that can be identified based on existing knowledge.

Although I provided, in section 1.3.1, a brief overview of the development of the field internationally, this was merely to provide the context for the description of the evolution of environmental assessment in South Africa (section 1.3.2) and the problems being experienced in the field in this country (section 1.4). Many of these problems are shared by those practising environmental assessment in other countries, however, that is not the focus of this thesis. Therefore, I have not included a review of international environmental assessment techniques and best practice in this chapter in any depth. Although some of these techniques are mentioned in Chapter 2, they are typically based on the same philosophical foundation as the field as a whole, and I wish to focus on revising that foundation, rather than proposing symptomatic solutions that do not address the roots of the myriad of constraints presented in the sections that follow. In instances

⁹ As described in the introduction to this thesis, these interviews were conducted in 2006 with selected environmental assessment practitioners, environmental researchers, government officials and members of NGOs.

where I have referred to the international literature and experience, it is primarily to provide a deeper understanding of the constraints to effective environmental assessment in South Africa.

1.4.1 Difficulties achieving inter-disciplinarity in environmental assessment

The difficulties currently experienced in crossing the divides between various disciplines and sectors constrain environmental assessment in a number of ways. For example, they limit the effective integration of various specialist inputs into the environmental assessment process. Also, the governmental review of EIAs is hampered by the structure of government departments that broadly reflects the divides between disciplines. In the section that follows, these particular problems will be discussed in more detail.

1.4.1.1. Integration and inter-disciplinary work in environmental assessment

One of the primary goals of environmental assessment is to promote sustainable development. In South Africa this concept is included in many pieces of legislation, such as NEMA, the *Development Facilitation Act (No.67 of 1995)*, the *Municipal Systems Act (No. 32 of 2000)* and the *National Water Act (No. 36 of 1998)*. There is much debate in the environmental arena on the meaning of sustainable development (e.g. Reid, 1995; Dresner, 2002); however, most definitions invariably call for the integration of social, economic and environmental priorities. Typically, the concept is depicted as three intersecting circles with the desirable point being in the middle where social, economic and biophysical concerns intersect.

In South Africa, such integration of social, economic and biophysical concerns, is central to the philosophy and practice of IEM, in which the environment, as stated in section 1.3.2, is defined in its broadest sense to include "... biophysical, social and economic components and the connections within and between these components" (DEAT, 2004a: 9)¹⁰. An 'integrated approach'

¹⁰ Although the term 'environment' is used in its broadest sense, to include social, biological, physical, historical, economic, political and cultural aspects, in the context of IEM (Preston *et al.*, 1994; DEAT, 2004a), the NEMA (Definitions, section 1, (xi)) defines the environment more narrowly stating that it "... means the surroundings within which humans exist and that are made up of:-

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships between among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being" (Republic of South Africa, 1998).

Despite this more narrow definition, the EIA regulations still require the consideration of social, economic and environmental or ecological concerns when undertaking an environmental assessment.

is defined in DEAT's document on IEM (2004a: 9) as one that acknowledges "... that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all components of the environment and all people in the environment". The preamble to NEMA (Republic of South Africa, 1998) states that "... the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions ..." is required in order to achieve sustainable development, while the EIA regulations (DEAT, 2006a) require a description of the way in which "... the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity" (Chapter 3, section 32(2)(d)).

Meeting this need for integration in environmental assessment requires that specialists from varying disciplines work together in an inter-disciplinary way. In the interviews that I conducted for this thesis, the respondents generally saw the value of specialist interaction, describing a range of related benefits. For example, they said that it assisted with identifying impacts, it provided a holistic understanding of the issues that were being discussed, it broadened their analysis, helped them think 'outside the box' and assisted in establishing 'a bigger picture of things'. One interviewee stated it clearly by saying that you "... need to partner with other bits of the problem".

Despite the requirements in legislation and recognition of the importance of integration, putting it into effect is seriously constrained in the practice of environmental assessment in South Africa. For example, Greyling (2000: 158) states that there is "... a lack of integration within the technical dimension of EIA ..." and that in some instances "... an EIA project manager puts together the findings of specialist studies by way of 'cut and paste' in the Environmental Impact Report, ticking off the one study after the other, not integrating the findings of specialist studies with each other, and not using the findings as parcels of information to give shape to the bigger picture upon which decisions can be based" (Greyling, 2000: 159). The inadequate integration of specialist studies has been a persistent concern, with the problem already identified in the early 1990s. For example, Quinlan (1993) argues that the principle of drawing on a range of specialists in attempting to understand complex environmental processes is sound and that their combined input should provide a better understanding of the interconnectedness of the human and natural environment. However, Quinlan (1993: 107) concludes that: "The opportunity to describe the interconnectedness of these processes is lost ... the moment the specialists begin to conduct their studies independently of each other. Logically, the specialists should integrate their work by working together, in order to learn from each other the different dimensions of these processes. This is rarely, if ever, carried out. As a result, the different specialist reports are not compatible, having been written within the confines and according to the dictates of each individual discipline".

Shandler *et al.* (1999: 246, parenthesis added) attribute the failure of integration in EIA to a lack of training of environmental assessment practitioners, stating that "... few [environmental practitioners] have adequate skills to sufficiently integrate socio-economic considerations. Most environmental practitioners have received only training in the natural sciences, and therefore define sustainable development from a narrow biophysical perspective".

The participants in the interview process that I conducted, generally reported that it was "... a challenge working with other disciplines ..." and making 'connections and linkages' between specialist reports. One interviewee called integration a 'nice idea' that had worked in only one or two environmental assessment reports that she has been exposed to, while in another interviewee's opinion "... people are not good at integrating ..." and "... economists and ecologists can't talk to one another ..." because their perspectives are so different.

A lack of integration in environmental assessment is not only a problem in South Africa, but also internationally. This problem has serious consequences, as explained by Hulme and Taylor (2000: 82) who state that: "Despite concerted efforts to integrate environmental, economic and social analyses ... the majority of 'integrated appraisals' remained informed guesswork parading around as objective technical analysis. Often such work is as likely to damage the livelihoods of those that interventions seek to help as it is to benefit them".

Based on the interviews that I conducted, the main constraints to effective inter-disciplinary work in South Africa are the differences in the terminology and conceptual frameworks used in various disciplines. One of the main limitations to effective dialogue between specialists is the use of language and terminology that is specific to a particular discipline (i.e. jargon) or that has a particular meaning in that discipline which varies from its use elsewhere. As Norton (2005: 440) states in the context of environmental policy-making in the United States: "Disciplines, too often thinking of themselves as the main course, have insulated themselves by creating in-group jargons and techniques that make them inaccessible either by the public or by scientists in related fields". One interviewee that I spoke to stated that "... we struggle to say things that mean the same thing to both sides". A particular concern within the environmental management arena, mentioned by several interviewees, is achieving effective dialogue between EIA practitioners and economists. A typical means of addressing the difficulties in communicating across the disciplinary divides, mentioned by one scientist who was interviewed, is the use of an extensive glossary. A glossary alone, however, does not address the differences in conceptual frameworks that would influence the use of that terminology by the various specialists.

Several interviewees listed differences between the disciplines in their fundamental way of thinking, as a constraint to effective integration. This was articulated in various ways, including differences in conceptual frameworks, research paradigms, perspectives, worldviews and the way of framing problems. One interviewee summarised this by stating that we are "... looking at the problem through different lenses". Due to the significance of this constraint to environmental assessment, some elaboration is necessary.

The many differences in conceptual frameworks or worldviews that can influence the approach of a specialist to a particular problem, is illustrated in the debate between and within the natural and social sciences, relating to absolutisms and relativisms. This was alluded to by one of the interviewees who admitted to struggling to work with those that had "... a completely relativistic view of reality". However, this issue cannot simply be divided into those that have a relativistic outlook and those that prefer an absolutist approach. Harré and Krausz (1996) explain the varieties of relativism and absolutism, illustrating that this is a nuanced, complicated discussion. For the purposes of this illustration, the lines of contestation can be drawn between those who believe that there is one point of view from which the final truth of reality can be determined and those that believe that meaning, truth and value are relative to the particular cultural context under consideration (Harré and Krausz, 1996).

In its variants, absolutism holds that there are beliefs that are true in all contexts and entities that exist for all persons (i.e. universalism); there are beliefs that are true and entities that exist independent of the views of any person or society (i.e. objectivism); and finally that there is a common set of basic statements that are valid for all enquiry and assessment and a common ontology from which all other existents are constructed (i.e. foundationalism) (Harré and Krausz, 1996). The varieties of relativism identified by Harré and Krausz (1996) hold that:

- Meaning is relative to the language used – you cannot translate words into another language without loosing meaning;
- Existence is relative to the conceptual framework employed – what exists for a person depends on what they believe in;
- Morality is relative to the society and epoch – what is considered right changes over time and between different cultures; and

- Aesthetic value is relative to cultures and epochs – one culture may not consider another's music beautiful and one generation's music may be considered 'outdated' by another.

The debate between absolutism and relativism has practical implications for environmental assessment. As one interviewee observed, there is a tendency for many scientists to either favour an approach based mainly on case-studies and contextual information or to promote the development of deterministic generalised frameworks. Although this is a debate that occurs within the social sciences it is often a difference that also manifests broadly between the natural and the social sciences (Smith, 2005). To illustrate, Ziman (1987: 15) states that "... a description of the natural world in terms of *particular* facts would be quite unmanageable and quite useless. The essence of scientific knowledge is that it goes beyond natural individual items of information and encompasses them in *general* statements". The natural scientist looks for 'patterns of fact' that would have to be considered in any general description of the world (Ziman, 1987). In an article entitled: *Are the Social Sciences Really Inferior?* Machlup (1961) argues that there are a greater number of variables to consider in the social sciences than in the natural sciences, which makes for more variation and less recurrence of exactly the same events. Although Machlup does not draw this conclusion directly, it can be inferred from his argument that such variation makes the development of general statements more difficult in the social sciences. The tension between absolutism and relativism is not going to be easily solved and, as Harré and Krausz (1996: 3) state: "The debate between relativists and absolutists is of great antiquity and seeming intractability. The literature on the subject is huge. The twists and turns of the argument are labyrinthine".

The natural and social sciences, in their traditional forms, have other differences that can constrain the effective integration of the knowledge produced in each sphere. Some involved in the study of social processes and relations argue that the object of their study is so different to the natural world that it requires a fundamentally different approach to the production of knowledge¹¹. Smith (2005) describes the differences between the natural and the social sciences, from an idealist point of view (Table 1.3).

¹¹ Idealists support this argument, while empiricists apply the scientific method of the natural sciences to the social sciences (Smith, 2005).

Table 1.3: *Differences between Natural and Social Science from an Idealist View.*

<i>Natural Science</i>	<i>Social Science</i>
Examines inanimate nature and living organisms	Examines human actions and practices
Non-evaluative, positive	Evaluative, normative
Objective experience	Subjective experience
Closed system (small number of discrete variables)	Open system (large number of variables that can only be defined loosely)
Quantitative, numerical and measurable variables	Qualitative, non-numerical variables
Predictive power of explanations for identifying outcomes is very important	Prediction limited to specifying patterns Prediction not the sole criterion for establishing usefulness of explanation

(Smith, 2005)

Although Smith's description is a very broad generalization, it does provide an indication of typical differences between the traditional natural and social sciences that may be contributing to difficulties in inter-disciplinary work in environmental assessment, and therefore in the integration of the social, economic and biophysical aspects of such assessments.

However, these differences, as well as those between disciplines within these sciences, are not confined to the conceptual and methodological spheres, but extend to the epistemological and ontological realms. For example, there are particular values that underlie a discipline and influence the interpretation of information within that discipline (e.g. the need to maintain and enhance the natural environment underpins environmental assessment). Smith (2005: xxi) goes so far as to state that: "Disciplinary discourses are effective to the extent that they provide a framework within which meanings can be regulated".

In his address to the *Second World Congress on Transdisciplinarity*, Swilling (2005), illustrated this effectively, drawing on Manfred Max Neef's critique of the triple bottom line approach to sustainability. This approach, as indicated in the description of sustainable development in this section, involves reducing sustainability to the sum of three partly overlapping spheres, i.e. the economic, the social and the ecological (Swilling, 2005). Swilling points out that this is problematic as it leaves the, often conflicting, internal logic (which comprises the epistemological, ontological and methodological aspects) of each sphere intact, concluding that "... If sustainability means markets, plus welfare, plus conservationism, then we really are in trouble. Unfortunately, this is, with rare exceptions, the state of play (Swilling, 2005: 2)".¹²

One scientist that I interviewed, made the important point that for effective inter-disciplinary work to take place, specialists and practitioners need to be comfortable with the insights of those from other disciplines and that it takes time to build up such trust. The purpose of the preceding discussion is to illustrate the significant challenge that this involves, given the conceptual, methodological, epistemological and ontological differences that are inherent within the various specialist disciplines.

1.4.1.2. Lack of cooperative governance

The split between disciplines and sectors is generally echoed in governmental structures in South Africa, which typically focus on separately managing particular aspects of human activities (e.g. Department of Water Affairs and Forestry, Department of Education, Department of Agriculture). This compartmentalization of functions is almost a universal characteristic of governance, occurring internationally and within development cooperation (Brown, 2000). Brown (2000: 5) points out that: "Compartmentalisation in government ensures that the necessary disciplinary expertise and implementation skills are brought to bear on specific development activities. But it also restricts the range of perspectives and disciplinary skills that can contribute to the formulation of that particular development activity". The need to overcome fragmentation in addressing environmental issues is recognised within this country's legislation through the principle of cooperative governance.

¹² On a smaller scale, one environmental assessment practitioner in the interviews I conducted gave an example of how the differences in values underpinning various specialist areas can seriously challenge the integrative task of an EIA practitioner. The example was from the EIA for the Eskom Wind Farm, in which the painting of the tips of the blades of the windmills became a controversial issue. The specialist that undertook the visual study recommended that the tips not be painted for aesthetic purposes, however, the bird specialist recommended that they are indeed painted so that they are clearly visible to birds. The resolution clearly required a value judgment that was outside the realm of scientific inquiry.

Cooperative governance is a critical part of South Africa's system of government, which, according to the *Constitution (Act No. 108 of 1996)*, comprises national, provincial and local spheres that are distinctive, inter-dependent and interrelated (section 40 (1)) (Cullinan, 2003). The theme of cooperative governance within the environmental sphere is developed in NEMA (Cullinan, 2003). It is stated in the Title of NEMA that it is an Act "... to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state ...". This promotion of co-operative governance reflects the understanding expressed in the Preamble to NEMA that the integration of social, economic and environmental factors is required in planning and decision-making, if sustainable development is to be achieved. Cullinan (2003: 2) summarises the approach adopted in this Act by stating that: "Simply put, the ubiquitous and integrated nature of the environment means that governments' usual approach of dividing human activities into sectors and then allocating management responsibility for each sector to different government departments, does not work in relation to environmental matters".

Although the theme of cooperative governance is embedded in South African environmental legislation, it is rarely effectively translated into practice (Kotze, 2003). Often the reality is a fragmented system of environmental management, with unaligned processes, fragmentation between local, provincial and national spheres of government and between various line functions (Kotze, 2003). One of the biggest frustrations expressed by government officials whom I interviewed was obtaining a response on environmental assessment applications from other government departments. This problem delays decision-making and compromises the effectiveness of the EIA process.

Spinks *et al.* (2003) also identify a lack of cooperative governance as one of the key constraints to the EIA process, due to the series of authorizations that are required for a single development proposal. Govender and Parks (2003: 121) draw similar conclusions when describing the process of approval for a waterfront development in Cape Town, stating that: "Relevant authorities are not consulting with each other and are reviewing the various applications in isolation, not realizing the integrated nature of the decisions they are making. Significant time delays are being experienced due to the linear nature of decision-making and significance of each decision taken. This domino effect has cost, process and time implications".

1.4.2 Difficulties in undertaking effective stakeholder engagement

Du Pisani and Sandham (2006b: 718) report that public participation is a 'particularly disappointing' aspect of environmental assessment in South Africa. He states that there is usually very limited stakeholder response to invitations to participate and very few objections are normally raised to proposed projects. It is arguable that this disinterest is partly the result of several inadequacies that typify numerous public participation processes in this country. These inadequacies, which I identified through the review of the IAIAAsa Conference proceedings and the interviews that I conducted, include, *inter alia*, the following:

- The inadequate inclusion of stakeholders and their views in environmental assessment processes;
- A lack of understanding of the purpose and value of stakeholder engagement in environmental assessment; and
- A lack of on-going engagement.

1.4.2.1. Inadequate inclusion of stakeholders and their views

Ensuring that stakeholder views are effectively included in environmental assessment processes is a significant challenge. In the worst cases of environmental assessment, stakeholders are not provided with a response to the concerns that they raise as part of the process and are therefore unaware of how these issues are taken into account (if at all). It appears that the aim of the environmental practitioner in such instances is on fulfilling the legal requirements for stakeholder engagement, rather than ensuring that stakeholder views effectively inform the process. This can lead to a lack of motivation amongst stakeholders to participate. In many instances people are not effectively encouraged to participate. Also, they may not be informed of the details about the project and its receiving environment to the extent that they can effectively engage in the process. In the view of one interviewee, such processes are 'more a containment exercise', where the aim is to avoid conflict as much as possible.

There appear to be particular stakeholder groups that are not effectively engaged. These include civil society, poor and vulnerable groups and future generations (Freeman, 2001; Naidu and Will, 2003; World Bank, 2005; Du Pisani and Sandham, 2006b). A member of an NGO that I interviewed stated that there are no effective governmental mechanisms for engaging with civil society and that their concerns are not taken seriously. A similar view was expressed in an assessment of the

participation of civil society in environmental assessment in southern Africa that was undertaken by the Southern African Institute for Environmental Assessment (SAIEA) in 2003. Respondents to a survey, which was conducted as part of this study, stated that civil society is not able to undertake their role in development planning, partly due to the lack of willingness of national government to involve them. The same study revealed that some government officials in South Africa are sceptical about the role of NGOs and believe that some of these organizations use the name of the public to achieve their own goals. A view expressed in the interviews that I conducted, was that the lack of importance placed on civil society concerns is due to their being value-based rather than legally and scientifically founded.

The participation of the poor, vulnerable and disadvantaged in environmental assessment processes may be limited by more practical aspects, such as a lack of financial resources to afford the travel costs of attending public meetings or a lack of access to newspapers in which notices are published (Naidu and Will, 2003). Their participation can also be constrained by a limited understanding of the language in which the process is being presented or by the academic and scientific jargon that may be used (Freeman, 2001; Naidu and Will, 2003). Besides these practical and technical issues, Du Pisani and Sandham (2006a) note that some disadvantaged communities see the environmental agenda as an obstruction to wealth creation and in protest, do not therefore participate in environmental assessment processes.

When poor and vulnerable groups are able to participate in stakeholder engagement processes, despite the constraints described above, their concerns are often not adequately understood (Freeman, 2001). Freeman (2001: 129) argues that this results from differences in the social and economic circumstances of the poor and those coordinating engagement processes, stating that: "It can be generally observed that while there is frequently a genuine effort by the facilitators of the process to accommodate the indigenous peoples of the area, it is often still painfully evident that the consultants and representatives of the developer lack real understanding as they generally come from privileged groups of society".

The result of the inadequate inclusion of poor and disadvantaged groups in environmental assessment is that more powerful stakeholders often disproportionately affect policy and other decision-making processes (World Bank, 2005). Measures are therefore needed to enable more vulnerable groups to include their views in the discussion. This challenge is particularly daunting in the South African context in which the country's characteristic diversity calls for innovative techniques to ensure that all have an equal opportunity to participate (Greyling, 1997). This

diversity is sketched by Greyling (1997: 94) when she states: “The people of this country refer to themselves as the ‘rainbow nation’ - eleven official languages, widely divergent ethnic and cultural groupings, megarich industries, utterly disadvantaged rural and urban communities, many people illiterate and without postal addresses, vastly different levels of education”.

A final group of stakeholders whose interests are often not adequately considered in environmental assessment processes are future generations. A fundamental principle of sustainable development is the consideration of the needs of this group; however, as the World Bank (2005) observes, for many, these concerns are distant and difficult to link to present needs. This link is formed by children who are typically the most affected by environmental degradation in developing countries, particularly through its effects on human health¹³ (World Bank, 2005).

1.4.2.2. Lack of understanding of the purpose and value of stakeholder engagement

There is often a lack of understanding, by the consultant team, the developer and the stakeholders, of the purpose and value of stakeholder engagement in environmental assessment processes (Greyling, 2000). Greyling (2000) explains that such a lack of understanding is particularly evident among the consultant team when the technical EIA process is seen as separate from the stakeholder engagement procedure. This separation is apparent when, for example, the overall purpose of the EIA and the steps in the technical process are not jointly defined by the EIA manager and the public participation practitioner (Greyling, 2000). This often results in insufficient time and resources being allocated to stakeholder engagement (Greyling, 2000). This split can also lead to the EIA manager and sub-contracted specialists defining their terms of reference with inadequate consideration of the views of stakeholders, reflecting a lack of understanding of their role as participants in a wider process that is informed by both technical aspects and the priorities of a range of interested and affected parties (Greyling, 2000).

Stakeholder engagement can also be misunderstood by practitioners, as a means of achieving consensus among the various interested and affected parties (DEAT, 2002c). Although this may in some instances be desirable, it is not the overall objective and can lead to certain stakeholders being unwilling to participate in the process, for fear of being pressurised into such a consensus (DEAT, 2002c). Another problem, which constrains the effectiveness of stakeholder engagement,

¹³ The World Bank (2005) use 2002 World Bank statistics, saying that over 90 percent of health effects are experienced by children under five years of age and diarrhea accounts for about a third of the total child deaths under age five in developing countries.

is the adoption of one-size-fits-all approaches to participation that do not adequately respond to the particular challenges of the stakeholders being engaged (DEAT, 2002c).

A lack of understanding of the value and purpose of engaging with stakeholders in the environmental assessment process also exists, in some cases, among developers and technical specialists, who view the participatory process as an "... irritating regulatory add-on to EIA" (Greyling, 2000: 155). As a consequence, time, resources and attention are allocated to the process to meet minimum legal requirements (DEAT, 2002). Such an approach, which lacks a real commitment to ensuring that stakeholder views are properly considered, can lead to accusations of token engagement (DEAT, 2002).

Problems also arise when the objectives of the EIA are not clear and stakeholders participate on the basis of their own agendas and expectations of the process, an issue mentioned several times in the interviews that I conducted. For example, an EIA process might be used to negotiate higher levels of compensation, or to provide a platform to pursue local debates (e.g. between authorities and local communities) that have little direct relevance to a proposed development.

1.4.2.3. Lack of on-going engagement

A lack of on-going stakeholder engagement was another concern that was raised during the interviews that I conducted. The environmental assessment process usually requires the environmental assessment and stakeholder engagement practitioners to engage with a community for a limited period of time ('flash-in-the-pan' involvement, as one interviewee called it). This limits the possibility of meaningful or a deep level of engagement occurring, in which trust is built over a period of time. One interviewee pointed out that, in some instances, longer-term involvement with a client and community is constrained by the requirements in legislation (i.e. the EIA regulations, Chapter 3, section 18(a)) for a consultant to be independent. The same interviewee expressed the view that "... independence should be more about the quality of work rather than the length of relationship with the client."

1.4.3 *Difficulties in impact prediction*

There are numerous difficulties in predicting the impacts of a proposed development on the environment, which include dealing with uncertainty, social issues and cumulative impacts. I will discuss each of these in the sections that follow.

1.4.3.1. Addressing uncertainty

Environmental assessment practitioners are required, according to best practice guidance (e.g. DEA, 1992), to provide an indication of the 'degree of certainty' that accompanies each of their impact predictions. This acknowledges the fact, recognized by most authors, that uncertainty is inherent in the process of environmental prediction (Tennøy *et al.*, 2006). Such a requirement is partially included in South Africa's EIA regulations (Chapter 3, section 32(2)(k)(iv)), in which an indication of "... the probability of the impact occurring ..." must be provided (DEAT, 2006a). This legal phrasing, however, appears to place more emphasis on an evaluation of the likelihood that an impact will occur, rather than on the evaluation of the assessors certainty of his/her statements. Nevertheless, this legal provision does provide some scope, albeit limited, for appreciating uncertainty in environmental assessments.

Norton (2005: 101) states, however, that: "Perhaps no issue confounds environmental managers more than the 'problem of uncertainty' ". This problem was highlighted in the context of southern Africa by Brownlie *et al.* (2006) who found, in a review of biodiversity issues and impact assessment in the region, that there was little consideration of uncertainty. There are several categorizations of uncertainty in impact assessment, however, it generally relates to the following (De Jongh, 1988; Norton, 2005): the impacts that should be studied; the level of analysis required; the alternatives to be investigated; the significance of impacts; the right choice of analytical tools; technical measurements; related governmental decisions; modeling inputs and techniques; and making accurate impact predictions.

Glasson *et al.* (1999) and Tennøy *et al.* (2006) point out that it is not only uncertainty that is a problem in impact prediction, but also the illusion of certainty that is sometimes portrayed in environmental assessment reports. Glasson *et al.* (1999) state that Environmental Impact Statements (EISs) often appear more certain in their predictions than they should, while Tennøy *et al.* (2006: 52) make a similar point by arguing that "... EIA predictions are uncertain, but that decision-makers are not made aware of the prediction uncertainty. EIA predictions thus appear more certain than they are".

Many of the aspects of uncertainty listed above relate to subjective choices that have to be made within the EIA process (De Jongh, 1988). The fact that these aspects are categorised as 'uncertainties', reflects the difficulties that are often experienced within environmental assessment processes, in dealing with its normative aspects. In particular, difficulties are experienced in

determining the significance of impacts (Preston *et al.*, 1994). This point was re-iterated by an environmental assessment practitioner in the interviews that I conducted. Although determining significance is arguably the most important part of the environmental assessment process (Sadler, 1996; Sippe, 1999), it is "... one aspect of EIA that has taxed experts globally" (DEAT, 2002d: 5). The subjective nature of determining impact significance is generally recognized within the environmental assessment community and as Sippe (1999: 75) states: "Environmental significance is an unashamedly anthropocentric concept. When applied in EIA decision-making, it uses judgements and values equally with, or to a greater extent than, science-based criteria and standards".

It is this subjectivity, however, that is often, or at least in part, identified as the cause of the problems experienced with EIA. For example, Spinks *et al.* (2003) identify, as an intrinsic weakness of the EIA process, the fact that despite attempts at objectivity, determining significance will always be a subjective exercise, influenced by factors such as societal norms. In addition, Preston *et al.* (1994: 759) describe significance as a 'problem area' in environmental assessment, commenting that: "To say that an impact will be significant is to suggest that it will have, or is likely to have, considerable influence or effect on some aspect of human well-being. But this is bound to be a subjective judgement: there are no objective measures which can be used to judge significance". In guidance produced by DEAT (2002d), the difficulties in determining significance are also partly ascribed to normative factors, such as considering the 'multiplicity of values' of stakeholders involved in the environmental assessment procedure. Determining significance is a persistent problem that has also been a concern within the international environmental assessment arena for over a decade. Sadler (1996: 118), for example, stated that: "More than other components ... the interpretation of significance is a contentious process". He too ascribes this, at least in part, to the subjectivity of the task, stating that it involves both science and politics.

1.4.3.2. Addressing social issues

The current EIA regulations (DEAT, 2006a) require a description of the potential impacts of an activity, not only on the natural and economic components of the environment, but also on the social and cultural aspects (Chapter 3, section 32(2)(d)). SIA developed internationally as a means of addressing social impacts, either as an integral part of the EIA process or separately from it (Vanclay, 1999). The steps in undertaking an SIA are similar to those for undertaking an EIA, with the SIA addressing the impacts of a proposed project or policy on people, while other studies

within the EIA address the impacts of the project on various aspects of the natural environment (Vanclay, 1999).

However, there are a number of challenges to dealing with social issues in environmental assessment, both within the international practice of SIA and in South Africa, where social impacts are usually identified as part of the overall EIA process. Du Pisani and Sandham (2006a), for example, state that in South Africa, empirical data suggest that social assessment is often neglected or treated as less important than other aspects of an EIA. Scott and Oelofse (2001) express similar views, arguing that social questions such as who gains and loses from a proposed development are not adequately addressed in current mainstream approaches to environmental assessment. Scott and Oelofse (2001) suggest a reason for this, stating that: "With the reliance on science and technology for assessing environmental impacts and creating solutions, social issues are side-lined as they are difficult to both conceptualise and measure". Weaver *et al.* (1999) focus on poverty, arguing that environmental assessment does not effectively deal with this critical social issue. They state that despite the need for development within South Africa, EIAs are strongly influenced by westernized concepts of the environment and therefore emphasise the protection of the natural environment, while neglecting social concerns.

Other problems in addressing social issues in environmental assessment, described by Taylor *et al.* (1990) and Du Pisani and Sandham (2006b), include the following:

- Applying the social sciences to impact assessment, since they do not have an applied tradition and certain concepts may not have been translated into terms that facilitate their easy application to an environmental assessment process;
- Taking into account social issues that are not amenable to empirical measurement (e.g. the social and psychological costs of a change in lifestyle as the result of selling the family farm for an industrial development);
- Accommodating the fact that unlike in the natural sciences, the objects under study (i.e. humans) can change their behaviour as a result of the study (e.g. they can change their reported concerns based on their impression of the purpose of the study);
- Requirements for standardized investigation and reporting within environmental assessment processes can be problematic for SIA, as social assessment often deals

with that which is 'non-standard' and 'unexpected' (Du Pisani and Sandham, 2006b: 716);

- Gathering valid social science information, as people may not provide an accurate description of their lifestyles and concerns (e.g. TV viewing and alcohol consumption tend to be under-reported), or may not be totally aware of the issues that are affecting them;
- Determining the social change that is specifically the result of the proposed project, plan or policy;
- Identifying whether certain social impacts, such as a change in the character of a community, are positive or negative, as this depends on value judgements and some in the community may perceive such a change as positive, while others see it as negative;
- There is a capacity shortage of social science skills within natural resource management agencies in South Africa, resulting in the social aspects of environmental assessments being evaluated by non-specialists; and
- A lack of sensitivity to social processes and awareness of the importance of social assessment, among certain regulatory agencies, corporations, engineers, economists and planners, results in the need for such assessments being overlooked.

1.4.3.3. Addressing cumulative impacts

EIA procedures have traditionally focused on identifying the direct impacts of a development on the environment, which occur predominantly in the short-term (Binedell and Hounsome, 1998; Van der Heyden *et al.*, 1998; DEAT, 2004d). These processes are therefore limited in their spatial and temporal context, focusing mainly on first-order cause-effect relationships (Binedell and Hounsome, 1998). The result is an inadequate consideration of the environmental effects caused by multiple perturbations, higher-order impacts, time-lags, broader spatial boundaries and indirect processes (i.e. cumulative effects¹⁴) (Binedell and Hounsome, 1998). This is a problem that is identified in the environmental assessment literature (e.g. Therivel *et al.*, 1992; Preston *et al.*, 1994; Sadler and Verheem, 1996; Kjörven and Lindhjem, 2002; OECD, 2006) and which was emphasized in the interviews that I conducted.

¹⁴ In this section the terms cumulative effects and cumulative impacts, as well as cumulative effects assessment and cumulative impact assessment will be used interchangeably.

Cumulative impacts are defined in the South African EIA regulations (DEAT, 2006a) as "... the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area" (Chapter 1, section 1(1)). Although this definition addresses the spatial dimension of cumulative impacts, it omits the temporal aspects. It should therefore be expanded to include cumulative impacts over time, as shown in the definitions provided by DEAT (2004d) and Preston *et al.* (1994), among many others.

The environmental assessment community seeks to more effectively address cumulative impacts through the development of cumulative effects (or impact) assessment and through the use of SEA to apply environmental assessment to the more strategic decision-making levels (i.e. policies, plans and programmes) (Modak and Biswas, 1999; DEAT, 2004d; OECD, 2006). In defining cumulative impact assessment, Glasson *et al.* (2005) draw on the definition provided by the Commonwealth Environmental Protection Agency (CEPA, 1994; cited in Glasson, 2005: 326), who state that: "Cumulative impact assessment is predicting and assessing all other likely existing, past and reasonably foreseeable future effects on the environment arising from perturbations which are time-crowded; space-crowded; synergisms; indirect; or, constitute nibbling". Glasson *et al.* (2005) use the Canadian Environmental Assessment Research Council's (CEARC) definitions of the terms used in the CEPA definition, which are as follows:

- Time-crowded perturbations are those that occur so close in time that the effects of one are not dissipated before the next occur;
- Space-crowded perturbations are those that are located so close to one another that their impacts overlap;
- Synergisms occur when different types of perturbations in a particular area overlap to form a new response by the ecological environment;
- Indirect effects are those that are produced at spatial or temporal distance from the initial perturbation, or have an effect via a complex pathway of interactions; and
- Nibbling occurs when a resource is eroded incrementally until it is used up or significantly changes.

Good practice guidance, both internationally and locally (e.g. DEAT, 2004d; OECD, 2006) promote the consideration of cumulative effects through the use of cumulative effects assessment as an independent tool, or its explicit incorporation into SEA or EIA. Various approaches have been

developed for cumulative effects assessment, both within South Africa (e.g. DEAT, 2004d) and internationally (e.g. Modak and Biswas, 1999; Canadian Environmental Assessment Agency, 1999).

SEA has the potential to address cumulative effects more effectively than site-specific EIA, because it relates to a larger area (e.g. a region or country) and deals with broader, more strategic issues that have implications beyond the short-term (e.g. transboundary pollution and the use of renewable energy within the energy sector as a whole). Presumably for these reasons the OECD (2006: 32) states that SEA "... inherently incorporates consideration of cumulative impacts". Sadler and Verheem (1996: 153) state more directly that "... compared to project EIA, the scope of SEA is more appropriate to the time and space scales at which cumulative effects are expressed". They caution, however, that cause-effect relationships are more indeterminate at the strategic levels of policies, plans and programmes, as many factors may influence their implementation and translation into specific projects (Sadler and Verheem, 1996).

Despite developments in the theory of environmental assessment, the evaluation of the effects of development, beyond those that can be determined through direct cause-effect relationships, remains a serious and persistent challenge to practitioners worldwide (Spinks *et al.*, 2003; Brownlie *et al.*, 2006). Although Sadler identified the need to address cumulative effects in environmental assessment as a key challenge in 1996, there has not been an effective response to this challenge more than a decade later. Kjörven and Lindhjem (2002: 34), for example, state that most regional and sectoral environmental assessments undertaken by the World Bank, have "... by and large not succeeded in addressing cumulative impacts any better than project-specific EIAs do". The situation is no better in southern Africa, as Brownlie *et al.* (2006: 3) conclude, stating, for example, that there is "... little if any consideration of indirect or cumulative effects on biodiversity or ecosystem services" in environmental assessment in the region. The conclusion of Spinks *et al.* (2003: 309) regarding the identification of cumulative impacts in South Africa mirrors that of the rest of the world, stating that EIAs "... have failed to come to terms with such impacts".

The importance of rising to the challenge of understanding and addressing the cumulative effects of development in South Africa is accentuated by the legal requirement in the EIA regulations to do so (Chapter 3, section 2(k)(i)). However, Binedell *et al.* (1998) point out that one of the reasons why cumulative effects are often not properly addressed in South African EIAs, is that there are difficulties in conceptualizing what it understood as being cumulative. The authors point out that, understanding cumulative effects, requires the development of 'non-linear thought patterns'. They

list other problems related to methodologies, regulations, deficiencies in data, inappropriate spatial and temporal boundaries and inadequate specialist terms of reference. However, in my view, these problems are secondary and will not be addressed effectively until we are able to conceptualise cumulative interactions in the environment.

1.5 Philosophical roots of the core constraints of EIA

Many of the constraints to effective environmental assessment described above, have their roots, from a philosophical perspective, in the modern worldview that underlies this field (Audouin and Hattingh, 2008). The modernist roots of environmental assessment are well recognized and, as pointed out by Audouin and Hattingh (2008), such an argument or similar has been made by various authors both in South Africa (e.g. Shandler *et al.*, 1999; Scott and Oelofse, 2001; Burns, 2002; Oelofse *et al.*, 2002) and internationally (e.g. Glasson *et al.*, 2005 and Jay *et al.*, 2007). Jay *et al.* (2007: 287 and 291), for example, agree with the trend to attribute the weaknesses of EIA in influencing planning and decision-making, to its 'rationalist beginnings' and 'techno-rational approach' that assumes value-free objectivity (Audouin and Hattingh, 2008).

Many of the problems that I have described in this chapter appear to be practical issues that can be addressed individually through slightly altering the current EIA process or the way in which this process is conducted. However, this is rather like relieving the symptoms of a cold, instead of its causes (Audouin and Hattingh, 2008). I think that it is more effective to address the systematic roots of these problems as they emerge from the philosophical assumptions inherent in the modern worldview (Audouin and Hattingh, 2008).

Modernism will be described in further detail in the Chapter 2. However, as a context for this chapter, there are three assumptions inherent in the modern view, which I will list here as philosophical roots of the problems described above; these are as follows (Capra, 1982; Pepper, 1984; Magee, 2001; Rihani, 2002):

- That technical, objective, natural science-based information and processes are separate from, and regarded as superior to, non-technical, subjective, and value-based information and processes. This constrains, for example, inter-disciplinarity in environmental assessment, the effectiveness of stakeholder engagement, and the ability of environmental assessment practitioners to address the normative aspects of impact prediction;

- That a system can be understood by observing the behaviour of its parts. This has caused difficulties in predicting impacts, particularly social and cumulative ones; and
- That all processes flow along linear, deterministic, predictable and orderly paths. This assumption has not only caused problems in the ability of environmental assessment practitioners to predict cumulative impacts, but also in their ability to deal with 'uncertainty' in the environmental assessment endeavour.

In the next chapter I will further analyse and explain the meaning and effects of these assumptions in the context of environmental assessment.

1.6 Summary

Despite the commitment of South Africa to the goals of sustainable development, most indicators show that insufficient progress has been made towards its attainment. A similar situation exists on a regional, continental and international scale. Environmental assessment is a key mechanism through which sustainable development can be promoted through appraisal of development projects; however, there are numerous persistent problems in its practice in South Africa and internationally. I have suggested in this chapter that the root of many of these problems can be attributed to the over-influence of modernism on the processes and methods of environmental assessment, an argument that has been made by several authors within the field.

In this chapter I have described the evolution of environmental assessment from its origin in the United States, with the promulgation of NEPA, to its adoption by over 120 countries worldwide. I have described how there has been a proliferation of environmental assessment processes and methods and how these have expanded since the 1970s from an initial narrow focus on predominantly project impacts on the natural environment to include social and economic impacts.

Most recently, environmental assessment has focused on sustainability appraisal and strategic level assessment in the form of SEA. Often, in a reversal of emphasis, the latter process focuses on the assessment of environmental constraints on policies, plans and programmes.

In South Africa, the voluntary practice of environmental assessment gained momentum in the 1980s, well before EIA legislation was promulgated. These were framed within an approach, described as Integrated Environmental Management (IEM), which was tailored to the South African

context. IEM assumed a broad definition of the environment to include social, economic and biophysical aspects. The first EIA regulations were published in 1997 and revised in 2006, making EIA mandatory for certain classes of projects and specifying a more rigid assessment process than was previously practised through IEM.

The development of SEA in South Africa followed similar lines to that of other countries, emerging as a separate process from EIA. An innovative approach, however, was adopted in South Africa from the outset which, as in the case of EIA, was designed to meet the particular needs of this country. The first national SEA guidelines were produced in 2000 and revised in 2007. Although several pieces of national legislation refer to SEA or to Strategic Impact Assessment, no specific procedure has been legislated.

I have described several problems currently facing the practice of environmental assessment in South Africa that are symptomatic of its modernist underpinnings. The philosophical roots of these problems can be found in three main assumptions of modernism, namely: that technical, objective, natural science-based information and processes are separate, and superior to, non-technical, subjective, and value-based information and processes; that an ecological or social system can be understood by observing the behaviour of its parts; and, that all system processes flow along linear, deterministic, predictable and orderly paths. These assumptions have led to difficulties, for example, in predicting project impacts in the face of complex, non-linear and highly unpredictable conditions of coupled environmental and social systems. Difficulties have also been experienced with stakeholder engagement in environmental assessment, with incompatibilities revealed between the strongly objective basis of such assessment and the subjective and value-laden concerns of stakeholders. Inter-disciplinarity in environmental assessment and the integration of diverse epistemologies has proved difficult to achieve through EIA, limiting its effectiveness.

To provide a greater understanding of the philosophical roots of the problems facing environmental assessment described in this chapter, I will next present an overview of the evolution and characteristics of modernism. In this chapter, I will also briefly describe the post-modern response to modernism, before showing the influence that these worldviews have on the environmental debate in general and on environmental assessment in particular. The discussion will also include a review of some of the core ideas of radical ecology, in order to begin setting the foundation for an alternative supporting philosophy for environmental assessment that challenges the modernist assumptions that I have described.

CHAPTER 2. MODERNISM, POST-MODERNISM AND THE ENVIRONMENTAL DEBATE

2.1 Introduction

In the previous chapter, several constraints to effective environmental assessment were identified. Their causes were attributed to the modern worldview that underlies this field. One purpose of this chapter is to provide a more in-depth understanding of this worldview and its links to the current practice of environmental assessment. A second purpose is to identify an alternative philosophical stance to modernism, which can begin to provide a basis for a new conceptual approach to informing decision-making about the environmental¹⁵ aspects of development.

I will begin this chapter with an overview of the modern worldview, followed by a description of the post-modernist response to its shortcomings. Thereafter, I will discuss the way in which these worldviews have influenced the environmental debate. Based on this discussion, I will identify a set of philosophical tenets which form the foundation for a conceptual approach to environmental assessment that challenges the assumptions of modernity. I will discuss this approach in Chapter 4, after I have investigated the work of various leading researchers in Chapter 3.

2.2 Modernism

Modernism, the mainstream philosophical view that underlies Western culture, was developed in the sixteenth and seventeenth centuries (Capra, 1982). The significant change in humanity's perception of reality that occurred between 1500 and 1700 has therefore dominated Western culture for the last 300 years (Capra, 1982).

Before 1500, a premodern religious worldview was dominant. In this view, reality was seen as a "... rich tapestry of interwoven levels reaching from matter to body to mind to soul to spirit", with each level having its own type of associated knowledge (Wilber, 2001a: 6). This meant that there was a strong link between material and spiritual phenomena, between facts and values (Capra, 1982). As Wilber (2001a) points out, the spheres of science and ethics were largely

¹⁵ As explained in the introduction to this thesis, the term 'environment' is used in a broad sense, to include social, biophysical and economic concerns.

undifferentiated. The 'paradigm' within which science operated was determined by Aristotle and the church, with Thomas Aquinas combining the ideas of these two authorities to form a framework that dominated scientific endeavour through the Middle Ages (Capra, 1982; Pepper, 1984). The focus of science during this period was on understanding the meaning and significance of things, rather than on prediction and control (Capra, 1982).

In the sixteenth century the medieval worldview started to change radically and the spheres of science, art and morals/values split in what Baumann (1992: x) calls the 'declaration of reason's independence'. This enabled the development of science, art and morals on their own terms (Wilber, 2001a). In time, however, these spheres of learning and knowing separated to the point of dissociation, leading to severe constraints to their integration which became perceived as necessary and, therefore, harsh criticism of modernism by post-modern thinkers (Wilber, 2001a).

In the meantime, the view of an 'organic, living, spiritual' universe, changed to a conception of the world as a machine (Capra, 1997: 19). The mechanistic view of the world was initiated by Descartes, with other key figures in the scientific revolution being Copernicus, Galileo, Newton and Bacon (Capra, 1997). This view became the mainstream philosophical orientation, which resulted in both positive and negative consequences. Modernism led, for example, to significant technological advances (including putting man on the moon), to liberal democracies, ideals of equality, freedom and justice and to modern medicine, physics, chemistry and biology (Wilber, 2002). The immensely positive aspects of modernism therefore cannot be ignored in the criticisms that have subsequently arisen.

These criticisms are a result, *inter alia*, of the view, initiated by Descartes, that the world consists of basically 'two kinds of substances' which are categorised separately, mind and matter (Magee, 2001: 88). To Descartes, the material world was simply a machine that on its own had no life or purpose. As Baumann (1992) states, in the modern view it is only humans that provide the world with any meaning (Baumann, 1992). The separation of mind and matter became known as the Cartesian division (Magee, 2001). This division has been accepted by scientists in the intervening centuries, as they have developed their theories either in the humanities, concentrating on the mind (i.e. on humans) or in the natural sciences, concentrating on matter (Capra, 1982). Current criticisms of modernism are also directed at its belief in unlimited progress that can be achieved through economic and technological growth and its view of life as a competitive struggle (Capra, 1997). Post-modern thinkers have linked these modern views to the current commodification of life, the replacement of quality with quantity in our culture, the loss of value and meaning, the

fragmentation of the natural world, to rampant materialism and to environmental destruction (Capra, 1991; Wilber, 2001a).

A key stage in the evolution of the practice of modern science occurred when Descartes persuaded people in the West that certain knowledge of the world was possible if the right method was followed (Magee, 2001). This method was to start with reliable facts, apply logic to those facts and "... not to let anything intervene that is in the very least degree susceptible to doubt, no matter how far-fetched that doubt may be"; following this process would provide 'rock-hard, reliable knowledge' (Magee, 2001: 88). As Baumann (1992: xiv) puts it "... the practice was about making the pronouncements adorned with the badges of reason, uncontested and uncontestable". Magee (2001: 88) points out that Descartes had the greatest impact in 'selling' science to the Western world, and on making the quest for certainty central to intellectual activity, with considerations of method the focus of that quest.

The goal of modern science is to describe reality objectively, with no reference to the subjective observer (Capra, 1982). As a machine, the world functions according to completely determinate universal mechanical laws and can be explained using mathematics (Capra, 1982). The material world comprises discrete, inert parts (i.e. atoms) which form entities that, according to Newton's first law of mechanics, "... remain at rest or in motion in a straight line unless acted on by an external force" (Merchant, 1990: 50). These entities are assumed to come into being or change when the parts are rearranged, through coming together or separating, in what Merchant (1990: 50) calls "... the billiard-ball universe of mechanistic scientists". The amount of energy or motion in the universe is considered to remain constant, but is redistributed among the entities that comprise the physical world, as atoms combine and separate (Merchant, 1990). In the modern worldview, reality is, therefore, perceived as a predictable machine that can be understood by examining its component parts (Merchant, 1990; Capra, 1997). The emphasis is not only on predictability, but also on certainty, orderliness and homogeneity (Baumann, 1992). Baumann (1992: xiii-xiv) explains that in contrast "... diversity looked more like chaos, scepticism like ineptitude, tolerance like subversion".

Modern science entails positivism, which is a philosophy that was articulated in the nineteenth century by Auguste Comte and in the 1920s and 30s, by a group of philosophers referred to as the Vienna Circle (Pepper, 1984). Positivism holds that all knowledge is based on sense-experience and that different kinds of knowledge do not exist (Mauter, 2000). The first precursor to positivism was the founding father of empiricism, John Locke (cited in: Magee, 2001: 104), who stated that "... no man's knowledge here can go beyond his experience" (Mauter, 2000; Magee, 2001). In this

view "... all genuine inquiry is concerned with the description and explanation of empirical facts" (Mauter, 2000: 438). As a result positivism does not, for example, recognise major differences between the methods of the natural and the social sciences (Mauter, 2000). Any knowledge that cannot be tested against reality in an empirical manner (e.g. intuitive, emotional or spiritual knowledge) is not considered valid or meaningful. Judgements based on scientific reasoning are therefore considered superior to subjective judgements (Pepper, 1984). Scientific knowledge is considered all important, while values, ethics, morals, intuition and emotion are devalued.

In scientific practice, this mechanistic view, with its Cartesian dualism and its emphasis on scientific knowledge, orderliness, predictability, homogeneity and certainty, led to the following fundamental assumptions, as I have outlined in Chapter 1 (Capra, 1982; Pepper, 1984; Magee, 2001; Rihani, 2002):

- That technical, objective, natural science-based information and processes are separate from, and superior to, non-technical, subjective, and value-based information and processes;
- That a system can be understood by observing the behaviour of its parts; and
- That all processes flow along linear, deterministic, predictable and orderly paths (given causes lead to known effects in all times and places).

Modernism has had a significant influence on people's attitudes towards the environment, as its mechanistic view has allowed for the exploitation of nature (Capra, 1982). Capra (1996: 20, parenthesis added) states that in terms of early modernism: "Animals were still [regarded as] machines, although they were much more complicated than mechanical clockworks, involving complex, chemical processes". Nature, as falling into the category of matter, was not seen to have its own purpose and, therefore, the aim of science, according to Descartes and Bacon, was to dominate and control it (Capra, 1982).

2.3 Post-modernism

The inadequacy of Newtonian mechanics as the ultimate theory to describe and understand the world started to surface in the nineteenth century with developments in electrodynamics, philosophy and the life sciences (Capra, 1982; Heylighen *et al.*, 2007). Einstein's work in physics led to relativity and quantum theories which resulted, for example, in profound changes in ideas around absolute space and time, elementary particles, the strictly causal nature of physical phenomena and the ability to objectively describe nature (Capra, 1982).

Heylighen *et al.* (2007) explain that systems theory, which was first developed by the biologist Ludwig von Bertalanffy in 1973, challenged the reductionism of modernism¹⁶. Central to Von Bertalanffy's theory is the view that living systems are essentially open, interacting with their environment through the intake of matter and energy. This interrelatedness with a broader environment implies that changes in living systems are more difficult to predict than those in closed mechanical systems, to which the principles of Newtonian science can be more effectively applied. However, systems theory was not the first to pose a challenge to reductionism as this had already been done by process philosophers such as Bergson, Teilhard and Smuts (Heylighen *et al.*, 2007).

Other developments that challenged modernist approaches to understanding the world include those in cybernetics and postmodern social science, which demonstrated the intrinsically subjective nature of knowledge (Heylighen *et al.*, 2007). Also, developments in the life sciences concerning evolution, contradicted the view of the world as a machine, emerging fully-developed (Capra, 1982). The theory of evolution showed that regularity in a system emerges out of dynamic changes, interactions and conflicting forces (Heylighen *et al.*, 2007).

In reaction to these twentieth century developments in physics, philosophy and the life sciences, many post-modern approaches to understanding reality have developed. These include complexity theory, eco-philosophies and modes of planning that place a greater emphasis on the local context, social diversity and flexibility. Strong post-modern trends have therefore emerged in most fields of endeavour, such as environmental management, planning, anthropology, philosophy and physics. Capra (1997: 6) states that a 'radical revision', of the paradigm which has dominated our culture, is now occurring. He describes this change as one that shifts from the mechanistic worldview of Descartes and Newton to a more holistic and ecological view.

In the section that follows, the post-modern reaction to modernity will be described. This is a difficult task as there is no coherent theory or single understanding of post-modernity (Best and Kellner, 2001). Instead the ideas and theories typically described as post-modern are diverse and often conflicting (Best and Kellner, 2001). Baumann (1992: vii-viii) states that post-modernism is mostly a 'state of mind' that often appears to be marked by its "... all-deriding, all-eroding, all-dissolving *destructiveness*". This is because post-modernism often seems like a critique that appears to find it ever more difficult to continue to be critical, because there is nothing left to be critical about (Baumann, 1992). However, Baumann (1992, ix) argues that post-modernist thinkers define this as a constructive destructiveness, which dismantles what modernism has passed for

¹⁶ Which, briefly stated, entails that a system can be understood by observing the behaviour of its parts.

truth, in a sort of 'site-clearing operation', in order to reveal truth in its 'pristine state'. In summary, Baumann (1992: x) states that: "All-in-all, postmodernity can be seen as restoring to the world what modernity, presumptuously, had taken away; as a *re-enchantment* of the world that modernity tried hard to *dis-enchant*". For example, post-modernist thinkers aim to heal the split between the powerful, wilful subject (i.e. humans) and the powerless, will-less object (i.e. nature), that leads to a (natural and man-made) world with no meaning in and of itself (Baumann, 1992).

Post-modernism can therefore be characterised by the aspects of modernism that it negates, which include: meta-narratives or totalising discourses; positivism and the myth of the pre-given; the mechanistic and reductionistic view of the world and the dominance of the profit-motive (Drengson, 1980; Gare, 1995; Wilber, 2001a). I will discuss each of these aspects in the sections that follow.

2.3.1 Negation of meta-narratives or totalising discourses

Gare (1995) states that the most widely accepted characterisation of post-modernity is that offered by Lyotard – the 'incredulity towards metanarratives'. This incredulity is aimed at any discourse that appeals to some grand narrative (e.g. the creation of wealth) that governs all generation and use of knowledge. In particular, however, the post-modern critique is aimed at modernism's belief in progress in areas such as knowledge, technology and the economy and the assumptions associated with this belief (Gare, 1995). Nisbet (1980: cited in: Gare, 1995: 5) identified at least five constant premises that can be identified with this idea of progress, namely: belief in the value of the past; conviction in the nobility (even superiority) of Western civilisation; acceptance of the worth of economic and technological growth; faith in reason and the kind of scientific and scholarly knowledge that can only come from reason and a belief in the intrinsic importance of life on this earth. It is perhaps because of post-modernism's negation of these ideas that it is often criticised as nihilistic. Many post-modernist thinkers, however, do not propose an alternative set of ideals to replace those that they criticise as, unlike modernists, they oppose the right of any single belief system to dominate society (Baumann, 1992).

The post-modern view of the world is therefore not subject to any type of grand plan and there is no reference to any particular 'larger' truth (Baumann, 1992). Rather the world is comprised of an indefinite number of agencies that generate meaning (e.g. the local community, a specific discipline, a social institution, a particular scientist or the peer group). Baumann (1992) notes that acceptance of these pluralities means first and foremost the surrender of the dominant position of

the Western world. Previously, the West was considered the most advanced, trend-setting form of global development; however, in the post-modern view it is one form among many.

2.3.2 Negation of the myth of the pre-given and the subject-object divide

Associated with this loss of belief in meta-narratives, is what Wilber (2001a: 117) terms, "... the enduring truth at the heart of the great postmodern movements". This truth is that interpretation is an intrinsic feature of the universe, not something added to reality, and that every occasion has an interpretive element (Wilber, 2001a). The world is therefore not pre-given, but is in significant ways a construction based on the individual or collective's perspective (Wilber, 2001a). In other words, as stated by Best and Kellner (2001), knowledge is socially constructed, rather than a purely objective mirroring of some external, independent reality. Such a view contradicts the modernist split of the world into subjective and objective components and its valuing of what it considers to be the exterior objective world, above the individual and collective's interior, subjective reality (e.g. values, intuition, morals). Postmodernism goes further to say that the meaning which is given to a specific observation or event is context-dependent. As the number of contexts is limitless, a single perspective cannot be applied in all circumstances (Wilber, 2001a). This leads to the pluralism that typically characterises post-modern thinking.

Wilber (2001a) argues, however, that post-modernism has gone to extremes in its recognition of subjectivity. It has in many ways denied the reality of the objective world, making the important features of the world that are subjective, the *only* features of the world. Wilber (2001a) calls for a balance, stating that the interpretive elements of reality should not replace objectivity, but rather situate it. He (Wilber, 2001a: 123) argues that "... a diamond will cut a piece of glass, no matter what meaning you give to 'diamond', 'glass' and 'cut' ". On the other end of the spectrum, however, the objectivity that scientists often cling to leads to an idealised view of science that implies detachment and certainty (Pepper, 1984). This leads, for example, to a strong focus on technical feats while neglecting questions of whether they are ethically right or wrong (Pepper, 1984). Skolimowski (1992) raises a similar issue in his critique of the modern world's divorce between knowledge and values.

2.3.3 Negation of positivism

The dissociations of modernity are not only between the subject and object, but also between the spheres of art, morals and science (Wilber, 2001a). Wilber (2001a) explains the latter process through reference to the 'dignity' and 'disaster' of modernity. The dignity of modernity is its

differentiation of art, morals and science, allowing each to develop at their own pace in their own way. However, the disaster of modernity occurs, when this differentiation goes too far and the areas of art, morals and science become dissociated. Mainly due to the successes that empirical science has in explaining the external world and in leading to discoveries, scientific rationality dominates the other two spheres (Wilber, 2001a). Positivism has become the prevailing view and all aspects of knowing, including those associated with the mind and spirit (e.g. the rational, trans-rational, intuitive and contemplative), are reduced to empirical modes (Wilber, 2001a). Wilber (2001a: 13) criticises this view calling it scientism¹⁷ and 'scientific imperialism' which 'crowds out' art and morals in any serious understanding of reality. Skolimowski (1992: 15) recognises the dominance of positivism, and its associated empiricism, in modern culture by stating that: "We all want to base our discourse and reasoning on fact and number, because such is the dogma of our present cosmology"; however, he argues against this, stating that empirical science does not allow for expressions of human meaning. Skolimowski (1992: 15) states that various attempts have been made to overcome the dominance of mechanistic rationality, but that "... the main imperatives of our cosmology are still holding us in their grip: to quantify, to objectify, to 'thingify' ". Perhaps the most succinct critique of positivism is provided in a sign which is reported to have hung in Einstein's office which stated "... not everything that can be counted counts and not everything that counts can be counted" (Brainy Quote, 2008).

2.3.4 Negation of the mechanistic view of the world

The mechanistic view of the world and its assumptions of, *inter alia*, order, objectivity¹⁸, reductionism, uniformity, universality and predictability (Capra, 1982; Rihani, 2002), are typically rejected by post-modern thinkers. Drenghson (1980), for example, states that the mechanistic view of the world and its methods of analysis have now reached their limits. Skolimowski (1992: 14) too argues that the mechanistic view "... provides a deficient code for reading nature. Hence our deficiency in interacting with nature". More recently, Cilliers (2008a) explains that reductionism is inadequate for grasping the complex and interrelated nature of the world's systems. Therefore, as stated by Best and Kellner (2001), instead of the traditional mechanistic ideas of causality, order, truth, mechanism and objectivity, post-modern theorists develop new discourses of indeterminacy, perspectivism, chaos and complexity, self-organisation and multi-cultural

¹⁷ The Oxford Dictionary of Philosophy (Blackburn, 1996: 344) defines scientism as a: "Pejorative term for the belief that the methods of natural science, or the categories and things recognized in natural science, form the only proper elements in any philosophical or other enquiry. The classic statement of scientism is the physicist E. Rutherford's saying 'there is physics and there is stamp-collecting'".

¹⁸ The post-modern negation of the view of knowledge as completely objective is addressed separately in section 2.3.2.

knowledge. In the post-modern view, the world is comprised of complex, dynamic, interrelated and holistic processes, rather than simple, static, discrete and atomistic ones (Best and Kellner, 2001).

2.3.5 Negation of the dominance of the profit-motive

Lux (2003), drawing on E.F. Schumacher's phrase, 'the failure of the modern experiment', criticises the profit motive by stating that the 'experiment' which has failed, is the attempt by humans in the last 300 years or so (which is an exceedingly short period in relation to the length of human history), to live without motives and principles that are higher than the material or economic. Lux (2003) argues that the absence of such 'higher' motives and principles has led to the presence of the profit motive. Lux (2003: 1) explains further that since the profit motive means the continuous expansion of economic wealth, a society based on this motive "... must by necessity be a society committed to perpetual economic growth". As Reid (1995) points out, such economic growth has been promoted by technological advance, which has created new possibilities for economic expansion and for increased consumption.

One of the important critiques of this belief in continual economic expansion relates to its consequences for the environment. Reid (1995) for example, lists the idea of material progress, which has been closely associated with ideas of economic growth, as one of the key obstacles to achieving sustainable development. The power of technology to facilitate such growth has led to what O'Riordan (1981) calls 'technocentrism', which is currently the dominant set of attitudes to science and the environment. This attitude is one of instrumentalism, in which the environment is valued for its use as a resource for meeting human 'needs' or desires. As pointed out by Lux (2003), these needs are insatiable, and in the name of economic progress, ecological resources are being used at an increasing ecological cost (Reid, 1995).

2.4 The Current Situation

Currently we are in a transition between the modern and post-modern eras, with a mix of progressive and regressive, positive and negative aspects (Best and Kellner, 2001). Some argue that reductionism remains the ruling mentality of technoscience and Best and Kellner (2001) point out that although post-modern paradigms are emerging from the sciences, these are not yet clearly articulated as post-modern sciences which can be distinguished from the modern ones. Rather, post-modern ideas are emerging while the modern sciences remain dominant in the mainstream.

The view which I will adopt in this thesis correlates with that promoted by Best and Kellner (2001) in their book *The Postmodern Adventure*, in which modernity is not seen as all 'bad' and post-modernism as all 'good'. Each worldview is considered to have its own area of validity. In particular, the view of modernism and post-modernism that I support is that proposed by Wilber (2001a), who describes how all healthy growth processes proceed from fusion to differentiation to integration. However, if differentiation goes too far it leads to dissociation, resulting in fragmentation, alienation and repression. In other words, it's not the modern differentiation of the spheres of art, values and science that is of concern, but rather their consequent dissociation from each other. The task at hand, the one that many post-modern theorists aim to achieve, is the integration of these spheres.

2.5 Modernism, Post-modernism and the Environmental Debate

The discussion so far has related broadly to the general philosophical elements of modernity and post-modernity, with no particular application of these concepts to a specific field. In this section, however, I will discuss the modern and post-modern movements in terms of their particular expression in the environmental debate. The purpose is to provide a better understanding of the link between the philosophical foundations of our culture and the way in which it has influenced the relationship between man and nature. The second purpose of the discussion that follows is to identify streams of thought that can begin to form the basis of an ethics for environmental assessment that challenges the modern, technocentric approach.

There are several analytical frameworks that can be used to classify modern and post-modern environmental views, however I will base this discussion on O'Riordan's (1981) classification along ideological lines which reflect the beliefs of environmentalists. This system, which is broadly divided into technocentric and ecocentric lines of thought, has been used in recognised texts, such as Pepper's book entitled, *The Roots of Modern Environmentalism* (1984). There are, however, some important points to note concerning the discussion that follows:

- Pepper (1984) warns that in understanding the technocentric and ecocentric modes of thought, it is important to avoid the temptation to divide the world neatly into these two camps. This classification is therefore not intended to represent a simple dichotomy, but is provided as a general framework for orientation only. In many cases current environmental practice has elements of both techno- and eco-centrism (e.g. SEA). Also, O'Riordan (1995) points out that these modes of thought may change, even within a single individual, as circumstances alter and as we go through various stages in life.

- Although I have used O’Riordan’s (1981) general categories in this description, I have drawn from several other authors (e.g. Bookchin, 1982; Devall and Sessions, 1985; Benton, 1994; Zimmerman, 1994) to describe the differences between a technocentric and ecocentric approach, even though these authors may not have used this terminology. In this respect, I may have expanded, to some degree, the original meaning which O’Riordan (1981; 1995) intended to convey through the use of these categories. However, I have not contradicted his general idea that technocentrism tends towards a more ‘human-centred and manipulative mode’, while ecocentrism tends towards a more ‘earth-centred or nurturing mode’ (O’Riordan, 1995: 12).
- Put in the broad philosophical terms discussed in sections 2.2 and 2.3 above, I have described modernist environmental thought under the heading ‘technocratic’ and provided examples of environmental philosophies that are, at least in part, in opposition to such thought as ‘ecocentric’. Zimmerman (1994) calls environmental philosophies that challenge the modernist attitude towards nature as ‘radical ecologies’, of which he identifies three forms: deep ecology, social ecology and eco-feminism. All three of these forms of radical ecology display one or more characteristics of the ‘ecocentric’ approach described by O’Riordan (1981; 1995) and have, therefore, been used to describe this category.

It is not only the ecocentric mode of thought, however, but also technocentrism, that is presented from the particular view of radical ecology, as it is mainly from this perspective that I wish to develop an alternative philosophical base for environmental assessment. The description that follows is, therefore, not an objective analysis of the two modes of thought, but rather a device (or ‘straw man’) that I have used to describe an alternative environmental view to the current mainstream perspective that is dominated by technocentrism.

- I have not assumed consensus within the technocentric or ecocentric philosophies, despite this division into these two main categories. It is arguable that there is relatively close agreement among technocentric approaches, as they are all based on the modern meta-narrative of belief in economic and technological growth and faith in science and reason (Gare, 1995). However, ecocentric approaches display the typical post-modern scepticism towards metanarratives (Gare, 1995), proliferating into a variety of approaches, the protagonists of which, often harshly criticise one another. I have therefore included, in the description below, some examples of the differences within the ecocentric approach.

- I have described the technocentric and ecocentric ideologies according to the following themes: their understanding of the human-nature relationship, their way of knowing it and the way in which they believe people should organise themselves within it.
- I have provided significantly more discussion on the radical ecocentric ecologies than on the technocentric approaches and on the understanding of the human-nature relationship than on the other two themes. The focus on ecocentrism is due to the second purpose of this discussion mentioned above, which is to identify ideas for the formulation of an ethics for environmental assessment that challenges the modern, technocentric worldview. The emphasis on understanding the man-nature relationship is primarily due to the focus which the ecocentric authors themselves place on this theme, rather than on the other two themes.
- In many instances the discussion draws from, and expands, the descriptions in the summary table provided in Appendix B. A earlier version of this table and certain parts of the main text presented below, were published in Audouin and Hattingh (2008).

2.5.1 Understanding of the human-nature relationship

2.5.1.1. Technocentric understanding of the human-nature relationship

The technocentric mode of environmentalism has its roots in many aspects of modernism (O’Riordan, 1981). It is, therefore, based on Descartes’ fundamental division between the realm of mind and matter (Capra, 1982) in which the human mind aims to achieve control over matter (i.e. nature) (Benton, 1994). The natural environment is valued for its use to humans as a resource, rather than for the fact that it exists, independent of its usefulness to humans (i.e. its intrinsic value) (Reid, 1995). This instrumentalist approach to nature is supported by faith in the ability of technology to control natural processes and manage resources in a way that meets humanity’s needs and wants (Reid, 1995).

Technocentrism is also based on a view of human well-being that is associated with growth, technological progress and economic expansion (Reid, 1995). Benton (1994) points out that this view is typically found in modern capitalist countries, state-socialist countries, as well as developing countries that are ‘modernizing’. If problems arise, it is assumed that they can be resolved through technological solutions, based on objective analyses and efficient management (Reid, 1995).

Many aspects of technocentrism have been criticised in the literature. For example, Reid (1995: 130-131) criticises its bias towards objective, quantitative analysis and large technological solutions, stating that: "Rather than welcoming other approaches as complementary, it tends to disparage them, particularly if they include 'subjective' or nonquantitative assessments or advocate low-cost, low-tech solutions. This disparagement may extend to a reluctance to acknowledge the right of non-technologists to make significant contributions".

Deep ecologists and social ecologists each contrast their philosophies with various forms of technocentrism which they label differently. Naess, for example, contrasts his philosophy of deep ecology with what he calls 'shallow ecology' which displays many of the characteristics of technocentrism (Cooper, 2001: 212). Naess views shallow ecology as an anthropocentric view that calls for the protection of the environment merely because of the material benefits to human beings (Cooper, 2001). Natural resources are therefore valued, from a shallow ecological position, solely for their instrumental value (Eckersley, 1992). Naess criticises the mainstream notion of sustainable development as being rooted in this position (Cooper, 2001).

Like Naess, Bookchin (1971: cited in: Biehl, 1997: 8) also compares his philosophy, in this case 'social ecology', with a form of technocentrism, which he calls 'environmentalism'. He views environmentalism as reformist 'environmental tinkering' that aims for technological solutions to ecological problems. He explains that the view of the natural world from the perspective of environmentalism is that of a 'passive habitat' that people use, and ascribes this instrumentalist approach particularly to urban planners, engineers, lawyers and socialists (Bookchin, 1971: cited in: Biehl, 1997: 8).

Reid (1995), Naess (in: Cooper, 2001) and Bookchin (in: Biehl, 1997) criticise the technocentric lack of fundamental questioning of the core assumptions on which our society and our relationship to the natural environment is based. From a deep ecological perspective, it is argued that the mainstream shallow approach aims to maintain the *status quo* in the midst of environmental problems (Harding, 1997). The 'greening' of business, for example, is seen by deep ecologists to be undertaken solely because of the benefits to humans (Harding, 1997) and therefore does not challenge the instrumentalism inherent in the relationship between humans and the environment. Measures for pollution prevention and the protection of biodiversity are also seen to be implemented mainly for the medicinal, economic and climatic regulation benefits to humans (Harding, 1997).

Bookchin (1993) argues that the fundamental issues underlying environmental problems are not addressed in mainstream environmentalism. His emphasis, however, is on the social and economic conflicts that need to be resolved before ecological problems can be relieved. Quite provocatively, he states that environmentalists are "... trying to make a rotten society work by dressing it in green leaves and colourful flowers while ignoring the deep-seated roots of our ecological problems" (Bookchin, 1987: 2).

2.5.1.2. Ecocentric understanding of the human-nature relationship

An ecocentric ethics, as described by O'Riordan (1981), centres on the virtues of reverence, humility, responsibility and care. Where the technocentric approaches emphasise processes and techniques for the management of environmental resources, ecocentric approaches focus on the type of relationship that should exist between humans and nature and on questioning the social and economic values that underpin Western society.

Ecocentrism has roots in the philosophies of the American nineteenth century romantic transcendentalists¹⁹, such as Thoreau (O'Riordan, 1981). The transcendentalists saw nature as carrying messages of higher and spiritual truth (Mautner, 2000) which could lead a human being to a new realisation of his own potential and his obligations to others and the natural environment (O'Riordan, 1981). This view of nature as imparting truth to man, is illustrated in Thoreau's book *Walden* (1854) where he states:

I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived. I did not wish to live what was not life, living is so dear; nor did I wish to practise resignation, unless it was quite necessary. I wanted to live deep and suck out all the marrow of life ...²⁰

In the twentieth century, various types of ecocentric environmental ethics emerged (such as Aldo Leopold's 'Land Ethic', or Holmes Rolston's ethic of natural value); however, I will focus on three main forms of radical ecology (i.e. deep ecology, social ecology and eco-feminism), as identified by Zimmerman (1994). I have chosen this focus because the radical ecologies provide the greatest

¹⁹ Transcendentalism is the "... name given to the rather heterogeneous outlooks of a number of thinkers and writers in New England (USA) whose work was influenced by the rise of romanticism in philosophy and poetry (Goethe, Novalis, Cousins, Wordsworth, Coleridge, Carlyle)" (Mautner, 2000).

²⁰ Quote from the book *Where I lived and What I lived For*, which is an extract from *Walden* (1854) and was published by Penguin Books in 2005.

contrast to technocentric thought. In each form of radical ecology the fundamental worldview or philosophy that underlies mainstream Western society is identified as the core of the global environmental problem, albeit each through a different lens. The radical ecologies therefore oppose reform environmentalism (Zimmerman, 1994), and ask for a deeper questioning of the social, philosophical and psychological aspects that influence the environmental problématique. Despite these similarities, there is often vigorous debate in the literature between the three branches of radical ecology, and in the section which follows I will discuss some of the main themes that form the focus of this debate. These themes are as follows: the general cause of the environmental problématique; conceptualising the connections between the human and non-human world; and the masculine and feminine in our approaches to environmental concerns. A summary of the main views expressed by each of the forms of radical ecology is presented in Appendix B.

(i) The general cause of the environmental problématique

The various forms of ecocentrism view the cause of the global environmental problématique differently depending on the focus of their attention. The deep ecologists, for example, focus on the relationship between humanity's worldview and nature, the social ecologists on the relationship between societal structures and the natural world, and the eco-feminists on the connections between the domination of women and the domination of nature (Warren, 1987; Zimmerman, 1994; Harding, 1997;). So, although all three types of radical ecology ascribe the global environmental crisis to some form of dominance, they do this in different ways. Deep ecology argues against the general dominance of humans over nature, social ecology narrows this specifically to the dominance of powerful groups in society over others, while eco-feminism identifies a particular (i.e. patriarchal) conceptual framework dominant in Western society as the problem. These differences often lead to debate between the various radical ecologies. Salleh (1984) for example, argues that deep ecologists do not explicitly recognise the links between the domination of women and the domination of nature and the way in which these re-enforce each other. However, perhaps in response to such comments, Devall and Sessions (1985), from a deep ecological perspective, state that: "For thousands of years, Western culture has become increasingly obsessed with the idea of *dominance*: with dominance of humans over non-human nature, masculine over feminine, wealthy and powerful over poor, with the dominance of the West over non-Western cultures. Deep ecological consciousness allows us to see through these erroneous and dangerous illusions" (Devall and Sessions, 1985: cited in: VanDeVeer and Pierce, 2003: 264).

The main argument of the deep ecologists, however, is that the environmental problématique is the consequence of the prevailing anthropocentric worldview or philosophy within techno-industrial societies in which people see themselves as separate from nature and superior to it, giving them the right to be 'in charge' of the natural environment (Devall and Sessions, 1985: cited in: VanDeVeer and Pierce, 2003: 265). Moreover, deep ecologists argue that the norms of technological modernity are inconsistent with the ultimate norms of various spiritual and philosophical traditions (Zimmerman, 1994). Deep ecology, like many of the world's religions, describes spiritual development in terms of a process of self-realisation in which all life unfolds its innate potential over time (Devall and Sessions, 1985). In humans this involves an increasingly deeper and broader sense of self that expands from identifying with the personal ego that aims solely for the satisfaction of its own goals, to identifying with others such as family and friends, to identifying with the human race as a whole and finally to including the non-human world as part of the larger Self (Devall and Sessions, 1985). This overcomes the separation between humans and non-humans that leads to the degradation of the latter. Naess (1988) argues that the process of identification with others leads to greater compassion and empathy for them, which results in our sharing in their sufferings and joys, even through we may not know them personally (Naess, 1988). As Naess (1988: cited in: VanDeVeer and Pierce, 2003: 269) puts it, 'we see ourselves in others' and he therefore argues for the widening and broadening of our sense of self to include both the human and the non-human world, as no laws or moral rules are needed to make us care for that which we see as part of ourselves.

Social ecologists, on the other hand, don't focus on the human individual's philosophy, but rather on societal organisation, attributing the world's ecological problems to authoritarian and hierarchical social structures which enable powerful elites to suppress others, while exploiting the natural environment for their own gain (Zimmerman, 1994). They refer particularly to those social structures within capitalism and state socialism. Social ecologists argue that the mentality of domination that is inherent in such hierarchical structures is extended to the natural world and results in the human exploitation of the non-human world (Bookchin, 1987; Zimmerman, 1994).

Social ecologists typically accuse deep ecologists of, among other things, underplaying the specific role of society in the environmental crisis (Bookchin, 1994). Bookchin (1994) argues that this lack of attention to the social causes of the problem exonerates society from their role in issues such as hunger, famine and epidemics, and enables the power elites to ideologically defend the extremes of wealth and poverty in the world. From a deep ecological perspective, Fox (1989) states that the problem of environmental destruction is too complex to narrow down to one particular cause, such as hierarchical social structures. Fox (1989: 15) argues that "... it is possible to conceive of a

society that is nonandrocentric, socioeconomically egalitarian, nonracist, and nonimperialistic with respect to other human societies – but whose members remain aggressively anthropocentric in collectively agreeing to exploit the environment for their own benefit”.

I agree that environmental destruction cannot be reduced to a single cause, but this also applies to the deep ecologists themselves who place most of their attention on addressing the individual's worldview. The debate appears to be between consideration of the collective's role in the environmental problématique and that of the individual. The collective and the individual, however, are not totally separate entities and, therefore, these issues are intertwined. Bookchin himself demonstrates this interconnectedness in his description of the 'organismic tradition' within social philosophy, that focuses on the relationship between individuals and society (Des Jardins, 1993). In this tradition, a middle way is sought between those that believe that individuals are merely the products of society and those that believe that society is simply a collection of individuals (Des Jardins, 1993). This view is that a dialectical relationship exists between an organic society or community and the individuals of which it comprises, with "... humans creating their society while at the same time being created by it" (Des Jardins, 1993: 244). Social practices and values influence the individual, while the society itself is the result of human decisions and actions (Des Jardins, 1993). Based on this argument, the causes of environmental destruction occur on both the individual and collective level.

This view is supported by the work of a contemporary North American philosopher, Ken Wilber, who describes any reality as comprising four main spheres: the individual exterior (e.g. matter); the individual interior (e.g. individual emotions); the collective exterior (e.g. institutions, laws, modes of production) and the collective interior (e.g. cultural values) (Wilber, 2001b; 2001c). While the interior dimensions are more subjective, the exterior ones are more objective. Wilber's (2001b; 2001c) argument is that any phenomenon or event has expression in all four of these spheres. This does not mean that we can reduce one for the other (e.g. only considering the perspective of the collective or the perspective of the individual; or considering solely the external or the interior world); but rather that we need to understand any problem or event in all its four dimensions. This is what Wilber (2001b; 2001c) calls an 'Integral Approach'.

(ii) The nature of the connections between the human and non-human world

A dominant feature of ecocentrism is the belief in the connectedness of man and nature. This belief is part of deep ecology, social ecology and eco-feminism. Deep ecology stresses that objects are not isolated, but rather nodes in a web of interconnections (Harding, 1997). Therefore the degradation of the environment has an impact on human nature. Similarly, eco-feminists see

humans and non-humans as co-members of an ecological community and although the differences between them are recognised, eco-feminists emphasise that one is not superior to the other and therefore neither one has a right to dominate the other (Warren, 1987). Any view that humans are abstract individuals fully contained within their own consciousness is rejected by eco-feminists, in favour of a broader perspective, in which the very nature of human beings is influenced by, and connected to, their social and natural environments (Des Jardins, 1993).

Bookchin (1987) describes the view from social ecology, which also stresses the interconnectedness of the human and non-human environment, but which is based on a concept of natural evolution. From this perspective, humans (or second nature), like other mammals, are seen to have evolved out of the non-human (or first nature). This non-linear, natural evolutionary process tends towards increasing complexity, subjectivity and flexibility (Bookchin, 1982). Humans, therefore, cannot separate themselves from this evolutionary process, as they evolved out of the development of the biological environment, despite the fact that they often threaten themselves and the natural world (Des Jardins, 1993). Bookchin explains that second nature is distinguished from first nature through its increased capacity for rationality, communication and culture (Des Jardins, 1993). The social ecologists state that humans should be supportive and protective of the needs of nature and an ethics of complementarity should exist in our relationship to nature and between and within social institutions (Bookchin, 1993).

Although the radical ecologies agree on the interconnectedness of humans and nature, differences emerge around the idea of biocentric equality, particularly between the deep ecologists and the social ecologists. Devall and Sessions (1985: cited in: VanDeVeer and Pierce, 2003: 264) explain that the "... intuition of biocentric equality is that all things in the biosphere have an equal right to live and blossom and to reach their own individual forms of unfolding and self-realization ...". As all human and non-human entities are part of an inter-connected whole, they are all seen, from a deep ecologist perspective, to be equal in intrinsic worth and, therefore, to deserve respect in their own right as part of this whole. Deep ecologists, therefore, believe that it is not necessary to create a hierarchy in which humans are at the pinnacle (Devall and Sessions, 1985).

Bookchin, however, displays strongly his polemic style of writing when criticising deep ecology's principle of biocentric equality. For example, when he categorises deep ecologists as 'mystical ecologists' and states that: "Anthropocentrism, the quasi-theological notion that the world exists for human use, is derided by mystical ecologists in favour of the equally quasi-theological notion of biocentricity, namely, that all life-forms are morally inter-changeable with one another in terms of their 'intrinsic worth' " (Bookchin, 1994: cited in: VanDeVeer and Pierce, 2003: 274). He states

elsewhere that biocentric democracy is meaningless and humans cannot be 'put on a par with beetles' (Bookchin, 1993: 5). Bookchin believes that biocentric equality denies the uniqueness of humans, devaluing their capacity for rationality and intellectuality (Bookchin, 1993; Des Jardins, 1993).

I would certainly agree with Bookchin's views, if biocentric equality did indeed deny the differences between the human and non-human environment, ignoring human beings' increased capacity for consciousness and rationality. However, I don't see this to be the case in the arguments put forward by deep ecology's founding members, such as Naess, Devall and Sessions. The concept of biocentric equality develops from the idea of holism in which man and nature are equal as *co-members of an interconnected system* (Des Jardins, 1993). Devall and Sessions (1985: cited in: VanDeVeer and Pierce, 2003: 265), for example, state that the basic intuition of biocentric equality "... is that all organisms and entities in the ecosphere, *as parts of the interrelated whole*, are equal in intrinsic worth" (italics added). Interestingly, Bookchin (1993: 5) himself, states elsewhere that "... the human and the non-human can be seen as aspects of an evolutionary continuum, and the emergence of the human can be located in the evolution of the non-human, without advancing naïve claims that one is either 'superior to' or 'made for' the other".

It should also be remembered that the principle of biocentric equality was developed in response to the instrumentalism of technocentric approaches which provide nature with value only in relation to its use to humans. From this view, it can be argued that that an instrumentalist perspective is not problematic as serious degradation of the environment can always be shown to be detrimental to human beings. This may be technically correct; however, I argue that the principle of biocentric equality is more a normative concept than a technical one. If we are to address our global environmental problems, we require an environmental ethics that engenders a deep respect and love for the natural environment. Striving towards a worldview that places more emphasis on the value of the environment to exist in itself (i.e. intrinsic value), than on its value mainly as a resource for human development is, in my view, a more effective way of promoting such a deep respect for the natural world. This does not mean that humans should not use the natural environment to meet their basic needs. Indeed, the principles of deep ecology, when stating that humans have no right to reduce the diversity of life forms, include the exception of satisfying *vital* needs (Devall and Sessions, 1985).

(iii) *The masculine and feminine in our approaches to environmental concerns*

The differences between masculine and feminine approaches to environmental concerns and the dominance of the masculine in mainstream western culture are brought to the fore by the eco-

feminists. The 'way of thinking' or patriarchal conceptual framework that they argue is a root cause of environmental problems comprises three philosophical moves: firstly a range of dualisms (i.e. separations between, for example, man and nature and the masculine and feminine) are conceived; then, rather than viewing these dualisms as complementary they are seen as opposing one another, with one side of each split being viewed as superior to the other (Warren (1990) calls this the creation of 'value dualisms'); and finally, oppression or subordination of the less valued side of the dualism is justified through a 'logic of domination' (Warren, 1990). As it is a *patriarchal* conceptual framework, more value is placed on what is traditionally viewed as masculine, rather than that which is associated with the feminine. Maleness is connected to the sphere of rationality, the mind, spirit and culture, which is contrasted to the spheres of femaleness, emotions, the body, passions, nature, the non-human world, matter and experience (Warren, 1990; Zimmerman, 1994). In summary, men/humans are considered different and superior to women/nature (Warren, 1987). Chuengsatiansup (2003: 13) observes that the worldview of modern science emphasises objectivity and "... the separation of the knower and the known, [however] a more feminine way of knowing is through relatedness and sympathy".

There are many different types of eco-feminism that are inexorably linked to a variety of feminist approaches (e.g. liberal feminists, Marxist feminists, social feminists and radical feminists) (Des Jardins, 1993). However, in this discussion I will focus on the more recent developments in feminism and eco-feminism, which are associated with the so-called 'third wave' of feminism. Feminism's first wave (i.e. liberal feminism) called for equality for women in a culture in which masculine traits dominate (Des Jardins, 1993). Plumwood, however, argues that this would only result in women being required to adopt these traits, only to be seen as equal to men if they become masculine (Des Jardins, 1993). Plumwood's critique of feminism's second wave (radical feminism) is that its call for a reversal of roles, in which a distinctive female point of view is particularly celebrated, reinforces the very dualistic way of thinking (e.g. between the masculine and feminine) that has resulted in the domination of humans over nature in the first place (Des Jardins, 1993).

The 'third wave', found mostly in the writings of Plumwood and Warren, however, identifies an alternative to the first two waves (Des Jardins, 1993). In Karen Warren's (1987) transformative feminism, the traditional ideas concerning feminism as a movement to end women's oppression are expanded to recognising the connections between all systems of oppression (e.g. sexism, racism, classism and the human domination of nature). The liberation of women is therefore tied to the eradication of all forms of oppression (Warren, 1987). Central to transformative feminism is overcoming the dualisms that support the patriarchal framework prevalent in society, including

those between the masculine and feminine (Des Jardins, 1993). Diversity and differences in the experiences of women are recognised and a central place is made for values such as care, friendship and trust (Warren, 1987).

Eco-feminism then contributes insights to this transformative feminism, on the links between the domination of women and the domination of nature (Warren, 1987). Warren (1990, cited in VanDeVeer and Pierce, 2003: 284), for example, argues that among the many varieties of ecofeminism, they all agree that "... *the logic of domination* has functioned historically within patriarchy to sustain and justify the twin dominations of women and nature". Since all feminists, not merely ecofeminists, oppose patriarchy, Warren (1990) concludes that all feminists must oppose the logic of domination which appears in many other contexts. Therefore, eradicating the logic of domination is part of any feminist critique, albeit a critique of patriarchy, imperialism or racism (Warren, 1990). Eco-feminists, however, specifically focus on the action of the logic of domination with regards to nature and argue that this logic, which is "... used to justify the domination of humans by gender, racial or ethnic, or class status is also used to justify the domination of nature" (Warren, 1990: cited in: VanDeVeer and Pierce, 2003: 285).

In my view, the eco-feminist critique has played a critical role in bringing to consciousness a very particular 'way of thinking' (i.e. the logic of domination) that has influenced many of the relations between the masculine and feminine in mainstream Western society. It is important that feminism and eco-feminism, with its links to how the logic of domination between the genders has influenced our relations to nature, continue with this important task. However, it is also important that the understanding that eco-feminism has provided enriches other philosophies and, in turn, is enriched by them. It can be argued that this is what has been happening in the debate between the deep ecologists and the eco-feminists in the literature (e.g. in the *Environmental Ethics* journal²¹); however, from my reading, this debate seems to have focused either on the differences between the two theories, or on trying to find common ground between them as they stand at the moment. I have chosen, therefore, to investigate the expansion of eco-feminist ideas, in the light of the conclusion presented in the previous section, from a focus on the role of societal groups (e.g. gender groupings) in the environmental problématique, to include the role of the individual. This expands the reach of eco-feminist ideas and makes the boundaries between this stream of radical ecology and that of deep ecology more porous.

²¹ Specific examples include Salleh, 1984 and 1992, and Fox, 1989.

I will use a few insights from psychology to assist in applying the eco-feminist critique to the individual. Without going into much detail, Jung's work on the *anima* and *animus* can be used to show how each individual has, within them, both feminine and masculine qualities (Jung, 1921; 1990). The *anima*, which is found in men and the *animus*, which is found in women, are part of the ancient unconscious instinctual trends that are in the psyche of modern human beings. Von Franz (1990: 177) explains that the *anima* is a "... personification of all feminine psychological tendencies in a man's psyche, such as vague feelings and moods, prophetic hunches, receptiveness to the irrational, capacity for personal love, feeling for nature, and – last but not least, his relation to the unconscious". The *animus*, on the other hand, is the male personification in a woman (Von Franz, 1990). As Jung (1951: cited in: Storr 1983: 111) states: "Woman is compensated by a masculine element and therefore her unconscious has, so to speak, a masculine imprint". Both the *anima* and *animus* have positive, as well as negative aspects. In general, the *anima* is associated more closely with connectedness and relationship than the *animus*, while the *animus* is associated more closely with discrimination and cognition than the *anima* (Jung, 1951). So, while men may generally place more emphasis on discrimination and cognition and women on relationship (Jung, 1951), each gender has characteristics of both within their psyche, even though the effects of the *anima* or *animus* may be unconscious. The 'unconsciousness' of opposite gender characteristics does not preclude them from having a powerful effect on an individual. For example, Von Franz (1990: 189) states that "... even in a woman who is outwardly very feminine the *animus* can be an equally hard, inexorable power" (italics added). Equally, a man can be strongly affected by characteristics of the *anima*.

I have introduced this brief description of the *animus* and *anima* to extend the debate concerning the 'logic of domination' between social groups to the role that this logic plays within an individual, male or female, either consciously or unconsciously. This approach is not excluded from the discussions in the literature as the male and female dimensions within every individual are recognised by several authors in the field, such as Salleh (1984), Warren (1987) and Zimmerman (1994). However, in my view, the role of patriarchal ways of thinking in environmental destruction, as they manifest in females, as well as males, requires more attention.

Arguably, one of the most insightful discussions in this regard is presented by Warren (1987). Although Salleh (1984) seems to indirectly and partially recognise the *anima* and *animus* in each individual, Warren provides an articulate and more in-depth response. Salleh (1984: 345) states that "... the deep ecology movement will not truly happen until men are brave enough to rediscover and to love the woman inside themselves". The implication is that men project their feminine characteristics on women and nature, characteristics that they consider to be inferior. Warren

(1987), however, rightly asks that if men project unwanted traits onto women and nature, what are women projecting onto men? Warren (1987: 41) enquires further: “Do women split off from themselves and project onto men violence, aggressiveness, selfishness, greed, anger, hostility, death hating, nature fearing, individuality, and responsibility?” I think that these are important questions if eco-feminism is to address a patriarchal way of thinking that Warren (1987) and others argue affects both men and women. Extending the focus of the debate beyond the genders to this ‘way of thinking’ is important if eco-feminism is not to be judged as “... injecting exclusively ‘women’s questions’ into Green politics”, but is to become the ‘broad epistemological challenge’ to mainstream Western society that Salleh (1992: 215) and others argue that it is.

The boundaries between the eco-feminists and the deep ecologists can be further softened and the application of eco-feminist insights to the individual deepened, through examining the eco-feminist critique of deep ecology in more detail. The eco-feminists direct much of their criticism in the philosophical literature (e.g. Salleh, 1984 and Plumwood, 1991) towards the deep ecologists, who they argue are unaware of the masculine bias in their theory (Zimmerman, 1994). Salleh (1992), for example, states that: “As far as deep ecology goes, we do not question the ultimate intentions of the project, and especially its aim to break down the ontological dualism of humanity versus nature. Nevertheless, the movement’s unconscious androcentrism continues to be a very real obstacle to that ‘self-realisation’, as they call it” (Salleh, 1992: 214).

The eco-feminist view is that deep ecology’s notion of self-realization reflects a Western male’s sense of ‘self’ rather than being a universal ideal (Zimmerman, 1994). Plumwood sees the process of self-realisation described by the deep ecologists as a masculinist system that involves a long process of abstraction and disconnection until finally the individual identifies with nature (Zimmerman, 1994). She sees this process as relying on rationalism with an atomistic view of the self rather than a relational one (Zimmerman, 1994). Plumwood interprets the process of self-realisation, as described by the deep ecologists, as an extension and enlargement of the personal ego and states that it “...does not question the structures of possessive egoism and self-interest; rather it tries to allow for a wider set of interests by an expansion of self” (Plumwood, 1991: 14). She views the expanded-self that emerges as one in which the “... distinctiveness and independence of the other [including nature]” is not recognised in the undifferentiated wholeness that results (Plumwood 1991: 15, parenthesis added). She argues that this ‘obliteration of all distinction’ does not provide a basis for a ‘kind’ environmental ethics, as this view of humans “... as metaphysically unified with the cosmic whole will be equally true whatever relation humans stand in with nature – the situation of exploitation of nature exemplifies such unity equally well as a

conservation situation and the human self is just as indistinguishable from the bulldozer and Coca-Cola bottle as the rocks or rain forest” (Plumwood, 1991: 13).

Plumwood views the Self that the deep ecologists speak of, as one which leaves behind personal interests in support of a depersonalised, detached, impartial, disembodied and abstract state of pure reason (Plumwood, 1991; Zimmerman, 1994). She sees this as enabling an approach to justice based on universal rules inspired by rationality, rather than virtue-based concepts such as care, respect, reverence and sensitivity (Plumwood, 1993). Although she acknowledges that the rational approach to justice (as she understands the deep ecologists) has some value and should not be abandoned, she states morality should also be grounded in particularised personal relations to others, which brings the intellectual aspects together with the emotional, sensuous and bodily ones (Plumwood, 1993). In other words, Plumwood argues that the rational approach to justice ignores the particularized, feeling-orientated ethics of care that many women describe and which emerges from a relational, rather than atomistic, idea of selfhood (Zimmerman, 1994). Salleh, in turn, (1984: 340) argues that the deep ecology movement “... overlooks the point that if women’s lived experience were recognised as meaningful and were given legitimation in our culture, it could provide an immediate ‘living’ social basis for the alternative consciousness which the deep ecologist is trying to formulate and introduce as an abstract ethical construct”.

It appears from his writings that Bookchin (1982), from a social ecology perspective, is also at great pains to distance the ‘wholeness’ that he refers to, from that which he believes the deep ecologists aim for, in their concept of self-realisation. Using his typical polemic style, Bookchin (1982: cited in: Biehl, 1997: 33) supports a ‘wholeness’ (described by Gutkind, 1962) that is not a “... spectral oneness that yields cosmic dissolution in structureless nirvana”, but is rather a “... richly articulated structure with a history and internal logic of its own”. Although he does not explicitly state this, I assume the ‘structureless nirvana’ to be how Bookchin (1994) understands the deep ecological perspective on holism, as he has associated deep ecologists, in his article entitled *Will Ecology Become ‘The Dismal Science’*, with ‘mysticism’ and regularly criticises them on this account.

In my view, Plumwood and Bookchin’s critique of the deep ecology’s notion of ‘wholeness’ and Plumwood’s understanding of Naess’ concept of self-realisation, is a misreading of the work of Arne Naess. These critiques, however, do raise an important issue. If the deep ecologists are to be understood, a more thorough explanation of what the notions of ‘self-realisation’ and ‘wholeness’ entail, is needed. Although these notions are not typically included in mainstream environmental debate, it does point to the psychological and spiritual development that is required within human

individuals, for the global environmental crisis to be fully addressed (Wilber, 2000). Such concepts show us that it is not only external, material changes (e.g. the reduction of pollution emissions) that are required, but also internal, non-material ones (e.g. an increase in the individual's awareness of the interconnectedness of man and nature) (Wilber, 2000). I will attempt a slightly more expanded description of how I interpret the deep ecologists' notion of self-realisation, using the work of Wilber (2000), in order to show how I believe Pumwood and Bookchin have misunderstood the views of Naess. Wilber's description of human cognitive development critically draws primarily on the research of Jean Piaget.

Broadly, Wilber (2000) describes typical human development as passing through three stages: the egocentric, sociocentric and worldcentric. Each of these stages can in turn be sub-divided; however, for the purposes of this discussion, I will deal with them in terms of their general characteristics. The egocentric stage, which typifies infancy and early childhood, is characterised, *inter alia*, by 'participation mystique' and a sense that the world centres on oneself (egocentrism). Stein (1998: 179) explains that 'participation mystique' is a term used by the anthropologist Levy-Bruhl to refer to "... an identification between an individual's consciousness and the surrounding world, without awareness that one is in this state; consciousness and the object with which one is identified are mysteriously the same thing. There is an absence of awareness of difference between oneself and one's perceptions on the one hand and the object in question on the other". Stein (1998) goes on to explain that to some extent many people remain in a state of participation mystique all their lives, for example, when they experience feelings regarding their cars. When the car develops a problem, they may become sick or get a stomach ache.

'Participation mystique', therefore involves an unconscious connection to the world around us and the infant experiences this in a number of ways (Stein, 1998). For example, s/he initially finds it hard to distinguish between the subject (him- or herself) and the object (the world outside). The child considers the other as an extension of him- or herself. As development occurs, however, the child is slowly able to distinguish between the self and the material world, but mental images remain fused and confused with external objects (Wilber, 2000). Wilber (2000) explains that these material objects are endowed with consciousness by the child, and s/he begins to give them commands, such as to follow when s/he walks. The object is then seen to obey out of its own will. With the influence of egocentrism, the winds and clouds, for example, are seen to be made for humans alone and they take notice of people. Initially, the perspectives of others are considered false, merely because the child's own point of view predominates. However, as development proceeds further, the child begins to realise that others don't necessarily think as s/he does and s/he begins to respond to control and verification (Wilber, 2000). Egocentrism begins to gradually

decline as the child realises that his/her thoughts do not govern the world. During this stage, the child also begins to slowly differentiate its feelings from that of others, particularly that of its mother. However, at this stage of development, a child is not easily able to put themselves in another's shoes and understand their perspective (Wilber, 2000).

Participation mystique means that this stage is, at least initially, characterised by a strong unity between the infant and its world (Stein, 1998). Although this may appear to be a holistic view, it is important to note that at this stage, wholes and parts within reality are collapsed or confused with one another (Wilber, 2000). The parts are not differentiated from each other, but are fused together. Stein (1998: 179-180) summarises this point when he says that the "... first stage of consciousness anticipates the final stage: ultimate unification of the parts into a whole. At the beginning, however, it is unconscious wholeness, whereas at the end the sense of wholeness is conscious".

During the second stage of cognitive development, described by Wilber (2000), there is a widening of the self beyond egocentrism. The most significant change at this sociocentric stage is the ability of the individual to 'take the role of the other' (Wilber, 2000: 233). This is not just a realisation that others have a different perspective, but it is the capacity to "... mentally reconstruct that perspective, to put oneself in the other's shoes" (Wilber, 2000: 233). The child now learns his or her role in relation to others in society and becomes strongly embedded in the norms, rules and dogma's within that society. For this reason this stage can also be referred to as the 'conventional' stage, where the previous stage was 'pre-conventional' and the next is 'post-conventional'.

Being a member of a particular culture or society becomes important at the sociocentric stage, and an individual is accepted as a member of that group if s/he embraces its belief systems. Wilber (2000) points out that although, during this phase, there is a lessening of egocentrism, where the self is the centre of reality, this is replaced with ethnocentrism where one's group, nation, culture or race becomes the centre. He goes on to point out that: "In this structure, there is no way a global or planetary culture can even be conceived unless it involves the imposing of one's particular mythology on all peoples: which is what we saw with the mythic imperialism of the great empires, from the Greek and Roman to the Khans and Sargons to the Incas and Aztecs" (Wilber, 2000: 235).

Wilber (2000) describes the final stage of development as 'worldcentrism', where an individual is no longer bound to a particular society, race or culture, but is "... operating in the space of universal pluralism and global grasp". Sociocentrism and ethnocentrism therefore begin to

decrease. At this stage the individual can understand the perspective, not only of his/her social group, but also of other groups. This stage is therefore non-ethnocentric and even less egocentric than the previous phases as the self is able to include more aspects of reality as deserving respect. Wilber (2000) explains that the worldcentric phase involves developing the capacity to distance oneself from egocentric or ethnocentric entrenchment and consider what would be fair for all peoples, not only ones own social group.

The individual is thrown back onto his/her own inner resources, as s/he can no longer merely follow the rules of society without question (Wilber, 2000). Wilber explains that this stage is highly reflexive, recognising a range of perspectives, and the relationships between them. Societal rules are evaluated according to more universal principles (e.g. equality) that are not culture-specific, but are part of multiculturalism. These universal principles are not concrete moral laws, but general statements that promote, for example, justice, mercy and compassion. As mentioned above, this phase is post-conformist in that it often involves a resistance to a particular society's norms; for example, Ghandi versus cultural imperialism and Martin Luther King Jr. versus racial discrimination (Wilber, 2000).

Wilber (2000) goes further to explain that the worldcentric stage is also characterised by an awareness of the relationship between objects, or parts of a system, in a 'wholeness' that is not a merely a fusion of everything. Rather, parts and wholes are seen as discrete from one another, but in mutual relationship. Their nature is determined, not only by their own particular characteristics, but also by their relationships with other parts and wholes. Wilber (2000: 241-242) states that this stage is the "... first truly *ecological mode of awareness* in the sense of grasping mutual interrelationships". Anthropocentrism declines as humans are rightfully seen as one set of wholes (e.g. social groups) which are part of other wholes (e.g. ecological systems), with no part, or whole, being essentially superior to others.

From the discussion of cognitive development above, it can be seen that Plumwood's critique of the Self described by the deep ecologists, in which she argues that an individual could confuse his/her needs with those of a rainforests', reflects an understanding of that 'Self' at the egocentric state of unconscious fusion, rather than at the worldcentric stage in which wholeness is consciously perceived as including both differentiated objects and relationships between these. If the deep ecologists were indeed describing a state that correlates with this egocentric stage of development, I would certainly agree with Plumwood's criticisms, as such a state would be a regression in an individual's development.

I think, however, that it is the 'conscious wholeness' of the worldcentric stage that the deep ecologists refer to, rather than the 'unconscious wholeness' of egocentrism, as Naess expressly argues that he is not referring to a widening of the personal, narrow ego when speaking about the Self. For example, he writes that "... if people equate self-realisation with narrow ego fulfilment, they seriously *underestimate* themselves" (Naess, 1988: cited in: VandeVeer, 2003: 272). Naess (1988: cited in: VanDeVeer and Pierce, 2003: 270) explains that he is influenced by the metaphysics of Gandhi who stated that: "What I want to achieve – what I have been striving and pining to achieve these thirty years – is self realisation, to see God face to face, to attain Moksha (Liberation). I live and move and have my being in pursuit of that goal. All that I do by way of speaking and writing, and all my ventures in the political field, are directed to this same end". Naess (1988: cited in: VanDeVeer and Pierce, 2003: 270) then points out that: "This sounds individualistic to the Western mind, a common misunderstanding. If the self Gandhi is speaking about were the ego or the 'narrow' self ... of egocentric interest, of narrow ego gratifications, why then work for the poor?" The deep ecologist Warwick Fox (1989), also explicitly distances himself from the purely personal basis for identification that characterises egocentrism. He states that solely identifying with 'my family', 'my self' and 'my ethnic grouping' is "... more like the cause of possessiveness, war and ecological destruction than the solutions to these seemingly intractable problems" (Fox, 1989: 12).

It is at the worldcentric stage of development that the relational perspective which the ecofeminists call for is truly possible, as the individual is able to see beyond his/her own ego needs and perspectives and recognise, appreciate and care for those of others. The process of self-realisation, as described by Wilber (2000), is therefore not one which results in a Self that is disconnected and disembodied. Wilber explains that each stage of development transcends, but also includes, the previous stages. Therefore the worldcentric stage includes the personal, but it is "... personal plus, not personal minus" (Wilber, 2000: 289). Fox (1989) explains, using an analogy of a tree, that the Self is identified with the tree in its entirety and not exclusively with a particular leaf (my personal self), or twig (my family), or branch (my community) of the tree.

I recognise that these points do not address all the eco-feminist's concerns with deep ecology's notion of self-realisation. That would require a much longer, broader and deeper debate. However, I think that the idea, supported by the western psychologist Carl Jung, that the psychological development of human beings is ongoing, despite the fact that physical growth ends at about the age of twenty (Stein, 1998), is relevant to environmental philosophy. This is particularly the case since the concept of sustainable development is a global principle that requires individuals to have the capacity to appreciate perspectives beyond their own. It is also a concept that requires an

individual to consciously hold the differences and linkages between the human and non-human environment in awareness. Wilber (2000: 541) points out that the evidence that the Earth is in 'desperate trouble' is overwhelming. We do not have a shortage of data. The problem is that "... most people just don't *care* ... the real problem is *not* exterior. The real problem is *interior*. The real problem is how to get people to *internally transform* from egocentric to sociocentric to worldcentric consciousness, which is the *only* stance that can freely, even eagerly, embrace global solutions" (Wilber, 2000: 541).

In terms of the eco-feminist critique, such internal development could possibly assist in overcoming an individual's patriarchal conceptual framework, as s/he increasingly becomes less uncritically embedded in mainstream society's norms and values. Eco-feminism, on the other hand, provides deep ecologists with an idea of the specific attitudes that need to be brought to awareness and questioned in the process of self-realisation, due to the detrimental effect that they have on an individual's relation to the natural world, and collectively on the relationship between society and the environment.

2.5.2 Mode of knowing the environment or gaining knowledge of it

2.5.2.1. Technocentric mode of gaining knowledge of the environment

There is a strong reliance on scientific credibility, modelling and prediction in technocentric approaches to the environment (O'Riordan, 1981). The type of knowledge which characterises technocentrism is rational, 'value-free' science, which supports managerial techniques such as 'objective' appraisals, including cost-benefit analysis (O'Riordan, 1981). Although there are several variants of technocentrism, Benton (1994) points out that they all tend to support the idea of scientific knowledge as a means of controlling nature to serve human purposes, by means of technological innovation. The 'technological optimist' version of technocentrism supports the idea that technological innovation has a limitless ability to master nature and overcome the constraints that arise in achieving this (Benton, 1994). Although the limits of scientific knowledge are increasingly being recognised, the assumption still exists that if science could decrease technical uncertainty then social consensus would follow as a result (Wynne, 1994).

Benton (1994) however, points out that there are a myriad of environmental problems for which a technological solution is not in sight. He also argues that focusing on technological solutions to environmental problems, results in the neglect of issues such as inequalities in power and resource distribution, which lead to the suffering of many poor communities as a result of environmental destruction. Benton (1994) points out that, in these cases, the problem is not a lack of technology,

despite the view of technological optimists that poverty can be decreased through economic growth that is stimulated by technological innovation (Benton, 1994).

Stakeholder engagement is limited in the technocentric approach, with faith being placed mainly in scientific experts. Public opinion is sought primarily as an indication of the strength of feeling concerning particular issues, rather than as a means to obtain advice on methods and techniques (O’Riordan, 1981).

2.5.2.2. Ecocentric mode of gaining knowledge of the environment

One of the most fundamental ways in which the ecocentric approach to knowledge differs from the technocentric, is in its explicit consideration of subjective factors. Where technocentric approaches draw heavily on what is seen as ‘objective’ science, eco-feminists and social ecologists, for example, emphasise the need to consider subjective factors, such as the dominant values within Western society and the impact of social hierarchy (Bookchin, 1982; Zimmerman, 1994). The ecocentric approach to knowledge is therefore not static and totally objective, but constantly evolving, changing over time and subjective. This is confirmed by various points made by the radical ecologists. Warren (1990: 291), for example, states expressly that “... ecofeminism makes no attempt to provide an ‘objective’ point of view”. She explains that ecofeminism is a social ecology which recognises that the related dominations of women and of nature are rooted in contextual factors such historical and socioeconomic circumstances, as well as the dominant conceptual framework within the Western world.

As the eco-feminists argue that it is currently a *patriarchal* conceptual framework that dominates the generation of scientific knowledge, they see such knowledge as strongly aligned with what is associated with the masculine, such as the mind and rationality (Warren, 1990; Zimmerman, 1994). They argue that this undervalues and marginalises what is traditionally associated with the feminine, such as emotions, experience and the non-human world.

From both a deep ecological and eco-feminist perspective, the world cannot be understood – and decisions made about how we should act – using facts and logic alone (Harding, 1997). The deep ecologists, however, do not propose an alternative approach to scientific knowledge, but argue instead for the development of ecological wisdom or consciousness within individuals (Harding, 1997). Indeed, Devall and Sessions (1985, cited in VanDeVeer and Pierce, 2003: 263-264) are explicit in their inclusion within their philosophy of what is traditionally considered non-scientific, stating that “... deep ecology goes beyond the so-called factual scientific level to the level of self

and Earth wisdom. Deep ecology goes beyond a limited piecemeal shallow approach to environmental problems and attempts to articulate a comprehensive religious and philosophical worldview". Therefore, in developing their ethics, deep ecologists draw on a variety of sources including the science of ecology, leading Western philosophers, Asian religions and the practices of primal peoples, among others (Zimmerman, 1994).

Developing the ecological consciousness the deep ecologists speak of does not require the accumulation of scientific knowledge, but the expansion of the self, as described above, from identification only with the ego and its values, needs and preferences, to identification with the non-human environment. Devall and Sessions (1985) argue that this spiritual growth is best achieved through a meditative process and way of life that includes a deep questioning of the basic assumptions on which our life is based. They state that an ecological consciousness has been cultivated by many individuals within the context of various spiritual traditions, such as Christianity, Buddhism and Taoism. The process of deep questioning promoted by Devall and Sessions (1985) is described in further detail in the section that follows.

The deep ecologists also place an emphasis on promoting deep ecological experience within the individual, which they argue frequently leads a person along an ecological path and to deep ecological wisdom (Harding, 1997). The example often used is that of Aldo Leopold's encounter with a wolf, which triggered a re-orientation in his attitude towards nature (Harding 1997). In short, Leopold was a wildlife manager who adhered to the belief that humans were superior to nature, viewing the natural environment as constituting 'resources' that needed to be 'managed' (Des Jardins, 1993; Harding, 1997). Out walking with friends one morning, Leopold shot a female wolf, together with a number of her puppies. As he watched the wolf die he saw a fierce green fire in her eyes. This experience brought to him, in that moment, to a deep respect for nature, which he felt had "... its own life, its own history, and its own trajectory into the future. He experienced the ecosystem as a great being, dignified and valuable in itself" (Harding, 1997: 2). This changed Leopold's 'managerialist' view, that humans have the right to control the rest of the natural environment, to one in which humans are a part of that environment and as such should aim to preserve its integrity and beauty (Harding, 1999).

Where the deep ecologists focus on the type of experience required for cultivating an ecocentric environmental ethics within individuals, the eco-feminists focus on the type of knowledge, which include feminine ways of knowing, that society needs to gain a more inclusive understanding of the environment. They too call for an expansion of knowledge beyond that based on facts and logic, emphasising the need to include story-telling, myths and first-person narratives (Warren, 1990).

These knowledge forms, they argue, are important ways of giving expression to people's lived and felt experiences, as well as to a variety of ethical attitudes that are often overlooked within mainstream Western environmentalism (Warren, 1990).

As eco-feminists promote diversity in knowledge and understanding, they resist the idea that there is a single, 'correct' environmental ethics (Des Jardins, 1993). Warren's (1987: 18) 'transformative feminism', for example, aims to provide "... a central theoretical place for the diversity of women's experiences, even if this means abandoning the project of attempting to formulate one overarching feminist theory or one women's voice". Despite this acceptance of diversity in environmental ethics, the purpose of eco-feminism in Warren's transformative feminism seems to be more singular. In general terms this purpose, as expressed by Warren (1987), is to promote an understanding of the connections between patriarchal conceptual frameworks and all forms of oppression and to challenge the logic of domination in such conceptual frameworks, thereby ending such oppression.

As all radical ecocentric approaches emphasise the connectedness between man and nature, they all lend themselves to an understanding of the social and ecological environment as an interrelated 'social-ecological system'²², to borrow a term from the Resilience Alliance (2006). Bookchin (1982: cited in: Biehl, 1997: 32) criticises reductionist approaches to knowledge stating that: "We can no longer afford to remain captive to the tendency of the more traditional sciences to dissect phenomena and examine their fragments. We must combine them, relate them, and see them in their totality as well as their specificity. In response to these needs we have formulated a discipline unique to our age: social ecology". Bookchin (1982) quotes E.A. Gutkind who states that the goal of social ecology is wholeness, which does not mean merely adding together numerous, randomly collected details and interpreting these subjectively. Rather social ecology, states Bookchin (1982: cited in: Biehl, 1997: 33), is a science that deals with interrelated social and ecological relationships in communities and ecosystems. This science seeks to "... unravel the forms and patterns of interrelationships that give intelligibility to a community, be it natural or social" (Bookchin, 1982: cited in: Biehl, 1997: 33).

As described above, there are various interpretations of what the radical ecologists mean when they refer to the concept of 'wholeness'. If however, we adopt the approach that a 'whole' comprises parts that are discrete from one another, but are in mutual relationship (Wilber, 2000),

²² Berkes and Folke started to use this term in 1998, in order to show that the division between the social and ecological environment is artificial (Resilience Alliance, 2006). This term has also been used in the environmental assessment field, for example, in the emerging ISA process which was briefly described in Chapter 1 of this thesis.

then we can begin conceptualising such 'wholes'. Bookchin (1982) provides a starting point in his understanding of ecological wholeness, as he points in the direction of systems and complexity theory – notions that are very useful in describing how parts and wholes in a system, and the relationships between them, can be understood. Bookchin (1982: cited in: Biehl, 1997: 35), for example, describes the ecological environment as "... a complex, richly textured, and perpetually changing natural kaleidoscope of life forms ..." the integrity of which depends not on simplicity and homogeneity, but on variety and complexity. He describes ecological wholeness as 'unity in diversity' and the general direction of natural evolution as one towards increasing complexity (Bookchin, 1982: cited in: Biehl, 1997: 34).

Theory and practice is emerging around so-called 'systems thinking' and complexity theory, in which the metaphor used to understand the world is not one of a machine that can be understood by analysing its separate parts, but of systems that cannot be reduced to the sum of their parts (Cilliers, 1998). This view "... transcends current disciplinary and conceptual boundaries and will be pursued with new institutions" (Capra, 1982: 285). Systems and complexity theory is described in further detail in Chapter 3.

There are several implications of the dynamic, systemic and complex nature of human-nature relationships for our attitude to knowledge and many of these will be discussed in Chapter 3. Perhaps most importantly, however, as Bookchin (1982: 35) points out, again referring mainly to ecological systems, is that: "To assume that science commands this vast nexus of organic and inorganic interrelationships in all its details is worse than arrogance: it is sheer stupidity". How much more difficult it would be to manage or control the interrelationships between that 'vast nexus' and the social environment.

2.5.3 Mode of organising ourselves within the environment

2.5.3.1. Technocentric mode of organising ourselves within the environment

Benton (1994) explains that there are several variants of technocentrism. He discusses two particular modes: the 'cornucopian' or 'technological optimist' mode, and the 'managerialist' mode. In the technological optimist version, mastery of nature is sought for two reasons: as protection against disasters such as floods, drought and disease; and to ensure that nature becomes an ever-increasing reservoir for meeting human desires. In the managerialist mode, which arose largely as a result of a critique of the cornucopian mode, the natural limits to meeting increasing human demands are acknowledged, while control and regulation is used to prevent these limits from being exceeded or to reverse the situation where this has already occurred (Benton, 1994).

Benton (1994) criticises the managerialist mode of technological determinism on a number of accounts. The first is that this approach can include decreased economic growth or even zero-growth; however, it does not consider fundamentally different lines of social, cultural and economic change. In addition, the managerialist approach, according to Benton (1994), has not considered in nearly sufficient depth, the social, legal and political underpinnings of environmental management and regulation itself. Strategies for sustainability tend to aim for a balance between the carrying capacity of the natural environment and human demands, without adequate socially-informed consideration of the institutional setting that would require the maintenance of this balance. The institutional arrangements required are often fundamentally different to those which are in place. Finally, this mode, although it developed in response to the environmental consequences of the technological optimist approach, itself adopts the mode of scientific rationalism (Benton, 1994).

Benton (1994) uses the example of the Club of Rome's *Limits to Growth* (Meadows *et al.*, 1974), to illustrate the managerial approach and goes so far as to say that the Club of Rome initiated this variant of the technocratic perspective. *Limits to Growth* was based on a 'world model' that was developed to investigate five major trends of global concern, namely: accelerating industrialization, rapid population growth, widespread malnutrition, depletion of non-renewable resources, and a deteriorating environment (Meadows *et al.*, 1974). The authors used very general variables in the model, as they were only interested in broad patterns in the changes of variables in the system (e.g. population or pollution levels). For example, they considered "... only one general population, a population that statistically reflects the average characteristics of the global population" (Meadows *et al.*, 1974: 93). They also included only one class of pollutants. This approach has distinct characteristics of modernity in its aim to reduce the environmental problem into quantifiable variables and therefore its dependence on scientific rationality. Also, Benton (1994) argues, the approach adopts a high degree of confidence and reliance on technology in its use of computer modelling; however, the causes of the environmental crisis identified in the report, include an unquestioning over-reliance on technology. The main conclusions of the report are shown in Box 2.1.

Box 2.1: Limits to Growth – Main Conclusions

The main conclusions of the Club of Rome's *Limits to Growth* report, which was based on the outcomes of a world modelling exercise, were:

1. If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.
2. It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential.

If the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success.

(Meadows et al., 1974: 23-24)

The report includes a critique of 'technological optimists' saying that (Meadows *et al.*, 1974: 145):

The hopes of the technological optimists centre on the ability of technology to remove or to extend the limits to growth on population and capital. We have shown that in the world model that application of technology to apparent problems of resource depletion or pollution or food shortage has no impact on the essential problem, which is exponential growth in a finite and complex system.

The authors of *Limits to Growth* state that they are not anti-technology, explaining that: "We would deplore an unreasoned rejection of the benefit of technology as strongly as we argue here against an unreasoned acceptance of them" (Meadows *et al.*, 1974: 154). Their proposal is that society should consider the social and physical side-effects of development before it is implemented; the social changes that would be necessary before the development could be implemented properly; and that if the proposed development successfully removes some natural limits to growth, what limits will be reached and will these be preferable to society?

The primary proposal made in *Limits to Growth* to achieve the second outcome listed in Box 2.1, is for the world to move to a situation of non-growth or constant population and capital. This they call a state of 'equilibrium'. The minimum requirements for a state of global equilibrium are listed in the report as follows (Meadows *et al.*, 1974: 173-174):

- The capital plant and the population are constant in size. The birth rate equals the death rate and the capital investment rate equals the depreciation rate;
- All input and output rates – birth, death, investment, and depreciation – are kept to a minimum, and
- The levels of capital and population and the ratio of the two are set in accordance with the values of the society. They may be deliberately revised and slowly adjusted as the advance of technology creates new options.

Although it is recognised in *Limits to Growth* that a change is required in the social-economic environment and a decrease in economic growth is needed, to the point of zero-growth, these changes are not investigated in any depth and the reader is therefore not left with any serious challenge to the current industrial paradigm.

The current mode of environmental assessment has strong affinities with the technocentric approach to environmentalism. This is evident, for example, in the reductionist division of the environment into separate parts for analysis. This presents considerable difficulties in integration, as described in Chapter 1. Current practice of mainstream environmental assessment is also typically characterised by a division between the observer (the scientists and environmental assessment practitioner) and the observed (the environment or community). This again leads to difficulties in integration, in this instance, between the subjective elements (e.g. values of the community) and the more objective ones (e.g. the technical environmental assessment process and the observations of scientists). However, there are several ecocentric elements in more recent developments in the environmental assessment field, such as SEA and Sustainability Assessment. SEA in South Africa, for example, includes stakeholder 'visioning' at the outset of the process, as well as the identification of sustainability objectives, which are largely based on stakeholder views (DEAT, 2000). The current mode of EIA will be explained in more detail in Chapter 3. This will be done in response to ideas proposed by several researchers in overcoming the constraints of modernism in their various fields.

2.5.3.2. Ecocentric mode of organising ourselves within the environment

All the radical ecologies propose a questioning of the fundamental assumptions of technocentrism, particularly its instrumentalist view of nature (Zimmerman, 1994). As philosophies, their emphasis is on changing the way people think, rather than proposing detailed strategies for action, although such strategies are included in some of their recommendations. The deep ecologists aim to change the way individual human beings perceive themselves and their relation to the environment, social ecologists ask us to question the hierarchical structures that exist within Western society and its economic system, and eco-feminists bring to our awareness the patriarchal conceptual framework which they argue dominates Western society and negatively affects our relationship to the natural environment.

In terms of management, which forms the basis for technocentric action, Bookchin (1982) suggests that we take a different perspective. He does not propose that we abandon the idea of environmental management totally, but supports an approach similar to that of steering a boat through currents, rather than commanding those currents. He states that: "What ecology, both natural and social, can hope to teach us is how to find the current and understand the direction of the stream" (Bookchin, 1982: cited in: Biehl, 1997: 35). More specifically, Bookchin (1982: cited in: Biehl, 1997: 35) suggests that, based on the fact that we cannot assume to understand social and ecological systems in all their complexity, and therefore cannot command such systems, we 'work with nature' accommodating a high degree of spontaneity and unpredictability.

Eco-feminism also shifts the emphasis away from the domination, control and management of nature, towards an approach that reflects a more equal relationship between man and nature and which is based on the ideals of caring, responsibility, love and trust (Des Jardins, 1993). It relates primarily to notions of justice and arguing for an 'ethics of care' to guide such notions, rather than traditional ethical concepts based on moral laws, rights and duties. Such concepts, argue the eco-feminists, "... presuppose a world in which interests conflict, in which the demands of justice restrict and limit human freedom, in which morality battles egoism" (Des Jardins, 1993: 252). Des Jardins (1993) points out that the ethics of care moves beyond merely the application of universal rules to specific problems in order to make decisions. This perspective focuses on understanding the nature of specific relationships and applying an 'ethics of virtue' based on these relationships. General principles are replaced, where appropriate, by virtue-based concepts such as respect, gratitude, sensitivity, friendship and care (Plumwood, 1993). Such a virtue-based ethics, argues Plumwood (1993), allows for particularity and the recognition of contextual factors that arise from

particular relationships. The virtues required (e.g. care) are based on the commitments of particular relationships or identities (Plumwood, 1993).

As mentioned in section 2.5.1, the eco-feminist perspective, is not one which totally rejects universal, abstract principles in ethical debate, but rather one that argues for a central place to be provided for contextual factors and for traditionally marginalised values such as care, appropriate trust, diversity and reciprocal relationships (Warren, 1987; Zimmerman, 1987; Des Jardins, 1993). For example, as noted by Zimmerman (1987: 35), Carol Gilligan suggests that a "... morality of compassion based on the feminine sense of relatedness is complementary with the morality of justice based on the masculine sense of separateness". Zimmerman (1987) argues that if interrelatedness is overemphasised, feminists are at risk of leaving no space for a conception of people as individuals and for making moral choices when people's views conflict with one another.

Although not discussed by the eco-feminists, in the context of environmental assessment and decision-making, it can be argued that this perspective calls for the contextualisation of universal principles and laws relating, for example, to sustainable development. This requires an understanding of the particular relationships within the social-ecological system and the virtues that should be promoted as a result of those relationships.

Among the deep ecologists, Session and Naess, come closest to bridging philosophy and proposals for policy, in their development of eight basic principles, called the Deep Ecology Platform (DEP). They suggest that others formulate their own particular versions of deep ecology based on the DEP, which is presented in Box 2.2. Naess used the DEP to develop his process for deep questioning at four levels (Harding, 1997), which is also presented in Box 2.2. This process is important as it provides an example of how such questioning, which is central to deep ecology, may be undertaken.

Box 2.2: Deep Ecology Principles and System for Deep Questioning

The Deep Ecology Platform (DEP)

- Human and non-human life has value in itself, independent of the usefulness of the non-human world for humans;
- Richness and diversity of life forms contribute to the realisation of these values and are also values in themselves;
- Humans have no right to reduce this richness and diversity except to satisfy vital needs;
- The flourishing of human life and cultures is compatible with a decrease of the human populations. For non-human life to flourish, such a decrease is needed;
- Present human interference in the non-human world is excessive and rapidly getting worse;
- Policies must therefore be changed in a way that deeply affects basic economic, technological, and ideological structures and results in a significantly different state of affairs;
- An ideological change is needed from increasingly aiming for a higher standard of living to appreciating life quality. There will be an awareness of the difference between big and great; and
- Those who support these points have an obligation to try to implement the changes needed, either directly or indirectly.

(Adapted from: Devall and Sessions, 1985: cited in: VanDeVeer and Pierce, 2003: 266)

Four-level system for deep questioning

Level 1: Uncovering a person's ultimate norm from which all actions result. This norm will always belong to the philosophical or religious domain. For example, Arne Naess' ultimate norm is self-realisation. These norms are not absolute truths but hypotheses from which other norms, for example the minimisation of ecological footprints, are derived.

Level 2: Questioning based on the views that form part of the Deep Ecology Platform (see principles above). These views can be adapted to the relevant context. The Deep Ecology Platform was developed as a set of principles that could be accepted by deep ecology supporters irrespective of their ultimate norm.

Level 3: Exploration of ones own situation and the broad options available for action based on the norms identified in levels 1 and 2. This level includes the identification of broad policies.

Level 4: Specific ways to implement the general policies and action identified in level 3. For example, documenting extinction of species and/or focusing on the alleviation of poverty.

(Harding, 1997)

In terms of how society should be organised in order to promote an ecocentric relationship with nature, Bookchin focuses his attention on the external social changes that are needed to enable freedom from dominance. In particular, Bookchin (1995: in: Biehl, 1997) proposes that the ideal of freedom is manifested through a form of social organisation called 'libertarian municipalism'. This proposal is based on his argument that: "The recovery and development of politics must ... take its point of departure from the citizen and his or her immediate environment beyond the familial and private arenas of life. There can be no politics without community" (Bookchin, 1995: cited in: Biehl, 1997: 175). Bookchin (1995) goes further to argue that the basic unit of political life is the municipality, from which all other aspects of social and political life, such as citizenship, interdependence and confederation, emerge. He also states that it is on this level that people can begin to gain an understanding of political processes that involve more than just voting. Bookchin (1995) therefore proposes that maximum democracy can be attained through the formation of assemblies on the local municipal scale. Governance within these assemblies would take place according to the principles of full participation, freedom from external control, decentralised decision-making and the avoidance of any form of domination. Initially these assemblies would represent a single neighbourhood or several neighbourhoods, forming confederations with adjacent municipal assemblies. Such confederations would deal with problems that affect an entire region. Power, however, would flow from the bottom-up as opposed to the top-down, as is typically the case in nation-states (Bookchin 1995).

Deep ecologists also promote small-scale, decentralised communities, rather than large urban centres (Cooper, 2001). However, their concept of social organisation is akin to bioregionalism, which emphasises small-scale, self-sufficient communities, a concept that Bookchin distances himself from in a number of ways (Bookchin, 1995; Cooper, 2001). For example, Bookchin's assemblies are formed according to politically defined communities and boundaries, rather than ecologically defined ones. Also, he rejects bioregionalism's concept of self-sufficiency in favour of the formation of socially and economically interdependent but autonomous communities (Bookchin, 1995).

2.6 Key philosophical tenets for an approach to environmental assessment that addresses its current modernist constraints

Based on the discussion above, I have identified several key philosophical tenets on which to build an alternative conceptual approach to environmental assessment. An additional tenet will be added in Chapter 4, in the light of Sen's ideas presented in Chapter 3. For now, however, these tenets are as follows:

- Humans and nature are seen as part of an interrelated social-ecological system in which neither dominates the other, but in which their differences are acknowledged. The connection between the well-being of humans and nature is therefore recognised;
- The link between a person's philosophy or conceptual framework and the way in which they practically interact with others and the environment is recognised and considered an important factor in improving the sustainability of social-ecological systems. Attitudes and structures of domination between social groups are seen to be detrimental to a social-ecological system as a whole;
- All life is considered part of an evolutionary process in which it unfolds its inherent potential. In human beings, this process of self-realisation involves an increasingly wider sense of self that moves from an ecocentric to a sociocentric to a worldcentric orientation;
- Nature is valued for its existence beyond its use to humans, and therefore certain activities are prohibited irrespective of their benefits to people;
- Diversity, both human and natural, is valued as a pre-requisite to the sustainability of a social-ecological system. An attitude of inclusion is adopted in which opposites are not seen as being in competition with one another, but as being complementary; and
- Decision-making regarding social-ecological systems is guided by an 'ethics of care' in which a central place is provided for contextual factors, as well as general principles.

2.7 Summary

In this chapter I have discussed the philosophical worldview of modernism, which underpins the field of environmental assessment. The discussion reveals the essential characteristics of this worldview, aimed at explaining many of the problems currently experienced in this field.

Modernism, which was developed in the sixteenth and seventeenth centuries, is characterised by a mechanistic view of the world, which leads to assumptions of order, reductionism, predictability and determinism. The inadequacies of this view in describing reality started to emerge in the nineteenth century with developments in electrodynamics, philosophy and the life sciences. In response to these inadequacies, post-modern ideas appeared in fields as diverse as philosophy, physics, urban planning and anthropology.

The shift from modernism to post-modernism is articulated as a change from a mechanistic worldview to a more holistic and ecological view. There is no single theory of post-modernism; however, there are a number of overriding characteristics that I have summarised in this chapter. These characteristics include the post-modern negation of a number of elements of the modern worldview, including the following: meta-narratives, the myth of the pre-given and the subject-object divide, positivism, the reductionistic view of the world and the dominance of the profit-motive.

Western society would seem to be in a transition between the modern and post-modern eras, sustained by elements of both worldviews. The position adopted in this thesis is not one that regards modern as 'bad' or post-modern as 'good' (or *vice versa*). It is argued, rather, that divisions have formed between the worldviews, to the point that there is a dissociation, for example, between values and science, which compromises the potential of environmental assessment.

In this chapter, I have also discussed the application of modernism and post-modernism to the environmental debate through reference to ecocentric and technocentric perspectives. These perspectives are also used to structure a discussion of the following three themes: understanding the man-nature relationship; the mode of gaining knowledge of the man-nature relationship; and the mode of human organisation within nature. The purpose of this discussion is to describe post-modern environmental approaches and to identify related streams of thought that can assist in developing the beginnings of an alternate, potentially more effective, environmental philosophy for environmental assessment.

The technocentric mode of environmentalism, on which environmental assessment is primarily based, has its roots in modernity. In this mode, human well-being is associated with growth, technological progress and economic expansion. Nature is viewed as a source of resources to support such growth and expansion. Although some versions of technocentrism recognise the natural limits to growth, fundamentally different forms of economic and social development to those of the mainstream are typically not investigated. The type of knowledge that characterises technocentrism is rational, 'value-free' science, which supports the 'management' of the environment using 'objective' appraisals such as environmental assessment. Generally, scientific knowledge is considered a means of controlling nature, through technological innovation, for the benefit of human beings. Although the limits of scientific knowledge are increasingly recognised, the assumption still exists that if enough knowledge could be attained to reduce scientific and

technical uncertainty, then social consensus would be attained regarding, for example, the actions to be taken to advance sustainable development – this, based on the ‘truth’ revealed by science.

The ecocentric mode of environmentalism, discussed in this chapter, focuses on three streams of radical environmental philosophy, namely: deep ecology, social ecology and eco-feminism. Although these philosophies all oppose technocentrism in some way, there are considerable differences in their foundational principles, some of which are highlighted in the discussion. Flowing from this discussion, I describe a number of philosophical tenets that could underpin environmental assessment and thereby enhance its effectiveness.

In the next chapter, I will investigate the work of three leading researchers that have, in some form, recognised the constraints of modernism and addressed certain aspects of these constraints in their research. These researchers are from the domains of the social sciences, economics and complexity theory. They each challenge the boundaries of their disciplines, particularly the division between science and values that is inherent in modernity. I employ some of the ideas gleaned from this investigation in the development of a conceptual approach to environmental assessment that moves beyond the limiting or restrictive assumptions of modernism.

CHAPTER 3. ADDRESSING THE CONSTRAINTS OF MODERNISM IN ENVIRONMENTAL ASSESSMENT: IDEAS FROM OTHER DOMAINS

3.1 Introduction

In this chapter, I will investigate the work of three leading researchers (i.e. Bent Flyvbjerg, Amartya Sen and Paul Cilliers)²³ as it pertains to the assumptions of modernism described in Chapters 1 and 2. My purpose is to identify streams of thought which can inform the development of a conceptual approach to environmental assessment that addresses the problems described in Chapter 1. I have described the criteria which I used to identify the leading researchers in the introduction to this thesis.

I will present the way in which each researcher describes some aspect of modernism that limits the effectiveness of their field. Although the researchers may not have expressed the issues they discuss using the term ‘modernism’, I will show in each case how their work is linked to a critique of this worldview. Thereafter, I will discuss the proposals that each researcher makes to overcome the constraints of modernism and review the current practice of environmental assessment in light of their ideas.

I recognise that a single author cannot represent the diverse range of perspectives that typically exist within a particular area of interest. However, that is not the purpose of the discussion that follows. Nor is it the purpose to present a philosophical treatise on each of the three researchers’ positions, in relation to the views of others. Rather, this investigation is an exploration of the work of Flyvbjerg, Sen and Cilliers in particular, in order to learn from the way in which they are practically dealing with similar philosophical constraints, and to apply this learning, where relevant and useful, in the development of an alternative conceptual approach to environmental assessment.

²³ The criteria used to identify the researchers are listed in Chapter 1, section 1.4.

3.2 Enhancing the role of social science in planning and environmental assessment

In this section, I will concentrate on the work of Bent Flyvbjerg, who is a Professor of Planning at the Department of Development and Planning at the Aalborg University, Denmark. Flyvbjerg has a concurrent position as chair in Infrastructure, Policy and Planning at Delft University of Technology in The Netherlands (Aalborg University, 2008). He has published on a range of topics such as megaprojects, the social sciences and rationality and power. Flyvbjerg has two decades of practical experience as a policy and planning adviser for over forty public and private organisations, including the United Nations, the European Union and the Government of Denmark. He received the Danish National Science Council Distinguished Research Scholarship and, in 2002, was knighted for his professional achievements by Queen Margrethe II of Denmark (Aalborg University, 2008).

Although Flyvbjerg has published extensively, I have focused on his main proposals for an alternative role for social science within research and development planning processes, as summarised in his book entitled *Making Social Science Matter* (2001) and in his papers (2002 and 2004), and on what he calls *phronétic planning research*. Flyvbjerg's conclusions, particularly regarding the influence of rationality and power on political and planning processes, are largely based on an empirical study which he conducted in the town of Aalborg in Denmark (Flyvberg, 2001). I do not describe this study in any detail, but focus on the main study conclusions that highlight modernism's subjective/objective divide in the planning context, and on his proposals for balancing instrumental and value-rationality, which are particularly applicable to environmental assessment.

3.2.1 Description of the problem

Flyvbjerg (2001) argues for a re-evaluation of the nature and role of the social sciences in understanding human action and in planning for human development. In this regard, he emphasises the need for an improved balance between value and instrumental rationality, which I will suggest, has important implications for environmental assessment.

In his book, *Making Social Science Matter* (2001), Flyvbjerg shows how the social sciences limit their own effectiveness through their attempts to emulate the 'modern scientific ideal' as expressed in the natural sciences. These attempts, he explains, are a result of the dominance of the scientific

ideal following the Enlightenment, to the extent that this ideal has almost become the only legitimate view of science.

The emphasis on objectivity and the devaluation of values and ethics that is inherent to modernism is echoed in Flyvbjerg's (2001) description of the narrowing of modern society's concept of rationality to a largely instrumental one. In this view, the focus is on the means to achieve particular ends, rather than on the ends themselves. These means are viewed as tools which are not strictly true or false, but are judged in terms of their usefulness in making predictions and moving from one set of data to another (Mautner, 2000). 'Truth' is either rejected in favour of usefulness or identified with it (Mautner, 2000). The result is that deliberation on the diverse range of contextual values (or value-rationality, as Flyvbjerg describes it) is marginalised.

Flyvbjerg (2001) goes further to argue that society's capacity for value deliberation is being eroded as instrumental or means-rationality becomes dominant. He points out that Max Weber was the first to analyse the social consequences of this trend, which include the alienation and erosion of traditional values. However, since that time other philosophers, such as Foucault and Habermas, have shown that the emphasis on instrumental rationality, to the detriment of value-rationality, has continued. Today, the results of this trend extend beyond the social domain, to the current environmental problems that threaten mankind, making the need to balance instrumental rationality with value-rationality all the more important.

Flyvberg (2001) implies in his argument that the current emphasis on the 'modern scientific ideal', predictive theory and instrumentalism within the social sciences leads to a reliance on theory and rules. This, he says, relegates the social sciences to an administrative role, the details of which are determined by whichever instrumental rationality prevails (e.g. whichever process or technology is being used), and whichever power relations happen to be dominant. Such a role is "... a 'headless' form of *ad hoc* social engineering no longer given credence by a superstructure of social-science theory" (Flyvbjerg, 2001: 167). Flyvbjerg points out that: "This kind of practical social-science activity does not require advanced graduate or post-graduate specialized institutions of higher learning. The type of social engineering we are speaking of here primarily demands midlevel generalists with an all-round Master's or Bachelor's degree: people who are flexible enough to administer and execute the kinds of measures dictated by whatever is considered instrumental at a given moment" (Flyvbjerg, 2001: 167). When describing ways forward for the social sciences, Flyvbjerg calls this scenario 'science as usual', meaning by this a focus on instrumentalism, objectivity and the devaluation of values and ethics.

3.2.2 Improving the balance between instrumental and value-rationality

Flyvbjerg (2001) addresses the problems he describes through three main steps:

- Expanding the range of knowledge forms that are recognised;
- Proposing an appropriate place for the social sciences within this range; and
- Describing the implications of this placement for the practice of social science research.

Flyvbjerg (2001) aims to expand the range of knowledge forms that are currently recognised by going back to a time before the emphasis on rationality and the scientific ideal. Here he draws on the work of Aristotle in demonstrating the range of 'intellectual virtues' that exist, which include and go beyond empirical science. Aristotle divided these virtues into three categories as shown in Table 3.1.

Table 3.1: Aristotle's Categorisation of Intellectual Virtues

<i>Intellectual Virtue</i>	<i>Description</i>
Epistémic science	Corresponds to the ideal of modern natural science; Based on analytical rationality; Universal knowledge consistent in time and space;; Invariable, context-independent; and Aims to know why.
Techné	Involves application of technical knowledge; Uses instrumental rationality to achieve a conscious goal; Pragmatic, concrete, context-dependent knowledge; Craft/art geared towards production; and Aims to know how.
Phronésis	Emphasises practical, context-dependent knowledge and ethics (what is variable) over theoretical formulae and universal truths; Can be translated into 'prudence', 'practical common sense' or 'practical wisdom'; Involves a sense of the ethically practical rather than type of science; Requires experience; Involves knowing how to respond to a particular circumstance in a way that cannot be reduced to knowledge of general truths; Action-orientated and the kind of intellectual activity most relevant to praxis; Involves analyses and interpretations of the status of values in society aimed at praxis; and Aims to know how and why.

(Flyvbjerg, 2001)

Flyvbjerg (2001) argues that despite their importance, modern science has neglected the concrete, practical and ethical dimensions of knowledge. His main proposal for social science therefore, is that it focuses on phronétic research, analysing the status of values and interests in society and on social commentary and action. The value of the social sciences, he argues, is not in their role as epistémé, where the natural sciences are strong, but in their role as phronésis, where the natural sciences are weakest. Flyvbjerg (2001) states that such phronétic research should focus on four questions:

1. Where are we going?
2. Is this desirable?
3. What should be done?
4. Who gains and who loses and by what mechanisms of power?

Flyvbjerg (2001) is careful to state that these questions should be asked realising that a unified 'we' and final answers do not exist. He stresses that "... no one is experienced enough and wise enough to give complete answers to the four questions, whatever such answers would be. Experience and wisdom of that kind should not be expected from social scientists, who are, on average, no more astute or ethical than anybody else" (Flyvbjerg, 2001: 61). What should be expected are attempts by phronétic social scientists to develop partial answers that are an input into "... ongoing social dialogue about the problems and risks we face and how things may be done differently" (Flyvberg, 2001: 61). This focus on phronésis does not exclude, in Flyvbjerg's view, the use of the social sciences as techné in addressing socio-cultural and administrative problems.

Flyvbjerg (2001; 2004) proposes various methodological guidelines for what he calls a 'reformed social science'. He does this by identifying the characteristics of phronétic research and in the section that follows I have evaluated current environmental assessment theory and practice in the light of these characteristics.

3.2.3 An evaluation of current environmental assessment theory and practice according to Flyvbjerg's proposals for a reformed social science

It can be argued that environmental assessment is not purely a social science or purely a research exercise and therefore that the evaluation that follows is inappropriate. However, Flyvbjerg (2004) himself has discussed his proposals in the context of development planning, which is closely related to environmental assessment and is also not purely a social science or research

endeavour. Within this context, Flyvbjerg (2004) calls his approach 'phronetic planning research'. Most importantly, I have used Flyvbjerg's proposals as a 'springboard' for developing ideas for an alternative conceptual approach to environmental assessment at the project-level.

Flyvbjerg's (2001; 2004) proposals for phronetic research are summarised in italics at the beginning of each section that follows.

3.2.3.1. Focus on values

Phronetic researchers focus on values addressing, for example, the four questions listed above; i.e. Where are we going? Is this desirable? What should be done? Who gains and who loses and by what mechanisms of power? Relativism, which says that one set of values is as good as another, and foundationalism, which says that a set of rational and universal values exist, should both be avoided through the development of a situational ethics. The point of departure for such an ethics is the particular social and historical context that is being studied and the shared view of a specific reference group.

Consistent with Flyvbjerg's (2001) critique of instrumentalism within the social sciences, the environmental assessment community has also placed an over-emphasis on procedural aspects, to the detriment of substantive concerns (Cashmore, 2004). As such, Flyvbjerg's (2001) statement that instrumentalism relegates the social sciences to an administrative role can equally be applied to EIA. In my experience, more time is spent in meetings and conferences around environmental assessment, discussing the nuances of the process, and how these can be correctly implemented, than on understanding what makes development sustainable within various contexts.

Despite this emphasis on instrumental rationality in environmental assessment, there are numerous value-based decisions that are made either explicitly or implicitly by environmental assessment practitioners and stakeholders throughout the process. Such normative issues include, for example: determining who gains and who loses as a result of a proposed development and by what mechanisms of power; the potential impacts that should be considered in the study; and the significance of these impacts (De Jongh, 1988; Flyvbjerg, 2001). In addition, Richardson (2005: 359, parenthesis added) states that "EA [Environmental Assessment] is being used by actors in the real world to mediate and contest value differences and conflicts, and EA practitioners are engaged in the daily business of mediating values, consciously and ethically or not, yet the EA community seems divided on whether this is happening, appropriate, or desirable".

The overall objective of environmental assessment is to promote sustainable development, which has been broadly defined in the literature, but which will always be a contested concept as its precise meaning depends on the values of those defining it. The current lack of attention to value-based issues is not only reflected in the emphasis on tools and procedures within the theoretical environmental assessment debate (even when addressing normative issues such as determining the significance of impacts), but also in the difficulties that are experienced in practice in undertaking effective stakeholder engagement and in adequately addressing social concerns, as described in Chapter 1.

There are positive trends towards addressing normative issues in environmental assessment, as stated by Richardson (2005: 349): “Within the EIA literature there is growing awareness of the central importance of values in EA”. In addition, ethical issues are increasingly becoming central to the practice of SEA and sustainability assessment. The SEA Guidelines for South Africa (DEAT, 2007), for example, require stakeholders to develop a vision and sustainability objectives, which are based on the values of those that are participating. However, in my view, there is still much work to be done in understanding how conflicting values and worldviews can be elicited, constructively debated and incorporated into environmental decision-making. Richardson (2005) states, for example, that “... there are very different positions emerging over what, precisely, should be done ...” about the importance of values in environmental assessment. Richardson (2005: 359) also states that “... there is a tendency for EA to concentrate on the provision of public participation as the key to working with difference and conflict. However, ...in the fine grain of EA work, value conflicts are present throughout EA: they are played out in the making of professional judgements, in the taken for granted ways of doing things, and in the political considerations of participation in EA, there remains a need to address how values are put at stake in the everyday actions and practices of EA practitioners and planners”.

The question of how to address normative issues in EIA, will be addressed in various forms throughout this chapter and the next; however, for now I wish to propose that EIA is seen as a phronétic exercise, as defined by Flyvbjerg (2001; 2004), rather than an epistémic science or form of techné. This is because it concerns the question of ‘what ought’ to be done, planned or approved, which, as Max-Neef (2005), states is an ethical question. As a form of phronésis, it would draw on epistémic science and techné, but would not conform to the traditional view, echoed in the interviews that I conducted, that environmental assessment is mostly an ‘objective’ process that merely provides predominantly scientific information into the political decision-making process. This view is confirmed in Hill (2004) who identifies the information processing model as the most common view of environmental assessment. From this perspective (which is discussed in section

3.4.3.5 of this chapter) the main purpose of environmental assessment is to inform decisions and a strict separation of facts and values is often maintained (Cashmore, 2004). Significant use is made of natural science methods, with limited application of the social sciences (Cashmore, 2004).

Environmental assessment has other characteristics which place it mainly in the domain of *phronésis*, rather than *epistémic science* or *techné*, including its emphasis on practical, context-dependent knowledge and its orientation towards *praxis*. For these reasons, as suggested by Flyvbjerg in the spheres of planning and social science, I think that environmental assessment should become a form of *phronésis*, which draws heavily on technological and scientific knowledge, but which places the need to understand context-specific sustainability values and the influence that these should have on decision-making, at the forefront.

3.2.3.2. Placing power at the centre of analysis

Power is placed at the centre of analysis as rationality without power is irrelevant. Analysis of power helps to avoid the idealism that often characterises ethical thinking.

It is rare, if ever, that a thorough understanding is gained of power relations and the consequences of such relations on, for example, the focus of the EIA, the way in which the significance of impacts is judged and the effectiveness with which the recommendations of the assessment are likely to be implemented. Although issues of governance are often addressed, these are usually limited to concerns around capacity building, institutional structures and cooperation between various sectors or spheres of government. Environmental assessments also do not usually include an evaluation of the worldviews, values and ideas that, due to prevailing power relations, drive activities within a social-ecological system and will have the strongest influence on the direction of future developments.

Power-relations are, however, critical to an environmental assessment process as they influence, *inter alia*, the way in which impacts will affect various stakeholders. South African best practice guidelines require a description of the main stakeholders who are likely to be affected by the impacts of a development and the way in which these impacts are likely to be distributed among these stakeholders (DEAT, 2004b). However, as argued by Scott and Oelofse (2001) social questions, such as those concerning who gains and who loses from a particular development are often not adequately addressed.

Power relations are also important considerations for the effective implementation of the recommendations in an environmental assessment. Such assessments are usually approved by an environmental department; however, they typically contain recommendations that also affect many other governmental departments. The extent to which such recommendations are implemented, is therefore affected, *inter alia*, by the influence that the environmental department has on other departments.

Hill (2004), in building environmental assessment theory, also draws on the work of Flyvbjerg and argues that particular attention should be paid to power relations during the scoping stage of EIA. He recommends that social specialists are commissioned, during the assessment stage, to undertake a 'social probe', which includes an analysis of values, interests and power structures and imbalances (Hill, 2004: 225). Hill (2004: 226) also states that: "EA professionals can undertake their duties with an awareness of power and can draw on existing strategies for counteracting misinformation and enhancing participation. Assessors can check factual statements, communicate information in a way that is comprehensible to lay persons, marshal dissenting expertise in review, and draw attention to alternatives that dominant interests might suppress".

3.2.3.3. *Getting close to reality*

Phronétic researchers get close to reality and the group being studied, making their research relevant. They remain close to that group throughout the research process and deliberately expose themselves to their positive and negative reactions. Although they become part of what is being studied, including local power relations, they retain the freedom to problematise and be critical of what they see and acknowledge the way in which local power relations may have influenced their research.

A key requirement of the current system for EIA in South Africa and of such systems internationally, is that the environmental practitioner should be as objective as possible. This constrains his/her ability to become immersed in the context in the way in which a phronétic researcher might. Typically, environmental assessment practitioners adopt a stance that is more closely aligned with the idea of 'an observer looking in' than with being part of what is studied, as Flyvbjerg (2001; 2004) suggests. This is influenced both by the perceived need to be objective and by the fact that they are usually outside consultants employed to undertake a project within a particular time and budget. They then move on to other projects in other areas.

It can be said that Flyvbjerg's proposal concerning 'getting close to reality' relates mainly to the conventional research context, rather than informing decision-making (as in EIA) which, some will argue, 'should be objective'. However, there are numerous value-based decisions that are made by environmental assessment practitioners, explicitly or implicitly, throughout the process²⁴. Therefore, it is arguable whether environmental assessment can be, in reality, as 'objective' as it claims to be, or that is required by law. Engaging more directly and explicitly with such normative debates, as discussed in section 3.2.3.1 above, would, in my view, make the process more transparent and accountable. Such engagement would require practitioners to 'get close to reality' and expose themselves to the positive and negative reactions within the community to a proposed development, beyond merely speaking to those who participate in stakeholder engagement exercises.

More fundamentally, I think that the environmental assessment process as a whole, should be re-conceptualised as a subjective argument that focuses on whether or not a proposed development should be approved or not, and if so, under what conditions. This is consistent with the recommendation in section 3.2.3.1 that environmental assessment should become a form of *phronésis* that is supported by epistémic science and *techné*. Lawrence (2007) includes 'reasoned argumentation' among those approaches that he proposes for use in determining significance in environmental assessment. He states that this approach is "... evident in all EIA documents, despite a propensity to cloak subjective reasoning in 'objective' scientific and technical language (Lawrence, 2007: 745)". Lawrence (2007: 745) argues that reasoned argumentation is already "... present in EIA documents in the document structure, in the values applied to evaluate alternative choices and impacts, and in how relevant inputs are linked, synthesized and summarised in support of interpretations and conclusions". Such an approach is therefore not foreign to environmental assessment; however, I propose that it is made far more explicit, to the extent that the purpose of the whole environmental study is to develop an argument on whether the development should go ahead or not, and what conditions should be applied.

This proposal is generally congruent with the approach advanced by Elling (2008) in his discussion on environmental assessment as a reflexive arrangement. In Elling's approach the intention is to develop reflexivity among the various stakeholders that are traditionally involved in an environmental assessment. The positive and negative impacts of a proposed development on the environment are identified through a series of dialogues between the developer, the administration and the citizens. The aim of these discussions is to reach, as far as possible, a mutual

²⁴ These decisions are examined further in the discussion on complexity in section 3.4.

understanding on what the impacts are, and to what extent they are acceptable. The outcome of the mediated dialogue is the actual assessment. This assessment is considered to be a political process, which exposes stakeholder interests and values, despite being founded on scientific and technical information. Although the assessment report itself does not recommend a particular decision to the politicians, Elling (2008:237) states that it is "... something they should relate to politically, and draw upon to set political priorities and make a political choice." In the report, the outcome of the reflexive dialogue is described, including the process that was followed, the likely environmental advantages and disadvantages (identified by the participants) of the proposed development, the possible conflicts concerning environmental values and interests, the stakeholders that are involved in these conflicts and the means by which environmental goals may be achieved (Elling, 2008).

The argumentation approach that I propose, although broadly similar to Elling's (2008), displays a number of differences. For example, it draws more directly on a number of knowledge generation techniques (of which dialogue is one), depending on the question being addressed²⁵. In addition, I propose that the environmental assessment, which should involve all stakeholders including the authorities, does indeed advise the political decision-makers whether the development should be approved or not. In this context, it is particularly important that, as Flyvbjerg (2001; 2004) recommends, the practitioners and specialists are exposed directly and extensively to the social-ecological system and retain the ability to be critical of what they see. Although this approach is contrary to traditional environmental assessment, the current South African EIA Regulations (DEAT, 2006a: Chapter 3, section 32(1)(m)) take a step in this direction, as they include a requirement that the practitioner provide such an opinion on whether the proposed development should go ahead, despite other requirements for objectivity (e.g. that the consultant be totally 'independent').

3.2.3.4. Focusing on practice before discourse, studying cases and context and emphasising detail

In phronétic research an emphasis is placed on daily practices, rather than discourse or theory. No practice is seen as more valuable than another and each is understood for itself and in relation to its context (e.g. historical, social and political). 'Little things' are emphasised in descriptions that do not marginalise the detail in order to focus on understanding the general trends. Rather, importance is given to detail, illustration, background and qualifications, which opposes current trends to focus on 'important problems' and the 'big questions'. Knowledge of particular circumstances, gained through case studies (experienced or narrated) precedents and concrete

²⁵ This is discussed in more detail in Chapter 4.

examples are emphasised. This is not a 'mindless return to empiricism' but a way of gaining more insight into differences, conflict and power relations and developing ideas that can inform planning beyond theory and generalisation.

The focus on case studies and examples does not exclude attempts at generalisations. However, history has shown that human action cannot be reduced to rules unconnected to interpretation. Such interpretation is influenced by the particular context being considered. Practice therefore cannot be derived from theories and first principles. It is always dependent on context-specific judgement and situational ethics. This judgement enables "... an infinite number of 'moves' to be made, adapted to the infinite number of possible situations, which no rule-maker, however complex the rule, can foresee" (Flyvbjerg, 2004: 298). In each circumstance the researcher must decide what contextual elements are relevant to the problem being addressed.

Environmental assessment processes are not traditional research projects, but are mainly orientated towards informing a governmental decision, and therefore focus on real, rather than theoretical, proposals, strategies and recommendations for action²⁶. Nevertheless, environmental assessment procedures do marginalise detail, as they typically focus on general trends and significant issues that are identified through scoping processes. This focus means that an environmental assessment would not usually contain detailed descriptions of case studies or particular examples. The emphasis in an EIA is on the synthesis and integration of information and assessment to inform a decision, rather than on elucidating the particular characteristics of a case study. Although there may be more scope within an SEA to include such descriptions, depending on the type of SEA that is undertaken, the focus is again on identifying general trends and strategies for action.

Although this approach may simplify and focus the assessment in circumstances where financial and human resources are limited, complexity theory (which will be discussed in section 3.4) points out that it is possible that 'small' issues may have significant impacts, the magnitude of which is not easy to identify or predict (Cilliers, 2000a). The focus on general trends and what appear to be significant issues, as raised in stakeholder engagement processes, also makes it difficult to capture tacit knowledge, practices that are not clearly described in documentation, informal practices (e.g. informal lines of communication in an organisation or community), or activities which

²⁶ In this respect, environmental assessment is closer to Mode 2 science, which is application-orientated, rather than to Mode 1 science, which, among other characteristics, is theoretical or experimental (Nowotny *et al.*, 2003). It is, however, debateable whether environmental assessment processes, which respond to development applications with the purpose of informing governmental decision-making, are in essence scientific research processes and therefore whether this categorization is relevant in this context.

are constantly changing according to irregular patterns. These practices, however, are an integral part of a social-ecological system. For these reasons, it is important that the environmental assessment process does not, by definition, ignore details or only focus on general trends.

3.2.3.5. *The inclusion of narratives*

In attempting to understand the practices mentioned above, phronétic researchers focus on the question of 'How?' as well as 'Why?' This enables an understanding of the way in which practices are undertaken, as well as the question of why they are done. Narrative analysis provides a way of gaining this understanding. Also, narrative analysis can assist in identifying what action is to be taken, as it provides an understanding of history (stories of which the action would be a part). Narrative inquiries into planning don't begin from theory, but from an interest in a particular phenomenon. Stories then provide descriptions and interpretations of that phenomenon from the perspectives of participants, stakeholders and others. Stories also help us to envision alternative futures, which is useful to planning.

Narratives have been used in strategic environmental processes in the development of alternative scenario's of possible futures (e.g. *the Southern African Millennium Ecosystem Assessment (SAfMA)*) (Scholes and Biggs, 2004). Certain forms of SEA (e.g. DEAT, 2000) also include visioning and the identification of alternative future scenarios for the environment. Here there is scope for the inclusion of narratives. However, within the current mode of EIA, the use of narratives is constrained by a number of factors including the following:

- Despite the identification of alternative development options in EIA, the process does not include the envisioning of alternative future states for the social-ecological system. The focus is on minimising negative potential impacts on the environment and enhancing the positive ones, rather than on promoting a particular vision of the environment, development and the relation between the two.
- The emphasis in EIA is on general trends and what are perceived to be significant issues raised by stakeholders and specialists. This means that a specialist, similar to the environmental practitioner, is more likely to focus on the synthesis and integration of information, rather than on identifying the differences in experiences and interpretation, that narratives are particularly effective in illuminating.
- The division of specialist studies into socio-economic or biophysical categories means that the specialist is focused on identifying impacts within his/her specialist area. As a narrative would usually pertain to a number of issues relevant to the project, the

specialist is more likely to use specialist survey and analysis techniques, rather than narratives to obtain information. Although each specialist is normally asked by the environmental assessment practitioner, to draw linkages to the work of other specialists involved in the assessment, and inter-disciplinary workshops are often held, the integration task often chiefly falls onto the environmental practitioner once the specialist studies are complete.

- Best practice guidelines (e.g. DEAT, 2002c) often call for a combination of techniques for information collection (e.g. field surveys and interviews) that could include obtaining narratives from individuals in local communities. However, the overall environmental assessment report is orientated towards providing the decision-maker with an evaluation of the impacts of the proposed development, according to a pre-determined structure. In South Africa this structure includes an evaluation of the nature of the impact, its extent and duration, the probability of it occurring, the degree to which it can be reversed, the degree to which it may cause the irreplaceable loss of resources and the degree to which it can be mitigated (NEMA, Chapter 3, section 32(k)). In the process of describing the issues identified in terms of the potential impacts of a proposed development, narrative detail is likely to be lost in current, standard form EIAs.
- The specialist normally has a limited budget within which to undertake the study, and therefore is constrained in terms of the amount of time s/he can spend with the community speaking to individuals. This re-enforces the focus on general trends, rather than on the details that typically comprise the content of a narrative.

The inclusion of narratives in environmental assessment processes is, however, particularly important if these processes are to be accepted as a form of *phronésis*, as suggested in section 3.2.3.1. If environmental assessment is also re-conceptualised as an argument (section 3.2.3.3), which does not require all information to be reduced to a form of *epistémé* or presented in a standard 'objective' format, then the incorporation of such narratives into the process should be made easier²⁷.

²⁷ Narratives are central to the emerging ISA approach which, as described in Chapter 1, pertains to sustainability assessment at the policy-level of decision-making. In the proposed ISA process, described by Weaver and Rotmans (2008), the impact of alternative policies on sustainability objectives are evaluated in narrative form.

3.2.3.6. Moving beyond agency and structure

The phronétic researcher focuses on both actors and structures and the relationship between them. Actors are analysed in relation to the organisations of which they are a part; and organisations are analysed in terms of their actors. Understanding is therefore gained both from 'within' and 'without'.

Environmental assessment processes usually include an investigation of the institutional arrangements for the monitoring and/or management of impacts of a proposed development (DEAT, 2004b). This is one of the minimum requirements of an EIA in South Africa, in terms of NEMA. In addition, best practice in SEA internationally includes an analysis of institutional arrangements and the identification of institutional failures that should be addressed (OECD, 2006). However, emphasis is usually placed on understanding the structures from 'without' (e.g. what institutions exist, their capacity, structure and functions and whether mechanisms for coordination exist). Less attention is generally paid, in much best practice guidance and in regulations, to the need to understand those structures from 'within' (e.g. the actors, the power relations between structures, the relationships between institutions or departments within an institution, the effectiveness with which various structures operate, the quality of coordination achieved through structures set up for this purpose, the core values of institutions and conflicts between these values).

3.2.3.7. Dialoguing with a range of stakeholders

Phronésis is dialogical in that it includes, and is itself included, in the dialogue between a range of stakeholders on a particular issue or within a particular area. No one view (including the work of the researchers) claims to be the ultimate and final authority. The aim is to provide input into 'ongoing dialogue' and practice in relation to planning, for example, within a particular context of power. The aim is not to generate "... ultimate, unequivocally verified knowledge about the nature of planning" (Flyvbjerg, 2004: 301). Phronétic research does not therefore see itself as having a privileged position from which the final truth can be determined, but rather a perspective on the issue or plan. Objectivity is not research without interest, but rather the use of a variety of perspectives and interpretations.

Environmental assessment processes currently include dialogue between numerous stakeholders. EIAs are also a *part* of the political dialogue concerning whether a development or plan should be approved or not and under what conditions. However, this political decision-making does not take the form of an 'ongoing' dialogue, as it is orientated towards a single decision at a particular time.

Although appeals can be made against the decision, once the development has been approved and has commenced, the decision is rarely reversible.

EIAs in South Africa are rarely considered a 'perspective' on a particular development, despite the value-laden nature of the process and the principle of sustainable development. Rather, if approved, they are seen as an objective description of the potential impacts of that development. If environmental assessment is undertaken as a form of *phronésis*, in which its normative dimension is not only acknowledged, but forms the centre of the study, and environmental practitioners provide an opinion on whether the development should go ahead or not, as required by the EIA regulations (2006a), then their role as a 'perspective' in a broader debate is made more explicit. This is a role that I believe they have been performing in any event, but without sufficient recognition due to the emphasis on trying to achieve objectivity.

3.3 A view from Economics

Amartya Sen, an Indian economist and philosopher, is Lamont University Professor at Harvard University. He has published extensively and received the Nobel Prize for Economics in 1988 (Wikipedia, 2008). Sen is a trustee for Economists for Peace and Security and won the Bharat Ratna, India's highest civilian award, in 1999 (Wikipedia, 2008).

In this section, I have focused the discussion on Sen's argument concerning the subject/object divide within economics and the resultant marginalisation of issues concerning values and ethics in this field. I will describe his conception of development that aims to overcome this problem, as well as the implications of this argument for the concept of sustainable development internationally and in South Africa. This has particular relevance for the field of environmental assessment in this country, which currently promotes the mainstream concept of sustainable development as its overall purpose.

3.3.1 Description of the problem

Fundamental to Sen's (1988a) work is his view that there has been a significant distancing between economics and ethics that has impoverished both disciplines. He stated in his closing address to an International Meeting on *Ethics and Development* that: "Many people are reluctant to 'mix' ethics with economics, and will refuse to get into 'ethics and development' – the theme of the conference - in the same way that they would turn down an invitation to drink and drive" (Sen, 2000: 5). In this section, I will describe Sen's ethical critique of mainstream economics, with

particular reference to his understanding of human behaviour and how people make choices, as well as his critique, from an ethical perspective, of alternative development approaches.

Sen (1988a: 7) argues that positive economics has 'shunned' normative analysis and ignored a variety of ethical questions that affect human behaviour. He makes this argument with reference *inter alia* to the narrow interpretation, within traditional economics, of what motivates people to make certain choices. This interpretation is based on the idea that humans behave in a rational way. Such rationality is, in turn, characterised very narrowly, as it assumes internal consistency of choice and the maximisation of self-interest (Sen, 1988a). This means that rational choices are assumed to have a consistency about them that can be explained without reference to factors external to that choice and that they are made in a way which maximises the interests and goals of the person making the choice. Sen (1988a) argues against these assumptions of modern economics on three accounts.

First, he says that there are obvious problems with assuming that people act in a rational way, as we all get confused, make mistakes and so on. He puts this graphically when he states that: "The world certainly has its share of Hamlets, Macbeths, Lears and Othellos. The coolly rational types may fill our textbooks, but the world is richer" (Sen, 1988a: 11). Secondly, he addresses the criteria of internal consistency of choice by arguing, *inter alia*, that a person who consistently chooses the opposite of what would enable him/her to achieve his or her goals cannot be seen as rational. Although rationality may require some consistency, this cannot be enough to characterise a rational choice. Also, the idea of purely *internal* consistency is not sound as such consistency can only be observed in terms of someone's interpretation of the choice made and in terms some factor (e.g. motivation, value system, goals), both of which are external to that choice (Sen, 1988a). Finally, Sen questions why it should be considered rational to pursue one's own self-interest to the exclusion of everything else. He says that "... to argue that anything other than maximising self-interest must be irrational seems altogether extraordinary" (Sen, 1988a: 15). He goes further to say that this 'self-interested' view of rationality denies the influence of ethics in decision-making. It shows the neglect of the normative dimension, particularly ethics, within mainstream economics today.

Sen (1988a; 1999; 2000) argues that Adam Smith's writings have been misinterpreted to imply that self-interested behaviour is all that influences decision-making. He says that this narrow interpretation of Smith is based on a single sentence written by the eighteenth century economist, which states that: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their

humanity but to their self-love ...” (Smith, 1776: cited in: Sen, 2000: 2). Sen argues that, although Smith said that self-love is required as a motivation for exchange, such exchange depends on the negotiation of a contract and the successful implementation of that contract (Sen, 2000). These factors in turn depend on behavioural ethics that facilitate fair agreements between parties, ensure that promises are kept and that the contracts are respected (Sen, 2000). He acknowledges that it is easy to argue that self-interested individuals often have a strong motivation to behave morally to meet what he calls the ‘demands of enlightened self-interest’ and what Smith called ‘prudence’. However, he points out that this is not, according to Adam Smith all that is needed in terms of behavioural ethics within economic exchange. Smith also included virtues such as ‘sympathy’, ‘generosity’ and ‘public spiritedness’, which go beyond not only narrow self-seeking, but also beyond enlightened self-interest (Sen, 2000).

In summary, Sen (1988a; 2000) argues that although rational behaviour includes self-interest maximisation, characterising rationality solely in terms of this (as is typically done within mainstream economics) excludes, or narrows, the ethical domain within this field, by not acknowledging the range of non-self-interested values and goals that we may wish to, and do, promote. The importance of this argument is the space it provides within mainstream economics for the consideration of values beyond self-interest. This space is critical if the values of environmental sustainability and the consideration of the interests of future generations are to be considered in the mainstream economic sphere. Sen (1999: 270) summarises this point when he says: “If personal advantage is narrowly defined then there is little room for considerations such as ethics, justice or the interest of future generations. These will then have little role in our choices and actions”.

Sen (1988a) also argues that the distancing of ethics and economics has resulted in a weakening of welfare economics. He points out that in classical economics there was no clear distinction between welfare economics and other forms of economics; however, as the distance between ethics and economics has grown, welfare economics has been marginalised “... into an arbitrarily narrow box, separated from the rest of economics“ (Sen, 1988a: 28). Welfare economics, like other forms of mainstream economics, is based on the assumption that individuals are motivated by self-interest, but it also extends to the social sphere and therefore includes the assumption that social decisions can be evaluated according to some measure of utility²⁸ (Sen, 1988a). Traditionally the desirability of a particular situation or decision was evaluated according to the sum total of individual utilities created. Sen (1988a) argues that this is a very narrow analysis, which is

²⁸ The term ‘utility’ can be interpreted in different ways; however, it generally refers to a person’s well-being, happiness and/or desire-fulfillment (Sen, 1987; Goodstein, 2008).

narrowed further by the exclusion of comparisons of utility between individuals. He explains that such inter-personal comparisons were rejected as they were seen to be 'ethical'²⁹ and 'normative'.

The only ethical criteria then for economic decision-making that remained in welfare economics was the Pareto Principle, which is sometimes called economic efficiency (Sen, 1988a). This principle is defined as follows: "A social state is described as Pareto optimal if and only if no-one's utility can be raised without reducing the utility of someone else" (Sen, 1988a: 31). Sen also criticises the narrowness of this principle due, *inter alia*, to its focus on utility and its neglect of distributional issues (for example, a situation where the utility of a wealthy person was raised to the detriment of a poor person would still be Pareto optimal). In summary, Sen (1988a) criticises a strong focus on utility on the following grounds:

- *A person's success cannot be determined solely based on their own well-being, as they may value causes or goals that do not affect them personally.* Sen argues that human behaviour can be seen not only in terms of an individual's well-being, but also their agency. The latter concept includes a person's ability to form goals, make commitments and follow particular values. If self-interest is the only motivation that is recognised, then an individual's agency has to be seen as geared only towards their personal goals. However, if the "... straightjacket of self-motivation" is removed, then one can see how agency can be geared towards aims that are not, or not entirely, for the benefit of a person's own well-being (Sen, 1988a: 41). Sen uses the example of fighting for the independence of a country. Once this is achieved one may be happy, but that happiness is not the only achievement of the fight, or even the main one. The main achievement is that of independence, of which personal happiness is a part. Sen recognises that the two concepts of agency and well-being are not entirely separate and that one can be happier for achieving something for others, but argues against the assumption that underpins utilitarianism, that human behaviour is exclusively geared towards self-interested goals.
- *The interpretation of well-being, as happiness and desire-fulfilment, is inadequate.* Sen explains that the definition of well-being as utility is particularly problematic when making interpersonal comparisons. He uses the example of variations in life conditions to illustrate this. A person who has experienced a life of deprivation may be

²⁹ Sen (1988a) comments that he is not sure why inter-personal comparisons were deemed 'normative' and 'ethical'. He says that although he would find the point hard to defend, it can be argued that such comparisons are meaningless. This argument would say that it is nonsense to compare the happiness of person A with that of person B. However he (1988a: 31) says: "I guess it is a reflection of the way ethics tends to be viewed by economists that statements suspected of being 'meaningless' or 'nonsensical' are promptly taken to be 'ethical'".

able to suppress suffering to a greater degree than those who were raised in more affluent conditions. The poorer person may be able to endure adverse circumstances for survival, but as Sen (1988a: 45-46) says, "... it would be ethically deeply mistaken to attach a correspondingly small value to the loss of their well-being because of this survival strategy". While happiness is certainly an important achievement it is an inadequate measure of a person's well-being.

- *The interpretation of well-being in terms of achievement is inadequate.* The utilitarian concept of well-being focuses on what a person is able to achieve in terms of happiness and desire-fulfilment. Sen states, however, that well-being can be more comprehensively represented by a person's freedom, as well as what s/he achieves on the basis of that freedom. Freedom should be valued not only for what it allows a person to achieve, but also on its own terms (i.e. the intrinsic value of freedom should be recognised). Sen argues that the options and alternatives open to an individual are as important as what that individual ends up achieving. Having only one option available is not the same as having many options, even if the same action is taken in both cases. Sen (1988a: 61) applies the concept of freedom to both a person's well-being and agency aspects, thereby identifying four categories of relevant information: 'well-being achievement'; 'well-being freedom'; 'agency achievement' and 'agency freedom'.

In summary, Sen argues that welfare economics has been weakened due to the marginalisation of ethical considerations within mainstream economics. This weakening has taken the form of confining welfare economics to the narrow box of self-interest and the Pareto principle, which is based on the concept of utilities. This concept is limited due to its exclusion of the agency aspect of human beings, as well as its definition of well-being in terms of happiness and achievement. Defining well-being in this way does not recognise variances in people's life conditions that affect the actual degrees of happiness experienced. In addition, through focusing on the happiness *achieved*, it does not acknowledge the intrinsic value of a person's *freedom*, or ability, to achieve such happiness, irrespective of whether s/he does so or not.

Sen (1988a) then expands the ethical information-base required concerning human behaviour and motivation in the economic sphere, from a limited one focused on self-interest, to a broader one that includes a person's agency function. This includes, but is not limited to, goals that are not of direct personal benefit. He expands the concept of human well-being in a way that recognises the intrinsic worth of an individual's freedom to choose. These ideas are central to the development

ethics that Sen proposes, which is particularly relevant to this discussion, as it has profound implications for the concept of sustainable development and consequently for the sphere of environmental assessment.

Before discussing this ethics, however, I will provide an overview of Sen and Nussbaum's³⁰ critique of various existing development approaches. Sen begins by explaining his view of the concept of development as value-laden, in that it represents our idea of what counts as good social change (Crocker, 1991). Measures such as growth in gross national product (GNP) or increases in personal incomes, he sees as important, but limited. Such measures are, in Sen's view, a *means* for human well-being or quality of life, rather than ends in themselves (Crocker, 1991; Sen, 1999). Sen and Nussbaum's description and critique of these and other development approaches, as discussed by Crocker (1991) are summarised in Table 3.2. In this table, the terms 'functionings' and 'capabilities' are used in the critique of different development theories. These terms are explained in the next section

³⁰ In the late 1980s Sen developed a dialogue with Martha Nussbaum and undertook work with her which was affiliated to the World Institute for Development Economics Research (WIDER), a branch of the United Nations University (Crocker, 1991). Nussbaum is a classics scholar and Aristotelian ethicist.

Table 3.2: *Sen's Critique of Alternative Development Approaches*

<i>Commodity Approach</i>		<i>Welfarist (Utilitarian) Approach</i>	<i>Basic Needs Approach (BNA)</i>
Description			
<p>Crude Commodity Approach</p> <p>Certain goods are identified as intrinsically good or ethically basic. Measures of development include GNP, per capita income, and economic growth (in goods and services).</p>	<p>Rawls' Liberalism</p> <p>This approach includes a list of social primary goods that Rawls' believes rational individuals want, irrespective of their particular goals. This list, which is central to his theory of 'justness as fairness' and is based on his concept of socially cooperating moral people in a democracy, includes, for example: rights and liberties, freedom of movement, income, and self-respect. This list assists in determining what an individual's legitimate claims are and allows for inter-personal comparisons of wealth.</p>	<p>Utilitarianism has three central concepts:</p> <p>Consequentialism: the 'rightness' of actions (including, for example, rules, acts and policies) should be judged entirely by the resulting state of affairs.</p> <p>Welfarism: the 'goodness' of various states of affairs should be judged solely by the set of individual utilities in each state of affairs.</p> <p>Sum-ranking: the 'goodness' of a set of individual utilities must be judged by their sum total.</p>	<p>Social and economic development is interpreted in terms of increasing human well-being, which is dependant on meeting certain basic needs. Streeten <i>et al.</i> (1981) said that the objective of development is to provide opportunities for the full physical, mental and social development of human beings.</p>

<i>Commodity Approach</i>	<i>Welfarist (Utilitarian) Approach</i>	<i>Basic Needs Approach (BNA)</i>	
Advantages			
<p>Based on the correct assumption that development does not occur without material goods and services.</p> <p>The measure used of access to commodities, can be a proxy for, or evidence of, the existence of human functionings.</p>	<p>Rawls' approach does not make commodities an end in themselves, but recognises them as an indispensable means for realizing democratic ideals. He moves beyond a commodity-centred approach and begins to focus on people.</p>	<p>Welfarism goes further than the commodities approach in that it interprets well-being and development not only in terms of the accumulation of goods, but as a feature of humans themselves (i.e. changes in their mental states towards happiness and/or desire-fulfilment).</p>	<p>Goes beyond a focus on goods and services, as well as beyond the welfarist focus on utilities (i.e. happiness and desire-fulfilment).</p> <p>It draws attention to the type of life that a person is able to achieve.</p>
Points of critique			
<p>This approach confuses ends with means. Goods and services are valued in themselves (intrinsically), rather than for what they assist human beings in achieving. The focus should be on the life we lead and not on increasing commodities.</p> <p>The focus on goods rather than people misses the differences in what people are able to achieve with the same</p>	<p>Rawls' approach would be a good way of making inter-personal comparisons if people were quite similar. However, due to our many differences in, for example, gender, age and natural abilities, we each do not have the same ability to build freedom into our lives. Therefore even if equality exists between people in holding the primary social goods that Rawls lists, inequality can exist in the actual freedoms enjoyed in reality.</p>	<p>Welfarism judges actions and makes comparisons based exclusively on the resultant mental states of humans (e.g. happiness and desire fulfilment) and ignores the 'agency aspect' of a person. Humans are not only beings that experience things, but also doers and evaluators. Both the agency and well-being dimensions of a person need to be considered.</p>	<p>The BNA lacks an adequate theoretical foundation, as it fails to clearly define what is meant by 'needs'. A clear justification of needs as more than commodities, utilities or rights is not provided.</p> <p>The BNA sometimes reverts to the commodity approach. Basic needs are often defined, in reality, in terms of certain goods (e.g. food, hospital beds).</p>

<i>Commodity Approach</i>	<i>Welfarist (Utilitarian) Approach</i>	<i>Basic Needs Approach (BNA)</i>	
<p>bundle of goods. Due to variations in life conditions, the same commodity may not increase one person's well-being to the same extent as another's. For example, a disabled person may not be able to achieve the same functioning as an able-bodied person, despite having the same bundle of goods.</p> <p>Hunger for goods can lead people to being excessively competitive and arrogant; and to a "... mercenary attitude towards other good things" (Nussbaum, 1990: cited in: Crocker, 1991: 113). More is not always better.</p>	<p>Inequalities can be identified and addressed, if we don't focus on a list of goods, but rather what influences, both positively and negatively, an equal conversion between people of goods into capabilities.</p>	<p>Welfarism defines the well-being of a person in terms of the concept of utility, which is usually defined as happiness or desire fulfilment. This definition of human well-being is too narrow. Although being happy is very important, it is inadequate as a sole criteria for well-being. One reason is that it does not take into account inter-personal variations in life conditions. For example, a person may be able to adapt to a life of deprivation through survival mechanisms that they have, but it is not ethical to put a small value on any loss of their well-being as a result.</p>	<p>"The human need for food as tended to be replaced by the food needed" (Crocker, 1991: 124).</p> <p>The BNA emphasises the minimum (basic needs) which makes it relevant mostly to low income communities and poorer countries. The focus should not only be on the number of poor people, but also on the inequalities between people and nations.</p> <p>Meeting needs is a relatively passive concept, which is appropriate to development aid to dependents (e.g. children, the ill and disabled), but less so to able, motivated and responsible adults.</p>

(summarised from Crocker, 1991)

3.3.2 Sen's Development Ethics

In Sen's view international and national development should focus on promoting and enhancing valuable human functionings and capabilities (Sen, 1988b; Crocker, 1991). The concepts of functionings and capabilities and the freedom and justice aspects of Sen's development ethics are explained in the sections that follow.

3.3.2.1. Functionings and capabilities

Sen's development ethic is based on the two core concepts of functionings and capabilities (Sen, 1988b; Crocker, 1991). He argues that a developed society enables people to be, live and act in certain ways that are considered valuable (Crocker, 1991). These ways of being and doing he calls 'functionings', which can range from being adequately nourished and free from disease, to being able to participate in the community and having self-respect (Crocker, 1991; Sen, 1999). What a person is currently being and doing are his/her functionings, whereas what s/he is *capable* of being and doing (or is free to be and do) Sen calls his/her capabilities (Sen, 1984). Sen (1984: 317) summarises this when he states that: "Functionings are ... personal features; they tell us what a person is doing. Capability to function reflects what a person *can* do". Capabilities tell us something about the person in relation to a good (Sen, 1984). For example, having some rice provides me with certain nutritional requirements and therefore the capability to function in a particular way. The utilitarian approach, however, would be to focus on the fact that the rice (a good) creates utility (happiness or desire fulfilment) through its consumption, leaving out the important fact that it also provides a person with the capability of meeting their nutritional requirements (Sen, 1984).

Crocker (1991) points out that the concepts of functionings and capabilities provide Sen with the ability to evaluate human well-being based on the "... straightforward fact that how well a person is must be a matter of what kind of life he or she is living – what the person is succeeding in being and doing" (Sen, 1985: cited in: Crocker, 1991: 130). This goes beyond the commodity approach's focus on the accumulation of goods, or welfarism's evaluation of merely the mental states of happiness and desire fulfilment. Crocker (1991: 130) also points out that the notion of functionings allows Sen to incorporate the concepts of 'well-being achievement' and 'agency achievement'. Well-being achievements relate to accomplishing ones own personal goals, while agency achievements relate to the functioning of 'choosing', which could involve choosing to promote one's own concerns, but could also include choosing to promote the goals and values of others (Crocker, 1991). Robeyns (2005), in explaining the difference between Sen's well-being and agency concepts, says that if well-being includes actions which are not beneficial to the agent herself then the focus is on overall agency.

From Sen's (1999: 87) perspective, poverty is therefore seen, as "... the deprivation of basic capabilities rather than merely as lowness of incomes, which is the standard criterion of poverty". Development should therefore focus, in his view, on expanding valuable functionings and capabilities and not solely on increasing income levels (Crocker, 1991; Sen, 1999). Sen (1999) does not underestimate the problem of insufficient income as he acknowledges that it can be the principle factor in capability deprivation. However, he argues that his approach focuses on aspects that are intrinsically important to the human being, while income is instrumentally important (i.e. a *means* of achieving a good life). In addition, there are factors that influence capability deprivation other than low income, such as poor nutrition. Finally, Sen (1999) argues that the impact of a low income has a variable impact on different families and groups and it is therefore better to focus on the actual functionings and capabilities that they achieve.

Sen (1988b) uses the example of Kerala in India to illustrate how real income and opulence may differ substantially from levels of functionings and capabilities. In statistical ratings, Kerala always features as one of the poorest states in India in terms of GNP per head. However, Sen points out that in terms of other important factors such as longevity and education, Kerala does better than any other Indian state. Evaluating Kerala in terms of functionings and capabilities would place it closer to the high end, than the low end of the scale (Sen, 1988b).

3.3.2.2. *Capabilities as positive freedom*

Sen (1999: 86) views his capabilities approach as a 'freedom-based perspective' as capabilities are the freedom an individual has to achieve alternative functionings, or to live the life that s/he has reason to value. Freedom, Sen argues, always adds intrinsic value to the actual functionings chosen, as it is better to have chosen a way of life than to have been forced into it (Sen, 1988b; Crocker, 1991). As an example, Sen (1999) contrasts an affluent person that is fasting with a destitute person that has no choice but to starve. The affluent person may achieve the same level of functioning in terms of nourishment as the destitute one, but the former has different capabilities to the latter and s/he has the freedom to choose to increase his/her level of nourishment in a way that the destitute person does not.

Sen also distinguishes between positive and negative freedoms. Negative freedoms he defines as the absence of restraints imposed by others (e.g. governmental organisations) on an individual's freedom (Sen, 1998b; Crocker, 1991). He argues, however, that this is a limited view as you can be free from external interference (negative freedom) and still be 'unfree' to live the life you choose due to the absence of valuable options (Crocker, 1991). He therefore introduces the concept of

positive freedom, which is the ability to live the life that one values (Crocker, 1991), not only because of the absence of restraints imposed by others, but also because of the existence of valuable options. Sen goes further to distinguish between the concepts of well-being and agency within the notion of freedom (Crocker, 1991). The first involves the opportunity to choose and achieve one's own personal well-being, while the second is the freedom to choose options other than those that serve one's own purposes (Crocker, 1991).

Sen therefore elevates the notion of freedom from one that has merely instrumental value (i.e. as a *means* of achieving a good life) to one that has intrinsic value and is itself part of a good life (Crocker, 1991). Development is therefore defined as a "... process of expanding the real freedoms that people enjoy" (Sen, 1999: 3). Crocker (1991) explains that it isn't the purpose of this approach to impose certain functionings on people. Rather, the aim is to enable them to cross certain thresholds (e.g. educational or resource thresholds) which allow them to make the choices that they value (Crocker, 1991).

The question of what type of capabilities should be promoted through development then becomes critical. Nussbaum³¹ has formulated a list of basic human functional capabilities on which Crocker (1991) has mapped Sen's scattered examples, as Sen has not developed such a list himself. In Box 3.1, I have summarised the list Crocker presented. He uses the letter 'N' to stand for Nussbaum and 'S' for Sen.

³¹ Nussbaum perceives capabilities slightly differently from Sen (Crocker, 1991). I have excluded an explanation of these differences, which are explained in Crocker (1991), as my intention is merely to provide examples of capabilities, the details of which I believe would require broad discussion in context, even beyond the dialogue between Nussbaum and Sen.

**Box 3.1: Basic Human Functional Capabilities as Identified by
Nussbaum and Sen**

Being able to:

- Live, as far as possible, to the end of a complete human life (N and S);
- Have good health, adequate nourishment, shelter, opportunities for sexual satisfaction and the ability to move about from one place to another (N and S);
- Avoid unnecessary and useless pain and to have pleasurable experiences (N and S);
- Use the five senses, to imagine, think and reason (N and S);
- Form attachments to things and people outside of ourselves and generally to feel love, grief, longing and gratitude (N);
- Form a conception of the good, choose the basic elements of ones own personal; existence and critically reflect on the planning of one's own life; including the ability to form ones own values, goals and commitments (N and S);
- Live, and show concern, for others; as well as being able to engage in various forms of social interaction (including being able to visit and entertain friends) and to participate in the life of the community (N and S);
- Have concern for nature and live in relation to it (N);
- Laugh and enjoy recreational activities (N);
- Live one's own life in one's own environment and context (N);
- Have self-respect and appear in public without shame (S); and
- Live a fully human life and achieve valuable functionings, within the limits of natural possibilities (N and S).

(adapted from Crocker, 1991)

3.3.2.3. Rights and Justice

Based on his concept of functionings and capabilities, Sen has formulated the beginnings of a theory of moral rights, which I will briefly describe in this section based on Crocker's (1991) explanation.

Sen describes moral rights in relation to basic functionings (e.g. the right not to be hungry) and capabilities or freedoms (e.g. having the means not to be hungry) (Crocker, 1991). He argues not only for negative rights that focus on a person's right not to be interfered with, but also positive

rights (e.g. to adequate nourishment and shelter). In deciding whether human actions are right or wrong, Sen says that we must consider the state of affairs which results from those actions (i.e. the consequences) and that state of affairs should include the fulfilment and violation of rights (Crocker, 1991).

Sen argues that what should be fairly distributed in development are basic functionings and capabilities (Crocker, 1991). The aim of government policy and planning should therefore be to fairly distribute amongst all citizens, the conditions (e.g. opportunities, as well as financial, educational and institutional support) in which individuals can choose a good human life. Such a life should not only allow them to function minimally, but to function well. This goes further than the equal allocation of goods and services, to enabling people to achieve certain basic capabilities (freedoms and choices) which allow them to function in particular ways. Sen argues further that for a development agency or government to be *just* it should focus on helping *as many people as possible* to make such choices, rather than merely further enhancing the conditions of the elite (Crocker, 1991).

In terms of this theory of moral rights, stakeholder participation in the processes public planning and decision-making (e.g. EIA), on the basis of one's own conception of the good, becomes critically important. Exclusion from these processes would, therefore, be unfair and unjust. However, Sen goes further to extend this argument to the importance of not excluding people from participating in the broader, ongoing social debate about society's goals and how they should be achieved.

3.3.3 Implications for environmental assessment

In this section I will examine, in the light of Sen's views, the development ethics that underlies the practice of environmental assessment in South Africa. A key objective of environmental assessment is the promotion of sustainable development (Sadler, 1996; Glasson *et al.*, 2005) and therefore it is this concept that will be evaluated in this section. Although there are varied interpretations of sustainable development, it is the mainstream international definition, as presented in the World Commission on Environment and Development's (WCED) Report (1987), entitled *Our Common Future*, which seems to most consistently influence South Africa's governmental policy-making and planning.

I will begin this discussion with an evaluation of the international concept of sustainable development in the light of Sen's critique and development ethics. In this evaluation I will draw on

Max-Neef's (1991) definition of needs, to provide an example of how human functionings and capabilities can be defined in more detail. Thereafter, I will analyse the South African concept of sustainable development presented in NEMA, as this is the framework legislation for environmental assessment in South Africa.

3.3.3.1. Sustainable development in the mainstream international arena

As mentioned in Chapter 1, the report, *Our Common Future*, defines sustainable development as "... development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED, 1987: 24). This is clearly a Basic Needs Approach (BNA) and therefore displays both the positive and negative attributes that Sen argues are characteristic of the BNA (Table 3.1).

On the positive side, it goes beyond a development approach that values goods and services in themselves, by drawing attention to the role these goods and services perform in meeting human needs. For example, the Guide to *Our Common Future* (Lebel and Kane, 1997: 3) states that: "Sustainable development is best understood as a process of change in which the use of resources, the direction of investments, the orientation of technological development, and institutional change all enhance the potential to meet human needs both today and tomorrow". In this statement, development is rightly viewed as the *means* to achieve the goal of meeting human needs, rather than an end in itself.

On the negative side, however, human needs are not clearly defined in *Our Common Future* (Reid, 1995). In his examination of the report, Reid (1995: 57) concludes that it "... fails to consider the nature of human need or its implications for development, despite its assertion of their importance ...". Where some reference is made to essential human needs, these are described mainly in terms of goods and services such as food, energy, livelihoods, housing, water supply, sanitation and health care, and not in terms of human functionings and capabilities, despite general references to the need to enhance the quality of life (WCED, 1987). This supports Sen's argument that the BNA lacks an adequate theoretical foundation that substantiates its view of needs as being more than commodities, utilities and rights (i.e. more than a commodity or welfarist approach). It is also consistent with his argument that although the BNA approach shifts attention within the development debate from the production of goods and services to meeting human needs, this debate often reverts to a focus on commodities. As described in Table 3.2, a key problem with this is that it ignores the variabilities in life circumstances which enable people to convert, for example, increases in incomes and commodities to opportunities that improve their quality of life (Crocker,

1991). Consequently, the fact that sustainability has to be pursued differently in different societies and within different circumstances is not acknowledged.

'Reviving growth' is identified in *Our Common Future* as a fundamental means of meeting human needs and reducing poverty and is the first critical objective for future environmental and developmental policies listed (WCED, 1987: 55). In Lebel and Kane's (1987: 2) guide to the *Our Common Future*, it is emphasised that: "The problems of poverty and underdevelopment cannot be solved unless we have a new era of growth in which developing countries play a stronger role and reap greater benefits". However, the concept of 'growth' and how it is to be achieved is not articulated in sufficient depth in the report (Reid, 1995). My impression, supported by Reid (1995), is that for the most part, it is conventional economic growth that is being referred to. In speaking about growth, aims such as "... increasing productive potential..." and achieving "... a rise in per capita incomes ..." are mentioned (WCED, 1987: 55 and 60). The main deviations from conventional economic growth include its reorientation towards meeting human needs, its restriction within ecological limits and the inclusion of equity concerns between and within generations (Lebel and Kane, 1987; Reid, 1995).

As human needs are mostly defined in terms of goods and services, and economic growth is primarily equated with increasing incomes (albeit in an equitable manner), *Our Common Future* does not offer a fundamentally alternative conception of development that significantly improves the synthesis of environmental and economic goals, and therefore the achievement of sustainability (Reid, 1995). Reid (1995: 64-65) states that "... the comprehensiveness and detail of *Our Common Future* is overshadowed by the inadequacy of its treatment of human need and its bias towards economic growth".

Sen's argument for development that goes beyond increases in GNP and per capita income provides a better chance than the BNA approach, for the integration between social, economic and biophysical concerns needed for sustainable development. This is because, as argued by Max-Neef (1991)³² who developed a similar economic approach to Sen, it places goods in the service of human life, rather than life in the service of goods, the accumulation of which is often seen as an end in itself. In other words, as Max-Neef (1991) states, development becomes more about people than objects. This results in a shift in focus from purely economic indicators (e.g. levels of income),

³² Max-Neef is a Chilean economist who has an international reputation for his work on development alternatives (Right Livelihood Award Foundation, 2006). He worked for many years among the poor in South America and has articulated the ways in which conventional modes of development have led to poverty and ecological destruction in the developing world (Rainforest Information Centre, <http://www.rainforestinfo.org.au/background/maxneef.htm>, accessed 09/11/09).

to the consideration of quality of life issues, for example, the ability of individuals to fulfil particular functionings such as creativity (Max-Neef, 1991; Sen, 1999). This provides a better integration of social and economic concerns in development and also considers the human being in his/her entirety, addressing physical as well as spiritual and emotional needs (Max-Neef, 1991).

When needs are viewed in terms of goods and services, such needs are typically thought of as infinite, as they change from one culture to another and between historical periods (Max-Neef, 1991). However, if needs are conceived in terms of the functionings of human beings (Sen, 1984) it is possible to define them in a finite way (Max-Neef, 1991) and to fulfil them through multiple means, not only resource-dependent ones. Although Max-Neef (1991: 27) does not use Sen's terminology, he lists what he calls 'fundamental human needs' that arguably fall into Sen's categories of functionings and capabilities. These include the need for subsistence, protection, affection, understanding, participation, idleness, creation, identity and freedom (Max-Neef, 1991). These needs are then fulfilled through 'satisfiers', which are ways of being, having, doing and interacting (Max-Neef, 1991). More specifically, satisfiers relate to forms of organisation, social practices, modes of behaviour and political structures. They may also include physical goods such as food and shelter, but are not limited to these. The need for protection, for example, may be fulfilled in numerous ways, including through the provision of parental care, insurance systems and shelter (Max-Neef, 1991). Max-Neef (1991: 25) states that: "This situation compels us to rethink the social context of human needs in a radically different way from the manner in which it has been approached by social planners and designers of policies for development. It is not only a question of having to relate needs to goods and services, but also to relate them to social practices, forms of organisation, political models and values. All of these have an impact on the ways in which needs are expressed"³³.

This approach, which Max-Neef (1991: 16) calls 'human scale development', therefore not only provides a better integration of the social and economic aspects of development, but places less strain on our resource-base. It does this by re-orientating the economic system from one which focuses on the production of goods and services as ends in themselves, to one that focuses on promoting the functionings of individuals and communities. These functionings can be promoted by a wide range of satisfiers that are not necessarily resource intensive.

³³ It is important to note that Sen and Max-Neef do not deny that meeting people's basic material requirements is a priority, particularly in the context of the developing world. However, they emphasise material goods and services as one of the means to achieve fundamental human needs, which they define in more intangible terms, such as the need for protection, affection, subsistence, creativity and identity (Max-Neef, 1991; Crocker, 1991).

3.3.3.2. *Sustainable development in the South African National Environmental Management Act (NEMA) (No. 107 of 1998)*

The concept of sustainable development contained in NEMA is based on the WCED (1987) definition and follows the BNA approach adopted internationally. NEMA draws attention to the importance of meeting people's basic needs stating, for example, in the preamble to the Act that "... the State must respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities". NEMA goes further to state that environmental management must place people and their needs at the centre of concern (Chapter 1, section 2(2)). However, despite a reference to needs in Chapter 1 (section 2(2)) that extends beyond the material, to include psychological, social, developmental and cultural aspects, no further detail is provided on what is meant by the concept of 'needs'. This omission leaves the implementation of NEMA open to an interpretation of basic needs that, as Sen argues, reverts back to a narrow focus on commodities, paying inadequate attention to the actual human functionings and capabilities that people should be enabled to achieve (Crocker, 1991).

It is not only the concept of 'needs' that is vaguely defined in NEMA, but also the term 'development'. NEMA states that "... 'sustainable development' means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations" (principle xxix, definitions: 10). This does not make the concept of development much clearer as, much like the WCED (1987) description, it is broad, open to various interpretations and does not specifically state what is to be sustained and what is to be developed (it seems that these answers are assumed). It is therefore arguable that NEMA, consistent with international approaches, is based on a conventional understanding of economic development, with the additional requirement that its environmental limitations be respected.

The aspects listed in Chapter 1 (section 4(a)) of NEMA as issues of concern for sustainable development relate mostly to the avoidance of environmental degradation (e.g. avoiding ecosystem loss, pollution and the disturbance of landscapes) within the process of seemingly conventional development. It is only the last factor on the list that touches on the functioning of people themselves, as it calls for consideration of the negative impacts of development on people's environmental rights. Although this last point begins to include the fundamental needs of people, it is limited in its focus on rights (excluding other functionings and capabilities) and in particular, in its concentration on 'negative' rights (Crocker 1991) (i.e. the right not to be interfered with).

The absence of a clear definition of development and the limited attention paid to people's needs within NEMA, is perhaps the result of the modernist divide between people and the natural environment, which is reflected in the powers and functions of sectorally-divided government departments. As NEMA is an 'environmental' Act, in a context in which the environment is defined in a way that emphasises its natural aspects, it is arguable that re-defining development in this Act, would venture into realms that extend beyond its ambit. However, as discussed in Chapter 1, such sectoral divisions are a key constraint to effective environmental assessment and are identified in *Our Common Future* as one of the 'roots' of environmental problems in general. As stated in the WCED (1987: 71) report: "Sustainable development requires that such fragmentation be overcome".

If environmental assessment is to promote its overall goal, which is sustainable development, such development needs to be conceived in a way that goes beyond promoting conventional economic development while attempting to limit its environmental impact. Sen describes such an alternative conception of development that extends the BNA approach to an interpretation that includes human functionings and capabilities. Testing such ideas within environmental assessment and other domains, is of critical importance, because, as Reid (1995: 141) states: "The construct of development that has prevailed for the best part of 50 years has represented, and continues to represent, a serious obstacle to sustainable development".

3.4 A view from Complexity Theory

In this section I will focus on the work of Paul Cilliers, who is Professor of Philosophy at Stellenbosch University. He lectures mainly in cultural philosophy, deconstruction and the ethics and philosophy of science. After working as a research engineer, he completed a D.Phil in complexity theory in 1994 (Sustainability Institute, 2008). He published the internationally renowned book entitled *Complexity and Postmodernism: Understanding Complex Systems* (Routledge, 1998) and won the Rector's Award for Excellence in Research in 2000 (Cilliers, 2008b). Cilliers was also awarded the Harry Oppenheimer Memorial Fellowship for 2006.

Underlying much of Cilliers' work is the problem of knowledge, what it is and the extent to which it is limited due to the fact that the world is complex. In the section below, I will present Cilliers' argument that traditional reductionist science is inadequate for dealing with complexity, as well as his description of the characteristics of complexity and its implications for knowledge generation. I will then relate Cilliers' work to the field of environmental assessment.

3.4.1 Description of the problem

The world in which we live is becoming increasingly complex as communications improve and technology facilitates connectedness and trade on a global scale. As a result, changes in particular social-ecological systems often have effects that reverberate through a multitude of other systems at various scales and locations (Heylighen *et al.*, 2007)³⁴. Heylighen *et al.* (2007) argue that complexity is perhaps the most essential characteristic of today's society. However, they state that the traditional scientific method of isolation, analysis and gathering of information, is incapable of dealing with such interconnectedness. The emerging science of complexity provides us with an alternative to this traditional scientific approach, as it has greater potential to deal with the interdependencies that typify modern society (Heylighen *et al.*, 2007).

As discussed in Chapter 2, several scientific developments have challenged the Newtonian worldview since the beginning of the 20th Century. Heylighen *et al.* (2007) state that these ideas from systems theory, cybernetics, postmodern social science and the life sciences, are starting to become integrated within the emerging field of 'complexity science'. Cilliers (2008c) cautions, however, that although the limitations of Newtonian science are acknowledged in this field, work done under the heading of 'complexity science' often reverts to traditional reductive approaches. Cilliers (2005a: 254) points out that we no longer need to fight against 'crude positivism', nevertheless there appears to be a resistance against positions, such as postmodernism, that emphasise the interpretive nature of knowledge. Cilliers (2005a: 256) acknowledges that many of these postmodern positions are "... so open and vague that they really do not contribute to our knowledge of the world", and are often too "... relativistic to produce any real understanding" (Cilliers, 2008a: 39). However, he states that since we live in a complex world, we need to acknowledge the limitations of our knowledge, and some of these positions help us to do that. For this reason, he argues that they "... should not be relegated to the junkyard of history" (Cilliers, 2005a: 256).

Heylighen *et al.* (2007) highlight the shortcomings of the modern, Newtonian worldview in dealing with complexity from both an ontological and epistemological perspective. These authors explain that ontologically, all phenomena (including social and mental phenomena) are reduced to independent material particles in motion, the nature of which is controlled by the deterministic laws

³⁴ One of the key references I have used is a chapter which Cilliers wrote with Francois Heylighen and Carlos Gershenson in a book entitled *Complexity, Science and Society* (Radcliffe Publishing, 2007) which was edited by Bogg and Geyer. Although Cilliers was not the first author, please note that reference to Heylighen *et al.*, includes Cilliers' work.

of cause and effect. Other basic categories of being, such as mind or purpose, are not acknowledged in themselves, but seen as epiphenomena that result from particular arrangements of particles in absolute time and space. This means that differences between such phenomena are solely attributed to variations in the arrangements of matter (Heylighen *et al.*, 2007).

From an epistemological point of view, Heylighen *et al.* (2007) point out that our knowledge is seen as a reflection of the arrangements of matter outside us. Therefore, the purpose of science is to observe these material arrangements and map them as accurately as possible. It is assumed that, ultimately, this will lead to a complete, objective representation of external matter, which enables us to predict all phenomena in time and space. The process of mapping involves a continual reduction of the complexity of a system, through taking it apart, until it is reduced to its smallest parts (i.e. atoms or elementary particles). It is assumed that if the initial position and velocity of the particles of a system are known, as well as the forces affecting them, then it is possible to predict their future positions and velocities with certainty. Heylighen *et al.* (2007) explain that if phenomena appear complex, then it is assumed that such complexity can be removed through further analysis, until the simplest components are studied and their current and future state becomes predictable.

Heylighen *et al.*, 2007 also point out that the Newtonian idea of objective, observer-independent knowledge and the assumption of predictability become problematic when extended to human beings. They explain that human agents cannot freely act upon systems without contradicting the physical laws of cause and effect. A conflict therefore arises between free-will and scientific determinism. Descartes avoided this problem by assuming the independent category of mind which does not obey the mechanical laws that govern material objects. The Newtonian worldview, which reduces all phenomena to mechanical objects, therefore cannot accommodate purposeful action and consequently does not address issues related to values and ethics (Heylighen *et al.*, 2007).

The laws of mechanics were assumed, not only to apply to physics, but to all other disciplines as well (Heylighen *et al.*, 2007). Heylighen *et al.* (2007) explain that although such widespread application did not occur in practice, a general mechanistic, Newtonian worldview was often adopted in many other disciplines, including economics, psychology and biology. The result is that many social scientists attempted to describe human behaviour without contradicting most of the Newtonian principles (Heylighen *et al.*, 2007). Economists, for example, as shown in Sen's (1988a) description of positive economics (section 3.3) and Heylighen *et al.*'s (2007) discussion, often reduce the sometimes inexplicable preferences of the human mind to predictable and deterministic choices through the introduction of the concept of utility. As discussed in section 3.3,

utility is defined as the well-being, 'happiness', 'goodness' or 'desire-fulfilment' produced by a state of affairs (Sen, 1988a; Heylighen *et al.*, 2007; Goodstein, 2008). It is assumed that perfect knowledge of the utility of various options is possible and that individuals will always choose the option that maximises their utility. This enables a view of human economic choice that is as deterministic and predictable as the movement of material particles.

One of the main reasons why other disciplines attempt to follow the modern scientific method is that, as Cilliers (2008c: 2) states: "We still live in a world where scientific knowledge, to a large extent, trumps all other forms of knowledge". This is perhaps the result of the simplicity and coherence of the Newtonian worldview, but also because of the success of this worldview in its initial area of application to mechanical systems (Heylighen *et al.*, 2007). However, Cilliers (2008c) explains that, when applied in a simplistic way to the social sciences, Newtonian logic (which is already problematic in the natural sciences) gives the impression that social problems can be addressed through reduction into their perceived components, experimentation and objective observation. This approach is inadequate when dealing with complex problems, as these change as we are studying them, and because we live in an interconnected world in which the whole, the parts and the relationships between these, need to be understood (Cilliers, 2008c). A positivist view, which promotes Newtonian science as the highest or only form of knowledge, is therefore wholly inadequate for understanding the complex world in which we live and for addressing its problems.

Cilliers has described the many implications of complexity for knowledge generation. In the sections below, I have summarised his description according to the following three categories: beyond objectivism, beyond universal determinism and beyond positivism. I have used the term 'beyond' to emphasise that a regression to an undifferentiated pre-scientific era is certainly not what Cilliers is proposing, but rather a step forward where we acknowledge the limitations of our current understanding and move beyond such limitations. Before I describe this move forward, however, I will address the question, from Cilliers' perspective, of what complexity actually is.

3.4.2 The Implications of Complexity Theory for Knowledge Generation

Cilliers does not provide a definition for complexity, but rather presents a list of its characteristics, which he formulated in collaboration with Fred Boogerd and Frank Bruggemans at the department of Molecular Cell Physiology at the Free University, Amsterdam. This list is shown in Box 3.2 below. The implications of these characteristics, in interaction with one another, for knowledge generation are discussed in the section that follows, while the meaning and importance of this complexity perspective for environmental assessment will be discussed in section 3.4.3.

Box 3.2: Characteristics of Complexity

1. Complex systems are open systems;
2. They operate under conditions not of equilibrium;
3. Complex systems consist of many components. The components themselves are often simple (or can be treated as such);
4. The output of components is a function of their inputs. At least some of these functions must be non-linear;
5. The state of the system is determined by the values of the inputs and outputs;
6. Interactions are defined by actual input-output relations and they are dynamic (the strength of interactions change over time);
7. Components on average interact with many others. There are often multiple routes possible between components, mediated in different ways;
8. Some sequences of interaction will provide feedback routes, whether long or short;
9. Complex systems display behaviour that results from the interaction between components and not from characteristics inherent to the components themselves. This is sometimes called emergence;
10. Asymmetrical structure (temporal, spatial and functional organisation) is developed, maintained and adapted in complex systems through internal dynamic processes. Structure is maintained even though the components themselves are exchanged or renewed;
11. Complex systems display behaviour over a divergent range of timescales. This is necessary in order for the system to cope with its environment. It must adapt to changes in the environment quickly, but it can only sustain itself if at least part of the system changes at a slower rate than changes in the environment. This part can be seen as the 'memory' of the system; and
12. More than one description of a complex system is possible. Different descriptions will decompose the system in different ways. Different descriptions may also have different degrees of complexity.

(Cilliers, 2005a: 257)

3.4.2.1. *Beyond reductionism*

The problem with attempting to understand complex phenomena through studying their component parts is clearly illustrated in Cilliers' (1998) description of connectionist models. Cilliers explains that as these models share the characteristics of complex systems they can be used in conceptualising such systems. Connectionism is a way of processing information based on an understanding of the brain, which is used in computational modelling techniques such as neural networks (Cilliers, 1998).

Summarising Cilliers' (1998) extensive explanation, networks are comprised of neural units that are connected to one or more other such units. The strength of the connection, or relationship, between two of these is determined by a particular value or 'weight', which can be positive or negative and is usually non-linear. The total output of a unit is determined through the sum of its various inputs, after these inputs have been multiplied by the value of the connection between that particular unit and the others to which it is connected. The output of one unit then becomes the input of others. Cilliers (1998) explains that the characteristics of a system in its entirety are determined by the values of the weights (i.e. the relationship between units) rather than the units themselves, which on their own, or even collectively, do not have any particular significance. This is because information is not stored in the individual units, but in the multitude of relationships between them.

In addition, Heylighen *et al.* (2007) explain that a system as a whole has a boundary that separates it from other systems, and which also has both incoming and outgoing streams. The output of one whole system can be the input of another. Moreover, if a group of systems, which are connected by various input and output relations, act in a fairly consistent way, they can themselves form a network, which can be considered a system, or super-system (Heylighen *et al.*, 2007).

Therefore, returning to the problem of reductionism, the concepts of connectionism and complexity show us that systems cannot be understood merely by studying their component parts (Heylighen *et al.*, 2007). There are two primary reasons for this. First, a component (or subsystem) of a complex system is not an independent element, but rather a relation that processes input into output according to the nature of that relation. In merely studying the component parts, the relationships between components, which are the most significant aspects of the system, are lost.

Secondly, as a result of the interconnectedness of the system, it has emergent properties, or characteristics that cannot be reduced to the properties of the parts (Heylighen *et al.*, 2007).

Emergent properties result from the characteristics of the components (or sub-systems) within the system (i.e. upward causation), and from the constraints that being part of a super-system imposes (i.e. downward causation). Heylighen *et al.* (2007) use the example of an individual that is not only controlled by the neurology of her/his own brain, but also by the rules of the society in which s/he lives. Once a system has coupled with another system, the resulting super-system imposes a certain structure and consistency on the subsystems, so that one cannot change without affecting the others according to the relations within the super-system (Heylighen *et al.*, 2007). The main focus within complexity theory is therefore placed on the state of the relationship between components, rather than on the components or sub-systems themselves

3.4.2.2. Beyond objectivity

An important insight from complexity theory is that when dealing with complex systems, we cannot escape the normative or ethical dimension of knowledge generation (Heylighen *et al.*, 2007). Cilliers (2000a) does not use the term 'ethics' to mean a nice or altruistic attitude, or to refer to a specific set of moral principles. Rather, by ethics, he means "... the inevitability of choices that cannot be backed up scientifically or objectively (Cilliers, 2000a: 29)".

Cilliers (2000a) explains that there are multiple moments of choice that cannot be avoided when trying to understand complex systems. Therefore the ethical dimension is not something additional to knowledge generation, but rather something that is intrinsic to it. Cilliers (2008c) points out, that complex systems are open systems and, therefore, if we wish to understand them in all their complexity, we need to understand both the system itself, as well as its environment. To do this comprehensively we would need to accomplish the impossible task of modelling the system and its environment, which is in itself, complex (Cilliers, 2008c). Our models must, of necessity, reduce the complexity of the system, leaving some elements out, and thereby introducing subjective choice (Cilliers, 2001; 2008c). Cilliers (2000a) explains that we choose the boundaries of our models, basing them on certain assumptions and limitations. In other words, we are subjective in our selection of the framework through which we will gain knowledge of a system. Such frameworks cannot be developed through purely objective processes, as we cannot have prior knowledge of the entire system in all its complexity to guide the development of the framework. However, this process need not be an arbitrary choice either and Cilliers (2005a; 2005b) points out that this choice is influenced by a number of contextual and strategic factors (e.g. the context in which the knowledge is to be useful, the purpose of the research, considerations of expediency), as well as the structure and patterns of the system itself. As any of these aspects change over time, the framework (including the boundaries of the system) needs to be revised (Cilliers, 2005a; 2005b).

There is no way of developing complete, final, objective knowledge of the system (Cilliers, 2005a; 2008c) because, as Cilliers (2005b: 612) states: “It is only from a situated position that we can have knowledge, never from an abstract position”, and as the situation (or context) changes, so should the framing of the models used for generating such knowledge (Cilliers, 2008c). Put simply, information produced by a model cannot be interpreted independently of its limitations and assumptions and those limitations and assumptions should be continually revised as circumstances change (Cilliers, 2000a).

Cilliers (2000a) makes the important point that even if complex systems could be modelled in their entirety (including all their non-linear interactions) such a model would be as difficult to interpret as reality itself. If, however, we could understand a model that is as complex as reality itself, the information produced by that model would still need to be interpreted (Cilliers, 2000a). This intrinsically normative dimension of knowledge generation, as outlined above, means that responsibility for choices made cannot be placed on an external, objective process such as a general algorithm or particular scientific process (Cilliers, 2000a; 2008c).

Cilliers (2005b) acknowledges that this view can be disconcerting to those that believe that science has to maintain pure objectivity and avoid relativistic approaches that would undermine scientific knowledge. Cilliers (2005b) explains, however, that complexity must be interpreted in a way that does not lead to relativism. Understanding knowledge as part of a complex system of interactions does not only deny that knowledge can be seen as atomised facts that have objective meaning, but also denies the view that knowledge is purely subjective (Cilliers, 2000b; 2005b; 2008c). A theory of complexity aims to go beyond the subject-object/relativism-foundationalism divide in a number of ways, including the following (the first one has already been briefly described above):

1. Recognising that the framework within which our knowledge is constituted (including the spatial boundaries of a system being studied), is determined through *both* ethical considerations (e.g. strategic choices) and the characteristics and structure of the system itself (Cilliers, 2005a; 2005b; 2008c). Due to the characteristics of the system, some frameworks for knowledge generation are more meaningful and useful than others, but there is no predetermined process or formula that can be used to identify ‘the best’ framework. In any event, such a framework needs to be revised as the context changes (Cilliers, 2005b).
2. Recognising the links between knowledge and the system or context within which it emerges (Cilliers, 2000b). Cilliers (2000b; 2005b) explains that it is not possible to first

identify the system and then sequentially derive the knowledge within that context, as the two are interlinked.

3. Problematising the idea that data and information can be transformed into knowledge through an objective, mechanical process. It is acknowledged that there are facts that exist independently of the observer, but as Cilliers (2000b: 10) puts it, they "... don't have their meanings written on their faces". Meaning comes into being through the network of interactions and relationships between components of the system. Cilliers therefore states that knowledge is interpreted data (Cilliers, 2000b; 2003; 2005b).
4. Acknowledging that to a large degree the natural sciences have to work with the assumption of objectivity, while realising the constraints of their knowledge claims due to the limitations of the particular framework they have chosen to generate that knowledge (Cilliers, 2008c). Cilliers notes that most good scientists acknowledge this, but the problem is exacerbated when the social sciences adopt the methods of the natural sciences in a simplistic way.
5. Emphasising that the argument from complexity is not against calculation and the construction of models, but rather for an acknowledgement that these approaches are never sufficient, as choice and interpretation are an inherent characteristic of knowledge generation (Cilliers, 2000a).

3.4.2.3. Beyond universal determinism

The principle of universal determinism is another way, according to Morin (2007), in which classical science has rejected complexity. In general, determinism is the idea that "... all events and states of affairs are determined by antecedent events and states of affairs" (Mauter, 2000: 137). This notion has several more specific nuances; however, it appears that the particular formulation which Morin (2007) criticises is one which holds that "... in a deterministic universe, its total state at any other time is deducible from knowledge of its total state at any one time, given complete knowledge of the universe's ways of working" (Mauter, 2000: 137-138). Using ideas from complexity theory, Cilliers (2007), who builds partly on Morin's discussion, counters this principle of classical science primarily through his argument, which I have paraphrased here, that not only is it impossible to have knowledge that applies at any time, we also cannot have complete knowledge of a system at a particular time. I will start with the first argument.

We cannot have knowledge of a system that applies to any time because of the normative nature of knowledge, as described in section 3.4.2.2 above. As the context changes, so should our

understanding, which means that all knowledge is provisional (Cilliers, 2007; 2008c). It is valid for the period in which the framework used to generate it, is appropriate or meaningful. However, even within that period the knowledge we have is limited due to a number of other factors including the following (Cilliers, 2001; 2005a; 2005b; 2007; 2008c):

1. When modelling, we reduce the complexity of the system and therefore leave some components out of consideration, as explained in the previous section. Our conceptualisation of the system is therefore always limited. In addition, our ability to predict the consequences of this limitation is constrained by the fact that those aspects which we have left out interact with the system in a dynamic, non-linear way, through direct and indirect feedback paths. Cilliers (2005a; 2007; 2008c) points out, that such prediction becomes particularly difficult as the system and its environment change over time. Cilliers (2005a; 2008c) does not use this as an argument against modelling, but rather as the reason for modesty and caution regarding the scope of the knowledge claims we make as a result of such modelling.
2. As we can only have knowledge in relation to a particular normative framework, all knowledge is situated or contextual knowledge. We therefore cannot make final and complete claims about the world; there is no 'framework for frameworks' (Cilliers, 2005a). Therefore various different descriptions of the same system can all have validity in relation to the framework in which they were developed. Some may be more useful than others; however, none can be a complete representation of the system.
3. Although the macro (or emergent) behaviour of a system is purely the result of micro-activities, it is not possible to take all these activities into account when trying to describe macro-level behaviour. Scientists therefore typically reduce complexity and focus on macro-level descriptions that are *approximations* of micro-level activities. Having said this, Cilliers (2007) notes that the very idea of clearly divided 'levels' is problematic, as activities on the micro-level affect those on the macro-level and *vice versa*. Even more critically, Cilliers (2007) notes that the concept of 'levels' is usually the result of our description, rather than an inherent feature of the system itself.

Cilliers (2005a) asserts that the fact that we can only have limited knowledge is not a disaster. Limiting frameworks make knowledge possible, as without them, absolutely everything, including the universe, would have to be encompassed in any complete description of reality, a task that is obviously impossible. Acknowledging the limits of our knowledge relieves us of the 'terrible duty' of finding the final, correct, complete and objective description of the system we are trying to study (Cilliers, 2007). Although Cilliers (2005a) argues for modest positions when dealing with complex

systems, he emphasises that this does not mean that he is proposing a weak approach. Acknowledging the limitations of our knowledge clearly, Cilliers (2005a) argues, is an ethical responsibility. We also need to deal with the implications of such limits which includes making choices, or put in another way, adopting an ethical position, as discussed in section 3.4.2.2 (Cilliers, 2000a).

3.4.2.4. *Beyond positivism*

Due to the limitations of scientific analysis in understanding complex issues, Cilliers (1998) argues strongly against an understanding of scientific knowledge as the only form of legitimate knowledge. He states that we need to 'actively resist' the propensity of knowledge generated through the methods of the natural sciences to be considered more valuable than other types of knowledge (Cilliers, 2008c). Cilliers (1998) explains that science has traditionally been developed through a process of falsification, in which theories are disproved and everything containing too much uncertainty, complexity or unpredictability is excluded from the accepted body of knowledge (until such time as that uncertainty, complexity or unpredictability is removed). He points out that this has led much of human knowledge to be regarded as unscientific and therefore not valid.

Cilliers (1998) draws on Lyotard's (1988) postmodern position in order to develop an approach to knowledge that acknowledges complexity and goes beyond positivism. Lyotard (1988: 3) argues that: "Scientific knowledge is a kind of discourse" and multiple discourses, which obey different rules, coexist. The totality of knowledge cannot therefore be reduced to the scientific discourse "... which has always existed in addition to, and in competition and conflict with, another kind of knowledge, which I will call narrative in the interests of simplicity" (Lyotard, 1988: 7). Lyotard argues further that there is no final, abstract way of legitimating knowledge, outside its ability to serve the goals of various groups within society (e.g. institutions, communities and disciplines). Therefore, there is no single 'metadiscourse', such as the scientific discourse, that unites all forms of knowledge (Lyotard, 1988: 36).

Cilliers (1998: 128) draws on Lyotard's contrast between what he describes as the 'pragmatics of science' and what he calls the 'pragmatics of narrative knowledge' before developing a 'narrative' interpretation of scientific knowledge. Lyotard's classification, as interpreted by Cilliers (1998), is shown in Table 3.3.

Table 3.3: *Cilliers' Interpretation of Lyotard's Properties of the Pragmatics of Science and the Pragmatics of Narrative Knowledge*

<i>Pragmatics of Science</i>	<i>Pragmatics of narrative knowledge</i>
<p>Scientific knowledge requires that only one language game, that of denotation, be retained. Other types of statements (e.g. interrogatives) may be used in the process, but the argument must always end in a denotative³⁵ statement.</p> <p>Scientific knowledge generated in this way is not part of the general 'social bond', but the property of experts and professionals who organise themselves into exclusive institutions.</p> <p>Only the competence of the researcher is at stake in the process of research. In the case of the human sciences, competence is not required of the subject of the research.</p> <p>The validity of scientific statements does not increase through reporting or through popularity. These statements are only as valid as their proof.</p> <p>Scientific knowledge is cumulative. Scientists should only add new statements to the accepted body of knowledge in their field, when they are different to accepted ones.</p>	<p>The criteria for narrative knowledge are defined by the society in which the narrative functions and are flexible and dynamic.</p> <p>These narratives lend themselves to a variety of language games. No specific linguistic form is privileged.</p> <p>These narratives are 'transmitted' in a way that strengthens the social bonds.</p> <p>Narratives don't function mainly as a reminder of past events, but as a re-enactment of them. The meaning of the narrative lies not in the fact that it occurred in the past, but in the way that it is told in the present.</p> <p>No special procedure is needed to 'authorise' the narrative and the process for its development. The narrator is not isolated, but performs the role of integrator. Those involved in the process can perform any of the roles, such as narrator or hero.</p>

(Cilliers, 1998: 128)

Cilliers' (1998) characterisation of narrative knowledge that is scientific, also builds on his understanding of knowledge as part of a connected system. In the connectionist model (section 3.4.2.1 above), the self is understood as a node in a network, rather than an isolated, autonomous individual. This provides the basis from which to counter the critique that says that if all narratives are only legitimated locally, then the result will be fragmentation, with each discourse becoming isolated and independent of the broader community (Cilliers, 1998). This critique goes further,

³⁵ The *Penguin Dictionary of Philosophy* states that: "The denotation of a term is sometimes said to be any object to which the term applies, sometimes the class of object to which it applies" (Mauter, 2000: 106). In short, the *Oxford Dictionary of Philosophy* states that 'denotation' is: "That which is ... referred to by a term" (Blackburn, 1996: 99).

arguing that if each person only has themselves as a point of reference for the validity of the knowledge, there would be no way of ensuring the objectivity of such knowledge. The unacceptable result would be that 'anything goes' (Cilliers, 1998). However, Cilliers' (1998) argues that from the connectionist perspective, society is a network in which discourses cannot isolate themselves even if they form clusters within that network. The various local narratives are in constant interaction with other discourses, battling for territory. These narratives may expand or contract, but they only have meaning in relation to surrounding discourses. Cilliers (1998: 116) points out that it is through this dynamic self-organising process that meaning is generated, and not through the "... passive reflection of an autonomous agent that can make 'anything go'".

A second argument that Cilliers (1998) presents against the critique described in the previous paragraph, relates to the distributed nature of information within a social network. In such a network, information is contained in the patterns across the entire system, rather than represented by a particular node. A specific node is part of many different patterns of information. Applying this to discourses, Cilliers (1998) says that narratives are spread over many 'selves' (or nodes) and that individuals, in turn, are part of many different discourses or patterns, such as mother, wife, researcher and artist. Cilliers (1998) defines discourses as a 'pattern of activity' over a large group of people who exchange information, again counteracting the argument that one individual can make 'anything go'.

Cilliers' (1998: 130) 'narrative' interpretation of scientific knowledge therefore comprises the following propositions:

- The world is complex and this complexity is diverse, but organised (not chaotic);
- Descriptions of this world cannot be reduced to simple, coherent and universally valid discourses;
- If complexity is modelled in terms of a network, any narrative will form a path through the network and there are many such paths;
- The network is dynamic and changes as various narrative paths are traced through it. However, all paths are constrained by the local structure of the network which can either be fairly loose, or quite tight;
- Although there are many narrative paths from one point to another in the network, it is not true that 'anything goes' as all narratives are constrained in some way, and some paths are not possible;
- All paths are contingent and provisional; and

- Certain parts of the network can be 'fixed' for strategic reasons in a process of 'framing' that is necessary for scientific inquiry. However, all knowledge produced as a result is relative to the particular frame used and cannot be generally applied to another time or space.

3.4.3 Implications for environmental assessment

In the sections that follow, I will relate Cilliers' work to the field of environmental assessment. I will begin by applying Cilliers' characteristics of complex systems to the social-ecological environment that is studied within an environmental assessment. Thereafter, I will again use the categories of 'beyond reductionism', 'beyond objectivity', 'beyond universality' and 'beyond positivism', as a starting point for the discussion of the implications of complexity theory for environmental assessment. For convenience, I have summarised Cilliers' arguments (as discussed above) in italics before the discussion in each of these categories, which begins in section 3.4.3.2.

3.4.3.1. The environment as a complex system

The social-ecological system that is studied within an environmental assessment displays the characteristics of complexity identified by Cilliers, as shown below (Cilliers, 1998; 2007; 2008a)³⁶:

- Social-ecological systems comprise a large number of elements. For example, they include many human individuals and communities that interact with ecosystems, which themselves contain numerous interacting plants, animals, micro-organisms and abiotic environments.
- Social-ecological systems display characteristics (i.e. emergent properties) that emerge from the interactions between the components of the system and not only from the characteristics of the components themselves.
- The interactions between the elements of social-ecological systems are dynamic and fairly rich. As technology becomes more sophisticated, for example, there is a constant flow of information between people on a global scale which is continuously changing as circumstances evolve. There are also dynamic and rich dependencies and interactions between natural species and between species and their environment. Such interactions, however, are currently changing towards an

³⁶ To develop this list, I have combined, summarised and adapted the characteristics of complex systems, described in Cilliers, 1998 and 2007, to apply to social-ecological systems. Most of the ecological examples used are informed by discussions (February, 2007) that I had with Dr Belinda Reyers (CSIR) in developing material for a CSIR sustainability science course.

increasingly more fragmented state due to human activities such as rapid urban development. This highlights the third type of rich and dynamic interactions that occur in social-ecological systems, namely between humans and the natural environment. Perhaps the most basic of these interactions occurs when people drink water and breathe air. Other fundamental, rich and dynamic interactions occur between man and nature through the continuous development and cultivation of land.

- The interactions within social-ecological systems are non-linear. For example, relatively small changes in the urban environment can have large effects on the system as a whole; a single keystone species, which has a disproportionately large defining influence on a system, can be adversely affected by a development, resulting in disproportionately significant system impacts.
- Elements within a social-ecological system usually interact at a fairly short range (not necessarily spatially, but through technological developments such as the internet). For example, people usually interact with service providers in their local neighbourhood and with friends that live in close proximity or who are accessible electronically.
- The activity of a component in a social-ecological system can directly or indirectly affect itself through feedback loops. A politician may make decisions, for example, that affect the governance of a country as a whole; however, as he is a resident of that country his decisions will also affect him on a personal level. Mining, for example, often results in the formation of small towns in the vicinity of a mine that service the needs of mine employees and their families. These towns are therefore dependent on mining activities for their survival. However, as minerals are non-renewable resources, those same activities take affected towns to the point where their economic base is eroded.
- Social-ecological systems are open systems as they are always strongly connected to their environment. For example, a particular social-ecological system will be influenced by broader climatic, economic and political conditions. For this reason, the boundaries of such systems are difficult to define, as they are not simply the result of physical characteristics. These boundaries are also based on strategic and normative considerations (e.g. the purpose of studying the system) and will therefore partly depend on the person or group determining them.
- Social-ecological systems do not exist in a state of equilibrium. For example, the economy is usually growing or shrinking, variations in climate are affecting agricultural

output on a yearly basis and patterns of migration, immigration and emigration, are influencing the demand for goods and services in a dynamic way.

- Social-ecological systems maintain and adopt an asymmetrical temporal, spatial and organisational structure, despite changes within the components.
- The functioning of social-ecological systems occurs at a variety of timescales. For example, changes in interest rates may occur at a faster pace than changes in consumer behaviour; farmers may adapt to changes in rainfall and temperatures at a much slower pace than those changes in climate actually occur.
- Social-ecological systems are strongly influenced by their history as their current state is partly a consequence of factors such as their geological past, previous social and economic policies, historical agricultural practices and earlier forms of urban development.
- Each element within a social-ecological system is unaware of the behaviour of the system as a whole and therefore acts mainly on the local information available to it. When making a decision whether to purchase a property in a particular location, for example, an individual usually considers factors such as the current trends in interest rates, their own ability to afford the property and their preferences concerning location, style, size and structure. Far less consideration is usually given to broader factors within the system, of which the individual is not likely to have certain knowledge (e.g. the influence of global market trends on the national economy and therefore on the particular property investment being considered).
- A social-ecological system can be described in various ways. Different descriptions will have various degrees of complexity and deconstruct the system in different ways.

Although I have concerns regarding their literal application to human beings as components within social-ecological systems, there are a number of other characteristics of complex systems listed by Cilliers (2007) which I believe to be an important *aid* in understanding social-ecological systems. Importantly, they describe the significance of the interconnectedness of a system and the reasons why reductionism is not appropriate when understanding complex systems. They are also useful when developing computational models. These characteristics are as follows:

- The components themselves are often simple or can be treated as such;
- The output of components is a function of the value of their inputs. Some of these functions are non-linear; and

- Interactions between components are determined by input-output relations, the strength of which changes over time.

My concerns, however, stem from Sen's (1999) argument that human beings have both functionings and capabilities. Put in the terms described by Cilliers, the actual interaction between human individuals or components within the system is important, but so are their capabilities or potential for interaction (Sen, 1984; Crocker 1991). In my view, this extends the debate, in the context of humans, beyond actual inputs and outputs, and places at least equal importance on the individual's state of being within him/herself. This may be an overextension of Cilliers' description of complex systems, but I think that it is important to remember that models are limited, as Cilliers (2005b) himself argues.

This point brings to the fore another important argument that Cilliers makes regarding the general use of complexity theory. Responding to questions posed by Gershenson, Cilliers (2008d: 20) states that he does not think that "... complexity theory as a computational technique will produce staggering new results ... This is not because of incompetence or fundamental errors, it is the nature of the beast. The formal descriptions of complex systems can only address certain aspects of the complex human world, helpful as they are. Researchers working in the discipline should be very careful about the claims they make about future possibilities". Cilliers then argues that the main contribution of complexity is not in its technological applications, but in the way it influences our understanding of the world. He therefore states that: "We should promote what can be called 'complexity thinking', a style of thinking which is critical of claims based on reductionist thinking, yet at the same time mindful of its own limits" (Cilliers, 2008d: 20).

3.4.3.2. Beyond reductionism

The traditional scientific method of analysis, isolation and the gathering of complete information is inadequate for dealing with the interconnectedness of the world today. In general complexity theory, it is recognised that knowledge of the parts of a system is not enough, and neither is knowledge of the whole sufficient. There is a need for an understanding of both, as well as the relationships between the whole and the parts.

In the early days of EIA, checklists and matrices were used to list the potential impacts of development on the environment, according to categories such as air, water, land and employment opportunities (Wathern, 1988; Sadler, 1996; Weaver, 1998). This approach involved the

fragmentation of the project and the environment into their component parts and the identification of first-order cause-effect relationships (Bisset, 1988; Burns, 2002).

Various methods have developed internationally that aim to promote, a more integrated 'systems-level' approach (Bisset, 1988). Among these are network and systems methods, in which the natural (and occasionally socio-economic) components of a system are linked together by lines that indicate the direction, and sometimes the magnitude, of energy flows between them (Wathern, 1988). Bisset (1988) points out that systems diagrams are based on the assumption that energy flows are indicative of the measure of impacts of a development and can be used as a 'common unit' in determining these impacts. These systems diagrams focus mainly on determining the nature of ecological impacts; however, some have argued (e.g. Lavine *et al.*, 1978) that they can provide a bridge between environmental and economic systems, as the energy flows can be expressed in monetary terms (Bisset, 1988).

Bisset (1998) states that there are a number of disadvantages to the use of system diagrams in EIA, including that:

- They are time consuming and expensive to construct and periodic revision may be necessary to accommodate natural and man-made changes;
- Not all important ecological relationships can be represented in terms of energy flows; and
- They are confined to ecological impacts as attempts to incorporate socio-economic issues are problematic from both a conceptual and practical point of view.

Other approaches to developing a systems perspective include, for example, Adaptive Environmental Assessment and Management (AEAM) and the issue-orientated approach. AEAM is based on the work of Holling undertaken in 1978 and includes the construction of a computer simulation of the systems likely to be affected by the development (Bisset, 1988). This construction is undertaken through a series of small workshops with scientists, decision-makers and others, the purpose of which is to reach consensus on the components of the system and the relationships between them. As far as possible, the discussion at the workshops is converted by modelling experts into quantitative relationships between the various components of the system. The potential consequences of a proposed development is then determined through the use of the model under different scenarios. However, Bisset (1988) notes that the literature and practice of AEAM is biased towards the management of resources and although there have been attempts to incorporate social and economic concerns these have been limited to a few variables (e.g. per

capita incomes). He also notes that there is a tendency in AEAM to quantify relationships based on uncertain data.

The current practice of environment assessment in South Africa is generally less reductionistic than the checklist methods described above. However, the reporting of the potential impacts of a proposed development is still typically divided into natural science and socio-economic categories. Such divisions are reflected in the current EIA regulations that require "... a description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity" (DEAT, 2006a: Chapter 3, section 23(2)(d)). Although attempts are made, after analysis, to integrate the various aspects of the environment, as discussed in Chapter 1 of this thesis, undertaking this task effectively is one of the key challenges to the practice of EIA.

The 'issues-orientated' approach, which was introduced by Taylor *et al.* (1990: cited in: Weaver and Rossouw, 1998: 312) in the context of social assessment, has influenced South African practice. In this approach the issues identified in scoping form the basis for drawing up the terms of reference for specialist assessment studies (Weaver and Rossouw, 1998). This is intended to promote a more integrated approach to environmental assessment, where several specialists collaborate in an inter-disciplinary manner to address a single issue (Weaver and Rossouw, 1998). However, I have noted several EIAs in which the issues, as they were expressed in scoping, are allocated in their entirety to the specialist whose disciplinary background seems most appropriate for its investigation. The possibilities for improved integration between specialists are therefore lost. In my view, supported by Will (2008) in the context of State of the Environment Reporting (SoER), an initial concept of the linked social-ecological system and the relationships within it, is required at the outset of an environmental assessment process, to guide the 'issues-orientated' approach. The links between a particular issue and specialist areas will then be clearer, which can assist the environmental assessment practitioner in assigning a number of specialists to a single concern.

3.4.3.3. *Beyond objectivity*

When dealing with complex systems, we cannot escape the normative or ethical dimension of knowledge generation. For example, the framework (or boundaries) within which our knowledge is constituted is determined through both ethical considerations and the characteristics of the system itself. Although some frameworks will be more useful than others, there is no pre-determined method for identifying the most appropriate framework or boundary. The normative dimension of

knowledge also arises in our interpretation of facts, which don't have their meaning 'written on their faces'. This meaning evolves through the interactions and relationships between the components of the system.

As stated in section 3.2.3.1, an ethical decision or choice has to be made regarding several inter-related dimensions of an environmental assessment, including the boundaries of the system (spatial and non-spatial), the values, principles and/or objectives that will inform the identification of impacts and their significance, and the types of knowledge or styles of rationality that are to be used in identifying and assessing such impacts. I will discuss each of these aspects below.

A type of 'boundary' or framework for an environmental assessment is determined through scoping (DEA, 1992). This participatory process includes the identification of significant issues that are to be addressed in the assessment, the alternatives to be considered and the terms of reference for the study (Preston *et al.*, 1994). In terms of South Africa's EIA regulations (DEAT, 2006a) scoping should also include, *inter alia*, a description of the property on which the activity is to be undertaken, the environment that may be affected by the activity and the way in which this may occur (Chapter 3, section 29(1)(c)(d)).

Among the key challenges within an environmental assessment is setting the spatial boundaries. A description of the property that is affected is clearly not adequate for this task, as the development may impact on communities and environments that are outside the site boundary. It can be argued that describing the affected environment is a better way of setting the spatial boundaries. However, according to complexity theory, to comprehensively identify this affected environment, an understanding is required of the links between this system and others (e.g. systems at the provincial, national and international scale; and biogeographical systems that do not follow administrative boundaries). As Cilliers (2008c) points out, having comprehensive knowledge like this is clearly impossible. Therefore the boundaries of an environmental assessment have to be drawn, based on both objective considerations (e.g. boundaries of a municipal area, a natural boundary such as a river or mountain), as well as value-based, strategic ones (e.g. issues being investigated).

It can be argued that in the environmental assessment process, the strategic, value-based aspects of those boundaries are determined through the participation, in the scoping process, of stakeholders (based on their values and preferences). However, in my view, a strategic decision is made, either explicitly or implicitly, concerning the boundaries of the assessment before scoping takes place, as such a decision is needed to guide the identification of stakeholders and the means

(e.g. location of notices) by which potential stakeholders will be notified of the proposed development. As those stakeholders are more likely to identify first-order issues that directly affect them and their immediate environment, the extent of the assessment is therefore strongly influenced by this initial decision. From my interpretation, the argument from complexity theory does not say that it is wrong to make this initial decision, but that it should be made explicitly; i.e. the reasons for defining the boundary in a certain way should be clearly explained. In addition, the influence of the boundary on the assessment should be acknowledged (i.e. what type of considerations would need to be left out). The current EIA regulations (DEAT, 2006a) require details concerning the stakeholder engagement process (Chapter 3, section 29(1)(h)) and the issues and potential impacts that have been identified (Chapter 3, section 29(1)(f)), from which the boundaries of the assessment could be broadly deduced; however, a rationale for these boundaries is not explicitly required.

One of the most important normative considerations within an environmental assessment is determining the significance of the potential impacts identified. In the environmental assessment literature, it is generally recognised that facts need to be interpreted and don't, as Cilliers (2000b: 10) states, have their "... meaning written on their faces ..." particularly when determining their significance. For example, in the guidance provided by DEAT it is stated that: "The main challenge [is] to ensure that the environmental impact reporting recognises that different impacts have varying levels of significance for different stakeholders. Professional judgement should ideally be used in conjunction with the different value judgements expressed by various stakeholders" (DEAT, 2002d: 15, parenthesis added).

Numerous methods have been developed internationally to determine the significance of impacts. These vary in a number of ways, including: the mix of technical information and stakeholder input that informs the judgement; the extent to which impacts are quantified; and the extent to which modelling techniques are used (Sadler, 1996; DEAT, 2002d). Although considerable literature exists on possible ways to include value-judgements in the determination of significance (e.g. Wathern, 1988; DEAT, 2002d; Glasson *et al.*, 2005), in South African practice this judgement seems to be primarily based on expert opinion. For example it is stated in DEAT (2002d: 29) that "... the EIA team often determines impact significance from a professional perspective. Public input and values seldom informs determination of significance and acceptability of impacts ...". He also states that "... the value judgements contained within scientific information are not made explicit". Glasson *et al.* (2005: 137) make a similar observation concerning EIA internationally, stating that: "Much, if not most, current evaluation of significance in EIA is simple and often pragmatic, drawing on experience and expert opinion ..."

Despite the recognition of the subjectivity involved in determining the significance of potential impacts an attempt is often made in environmental assessment theory, to formulate an objective means of making these judgements. In the 1970s and early 1980s several methods were developed, most of which reflected that era's emphasis on quantitative analysis (DEAT, 2002d). The focus was on attaining objectivity in assessment and many of these methods (e.g. the Leopold Matrix) required the weighting and ranking of the significance of potential impacts (DEAT, 2002d). Even those that incorporated stakeholder inputs and the expression of values, attempted to convert these into numerical ratings such as through the Sondheim Method and the Crawford Method (DEAT, 2002d). These methods have been criticised for the false impression of objectivity that they often created (Bisset, 1988; DEAT, 2002d). Bisset (1988: 53), for example, comments that: "It is argued that the subjectivity involved in these computations is hidden within a spurious objectivity".

An attempt was made in the 1970s and 1980s to disaggregate stakeholder values by showing the costs and benefits of a proposed project according to the views of various stakeholder groups (e.g. business and industry, civic and non-governmental organisations and professional organisations) (Burns, 2002). An example of such a technique is the goals-achievement matrix, in which both quantitative and qualitative evaluation units are used to describe such costs and benefits (Burns, 2002). However, this technique is not part of mainstream EIA in South Africa today. There is currently less emphasis on quantification, as many EIA systems move towards a qualitative description of the significance of impacts; however, the emphasis on attaining some form of objectivity persists. This occurs in many forms, with some countries requiring significance to be determined through the consideration of a pre-determined list of questions (e.g. the Canadian system), while others require consideration of a pre-determined list of actions or impacts that are regarded as significant (systems used in California and New York) (DEAT, 2002). In South Africa the attempt to achieve objectivity is made to an even greater degree. The South African EIA regulations require the significance of impacts to be described in terms of a list of criteria that does not include the acceptability of the proposal to various groups within the community. Although this criterion is included within the local literature on environmental assessment (e.g. DEAT, 2000), it is excluded from the list provided in the EIA regulations (Chapter 3, section 32(2)(k)), which are confined to the following 'more objective' measures:

- (i) Cumulative impacts;
- (ii) The nature of the impact;
- (iii) The extent and duration of the impact;
- (iv) The probability of the impact occurring;
- (v) The degree to which the impact can be reversed;

- (vi) The degree to which the impact may cause irreplaceable loss of resources; and
- (vii) The degree to which the impact may be mitigated.

To comprehensively determine the significance of the potential impacts of development on a community and the environment that sustains it, one would have to interview most individuals and understand the consequences of such impacts on most aspects of their lives. Although this is again impossible, complexity theory provides a way forward. The fact that the significance or meaning of the potential impacts identified is not objective and must be interpreted from a particular perspective must be made explicit in the EIA. As complexity theory points out, there is no objective 'framework of frameworks' (Cilliers, 2005a); therefore, we need to leave some things out and include others, making the development of the framework a choice and subjective exercise. An action will have either a positive or negative impact, which will vary in significance, depending on the perspective taken. What may be considered a considerably negative impact from an environmental point of view may have minor, but positive, consequences from an economic perspective. We can go further to say that determining impacts and their significance are not separate exercises. It is therefore critically important to develop and present the framework against which impacts and their significance are identified.

It can be argued that the criteria contained in South African legislation for determining significance forms this framework. However, describing impacts in terms of their nature, extent and reversibility, is still dependent on individual perspective. This perspective or framework against which impacts (including their significance) are identified should be developed at the early stages of an impact assessment process. As shown by complexity theory, no pre-determined objective method can be prescribed to develop this framework, as it is an ethical task or a choice that should respond to the context in which it is applied.

Such an approach is partially emerging in the development of sustainability assessment, in which the social, economic and biophysical impacts of a development are assessed, in an integrated way, against sustainability indicators, strategies and/or principles (Dalal-Clayton and Sadler, 2005). South African guidance on SEA (DEAT, 2000; 2007) includes such an approach, in which sustainability objectives, criteria and indicators are defined in a context-specific way. These objectives, criteria and indicators form a framework to guide the development and assessment of a policy, plan and/or programme. This is similar to the sustainability-led SEA approach introduced by Therivel *et al.* (1992) in which policies, plans and programmes are evaluated against sustainability objectives. Others such as Jay *et al.* (2007), Shandler *et al.* (1999) and Sadler and Jacobs (1990)

argue for a stronger link between impact assessment and sustainability objectives in the domain of EIA.

The assessment of the effects of potential projects against sustainability objectives provides a means of making explicit the perspective from which the assessment is undertaken. It provides a way of showing the values against which the project will be evaluated. Although this is a significant improvement on the attempt to evaluate impacts according to a pre-determined template, it does not go far enough in recognising the subjectivity and interpretive elements in EIA. The potential effects of a proposed project on contextually defined sustainability principles and objectives, is still open to interpretation and dependent on the particular perspective being taken. Therefore, we will never escape the strong normative dimension in identifying and assessing the significance of potential impacts. Recognising this frees us, as Cilliers (2007: 109) states, from trying to find the "... final, correct and objective description of the thing that we are trying to understand" (in this case, the significance of impacts). If we accept the connectionist perspective in which society is a network in which various local discourses exist and interact with one another (Cilliers, 1998), then we can select the interpretation or narrative that appears to be most meaningful at the time, make this selection explicit and acknowledge that alternative discourses have been omitted.

In practice this means that the existence of a range of discourses must be recognised and that an attempt must be made to select the types of knowledge, styles of rationality or particular narratives that are most suited to determining the consequences of a proposed project and their significance. A range of different discourses will need to inform a single environmental assessment, not merely a scientific one or one based on the general professional opinion of environmental practitioners. For example, determining the systemic effects of the clearing of indigenous vegetation may require both scientific knowledge (e.g. effects on erosion) and the local knowledge of the community (e.g. effects of the availability of plants on their use for medicinal and domestic purposes by a particular community). The need to acknowledge multiple epistemologies is increasingly being recognised in the literature, such as that on sustainability science (Burns *et al.*, 2006; Burns and Weaver, 2008), as well as that on environmental assessment (e.g. Hill, 2004). The implications of a narrative interpretation of knowledge for environmental assessment and management are discussed in further detail in section 3.4.3.5 below.

3.4.3.4. Beyond universality

At any given time we cannot have complete knowledge of a system. Such knowledge is always contextual and provisional, as it can only be developed in relation to a particular framework (or

context). In addition, our knowledge is limited by the difficulties in predicting the consequences of non-linear interactions between the system and the components that were excluded when framing it. Our knowledge is also limited by the fact that we cannot identify all the micro-level activities within the system when trying to describe macro-behaviour (or emergent behaviour). Our descriptions are therefore approximations of such micro-level activity.

Limitations in knowledge have been recognised within impact assessment in South Africa, since its inception, through what is known as the precautionary approach. This principle is currently contained in NEMA, as well as DEAT's (2004a) best practice information document on Integrated Environmental Management (IEM). According to NEMA (Chapter 1, section (2)(4)(a)(vii)) a precautionary approach is "... a risk-averse and cautious approach ... which takes into account the limits of current knowledge about the consequences of decisions and actions ..." (Republic of South Africa, 1998).

The limitations of knowledge are also recognised within the environmental assessment report itself and in the specialist studies that inform environmental assessments. According to South African best practice guidance (DEAT, 2002e) and the EIA regulations (DEAT, 2006a: Chapter 3, section 33(2)(c)(e)), specialists must indicate the scope of their study, any gaps in knowledge and the assumptions that they have made. The EIA regulations (DEAT, 2006a: Chapter 3, section 32(l)) require that this information is also contained in the integrated environmental assessment report.

Another way in which the limitations of knowledge are acknowledged is in the requirement within best practice guidance (DEAT, 1992) for assessment practitioners to provide an indication of the degree of certainty that accompanies each of their impact predictions. This requirement is partially included in South Africa's EIA regulations (DEAT, 2006a: Chapter 3, section 32(2)(k)(iv)), in which an indication of 'the probability of the impact occurring' must be provided. This legal formulation, however, contains a limited recognition of uncertainty as it places more emphasis on an evaluation of the likelihood that an impact will occur, than on the evaluation of the assessor's certainty of his/her statements. A similar recognition of uncertainty is contained in international EIA requirements, such as the European Union EIA Directive, in which an indication of the probability of an impact occurring must also be provided (Glasson *et al.*, 2005).

There are various categorisations of uncertainty in the environmental assessment literature. Glasson *et al.* (2005), for example, draw on the work undertaken by Friend and Hickling (1987), in which they identify three types of uncertainty related to planning and strategic choice:

- Uncertainty related to the environment that is being studied, which creates a need for information which could possibly be met through, *inter alia*, further investigation, analysis, research and other methods;
- Uncertainty related to guiding values, which leads to the need for clearer objectives that could be defined through, for example, clarifying aims, setting priorities and involving others; and
- Uncertainty related to decisions (e.g. government policy), which leads to the need for coordination, which could be met, for example, through liaison, planning and negotiation.

Another writer, De Jongh (1988), identifies two types of uncertainties within impact assessment, namely: uncertainty related to impact prediction, and uncertainty related to the EIA approach. The author argues that uncertainty is inherent in impact predictions and is therefore unavoidable. He provides a description of various ways in which uncertainty 'creeps into' impact prediction relating, for example, to difficulties in impact description, inaccuracies in data measurement, variabilities inherent in data, and uncertainties inherent in models (mathematical, conceptual or physical) of the environment. De Jongh (1988) also discusses uncertainty related to the EIA approach as a whole. Here he lists a number of strategic choices that have to be made in the environmental assessment process, such as the impacts and alternatives to be investigated. He then describes numerous techniques to 'manage' uncertainty, or to reduce it to levels that are acceptable to the decision-maker.

Complexity theory reveals a number of concerns with the approaches to the limitations of knowledge within environmental assessment, such as the ones described above. These include the extension of scientific discourse and approach to knowledge to the value-domain; as well as the attempt to 'manage' uncertainty. I will discuss each of these below.

The debate on uncertainty is an example of where scientific discourse has dominated, marginalising the value-domain. Glasson *et al.* (2005), for example, recognise three types of 'uncertainty', two of which are clearly within the normative and ethical domain. However, the focus within EIA studies is usually on uncertainty related to the, 'more objective' category of the external environment (Glasson *et al.*, 2005). This typically includes uncertainty concerning the proposed project, the receiving natural and socio-economic environment, and the assumptions underlying the methods used (Glasson *et al.*, 2005). These authors state that socio-economic conditions of the environment may be difficult to predict, as societal values may change rapidly; however, they

do not discuss in any detail the choices that have to be made related to the other two more normative categories. This is perhaps a consequence of what Shandler (1999: 246) calls "... the identification of environmental practitioners with scientists and science ..." and the resultant marginalisation of value-based concerns, as discussed in Chapter 1 of this thesis.

De Jongh (1988: 63) relates the issue of uncertainty in environmental assessment more specifically to scientific discourse when he says that: "It was only with the discussions about the scientific content of EIAs during the 1980's that 'uncertainty' was first mentioned as an important issue". Even the term 'uncertainty' itself, in my view, seems to be more appropriate when speaking about a scientist's confidence in his/her statements than about strategic choices (which are also categorised as 'uncertainties') that have to be made. The scientific basis for the use of 'uncertainty' in environmental management, and therefore its application to strategic choices which are value-based, is explained by Norton (2005: 101) who says that: "Perhaps no issue confounds environmental managers more than the 'problem of uncertainty'. On a closer look the 'problem' of uncertainty is really a grab bag of more or less related problems, all resulting from the fact that our finite knowledge will always fall short of any ideal of 'full' knowledge upon which to base everyday decisions. Uncertainty, in this sense, is just a general label for all the failures of our scientific models".

It is important that the debate on uncertainty in environmental assessment does not interpret the normative choices that have to be made through a scientific lens or discourse. Despite difficulties in making strategic choices, it is, in my view, inappropriate to address these difficulties the same way one would address limitations in scientific knowledge. Friend and Hickling (1987) move towards this with their three categories of 'uncertainties' in which they propose alternative ways of addressing each. However, categorising normative choices as 'uncertainties', reflects the dominance of the scientific discourse in the environmental field, and does not promote the explicit engagement with such choices that is needed.

Although there are clearly uncertainties in impact prediction that we may try to reduce, Cilliers (2005b) provides us with an alternative way of viewing the strategic choices in environmental assessment. These choices are part of the contextual and provisional 'framework' that enables knowledge creation. If such a framework did not exist we would try to know everything about everything, which is impossible. Therefore instead of being 'uncertainties' which have to be managed or reduced, strategic choices make it possible to develop an understanding of the consequences of a particular development. This means, however, that we adopt a particular perspective in doing this, and the knowledge generated from such an assessment is therefore not

universal. The particular responsibility of an environmental assessment practitioner is to make this perspective, as well as the reasons for choosing it, as explicit as possible.

Complexity theory also highlights another problem with attempts to 'manage' uncertainty, as described, for example, by De Jongh (1988). To undertake such management, a fair understanding, either quantitatively or qualitatively, of the nature and extent of uncertainty is needed. However, gaining such an understanding is particularly difficult as non-linear and dynamic interactions occur within, and between, social-ecological systems (Cilliers, 2005a, 2007, 2008c). It is also particularly difficult, he states, because we don't always know what it is that we have left out when defining a system, and those excluded elements may also interact with the system in a non-linear way (Cilliers, 2008c). This means that there is uncertainty in our estimations of uncertainty. Often we don't know what we don't know. So, although indications of degrees of certainty may be provided (as suggested in DEAT's (2002d) best practice guidance) and various methods to 'manage' uncertainty put in place, environmental practitioners, stakeholders and decision-makers should never assume that the social-ecological system will not behave in completely unpredictable ways. They should also always acknowledge that this uncertainty exists.

In contrast to De Jongh (1988), Lawrence (1997) recognises, to a greater degree, the uncertainty inherent in impact prediction due to the open nature of complex systems. Lawrence (1997) acknowledges the importance of concepts of non-linearity, complexity and emergence in developing EIA practice and specifically mentions the "... inherent variations in complex systems ..." as a factor that contributes to uncertainty in impact prediction (Lawrence, 1997: 87). However, despite such recognition, this uncertainty is not always made explicit in practice (Glasson *et al.*, 2005). Glasson *et al.* (2005: 135) state that environmental assessments "... often appear more certain in their predictions than they should". This points to a huge problem, as a greater concern than uncertainty is the appearance of certainty that doesn't exist. This is because it could lead to false confidence in decision-making, insufficient caution in the implementation of projects and inadequate monitoring of the actual effects of a development once it is implemented.

In summary, complexity theory provides us with an approach to the limitations of knowledge, or to what are called 'uncertainties' in environmental assessment, that:

- Relieves us of trying too hard to 'manage away' uncertainty when there will always be changes in the system that we cannot predict and which we don't even know that we don't know;

- Promotes what Cilliers (2005a) calls a 'modest' approach to predictions³⁷; and
- Gives us a more proactive view on the strategic choices that have to be made, and which comprise the perspective from which the environmental assessment is undertaken, turning these from 'uncertainties' to be reduced to positive choices that enable knowledge generation.

Following Cilliers' (2005a) call for modest claims when dealing with complex systems, we can say that environmental assessments are valid so long as the perspective or framework that is adopted in the assessment is meaningful and even then, there are non-linear interactions and other difficulties in prediction that limit its preciseness. Currently, approaches to environmental assessments are generally not seen to provide such a 'perspective' on the potential environmental impacts of a proposed project, but rather a scientific evaluation of these impacts that is as objective and accurate as possible. This is despite several authors (e.g. Jay *et al.*, 2007) questioning the assumptions of value-free objectivity and universality in EIA.

The modest position to knowledge generation, when applied to environmental assessment, also means that environmental assessment practitioners should be cautious in the way that the assessment is communicated and used in decision-making. Moreover, it means that assumptions cannot be made that all the potential impacts of a proposed development are identified and therefore monitoring of what actually occurs is essential.

3.4.3.5. *Beyond positivism*

Scientific knowledge should not be understood as the only form of legitimate knowledge, as this limits our ability to understand systems, particularly their social aspects. Cilliers proposes a 'narrative' interpretation of scientific knowledge that, inter alia, acknowledges that descriptions of the world cannot be reduced to a single discourse. Various narratives, which are locally legitimated, exist and should be recognised. This will not lead to isolation and fragmentation of discourses as individuals are part of a system in which narratives are in constant interaction with other discourses. These narratives expand or contract as a result of this interaction, but they cannot isolate themselves. For these reasons, and the fact that all discourses are constrained in the system in some way, a narrative interpretation of knowledge will also not lead to a situation where 'anything goes'.

³⁷ Cilliers (2005a) emphasises that a modest position is not one that is weak, relative, self-contradictory or vague. Rather, he states that: "We can make clear, testable assertions about complex systems. We can increase the knowledge we have of a certain system, but this knowledge is limited and we have to acknowledge these limits" (Cilliers, 2005a: 263).

Environmental assessment processes vary in the degree to which they are based on scientific discourse, value-judgements and stakeholder views (Cashmore, 2003). To illustrate this Cashmore (2003) identifies a range of approaches to EIA which he places either in the category of an applied science or a civic science, as summarised in Table 3.4 below (Cashmore, 2003: 408-414). Within each of these categories he identifies various EIA models, while explaining that, although there has been a general shift away from the analytical approaches towards EIA as a civic science, the models do not represent a temporal trend in the literature.

Table 3.4: Cashmore's Categorisation of EIA Models

<i>EIA as applied science</i>		<i>EIA as civic science</i>		
<i>Analytical science model</i>	<i>Environmental design model</i>	<i>Information provision model</i>	<i>Participation model</i>	<i>Environmental governance model</i>
<p>In this model the foundation of EIA is considered to be the scientific method and an epistemology of positivism in particular.</p> <p>EIA is not necessarily seen as a science in itself, but, as a minimum, the process should be based on scientific principles and norms, to be credible. A demarcation is maintained between facts and value judgements.</p> <p>The research problem is the design and undertaking of the EIA. Scientific objectives must be identified, literature reviewed, modelling and experimental manipulation undertaken, recommendations made and</p>	<p>Most forms of EIA, in which the focus is on the EIA documentation that informs the development decision, are criticised for being separate from the design of the development and therefore limited to a reactive analysis of the proposed development once the design is complete. This creates the impression that EIA is just an obligatory step at the end of the process, which is required to obtain development consent.</p> <p>In this model a technocratic approach to EIA is supported in which it is integrated into the design of the development or policy.</p> <p>Extensive emphasis is placed on technical expertise.</p>	<p>Main purpose is to inform decision-making.</p> <p>A strict separation of facts and values is often maintained and extensive use is made of natural science methods, with a limited role assigned to the social sciences.</p> <p>The differences between EIA and science are recognised. EIA is viewed as generally more driven by time and resource constraints than science and more oriented towards a specific outcome (i.e. a decision). Unrealistic time constraints are accepted as inherent to the decision-making process.</p>	<p>There is a central role for science in analysing the environmental impacts of alternative development options and best practicable scientific techniques are promoted. However, this approach is more pragmatic than the previous model. The focus is on sound environmental management and on substantive outcomes, rather than the scientific method.</p> <p>Quantification is considered important where it is possible; however, qualitative predictions are still considered useful for effective environmental management.</p> <p>There is a more substantial and inclusive role for stakeholders</p>	<p>EIA is viewed as a decision tool used in environmental governance to empower stakeholders, promote equity in society and advocate an ecocentric interpretation of sustainable development. EIA must be a civic science and therefore inclusive and deliberative.</p> <p>It is also recognised that EIA is a political process used, for example, to promote, social justice and to make institutions accountable. EIA, like all political processes, is a framework for negotiation. The role of science is based on a different conception of science to that in the other models, which are based mostly on natural science, modified by social theory. This model is based</p>

<i>EIA as applied science</i>		<i>EIA as civic science</i>		
<i>Analytical science model</i>	<i>Environmental design model</i>	<i>Information provision model</i>	<i>Participation model</i>	<i>Environmental governance model</i>
<p>monitoring undertaken. EIA report subject to peer review.</p> <p>Impact predictions are constructed as quantified hypotheses that are tested. Monitoring is therefore considered very important.</p> <p>Unrealistic time constraints are seen in the analytical science model as the result of poor planning.</p>	<p>There is limited consideration of this model in the literature, perhaps because it would be very difficult to legislate.</p> <p>Based on the same epistemological and ontological assumptions as the analytical science model.</p> <p>Stakeholder engagement is seen as part of the broader planning process rather than explicit aim of the EIA itself</p>	<p>EIA is not seen as an experimental science or a research exercise; however, it is still seen as mainly analytical (e.g. feasible alternatives are identified and evaluated and modelling techniques used for quantification of impacts). The same degree of scientific rigour as that found in academic research is not expected. Rather, best practicable scientific techniques are promoted and it is considered important to balance rigorous analysis, stakeholder engagement and administration.</p> <p>Differences surrounding EIA outputs are seen as the result of differing values, rather than scientific issues. Although EIA is expected to confront subjectivity, a division between facts and value judgements is often maintained.</p>	<p>than in the previous model. The project proponent engages with a wider range of stakeholders and is prepared to modify the proposal based on these discussions. Extensive use is made of social science techniques.</p> <p>Stakeholder involvement is seen as a substantive, scientific process, not just a procedural exercise. It is driven by the need to make environmental decision-making more transparent and the need to embrace the plurality of values. The individualistic nature of values is recognised. There is a legitimate role for discourse containing both objective facts and subjective values and the demarcation between the two becomes blurred.</p>	<p>on a postmodern view in which the possibility of theory-neutral observation is rejected. Meaning and value are not derived from observing objective, scientific facts, but are socially constructed and dependent on local and historical context.</p> <p>Science is not used by the technical elite for the political elite, but rather to empower all stakeholders.</p> <p>The sciences are considered important in evaluating the impacts of societally defined alternatives, but the focus is on various social interpretations of resource value and the interactions between stakeholders and institutions.</p>

(summarised from Cashmore, 2003)

Cashmore (2003) highlights certain similarities between the models described in Table 3.4. He points out that each one is primarily based on existing philosophies of science (either positivism or relativism) and that all are founded on poorly defined conceptions of the purposes of EIA. Environmental assessment in South Africa displays certain characteristics of each of Cashmore's (2003) models; however, I would argue that our mainstream approaches to EIA are primarily founded on the 'information provision model'. A possible exception is the sustainability-led approach to SEA promoted in the DEAT (2000; 2007) guideline documents, which is strongly aligned to the environmental design model. The discussion that follows, however, relates to the model of EIA which is more commonly practiced and which is the focus of this thesis.

The emphasis within EIA in South Africa on informing a single authority decision concerning a proposed development, is reflected in the current Regulations, which define EIA as "... process of collecting, organizing, analyzing, interpreting and communicating information that is relevant to the consideration of the application" (DEAT, 2006a: Chapter 1, section 1). This has not always been the case, as IEM incorporated more elements of the environmental design model. For example, the Council of the Environment (1988: iii) guideline document describes IEM as "... a systematic approach for ensuring the structured inclusion of environmental considerations in decision-making at all stages of the development process". However, this latter emphasis was not carried forward into the current legislation, which centres mainly on the role of EIA in informing the authority decision of whether or not to approve a proposed development.

Although the emphasis on stakeholder engagement in South Africa is perhaps more than is implied in the 'information provision model', the perceived divide between facts and values remains. For example, the stakeholder engagement process, in which the values and priorities of stakeholders are elicited, is typically seen as a somewhat separate process and is often not properly integrated into the overall EIA (Greyling, 2000). This situation is not unique to South Africa, and as Greyling (2000: 154) states: "A difficulty experienced world-wide in environmental impact assessments (EIAs) is the proper integration of public issues and technical assessment".

The strong bias towards science and science-based approaches within environmental assessment contained in each of Cashmore's (2003) models (with the possible exception of the 'governance model') is also reflected in the South African approach to EIA in a number of ways that have already been discussed. Briefly, these include the emphasis on objectivity, the requirement that impacts are presented according to a universal, pre-determined template defined in legislation, the separation of facts and values discussed above and the division of the environment into its

component parts for investigation, followed by an attempt by the environmental assessment practitioner to integrate these parts.

Each of Cashmore's (2003) models is also, to a varying degree, based on a utilitarian approach, a point which Cashmore does not explicitly discuss. Utilitarianism contains many of the characteristics associated with positivist science, including a focus on objectivity, universalism and quantification. Jeremy Bentham (1748-1832), the founder of traditional utilitarianism, and his followers were influenced by philosophers such as the materialist, Hobbes (1588-1679) and the empiricist, Hume (1711-1776) (Magee, 2001). They sought an objective way of making value judgements that would provide a common, acceptable means of developing social policy (Velasquez, 2006).

Such objectivity and universality is sought in utilitarianism in various ways. First, a single maxim is followed that states that the social policy that should be implemented is the one that leads to the greatest utility or good for the greatest number of people (Velasquez, 2006; Des Jardins, 1992). Secondly, objectivity is required in the definition of 'the good', which must apply to all contexts and be good for all people and all times (universality) (Des Jardins, 1992). Thirdly, objectivity is required in the way that alternative policies are evaluated and selected. To determine which action or policy produces the greatest good for the greatest number of people, the utilitarian principle assumes that all the benefits and costs from such an action or policy can be measured on a numerical scale and added or subtracted (Velasquez, 2006). The action or policy that is ethically 'the best' is the one whose net benefits are greatest when compared to the other alternatives. Not only direct costs and benefits should be measured, but also foreseeable future effects and significant indirect effects (Velasquez, 2006).

Utilitarianism has strongly influenced both economics, as well as social and environmental policy-making (Des Jardins, 1992; Velasquez, 2006). Its influences on environmental assessment are numerous and significant. For example:

- There are strong similarities between the stages of the various environmental assessment processes and those of traditional utilitarian approaches to decision-making, which usually involve: determining what alternative projects or policies are available, estimating the consequences (positive and negative) that are likely to occur in the foreseeable future; and choosing the most ethically appropriate project or policy design by identifying the alternative that produces the greatest utility (Velasquez, 2006). In the case of environmental assessment, the final choice concerning the most

appropriate project or policy design is usually undertaken by the relevant governmental authorities. The South African EIA regulations (DEAT, 2006a: Chapter 3, section 32(2)(m)); however, now require the environmental assessment practitioner to express an opinion on whether the proposed activity should be authorised or not and under what conditions.

- Specialist studies, commissioned as part of environmental assessment processes, may draw on a variety of discourses and sources of information; however, they are required, in EIA, to reduce these to a utilitarian description of the positive and negative consequences of the proposed development or policy. The way in which these impacts are to be described (e.g. in terms of their nature, extent, duration and probability of occurring) is pre-determined within the legislation in order to obtain as much objectivity and uniformity as possible.
- Initial approaches to environmental impact assessment relied strongly on the quantification of impacts or, if this was not possible, the description of impacts in terms of some numerical score (Wathern, 1988; DEAT, 2002d) which enabled the comparison of alternatives. Although there is arguably less reliance on quantitative approaches today, a bias towards such approaches is still evident in some parts of the literature and in practice.

A number of constraints to utilitarianism (e.g. difficulties in trying to quantify essentially unquantifiable phenomena) have been recognised within both the economics and environmental literature, by authors such as Sen (1988a), Goodstein (2008) and Velasquez (2006). Des Jardins (1993) points out that many of these can be countered through amendments in the way that utilitarian principles are applied. However, he argues that a more fundamental critique relates to the assumption within utilitarianism that no act is fundamentally right or wrong. Its 'rightness' or 'wrongness' depends on the context. Des Jardins (1993) points out that this excludes the domain of ethical concern in which a particular action is ethically incorrect, based on certain principles, even if the consequences of that action are beneficial. He also points out the reverse. Some actions may be ethically right in principle, but the consequences are unfavourable. One of the examples that Des Jardins (1993) uses relates to an environmental controversy in the United States, in which logging is threatening to destroy the habitat of the endangered spotted owl and result in its extinction. A number of social benefits are incurred from the logging activities. Des Jardins (1993: 32-33) explains that: "Because there is no known human *use* for the owl and because the owl does not contribute to human society in any obvious way, a utilitarian calculation might suggest that the logging be allowed. However, environmentalists charge that it is wrong in

principle to cause the extinction of a species, even if doing so results in a net increase in beneficial social consequences”.

As discussed in section 3.2.3, I propose that a phronétic approach to environmental assessment is adopted which takes the form of a rational argument on whether a development should proceed or not and under what conditions. This means that value-deliberation would form a central part of such studies, which would not be dominated by a single discourse. This has several implications for the scientific and utilitarian discourses that currently direct the field and its procedures.

First, to accommodate multiple narratives, including the scientific, the assessment should not be required to predict all the changes caused by a proposed development, within a social-ecological system, in an ‘objective’, pre-determined way. It may be appropriate to portray some changes according to the current template (i.e. impact nature, extent, duration, probability, etc); however, in other cases, particularly when social concerns are dominant, it may be more appropriate to provide a more nuanced description. For example, the inclusion of an analysis of values within the phronétic approach would require, *inter alia*, a description of how such values conflict and how they correlate to contextually defined sustainability principles, among other factors. Changes in the social-ecological system should be described using the most appropriate means among the range of techniques available to the natural, social and economic fields of endeavour.

Secondly, I acknowledge that the utilitarian consideration of the costs and benefits of a proposed development are key factors to consider in deciding whether such a development should be approved or not. However, I propose that the dialogue is altered to one which focuses on *changes in the social-ecological system* which are identified and described in terms of *contextually defined sustainability principles/objectives*. The question then changes, (incorporating Sen’s insights) from what the positive and negative impacts of a proposed development on the (objectively described) environment are, to how the social-ecological system is likely to change and what opportunities and constraints this provides for achieving the life stakeholders have reason to value? The latter question, I believe, moves the focus of the argument beyond the utilitarian description of consequences, to the consideration of aspects that are valued by stakeholders, irrespective of whether they appear to be consequential in a cost-benefit analysis or not. This enables the debate to more effectively recognise the intrinsic value of particular aspects of the social-ecological system being considered.

3.5 General principles for an approach to environmental assessment that addresses its current modernist constraints

Based on the discussion of the work of the radical ecologists in the previous chapter and of Flyvbjerg, Sen and Cilliers in this chapter, I have identified a number of general principles to guide the development of an approach to environmental assessment that begins to address the problematic modernist assumptions listed in Chapters 1 and 2. I have considered environmental assessment to be a part of the overall decision-making process regarding development and, therefore, where I refer to 'decision-making' in the principles below, I do not refer exclusively to the government's role in such decision-making, but include the environmental assessment process. The principles, which are discussed in further detail in Chapter 4, are as follows:

- (i) The environment should be conceived as a complex social-ecological system, that should not only be understood in terms its component parts, but also in terms of the relationships between these parts;
- (ii) Social-ecological systems should be understood both in terms of their more interior, subjective aspects, as well as their exterior, objective ones;
- (iii) The contextual and normative nature of all knowledge of social-ecological systems should be recognised, as well as the subjective nature of the environmental decision-making process itself;
- (iv) A phronetic approach should be adopted to understanding the social-ecological system as well as to decision-making concerning such systems;
- (v) A range of epistemologies should be used as appropriate to understand the various aspects of social-ecological systems and to make decisions concerning human activities within these systems; and
- (vi) The provisional and limited nature of our understanding of social-ecological systems and therefore our predictions of their behaviour should be acknowledged.

3.6 Summary

In this chapter I have presented aspects of the work of three researchers, Flyvbjerg, Sen and Cilliers, who have addressed some of the constraints of modernism within their respective fields. I propose that they have achieved this through their ability to explore beyond the boundaries of their disciplinary domains.

Flyvbjerg's core argument is that a better balance between instrumental rationality and value-rationality is required within the social sciences, in particular, within development planning processes. The aim of this is to elevate the contribution to these processes of value deliberation, which has become marginalised as there has been a trend towards tools and procedures that are narrowly aimed at achieving certainty in prediction. This trend, argues Flyvbjerg, reflects an attempt by the social sciences to emulate 'the modern scientific ideal', which has resulted in social-science activity being dominated by whichever instrumental rationality prevails and by whichever power relations happen to be prevalent. The narrowing of society's rationality to primarily an instrumentalist one, in which theory is judged mainly in terms of its efficiency and usefulness in making predictions and controlling events, rather than in terms of its ability to reveal literal truth or falsity, reflects the modernist emphasis on objectivity and the marginalisation of the subjective value domain. I have suggested that this trend also influences the field of environmental assessment in which much of the focus is on the development and application of tools, processes and techniques aimed at prediction.

Flyvbjerg's proposal is described for an alternative role for the social sciences that can relieve this sphere of knowledge of inappropriate attempts to emulate the natural sciences, and their emphasis on analytical rationality and universal knowledge. It is a role that acknowledges a wider range of intellectual virtues than that of traditional science, drawing on Aristotle's categorisation of epistémic science, *techné* and *phronésis*. It is argued that social science should be seen as action-orientated *phronésis*, emphasising context-dependent knowledge and ethics and involving 'practical wisdom' as well as the values within society. I have suggested that this also has application to environmental assessment, due to the strong influence of values on the process, and that it too should be seen as a form of *phronésis*, whilst drawing on *techné* and epistémic science. This is in contrast to the current dominance of *techné* and epistémic science and inadequate integration of stakeholder values into environmental assessment processes.

In my discussion of Sen's work, I show that like Flyvbjerg's, it explores the modernist divide between the subjective and objective spheres of knowledge. Central to Sen's work is his argument that a perceived divide between ethics and economics has impoverished both disciplines. In this regard, positivist economics has marginalised normative analysis and ethical questions that affect human behaviour.

In an attempt to integrate the normative dimension back into the concept of development, Sen provides us with a means of understanding economic concepts that goes beyond the current emphasis on goods and services. He provides a critique of a variety of development approaches

including those in which commodity, welfarist and basic needs are centrally represented. The mainstream concept of sustainable development, which strongly influences South African environmental legislation, is most akin to a basic needs approach (BNA), which goes beyond the focus on goods and services within the commodity approach and beyond the focus on utilities (i.e. happiness and desire fulfilment) within welfarism. However, Sen does state that the BNA lacks an adequate theoretical base, particularly in relation to what are defined as 'needs'. As needs are often articulated in terms of the provision of goods and services, Sen argues that the BNA typically reverts back to a commodity approach, not paying enough attention to fundamental issues, such as the inequalities between people and nations, which are significant causes of poverty.

In response to these problems, Sen proposes that development should promote and enhance valued functionings and capabilities. He states that a developed society enables its citizens to be, live and act in certain ways that are considered valuable, which he calls 'functionings'. These functionings range, for example, from being adequately nourished to being able to participate in the community. What a person is achieving are his/her functionings, while what s/he is free and able to achieve, but may choose not to, are his/her capabilities. In defining development in this way, Sen changes the debate from a focus on the material (i.e. the goods and services that should be provided) to the more normative question of what human functionings and capabilities should be enabled and how goods and services can assist in achieving this.

Cilliers' critique of the modern worldview focuses on its limitations in dealing with the complexity of systems, particularly due to its reduction of all phenomena to predictable movements of particles in time and space. If phenomena appear complex, it is assumed that such complexity can be removed through further analysis, until predictability is restored. Cilliers points out that the modern worldview is further limited in its ability to deal with complex systems, due to its assumptions regarding determinism and objective, observer-independent knowledge. Among many other limitations, these assumptions do not accommodate purposeful action taken by human beings, which is typically based on non-deterministic factors such as values and ethics.

In an attempt to acknowledge complexity, Cilliers describes its characteristics and implications. In this chapter I have categorised these according to how complexity moves us beyond reductionism, objectivity, universal determinism and positivism. I indicate that an acknowledgement of complexity has important consequences for the field of environmental assessment, which deals with complex social-ecological systems, but has inherited, to varying degrees, modernism's reductionism, scientism and emphasis on making objective predictions. The many consequences of this include

the difficulties experienced in the field of addressing value-based issues, which are typically placed within the category of 'uncertainties'.

In the chapter that follows, I will draw on the work of the radical ecologists presented in Chapter 2, as well as the ideas discussed by Flyvbjerg, Sen and Cilliers, described in this chapter, to deconstruct the three problematic modernist assumptions listed in Chapters 1 and 2 and to propose an alternative conceptual approach to environmental assessment that can overcome these problems.

CHAPTER 4. THE 'SUSTAINABILITY ARGUMENT': WEAVING THE THREADS TOGETHER

4.1 Introduction

In this chapter I will summarise the constraints to effective environmental assessment, as well as their philosophical roots, as described in Chapters 1 and 2. Thereafter, drawing on the ideas presented in Chapter 3, I will deconstruct the three problematic assumptions of modernity, and explain the implications of this deconstruction for environmental assessment in South Africa. The assumptions that will be discussed are as follows:

- That a system can be understood by observing the behaviour of its parts;
- That all processes flow along linear, deterministic, predictable and orderly paths; and
- That technical, objective, natural science-based information and processes are separate from, and superior to, non-technical, subjective, and value-based information and processes.

My focus will then turn to developing a new conceptual approach to environmental assessment. I will begin by adding a philosophical tenet, based on Sen's work, to the list presented in Chapter 2 and explaining the principles listed at the end of Chapter 3 in more detail. Thereafter, I will describe the characteristics of the 'sustainability argument' approach that I propose. Parts of this proposal began to evolve in the discussions on the work of Flyvbjerg, Sen and Cilliers in the previous chapter; however, I will now synthesise and mould these into a more complete description which is presented in section 4.5.3. Thereafter, I will discuss the ways in which the 'sustainability argument' approach addresses the problems identified in Chapter 1. Finally, in section 4.6, I present some of the key challenges to implementing this proposal, as well as ideas for future research.

4.2 Revisiting the Problem

Environmental assessment is currently experiencing a number of problems that can be attributed, from a philosophical perspective, to the strong influence of modernism within the field (Audouin and Hattingh, 2008). The modernist roots of environmental assessment are well recognized and a

similar argument has been made by several authors in South Africa (e.g. Scott and Oelofse, 2001; Burns 2002; Audouin and Hattingh, 2008) and internationally (e.g. Jay *et al.*, 2007).

The roots of these problems are found mainly in the following three modernist assumptions (Capra, 1982; Pepper, 1984; Magee, 2001; Rihani, 2002):

- *That a system can be understood by observing the behaviour of its parts:* this has caused difficulties in predicting impacts, particularly social and cumulative ones;
- *That all processes flow along linear, deterministic, predictable and orderly paths:* this assumption has not only led to problems in the ability of environmental assessment practitioners to predict cumulative impacts, but also in their ability to deal with uncertainty in the environmental assessment endeavour; and
- *That technical, objective, natural science-based information and processes are separate from, and superior to, non-technical, subjective, and value-based information and processes:* this has constrained inter-disciplinarity in environmental assessment, the effectiveness of stakeholder engagement, and the ability of environmental assessment practitioners to address the normative aspects of impact prediction.

4.3 The Philosophical Roots of Environmental Assessment

The modernist view of the world was initiated by Descartes, who is widely considered the father of modern philosophy (Capra, 1982). From this perspective, the material world is conceptualised as a machine and life is viewed as a competitive struggle in which there is a strong belief in the value of economic and technological growth (Baumann, 1992; Capra, 1996). Integral to this view is a division between science and values, based on a fundamental split between mind and matter, called the Cartesian division. In this view the mind, or humans, aim to control matter, or nature (Benton, 1994). People provide the material world with its meaning, as this world, being analogous to a machine, has no purpose of its own (Baumann, 1992). Nature is therefore valued primarily in terms of its utility to human beings and not for the fact that it exists (Capra, 1982; Reid, 1995).

Scientists, who have been strongly influenced by the Cartesian division for centuries, have developed their expertise mainly in the natural sciences, concentrating on observing matter objectively, or in the humanities, concentrating on the subjective individual and collective human mind and its values (Capra, 1982). Wilber (2001) makes an important point, that it is not modernity's initial differentiation between these spheres that is concerning, as it enabled each to

develop on its own terms, but it is the subsequent dissociation between them and the dominance of science over the others that is problematic.

A further assumption of the modern worldview is that if the right process is followed, objective and certain knowledge of the world is possible (Magee, 2001). This process involves applying logic to empirical facts, in a way which does not permit anything to intervene that is susceptible to doubt in any way (Magee, 2001). The goal of modernist science, therefore, is to describe the world objectively, with no reference to the subjective observer (Capra, 1982). As a machine, this world functions according to completely determinate universal mechanical laws (Capra, 1982), and once global patterns are defined, it is assumed that the future behaviour of the world can be predicted using the right inputs into a model thereof (Rihani, 2002). The emphasis is not only on prediction and certainty, but also on orderliness and homogeneity (Baumann, 1992).

Modernist science is rooted in positivism, which holds that all knowledge is based on sense-experience and that different kinds of knowledge do not exist (Mauter, 2000). In this view, all genuine inquiry relates to the explanation of empirical facts (Mauter, 2000). Consequently, any knowledge that cannot be tested against reality in an empirical manner (e.g. intuitive, emotional or spiritual knowledge) is not considered as valid or meaningful. Judgements based on scientific reasoning are therefore considered superior to subjective judgements and scientific knowledge is promoted to the detriment of knowledge founded on values, ethics, morals, intuition and emotion (Pepper, 1984).

Modernist science led to numerous developments, which Wilber (2001a) points out should not be ignored in any critique of modernism. These developments were in fields such as medicine, physics and biology, among many others. The success of the mechanistic worldview in the natural sciences led to the study of human nature and society adopting this worldview and approach, resulting in the formulation of the social sciences (Capra, 1982). The inadequacies of Newtonian mechanics began to surface in the nineteenth century as a result of developments in the fields of quantum physics, the life sciences, philosophy and others, which contradicted many of the basic assumptions of the mechanistic view (Capra, 1982). In response to these developments many post-modern approaches to reality have developed, in which the idea that the world is a machine comprised of simple, static, discrete and atomistic mechanisms ruled by laws of order and causality is strongly rejected (Best and Kellner, 2001). From the postmodern perspective, the world is conceptualised as comprising multiple complex, dynamic, interrelated and holistic processes (Best and Kellner, 2001).

Postmodern thinkers reject the idea that there is a single discourse or truth that should govern the generation of knowledge and argue that there are a multitude of agencies, such as community groups, that give the world meaning and therefore a multitude of discourses or truths (Baumann, 1992; Gare, 1995). In particular, post-modern thinkers reject modernism's 'grand narrative' of economic and technical growth as the guide for all political action (Gare, 1995). They also reject modernism's extreme faith in reason and the type of scientific knowledge that can only result from the application of reason (Gare, 1995). They argue that postmodernism has led to the commodification of life, a focus on quantity rather than quality, the fragmentation of the material world and the loss of value and meaning in our culture (Capra, 1991; Wilber, 2001).

In their response to modernism, postmodernists negate the perceived split between mind and matter. These thinkers argue that knowledge does not objectively mirror an outside reality, but is socially constructed (Best and Kellner, 2001) and is therefore influenced by numerous subjective factors (e.g. political context, values of the observer). The meaning of a particular observation is potentially limitless, as it is context-dependent and contexts (e.g. perspectives of an individual or collective) are limitless (Wilber, 2001). Wilber (2001) argues, however, that post-modernism has gone to extremes in recognising subjectivity as it has denied the reality of the objective world. He argues for a balance between objectivity and subjectivity, where the interpretive aspects of knowledge do not replace objective ones, but rather place them within a context. Perhaps such a balance is now possible as a fight against 'crude positivism' is no longer needed, as pointed out by Cilliers (2005). However, this author also states that a resistance remains to philosophical positions that emphasise the interpretive aspects of knowledge.

The evolution of modernism and post-modernism is reflected in the environmental debate through the development of technocentric and ecocentric approaches to environmental problems (O'Riordan, 1981). Technocentrism is based on modernity and is therefore a view of human well-being associated with growth, technological progress and economic expansion (O'Riordan, 1981; Reid, 1995). Although the limits to such growth are recognised in some modes of technocentrism, the natural environment is generally seen as a resource for human development and not regarded for its intrinsic value (Benton, 1994; Reid, 1995). Objective, rational science is considered an important means of managing nature for human benefit, through techniques such as cost-benefit analysis (O'Riordan, 1981; Benton, 1994).

Although there are many forms of ecocentrism, which is associated with a postmodern approach to environmental problems, they all oppose technocentrism in some way. Where technocentrists focus on processes and techniques for environmental management, the ecocentrists place the

emphasis on the type of relationship humans should have with nature. They all criticise technocentrism's lack of questioning of the fundamental social and economic assumptions on which society rests, as they typically describe the environmental problématique in relation to one or more of these assumptions. The deep ecologists, for example, focus their critique on the dominant Western view that sees humans as separate from, and superior to, nature; the social ecologists question the social hierarchies on which Western society rests; while the eco-feminists criticise the patriarchal conceptual framework that dominates this society (Warren, 1987; Zimmerman, 1994). In general, the ecocentric approach promotes the virtues of reverence, humility, responsibility and care in people's relationship to the environment (O'Riordan, 1981), as well as an approach to knowledge that includes the explicit consideration of subjective factors such as society's values (Bookchin, 1982; Zimmerman, 1994).

In general, environmental assessment in South Africa reflects the current position of mainstream Western thinking, which Best and Kellner (2001) place somewhere between the modern and post-modern worldviews, with the modern perspective still dominant. The modern and technocentric emphasis on empirical, objective knowledge to the detriment of subjective views and values is partially relieved in this field through recognition, among practitioners and researchers, of the subjective nature of many elements of the EIA process (e.g. determining the significance of impacts). However, the problems that the profession encounters indicate that it continues to be plagued by modernism's dissociation between science and values and the dominance of science to the detriment of other forms of knowledge.

In the section that follows, I will re-examine the basic assumptions of modernity within the context of environmental assessment as it is currently practiced. The findings of the researchers whose work I have investigated in this thesis will be used to inform this task. My purpose is to deconstruct the three main modern philosophical assumptions that are consciously or unconsciously influencing the field of environmental assessment, and which I believe led to many of the current constraints being experienced. An alternative way of undertaking environmental studies that inform development decision-making will then be proposed based on a new philosophical understanding.

4.4 Deconstructing the assumptions of modernity within the field of environmental assessment

4.4.1 *Re-examining the assumption that the system can be understood by observing the behaviour of the parts (i.e. reductionism)*

The need to understand the environment as a system, and not merely its component parts, has been recognised within the environmental assessment community through, for example, the use of network and systems diagrams, and the development of Adaptive Environmental Assessment and Management (AEAM) (Bisset, 1988). However, both systems diagrams and AEAM have met with significant constraints which include their inability to effectively incorporate social and economic concerns (Bisset, 1988; Wathern, 1988). Environmental assessment practice in South Africa, as in many other parts of the world has generally continued in a relatively reductionist manner in which the natural and social environment are not usually studied in an integrated way. Researchers in the field of sustainability science (Burns and Weaver, 2008), for example, are attempting to address this problem and refer to the environment as a social-ecological system (Resilience Alliance, 2006). Environmental assessment would benefit from adopting this terminology and learning from this emerging field (Audouin and Hattingh, 2008). Of critical importance is that the concept of social-ecological systems is supported by a solid theoretical understanding of how systems operate and what recognising the systemic nature of the environment implies for practice within a particular context. Ideas for such an understanding are being developed in the field of sustainability science, many of which are based on complexity theory (e.g. Du Plessis, 2008).

Complexity theory provides a compelling argument for linking humans and nature, particularly in our generation of knowledge of the world's systems. From this perspective such systems cannot be understood merely by studying their component parts (e.g. the social environment separately from the ecological environment) for two primary reasons (Heylighen *et al.*, 2007):

- A component (or subsystem) of a complex system is not an independent element, but rather a relation that processes input into output according to the nature of that relation; and
- The system has emergent properties, or characteristics that cannot be reduced to the properties of the parts.

In my view, an understanding of complex social-ecological systems should be founded on some conception of the inter-relationship between humans and nature, from the perspective of environmental philosophy. The radical ecologists (i.e. deep ecologists, social ecologists and eco-feminists) provide examples of such conceptions. I don't believe one particular philosophical view to be 'correct' or that there is indeed a single 'correct' way of conceptualising these links, as this question is one that concerns values to a greater extent than scientific exactitude. However, I do think that it is important that those trying to understand social-ecological systems have some philosophical idea on which to base their scientific descriptions. Otherwise, it is likely that the dominant view of humans and nature as separate, and of nature as primarily a resource for human growth and development, will consciously or unconsciously dominate by default, no matter what terminology is used.

Examples of different philosophical concepts of the human-nature relationship are provided by the radical ecologies, namely deep ecology, social ecology and eco-feminism. Each, however, has its own version of this relationship and emphasise different aspects. Deep ecologists, for example, stress that all objects in the world are nodes in a web of interconnections (Harding, 1997). As all human and non-human entities are part of an inter-connected whole, they are all seen as equal in intrinsic worth (Devall and Sessions, 1985). It is therefore unnecessary, from a deep ecological perspective, to create a hierarchy in which humans are at the pinnacle (Devall and Sessions, 1985). This biocentric equality is disputed by the social ecologists, who argue that not all life forms are morally interchangeable with one another in terms of their intrinsic worth (Bookchin, 1994). They argue that biocentric equality denies the uniqueness of humans and devalues their increased ability for rationality (Bookchin, 1993; Des Jardins, 1993).

The social ecologists describe the interrelatedness between humans and nature in a different way. Their concept is based on an idea of natural evolution in which humans (or 2nd nature), like other mammals, evolved out of the non-human (or 1st nature) (Bookchin, 1987). This evolutionary process tends towards increasing complexity, subjectivity and flexibility (Bookchin, 1982). Humans, although part of the same evolutionary process as the biological environment and therefore intrinsically linked to this environment, are distinguished from 1st nature by their greater capacity for rationality, communication and culture (Bookchin, 1993; Des Jardins, 1993).

Finally, the eco-feminists see the link between humans and non-humans as one of co-members of an ecological community (Warren, 1987). The differences between humans and non-humans are recognised by eco-feminists, but they emphasise that one is not superior to the other and therefore has no right to dominate it (Warren, 1987). Their argument is based on a critique of a value-

dualism in which humans are separated from, and considered superior to, nature, enabling the exploitation of the latter (Warren, 2003). Similarly, the eco-feminists argue, the male (which is associated with mind, rationality, spirit and culture) is considered separate from, and superior to, the female (which is associated with nature, emotions and the body). Rather than viewing these dualisms as complementary, they are viewed in modern society, in competitive 'either-or' terms (Warren, 1987; Zimmerman, 1994; Warren, 2003).

Various individuals are likely to have their own versions of the precise nature of the human-nature relationship, influenced by their own values, belief-systems and cultural backgrounds. What is important, however, is that the interconnectedness of this relationship is acknowledged, in order to increase the value that modern society places on the natural environment and to promote a more caring, responsible attitude towards it.

When applied to current environmental assessment practice, the discussion above implies the following:

- That nature is not simply a resource for human development and economic growth, but a vital aspect of a complex system of which humans are a part, and on which they are dependent for their survival. Notwithstanding the increased capacities of humans for rational thinking, communication and culture, viewing humans and nature as co-members of various systems on all scales, calls into question the goal of 'managing' nature. The terminology of 'management' implies a pre-determined hierarchy within the system in which humans, as separate and superior to nature, have a pre-given right to dominate it. In my view, it would be better for humans to strive towards finding a way to inhabit the social-ecological systems of which they are a part, which does not degrade the system or its components.
- That the environment typically considered in an environmental assessment comprises a system of relationships between humans and the natural environment, as well as a large number of human and non-human elements. For this reason it is a misperception to structure an EIA according to 'development' on the one hand and the 'environment' on the other, and then attempt to determine the impact of the former on the latter. The proposed development, if approved, becomes part of a system that is changing constantly and this needs to be accommodated in the assessment process.
- That the environment cannot be understood through merely examining its component parts (e.g. land, water, air and population) since it has emergent properties that result

from the interaction of these parts and these interactions, in turn, restrict the behaviour of the parts.

4.4.2 *Re-examining the assumption that all processes flow along linear, deterministic, predictable and orderly paths*

Through the lens of complexity theory we can see that complex systems have a large degree of unpredictability by definition and, therefore, we can never have complete understanding of such systems (Cilliers 2005a; 2007). Cilliers explains that the predictability of complex systems is constrained by the necessity to omit certain components when drawing its boundaries. Without doing this it is impossible to gain even an approximate understanding of a system and the environment to which it is inexorably linked. This leads to unpredictability within the system as the aspects which are left out in the bounding process may well interact with the system in a dynamic non-linear way. Small causes may have large effects and vice versa. The unpredictability of the behaviour of complex systems is increased further by the fact that we do not always know what it is that has been left out in the modelling process.

The predictability of complex systems diminishes even further when we consider the nature of the knowledge that we have of such systems. Cilliers (2005a; 2005b; 2008c) shows that this knowledge is limited to the boundaries (both spatial and non-spatial) that we develop when conceptualising or modelling them. As these boundaries are informed by both subjective factors (e.g. purpose of the study) and the structure of the system (e.g. catchment boundaries), there is no pre-determined way to formulate them, although some may be more meaningful in a particular situation than others. Cilliers (2005a) explains that our knowledge is therefore valid within a particular context and as that context changes, so should our knowledge. As a result, the behaviour of a complex system in one time and place cannot necessarily be used to predict the behaviour of the same system at another time, or another system in a different location.

Cilliers (2000a; 2005a) does not use the above argument to negate the need for models, but rather to call for modesty in their use and recognition of the limitations of the knowledge we generate concerning complex systems. Importantly, the view from complexity relieves us of the impossible task of finding a final, correct, objective and comprehensive description of systems (Cilliers, 2007).

The unpredictability of complex systems and the limitations of our knowledge of these systems have a number of implications for environmental assessment as it is currently practiced, including the following:

- That our understanding of social-ecological systems and the predictions made in assessments are only applicable in terms of the normative framework or context (e.g. strategic choices about the type of issues to be considered and the spatial boundaries of the study) within which they were developed. If another framework is used, or any aspect of a framework or context changes, such understanding and predictions are likely to be different. It is impossible to gain an entirely objective understanding of a social-ecological system and therefore to make entirely objective predictions of the effects of development.
- That our knowledge of social-ecological systems and therefore our predictions of their behaviour will always be inherently limited in ways we will not, in many instances, be able to identify, let alone quantify.
- That simply addressing what are considered to be significant first-order cause-effect relationships within the environment is wholly insufficient, as it does not reflect the systemic, interconnected and non-linear nature of social-ecological systems. Such an approach excludes feedback loops and does not take into account the fact that small causes can have large effects and *vice versa*.
- Since social-ecological systems themselves, and the contexts in which we gain knowledge of them, are dynamic, we cannot have a single, final understanding of such systems, or make final, objective, unchanging predictions of their behaviour.

4.4.3 *Re-examining the split between technical, objective, natural science-based information and processes, and non-technical, subjective, value-based information and processes and the dominance of natural science-based rationality*

The dissociation between subjective value-based information and processes and more objective, science-based ones begins on the philosophical and conceptual level. Complexity theory reveals how all knowledge has intrinsically subjective elements (Cilliers, 2000). In particular Cilliers points out that the framework within which our knowledge is constituted is developed using both subjective (e.g. the purpose of the research) as well as objective considerations (e.g. the boundaries of a water catchment). He also points out that data cannot be transformed into knowledge through an objective, mechanical process, but that interpretation is required, a task which is influenced by the subjective perspective of the observer.

Applying this understanding to environmental assessment reveals the ethical choices within the process, as well as values which underlie the environmental assessment approach as a whole. My purpose in summarising this is to show, that what is often thought of as a predominantly objective

exercise, is permeated with subjectivity, not only in its processes and techniques, but also in its philosophical foundations.

Many of the normative choices that are made within the environmental assessment process make up the contextual framework within which environmental assessment is undertaken and include, for example:

- Identification of the stakeholders to be involved in the engagement process;
- The selection of methods to elicit data;
- The spatial boundaries of the assessment;
- The temporal boundaries of the assessment; and
- The way in which the significance of potential impacts is determined.

In addition to this framework, subjectivity is involved in the many instances of interpretation that are part of the environmental assessment process. These include, for example, the interpretation of the views and concerns of stakeholders in order to identify the strategic issues that should be addressed in the assessment; and the interpretation that the specialist must undertake to convert his/her data into knowledge of the potential positive and negative impacts of a development and the significance thereof. Drawing from the insights of the radical ecologists, it can be argued that such interpretation is strongly influenced by the environmental ethics of those involved in undertaking this task, as well as by prevailing social attitudes. If this is the case, and I believe that it is, then the arguments of the radical ecologists that attitudes of domination have spilled over into the mainstream position towards nature, is of particular relevance to environmental assessment practitioners.

More generally, mainstream environmental assessment, as an approach to incorporating environmental aspects into decision-making, is based on a value-system that is predominantly technocentric (O'Riordan, 1981). As described in Chapter 2, the managerialist mode of technocentrism is underpinned by numerous normative assumptions, including, for example, the following (O'Riordan, 1981; Benton, 1994; Reid, 1995):

- A view of nature as primarily a resource for humans;
- A view that human well-being is associated with technological progress, growth and economic expansion;

- An acknowledgement of the natural limits to meeting increasing human needs and the use of control and regulation to prevent these limits being exceeded;
- A high degree of confidence in the ability of technology to solve problems such as poverty and ecological destruction;
- A view of scientific knowledge as a means to control nature through technological innovation; and
- A reliance on scientific rationality, value-free scientific and managerial techniques, modelling and prediction.

These characteristics are evident in a number of ways in environmental assessment. For example: in the emphasis on objectivity; the requirement for impacts to be presented according to a legislated and universally pre-determined template; the emphasis in current debates in the field on the administrative and technical aspects of the procedure; as well as the fact that environmental assessment is considered a 'tool' or 'technological process' that is used to 'manage resources'. Even more recently formulated terminology, for example, the introduction of the concept of 'ecosystem services' (Scholes and Biggs, 2004), is orientated towards a view of the environment as primarily a resource for human development. However, it is in fact this instrumentalist technocentric worldview that the ecocentric philosophers describe as one of the primary causes of our current environmental problems.

The 'managerialist' technocentric view is also evident in the overall goal of environmental assessment to promote sustainable development (Cooper, 2001). The focus of this concept, in its mainstream interpretation, tends to be on minimising the consequences of development on the environment through managerial techniques, with limited questioning of the core economic and social values on which mainstream society is based (Pepper, 1984; Benton, 1994). This technocentric view is therefore self-sustaining, as its emphasis on objectivity and its marginalisation of normative concerns, including those related to its own perspective, limits such questioning. Benton (1994) points out that although decreased economic growth or even no growth is considered within the framework of sustainable development, essentially different forms of social, cultural and economic existence are not proposed. The socio-economic value system that underlies the concept of sustainable development, as described in the *Limits to Growth* (WCED, 1987), is therefore largely based on conventional economic growth (Reid, 1995).

Environmental assessment is also influenced by the value-system associated with the utilitarian approach to decision-making. Within such an approach the *consequences* of an action or development are valued as the dominant factor to consider in making a decision, excluding the area of ethical concern in which an act may be considered 'wrong' based on certain principles, despite its potential consequences (Des Jardins, 1993). Flyvbjerg (2001) points out that the emphasis on objectivity within the scientific approach has led to an emphasis on instrumental rationality in society, to the detriment of value-rationality. This can be seen within the environmental assessment context in the many attempts within the local and international arena, to deal with the shortcomings of the assessment approach mainly by revising the process or the tools used within it.

The argument above illustrates the following:

- That the current mainstream approach to environmental assessment as a whole, is not as value-free as it attempts to be, but is rather based on a worldview (i.e. technocentrism) that has a bias towards scientific rationality, with its requirements for objectivity and uniformity. This bias has led to the value-based assumptions upon which environmental assessment rests (e.g. current modes of social and economic development) remaining largely unquestioned to any significant degree. As a consequence, the dominant worldview currently underlying mainstream environmental assessment procedures is not necessarily congruent with the goals of reducing environmental destruction and alleviating poverty.
- That within the environmental assessment endeavour, knowledge, tasks and processes should not be conceived in the dualistic terms of being subjective *or* technical, objective and scientific. Rather, as argued by Wilber (2001), every external, objective occasion has its interior, subjective correlates. Our knowledge and activities have both objective *and* subjective components, each of which need to be recognised on their own terms, without one dominating the other. Interpretation, for example is involved in many aspects of environmental assessment and such interpretation is influenced by the environmental ethics of the individual, as well as the society of which that individual is a part. This means that an environmental assessment is not simply the provision of objective scientific environmental information into the subjective political task of decision-making.
- That the environmental assessment process as a whole, the tasks within it and the problems that are currently being experienced in their implementation cannot be addressed using predominantly scientific rationality, but require an appropriate

balance between such rationality and value-deliberation. For example, the subjective dimensions of all aspects of environmental assessment are not ‘uncertainties’ to be ‘managed away’ through some ‘objective’ tool. Rather, they are normative choices that need to be made explicit within environmental assessment and addressed in a way that is appropriate to their subjective and often emotive nature.

4.5 An alternative conceptual approach to project-level environmental assessment

In this section I will propose an alternative conceptual approach to environmental assessment, which aims to address many of the constraints experienced in this field due to its modernist roots. First, I will list the philosophical tenets of the ‘sustainability argument’ approach that I propose, which include an additional tenet to the ones listed in Chapter 2, based on the work of Sen. Thereafter I will present the principles, as listed in Chapter 3, on which the proposal is based. When describing these principles I will begin to present the ‘sustainability argument’ approach, but will describe it in more detail in section 4.5.3. It is important to note that I consider this proposal to be one perspective on how practitioners may begin to address the modernist constraints to the current practice of environmental assessment, and not a final, correct ‘answer’. It would be possible to develop other approaches which do not contradict the essence of the philosophical tenets and principles described.

4.5.1 Philosophical tenets of the ‘Sustainability Argument’ approach

Drawing primarily on the work of the radical ecologists as discussed in Chapter 2, as well as on Sen’s idea of development (discussed in Chapter 3), a more sustainable relationship between humans and nature would be one in which:

- Humans and nature are seen as part of an interrelated social-ecological system in which neither dominates the other, but in which their differences are acknowledged. The connection between the well-being of humans and nature is therefore recognised;
- The link between a person’s philosophy or conceptual framework and the way in which they practically interact with others and the environment is recognised and considered an important factor in improving the sustainability of social-ecological systems. Attitudes and structures of domination between social groups are seen to be detrimental to a social-ecological system as a whole;

- All life is considered part of an evolutionary process in which it unfolds its inherent potential. In human beings, this process of self-realisation involves an increasingly wider sense of self that moves from an ecocentric to a sociocentric to a worldcentric orientation;
- Nature is valued for its existence beyond its use to humans, and therefore certain activities are prohibited irrespective of their benefits to people;
- Diversity, both human and natural, is valued as a pre-requisite to the sustainability of a social-ecological system. An attitude of inclusion is adopted in which opposites are not seen as being in competition with one another, but as being complementary;
- Development is understood as a means to enhance the basic capabilities of people to function in a way that is deemed valuable, of which meeting basic needs is only a part; and
- Decision-making regarding social-ecological systems is guided by an 'ethics of care' in which a central place is provided for contextual factors, as well as general principles.

4.5.2 Principles on which the 'Sustainability Argument' approach is based

The principles listed below, which are drawn from Chapter 3 of this thesis, form the foundation for the 'sustainability argument' approach which I begin to describe in this section, but explain in more detail in section 4.5.3. Many of these principles pertain to the general characteristics of social-ecological systems, as I consider this understanding to be fundamental in the design of an alternative conceptual approach to environmental assessment. Each of the principles will be briefly discussed in the sections that follow.

4.5.2.1. *The environment should be conceived as a complex social-ecological system that should not only be understood in terms of its component parts, but also in terms of the relationships between these parts*

Understanding the social-ecological system requires some conception of its boundaries and the components and relationships within it, which should be developed with the input of key stakeholders (Audouin and Hattingh, 2008; Du Plessis, 2008; Will, 2008). Developing this conception should also be guided by the general characteristics of complex systems, as described

by Cilliers (1998; 2007) and discussed in Chapter 3 (section 3.4.3.1)³⁸. This concept (or model) should then guide the understanding of the system as a whole, as well as the investigation of its component parts. The former should be gained from both a deductive (top-down) and inductive (bottom-up) perspective. The inductive understanding should be informed by the investigation of the component parts, which is now made easier by the existence of a conceptual understanding of how the parts relate to one another.

In order to overcome the current human-nature (or development-environment) division inherent in environmental assessment, the proposed development should be seen as a potential change to the social-ecological system. The components of this system comprise individuals, societal groups, elements from nature, as well as the built environment. The focus should then be shifted from predicting the potential impacts of a development on the environment, as is currently the case in environmental assessment; to describing, as part of the sustainability argument, how the system is likely to change under different conditions. It is important that not only the likely effects of the proposed change on the social-ecological system (under various assumptions) are described, but also the influence of that system on the implementation of the proposed change³⁹. These effects should be evaluated in terms of a contextually-defined understanding of sustainability⁴⁰.

4.5.2.2. *Social-ecological systems should be understood both in terms of their interior, subjective aspects, as well as their exterior, objective ones*

It can be deduced from Wilber's (2001) *Integral Framework*, that a thorough understanding of a social-ecological system should be informed by a comprehension of both its exterior (or material) aspects, as well as its related interior dimensions (e.g. values and ethics)⁴¹. For example, Flyvbjerg (2001) states that institutional structures should be understood from 'within and without', as agency and structure are interlinked. This means that power-relations within organisations (e.g. between government departments), as well as the values that support them, should be researched, as well as the capacity, structure and functions of those institutions.

³⁸ The view of the social-ecological environment as a complex system is promoted in several other spheres, including that of development planning and of adaptive management. Van Huyssteen and Oranje (2008: 521), for example, describe the recognition of complexity within a development planning pilot project in South Africa and state that this project "... sought to identify emergent patterns amidst the seemingly unpredictability of the complex systems that it was engaged with". The concept of the social-ecological environment as a complex system is also supported within Norton's (2005) approach to adaptive management. Norton (2005: 93) states that in this approach "... there is a commitment to open systems, to understanding nature and the environment as a complex and multiscale interaction of parts".

³⁹ If the sustainability argument is being formulated in conjunction with the development design process, a description of how the social-ecological system should influence the design of the proposed change should also be included.

⁴⁰ This understanding should be based, however, on the philosophical tenets listed in section 4.5.1.

⁴¹ This argument is also made in Du Plessis (2008).

4.5.2.3. The contextual and normative nature of all knowledge of social-ecological systems should be recognised

Drawing from complexity theory (Cilliers, 2005b) it is important to note that there are multiple perspectives on any particular social-ecological system, some of which are more useful or appropriate than others. These perspectives, which cannot be developed objectively, are strongly influenced by the normative framework or context in which they are formulated. This framework includes aspects such as the definition of the system, the purpose of the study and the values of the researchers and stakeholders. The collection of data related to a social-ecological system, for example, depends on the reason why that data are being collected, and the process of interpretation is influenced by the values and perceptions of the specialist researchers and stakeholders.

There are several implications of the contextual and normative nature of knowledge for environmental assessment. Most fundamentally, as discussed in Chapter 3 (section 3.2.3.1), I propose that rather than attempting to implement an 'objective' procedure, in which impacts are identified and assessed according to a pre-determined, legislated template, the focus should be on developing a rational argument. Lawrence (2007) includes the 'rational argument' approach, among others, in his proposal for evaluating significance, but does not transform the entire environmental assessment process along these lines. The purpose of such an argument would be to formulate an opinion, drawing on scientific knowledge as well as value-deliberation, on whether a proposed development should be accommodated within a social-ecological system or not, and if so, under what conditions⁴².

This sustainability argument should draw on situational ethics by, for example, relating to what are defined as valuable functionings and capabilities (Sen, 1984) within a particular context. The specific process for developing the argument should also be defined in a context-specific way, based on the philosophical tenets listed in section 4.3, the principles presented in this section, as well as the principles for sustainability contained in national legislation. The focus on situational ethics, guided by general sustainability principles, is congruent with a phronétic approach to research and decision-making as described by Flyvbjerg (2001), as well as the eco-feminist call for a shift away from ethics as mainly a matter of pre-determined abstract rights and rules, to an approach in which the context influences what is considered appropriate (e.g. Plumwood, 1993).

⁴² This argumentation approach is similar to that advanced by Elling (2008) in his discussion on environmental assessment as a reflexive arrangement, as described in Chapter 3.

The normative framework, context or perspective from which the sustainability argument is made should be fully explained. Stakeholders should participate in making the choices that comprise this framework, including the spatial and temporal extent of the study, the conceptualisation or modelling of the social-ecological system, the aspects to be studied, the interpretation of the data, as well as the interpretation of what sustainability means in the particular context under discussion⁴³. Stakeholder engagement should not be considered a separate and secondary process, to the technical one. Rather, selected key stakeholders should be considered a part of a sustainability team that coordinates the development of the argument and which comprises specialist researchers and a sustainability practitioner that coordinates the process. These stakeholders should participate in developing the sustainability argument as determined by that team on a case-by-case basis (and according to principles set in legislation), and not according to a pre-determined format that is simply applied in every instance.

Within this context, the role of government departments, shifts from merely an administrative role in which they focus on ensuring that certain steps are followed, to understanding what principles should be promoted in legislation, developing non-legislated guidelines for best practice on how these principles can be met, determining whether these have been met in an appropriate way in particular cases and deciding whether or not a particular development should be approved based on the argument provided by the study team.

4.5.2.4. A phronétic approach should be adopted to understanding social-ecological systems as well as to decision-making concerning such systems.

The overall task of developing a sustainability argument should be seen (as suggested in Chapter 3, section 3.2.3.1) as a form of phronétic research, rather than a type of epistémic science, although the latter should certainly inform this task. As such, the research which supports the development of the argument should display the characteristics of phronésis, as described by Flyvbjerg (2001; 2004) and emphasise power-relations, values and the views of multiple stakeholders. Practical, context-dependent knowledge should also be emphasised and there should be a focus on concrete examples, detail, description, background, qualifications and practice rather than theory and general rules. This does not mean, as Flyvbjerg (2001) states, that attempts at generalisations should be excluded, but rather that the social-ecological system should not be explained in terms that do not reflect its particular characteristics and which ignore exceptions to general trends.

⁴³ This interpretation should be based on the philosophical tenets listed in section 4.5.1.

Consistent with Flyvbjerg's (2001; 2004) phronetic approach, as well as Cilliers' (1998) narrative one, the sustainability argument should not see itself as having a privileged position from which the final truth can be determined, but rather as a perspective that contributes to the debate concerning a proposed change to the social-ecological system. This perspective should draw on a range of epistemologies (including scientific analysis, stakeholder views, myths and stories) and a variety of methods, including specialist scientific studies and first person narratives. If the argument is based on a set of situational ethics of what sustainability means, as recommended in the section below, it will further display the characteristics of phronetic research.

4.5.2.5. A range of epistemologies should be used as appropriate to understand the various aspects of social-ecological systems and to make decisions concerning human activities within these systems

The fact that social-ecological systems have interrelated subjective and objective dimensions and that all knowledge has a normative dimension, means that scientific rationality, which focuses on knowledge that can be attained through empirical testing, should be mixed with what Flyvbjerg (2001) calls value deliberation. There are many aspects of social-ecological systems which cannot be understood in all their complexity through traditional scientific techniques alone. These include, for example, the views of stakeholders concerning a proposed development, ethical aspects of a decision-making process, poverty issues, employment problems and social tensions. Flyvbjerg (2001) makes the important point that traditional scientific thinking, or what he calls epistémé, has strongly influenced the social sciences to the extent that they typically attempt to deal with these issues in an instrumental way that does not engage sufficiently with the values and subjective interpretations that influence such concerns. Value-deliberation, which Flyvbjerg (2001) argues is a more appropriate role for the social sciences, should include, for example, an engagement with the various narratives and stories that Cilliers (1998) points out are not logically structured, but which guide the activities of social groups and provide these activities with meaning.

Such value-deliberation also requires an engagement with the felt experiences of social groups, particularly those that are traditionally marginalised, such as women, children and traditional communities. In addition, the sustainability team which develops the sustainability argument should be aware of, and informed by, their felt experiences and intuition, and not only the scientific information that is available to the study. This information should be presented in a way that is appropriate to its particular nature, and not automatically reduced to empirical forms.

4.5.2.6. The provisional and limited nature of our understanding of social-ecological systems and our predictions of their behaviour should be acknowledged

Through the lens of complexity theory (Cilliers, 2001; 2005a; 2005b; 2007) we can identify a number of inherent limitations to our knowledge of social-ecological systems. The first relates to the contextual nature of such knowledge, which compels us to view our understanding of these systems as provisional. In addition, our knowledge is limited because we have to reduce the complexity of social-ecological systems when modelling them or developing some concept of their boundaries, their components and the relationship between these. As a result, Cilliers (2005a) calls for a modest approach to the knowledge claims and predictions that we make. Since we cannot assume full control of a social-ecological system, a high degree of spontaneity and unpredictability should be anticipated, as we attempt to understand trends and navigate our way through these (Bookchin, 1982).

This modest approach, as well as the dynamic nature of social-ecological systems, is also accommodated by the shift in focus, as described in section 4.5.2.1., from predicting the potential impacts of a development on the environment, to describing how the system is likely to respond under different conditions, as a result of the proposed change. This could involve the generation of scenarios, which are already a part of the practice of certain types of SEA. The impact of alternative development options on the environment are already identified in EIAs; however, this assessment is usually undertaken from a single perspective of what the underlying social and economic trends in the environment are likely to be. Different stakeholder groups and specialists, though, are likely to have varying opinions on these trends. The introduction of alternative scenarios within the sustainability argument therefore accommodates, to a greater degree, this subjectivity, as well as the continually changing nature of the environment. This approach also relieves the sustainability team of finding a single, correct answer of what the potential impacts of a development are, when there is no such answer. The illusion that there is one is removed, enabling the sustainability argument to be more accommodating in its presentation of the variables and subtleties that should be considered when making a development decision.

Acknowledging the inherent uncertainty in understanding social-ecological systems, and our inability to determine the effect of elements that have been left out of our description of the system, also relieves the environmental community from trying to find a fool-proof, predetermined way of quantifying, and dealing with, uncertainty. I am not arguing against a description, by the sustainability team, of their confidence in their scientific statements, but rather that the focus should be shifted away from trying to find a pre-determined, objective method to identify all

uncertainties and manage them, a task that is impossible. Instead, the team should focus on ways to improve the ability of social-ecological systems to adapt to change in a manner that promotes the movement of the system towards sustainability, as defined within the normative framework discussed in section 4.5.2.3.

4.5.3 Formulating the Sustainability Argument

In this section I will present the key characteristics of the 'sustainability argument' approach that I propose. Some of the ideas presented have already been discussed above; however, in this section I will synthesise and expand these into a coherent description. As explained in the introduction to this thesis, the approach presented is a conceptual one and the details of implementing each stage would need to be determined and tested in practice. Such testing is outside the scope of this thesis, but would need to form the next step in any research undertaken as a follow-up to this study.

I will now move away where relevant in this section, from using the terms 'environmental assessment', 'environmental assessment practitioners' and the 'environmental assessment team'. Rather, in order to accommodate a range of values, perspectives and epistemologies, I will refer to 'the sustainability argument', 'sustainability practitioners' and the 'sustainability team'. This change in terminology also explicitly indicates the subjectivity inherent in the proposed approach.

It is also important to note that, as explained in the introduction to this thesis, I have related the approach described below to the stage in the decision-making process at which traditional EIA is currently undertaken in South Africa, namely at the point at which an authority decision is made as to whether the proposed development⁴⁴ should proceed or not and under what conditions. It is possible, however, to apply this approach during the process of *designing* the development, guiding it onto a sustainable trajectory. To achieve this, the characteristics listed below would need to be adapted to the context-specific design process being followed. I have, however, added some footnotes to the description that follows, to provide initial, conceptual examples of how this might be achieved, in relation to some of the characteristics listed.

The specific step-by-step process of developing the sustainability argument should, in all instances be constructed on a case-by-case basis by the sustainability team. This process should, however,

⁴⁴ The term 'proposed development' is used in a broad sense to include any proposed change to the social-ecological system that requires governmental authorization. This may include, for example, the establishment of regional parks, undertaking certain mining and agricultural activities and the construction of housing projects.

be developed in accordance with the principles of accountable, equitable and transparent decision-making and display the characteristics described below⁴⁵.

1. The sustainability team for the study should comprise disciplinary specialists, selected key stakeholders from sectors such as industry, commerce, Non-Governmental Organisations (NGOs) and community-based organisations (CBOs) and at least one sustainability practitioner who coordinates the development of the argument⁴⁶.
2. Specialist and stakeholder input should be designed to answer specific questions throughout the process of developing the sustainability argument⁴⁷. This approach is aligned with the 'issues-based' approach to environmental assessment proposed by Weaver and Rossouw (1998), based on the work in social assessment undertaken by Taylor *et al.* (1990). This approach is also aligned with the Principles for Transdisciplinary Research proposed by the Swiss Academy of Arts and Sciences (Pohl and Hadorn, 2007⁴⁸). The sustainability team as a whole should be involved in framing the questions and determining how they should be answered (e.g. what forms of knowledge are required). Information and opinions should be sought from a variety of sources including: scientific specialist studies; personal narratives; people's felt experiences; historical databases; and the practical wisdom of the sustainability team, among others. Emphasis should be placed on providing concrete, practical examples of the functioning of the social-ecological system, rather than abstract descriptions.
3. The type of engagement that is undertaken at various stages of the process should be adapted to the nature of the questions asked, rather than only applying a pre-determined

⁴⁵ Some of the concepts that are central to the characteristics listed, such as the conceptualization of the environment as a social-ecological system and the acknowledgement of multiple forms of knowledge, are also being explored within the broader context of sustainability science research (Burns *et al.*, 2006). As stated in the introduction, my participation in such research has influenced the ideas and proposals made in this thesis.

⁴⁶ If the sustainability argument is being developed in conjunction with the development design process, the design professional (e.g. architects and town and regional planners) should be part of the team.

⁴⁷ In cases where the sustainability argument is being formulated in conjunction with the development design process, answering these questions would include investigations into how the design of the development can enhance the surrounding ecological environment (e.g. through maintenance and enhancement of biodiversity in the area and through capital expenditure on alien plant eradication), minimize resource use (e.g. through promoting energy efficiency) and minimise waste production (e.g. through recycling and reducing carbon emissions).

⁴⁸ The Swiss Academy of Arts and Sciences' (Pohl and Hadorn, 2007) approach to Transdisciplinary research places strong emphasis on the participatory identification of problems and the division of these problems into sub-problems, to be answered using the most appropriate knowledge forms and the most appropriate means of collaboration between disciplines and organizations.

'one-size-fits-all' method such as a scoping workshop⁴⁹. Some engagement activities, for example, may only involve certain parts of the community, while others may be broader in terms of involvement. The views of stakeholders should be sought on a broader range of topics than is usually the case in traditional EIAs, which typically focus on stakeholder opinion regarding the proposed development and the assessment process to be followed. Stakeholder views should inform, for example, the description of the social-ecological system, the understanding of current trends within the system and the values that influence the formulation of the sustainability argument⁵⁰. The views of traditionally marginalised groups such as women and indigenous communities should be explicitly sought in ways that respond to their time and resource constraints.

4. Early in the process, the social-ecological system should be conceptualised as a *complex* system, placing equal emphasis on the links between the elements within the system, as on the elements themselves⁵¹. Will (2008) suggests developing such a conceptualisation as the first stage in undertaking State of the Environment Reporting (SoER), Weaver and Rotmans (2008) include this task in the ISA process related to the policy-level of decision-making and Du Plessis (2008), drawing partly on Wilber (2000), provides conceptual guidance on how to accomplish this. In addition, Walker *et al.* (2002) propose a similar step in their framework for analysing the resilience⁵² of social-ecological systems, which begins with developing a conceptual model of such systems, with extensive involvement from stakeholders.

The conception of the social-ecological system should relate both to what Wilber (2001) calls its 'interior' (e.g. value systems and power relations) and 'exterior' (e.g. institutional structures, ecology) aspects and should include a description of its history. This task should be undertaken with the participation of selected key stakeholders as part of the sustainability team. As suggested by Will (2008) in relation to SoER, the concept of the

⁴⁹ In cases where the sustainability argument is being formulated in conjunction with the development design procedure, the respective requirements for participation should be integrated into a single process.

⁵⁰ Involving stakeholders from a variety of disciplines and backgrounds in the description of social-ecological systems, the trends within these systems, the problems that should be addressed and the objectives that should be achieved, has been tested in several other domains in South Africa, particularly that of development planning (van Huyssteen and Oranje, 2008). Van Huyssteen and Oranje (2008), for example, describe 'difficult discussions' regarding values and worldviews as part of a National Spatial Development Planning (NSDP) pilot study that was coordinated by The Presidency in 2006.

⁵¹ Conceptualising the social-ecological system should be undertaken as early as possible when the sustainability argument is informing the development design process.

⁵² Walker *et al.* (2002: 1) state that the term 'resilience' refers to the ability of a system to maintain its functionality when it is perturbed, or to maintain "... the elements needed to renew or reorganize if a large perturbation radically alters structure and function".

social-ecological system should evolve throughout the process of developing the sustainability argument, as more information becomes available to the team.

5. The strategic decisions made throughout the process of developing the sustainability argument should be made explicit through their inclusion in a 'normative framework'. This framework, as it develops, should guide the formulation of the questions to be addressed and the way in which they are answered. The framework should include aspects such as: the purpose and duration of the study; the basis on which the spatial, temporal and non-spatial boundaries of the system were determined; the basis on which stakeholders were selected to participate in the process; the reason for the inclusion or exclusion of system elements; the type of information that was used to describe the system and the assumptions contained in this information; as well as the variables that were used in developing the scenarios/narratives that provide the context for anticipating the breadth of possible changes in the system (see point 7). The specific process that is to be followed in developing the argument should also be described as part of the strategic choices made.
6. Importantly, the normative framework should also include a description of the range of sustainability values that should guide the study. These values should be informed by the views of key stakeholders and guided by the philosophical tenets and principles listed as part of this sustainability argument approach. One way that these values should be expressed is through a description of what the notion of 'human needs' means in the context of the particular social-ecological system being studied. This description should go beyond focusing on an increase in goods and services, to include the enhancement of key functionings and capabilities within the system, as described by Sen (1984).
7. The sustainability argument should also be informed by the following:
 - A value-based discussion on the ways in which the proposed development is and/or is not aligned with the diverse range of values within the various stakeholder groups, irrespective of its consequences; and
 - A discussion, using alternative scenarios⁵³ and/or narratives, on how the system is expected to change under various assumptions, both with and without the proposed development⁵⁴, and the ways in which these changes are likely to move the system and its parts away and/or towards the sustainability values described in point 6 above. The influence of the social-ecological system on the implementation of the

⁵³ Walker *et al.* (2002) propose the use of possible future scenarios in their framework for examining the resilience of social-ecological systems and Weaver and Rotmans (2008) include such scenarios in the ISA approach to assessment at the policy-level.

⁵⁴ This task may relate to alternative designs and building configurations if the sustainability argument is formulated in conjunction with the development design process.

proposed development should also be described. These effects and changes should be presented in the most appropriate form, which need not be consistent and should not be pre-determined before the process begins. Some changes, for example, could be easily quantitatively described while others may require a more nuanced discussion.

8. The sustainability argument should be communicated, not only through reporting, but through a verbal presentation to a multi-sectoral government panel⁵⁵. As suggested by Norton (2005) in the context of risk assessment, the sustainability argument should be presented in ordinary language that omits jargon as far as possible. Most importantly, that argument, as stated by Cilliers (2005a), should be presented modestly, fully acknowledging the uncertainty that is inherent in making predictions within complex social-ecological systems.

4.6 Addressing the problems being experienced in the current approach to environmental assessment in South Africa

In the sections that follow, I will discuss how the 'sustainability argument' approach could address the problems currently being experienced in environmental assessment field in South Africa, as described in Chapter 1. The effectiveness of the proposed approach in addressing these problems in practice would need to be tested through its implementation in specific contexts.

4.6.1 Difficulties in achieving inter-disciplinarity in environmental assessment

In the approach that I have described above, social and natural scientists (as well as key stakeholders) would need to work together from the outset, as part of the sustainability team. The first task of conceptualising the social-ecological system provides a means for the various specialists to develop a shared understanding of the links between their various domains. Any subsequent work that they undertake in order to understand parts of, and relationships within, the system, would then be done within the context of this shared systems perspective, jointly constructed by the inter-disciplinary sustainability team. This will enable more effective integration of the inputs of various specialists, than if their studies are undertaken in relative isolation, with the sustainability practitioner left to piece them together at the end of the process.

⁵⁵ If the sustainability argument is being developed in tandem with the development design process, the results of the studies undertaken as part of formulating the argument should continually inform the design. The final argument can then be presented to decision-makers, as well as a description of the way in which it has influenced the design of the proposed development.

In addition, the development of a normative framework for the sustainability argument would require social and natural scientists, as well as key stakeholders, to collaboratively define the boundaries of the system as well as other aspects, such as the basis on which stakeholders are selected to participate. Importantly, they would also determine the sustainability values (e.g. the recognition of the intrinsic value of the natural environment and of people's freedom to live the life that they have reason to value) that will guide any specialist work and the development of the sustainability argument. This last aspect is not typically included in scoping procedures as they are currently undertaken, although as mentioned in Chapter 1, the development of sustainability assessment is moving in this direction. Specialist work is therefore not considered to be totally 'objective' but to be undertaken within a particular normative framework that is debated and collaboratively defined. The diverse range of values that underlie various specialist spheres and which influence the views of stakeholders would most likely lead to several areas of contestation in the development of such a framework. The aim is not to subsume these disputes into an artificial consensus, but rather to highlight, as part of the sustainability argument, the areas where agreement could not be reached and the reasons for this. Where relevant, this could focus the attention of the final decision-making authority on these areas of contestation where difficult strategic choices still have to be made.

In the proposed approach, the use of specialists to answer specific questions raised by the sustainability team also facilitates greater inter-disciplinarity in a number of ways. For instance, multiple specialists are involved in framing problems and developing the questions to be answered. Also, many of the questions identified may not relate to one specialist area in particular (e.g. questions concerning the causes of poverty or environmental degradation) and the answers therefore, would be sought with the input of as many different specialists as deemed necessary. In this process specialists should also gain a greater understanding of the linkages between the work that they undertake and those of others in different domains.

Shifting the emphasis from developing an 'objective, uniform assessment', to developing a perspective or argument which is partly supported by scientific findings, enables the inclusion of a wider range of knowledge forms than is currently the case. Answers to the questions posed by the sustainability team would be sought not only through specialist scientific input, but also through other means, such as interviews with people, narratives and workshops. As the knowledge gained would be presented in a way that is most appropriate, all forms of knowledge (including indigenous knowledge and that of the social sciences) would not be forced into an artificial pre-determined template, such as that used to currently describe potential impacts. This would enable more effective inter-disciplinary work as one knowledge form, such as scientific knowledge, would not be

considered superior to others and dominate the way in which information should be interpreted and communicated.

Although the sustainability practitioner may be finally responsible for presenting the sustainability argument, the components of the argument (e.g. concept of the social-ecological system, the questions asked and discussed, and the answers provided) are developed by an inter-disciplinary team. The outputs are therefore not interpreted through the lens (values and training) of merely one individual.

The verbal presentation made by the team to an inter-sectoral governmental panel promotes inter-disciplinarity in the final decision-making phases of the process. The current procedure, which in most cases involves mainly the circulation of the report among government departments, with each providing written comments, is cumbersome, time consuming and does not easily promote inter-disciplinary debate. However, if the panel receives the report before the presentation and is therefore able to raise concerns at the meeting, these concerns can then be discussed immediately in an inter-disciplinary setting.

The proposed approach also begins to address the current perceived divide between researchers and decision-makers, which is promoted through the idea that the purpose of environmental assessment is to provide 'objective' information to inform 'subjective' political decision-making. This is undertaken through the explicit recognition of the normative choices (e.g. the boundaries of the social-ecological system) that have to be made before final decision-making by the authorities and therefore the inclusion of governmental representatives in making those choices early in the process. More fundamentally, however, shifting the emphasis from developing an 'objective' scientific statement to developing a sustainability argument, more closely aligns the process with political decision-making, which is inherently based largely on perspectives, arguments and opinions.

This change should also assist in expediting the decision-making process, as the authorities are presented with an argument for a particular decision, supported by scientific evidence and value-deliberation, rather than an 'objective' statement of impacts and their significance, upon which they then need to make a value-judgement in a short space of time. This judgement typically needs to be made without these authorities necessarily having personally engaged with the affected community and developer, and without them having specialist knowledge of the development and the environment, beyond that provided to them in EIA reports. The change proposed here is congruent with the current EIA regulations (Chapter 3, section 23(2)(d)) that require the

environmental assessment practitioner to provide an opinion on whether the proposed development should be approved or not. However, these regulations do not go so far as to structure the entire process as an argument that is not only supported by the scientific evidence, but also value-deliberation and other forms of knowledge.

4.6.2 Difficulties in undertaking stakeholder engagement

In the proposed approach, stakeholder engagement permeates the entire process in a way that does not separate it from the development of the overall sustainability argument. Stakeholder engagement practitioners and certain key stakeholders are members of the sustainability team and are therefore an integral part, from the outset, of defining the process to be followed. Stakeholder engagement practitioners are not sub-contracted to 'sustainability practitioners' in the way that they are currently often subcontracted to environmental assessment practitioners. Instead, they are involved as an equal member in the sustainability team. They participate from the outset in identifying the questions to be answered in developing the sustainability argument and in determining how these should be answered. As the type of engagement activities undertaken depends on the nature of the questions asked, continual interaction between stakeholder engagement practitioners and the rest of the sustainability team is essential.

The inclusion of stakeholder views in conceptualising the social-ecological system and in developing the normative framework ensures that stakeholders are able to influence the process beyond merely expressing their views on the proposed development and the process to be followed. Stakeholder involvement in defining the social-ecological system also ensures that their values and priorities, not merely those of disciplinary specialists, are included from the outset of developing the sustainability argument. Stakeholders also assist in determining what sustainability values should guide the evaluation of the proposed change and whether this change is likely to move the social-ecological system towards or away from these values.

The recognition that every aspect of the social-ecological system, and the changes that are likely to occur as a result of the proposed development, has both interior (i.e. non-material) and exterior (i.e. material) dimensions, means that greater attention is likely to be paid to power-relations, value-systems and feelings, among other subjective elements. In addition, defining development in terms of Sen's (1988b) functionings and capabilities requires an understanding of the values of stakeholders, beyond their material needs for goods and services (e.g. the need for self-respect and for opportunities to express themselves creatively). The explicit and integrated inclusion of these subjective aspects in developing the sustainability argument raises the importance of

stakeholder engagement, significantly reducing the risk that it merely becomes an obligatory 'add-on' to a technical procedure, a problem Greyling (2000) identifies with the current EIA approach.

The proposed approach requires that the views of people from marginalised groups, such as the poor and those from rural communities, are elicited. Although the practical problems in undertaking this task still need to be overcome, the views of these groups cannot be overlooked simply because they may not participate in traditional engagement processes such as scoping workshops, despite being invited to do so.

Finally, the issue concerning independence is a particularly difficult one. As pointed out in Chapter 1, the longer term involvement of an environmental assessment practitioner with the community is constrained by legal requirements within NEMA for the consultant to be independent. Also, what one person that I interviewed called 'flash-in-the-pan' involvement characterises current environmental assessment procedures. If independence is equated to objectivity, then this clearly does not apply to the approach that I have proposed, which is overtly an opinion or perspective on whether the proposed development should be approved or not, and under what circumstances. This opinion is developed using Flyvbjerg's (2004: 293) phronetic approach in which all the researchers 'get close to reality', understand the practical details relevant to the social-ecological system concerned, dialogue with the community and individuals, and present their argument using narratives and examples. The sustainability team draws, *inter alia*, on their common sense, experience, wisdom and a sense of what is ethically appropriate (Flyvbjerg, 2001).

However, if being independent means retaining the ability, as Flyvbjerg (2001) puts it, to be critical of all that is observed and to acknowledge how local power relations may have affected these observations, then I think this is particularly important. Retaining this ability would mean that the members of the sustainability team are not financially affected by whether the proposed development is approved or not⁵⁶. However, I do not believe that they should be prohibited from participating in tender processes for further work that may result from the development being approved (e.g. implementing monitoring programmes), so long such processes are equitable and transparent. In essence, I agree with the view expressed by an interviewee that "... independence should be more about the quality of the work rather than the length of relationship with the client".

⁵⁶ The question may arise as to whether it is possible for the sustainability team to have no financial interest in whether the development is approved or not. However, I believe that independence, from a financial point of view, is an important *principle* to follow. Particular threats to this principle would need to be responded to in specific circumstances, as they arise in practice.

4.6.3 Difficulties in predicting social and cumulative impacts and in dealing with uncertainty

Developing the sustainability argument requires an explicit recognition of the inherent uncertainties in attempting to make predictions, but also an acknowledgement that it is often impossible to characterise such uncertainties. The modest approach proposed by Cilliers (2005a) should lead decision-makers to view the sustainability argument as a perspective and input into a debate on the proposed development and not as the 'final answer'. A key way in which it aims to do this is through the use of alternative scenarios/narratives, based on varying assumptions (e.g. economic growth rates and government policy on energy provision). This facilitates debate on these assumptions that underlie the changes predicted, rather than providing a single statement of impacts. This is particularly important as, following the post-modern argument, I do not believe that there is a single 'final, right answer', but rather that some answers are more appropriate than others at a particular time and in a particular context. What is more or less appropriate should be debated, and it is this debate that the sustainability argument aims to enhance.

This modest approach also increases the importance of monitoring the actual changes that occur in a particular social-ecological system as a result of a new development (e.g. the actual number and type of employment opportunities created and the effect which construction has on land degradation). Such monitoring is important as an 'early warning system' of any problems that arise in the construction and implementation of the development. The results of such monitoring should also broadly inform the process of social learning in which stakeholders involved in the development of 'sustainability arguments' in the future, share the knowledge they gained from relevant previous experience (Norton, 2005).

Strategic choices, which are typically characterised as 'uncertainties' in current approaches to environmental assessment, would be made more explicit through their inclusion in the normative framework, developed as part of the sustainability argument. The subjectivity of such choices would be acknowledged, relieving sustainability practitioners of trying to find ways to make them objectively. No attempt would therefore be made to develop the normative framework through objective means and therefore opportunities for discussion and debate would be revealed, rather than 'shut down'. This framework would be an account of the choices that are made (e.g. the type of knowledge forms that support the sustainability argument), the sustainability values that will guide the development of the argument, the aspects on which there are agreement and those on which there is not, as well as a description of the stakeholders who participated in making these choices. I recognise that such a framework does not relieve those involved in developing the

sustainability argument of finally being responsible for the decisions that they make, but it can assist in making the values that influence such decisions more explicit.

There would also not be an objective way of determining the meaning (or significance) of the changes in the social-ecological system as a result of the proposed development becoming part of the system. The core of the sustainability argument is the discussion on the ways in which the proposal is likely to move the social-ecological system towards and/or away from the sustainability values defined by key stakeholders. Making these values and the information considered in this argument clear, would enable decision-makers, in discussion with the sustainability team, to debate the views expressed and re-evaluate them should they be able to convincingly argue differently. Such arguments, however, should be supported by the views of affected communities, scientific evidence and other relevant forms of knowledge.

The concept of the social-ecological system, developed at the beginning of the process, would assist in identifying cumulative changes, as it would help to determine the paths along which such changes would occur and therefore extend the discussion beyond first-order cause-effect relationships. Current developments in computer modelling, for example, can assist in the task of conceptualising the system and therefore in identifying such cumulative responses (e.g. Peter, 2008). This would go some way towards addressing the concern expressed by Binedell *et al.* (1998) that a key constraint to addressing cumulative effects are the problems experienced in conceptualising cumulatively. Of critical importance, however, is that the assumptions used in such modelling are made explicit and that the results are communicated to stakeholders in a transparent and accessible way. The argument concerning the inherent nature of uncertainty in the predictions of the behaviour of complex systems also applies to cumulative effects and therefore the same attitude of modesty is required. In addition, the use of alternative scenarios in the discussion will not only respond to uncertainty in the system's direct responses to changes, but also to uncertainty in its indirect responses.

Addressing the concerns, described in Chapter 1, regarding the prediction of social impacts follows from the point made in section 4.5.2.5, that knowledge gained in developing the sustainability argument, would be presented in the most appropriate way and will not be forced into a pre-determined template. In some cases qualitative explanations, using examples, narratives and descriptions of people's felt experiences may be appropriate, while in others quantitative analyses, graphs and statistics may be more suitable. More fundamentally though, not all information would be reduced to predicting changes in the system. Such problems as undertaking empirical measurements, fulfilling requirements for standardized reporting, and making predictions of

continually changing human behaviour, are symptomatic of the requirement in EIA that all issues are reduced to definable predictions of impacts. In the approach that I have proposed, social scientists would only focus on predicting and measuring changes in the system where this is appropriate (e.g. increases in the number of houses or employment opportunities). However, a large proportion of their work would be in undertaking what Flyvbjerg (2001) calls value deliberation. Such deliberation would contribute to formulating the normative framework for the study, including defining (with the participation of stakeholders) what development means in the particular context being studied. Importantly, the role of the social scientist would therefore include facilitating value-based discussions on whether the proposed development is aligned with the range of values within the various stakeholder groups, irrespective of its consequences. For example, it may be possible to mitigate the negative consequences (e.g. degradation of the environment) of introducing a large commercial development into a predominantly rural social-ecological system; however, this may set a precedent that constrains the connection with nature that the community wishes to maintain and promote.

4.7 Back to the Beginning and Future Challenges

I began this thesis by explaining my discomfort with the disparity between our highly structured, rational and uniform environmental assessment processes and the more spontaneous, dynamic, political, diverse and value-based nature of reality – a discomfort which prompted me to undertake this research. I have therefore attempted to develop a ‘sustainability argument’ approach to project-level development decision-making that is more flexible, responsive to local circumstances, and aware of its own limitations. The approach is adaptable and context-specific in numerous ways, for example: by not being overly prescriptive in the exact tasks that have to be undertaken in developing the sustainability argument; by focusing the argument on the way in which changes in the social-ecological system affect contextually-defined priorities; and by enabling the incorporation of a range of knowledge systems and the communication of their findings in a variety of ways. The dynamic nature of social-ecological systems is also recognised in the generation of alternative future scenarios, the focus on the explicit inclusion of the assumptions made throughout the process and the modest approach to the perceptions, predictions and ideas expressed in the argument. Finally, the conceptual approach that I have proposed is overtly value-based. The sustainability argument is presented as a *perspective* into the broader decision-making process, which represents a set of values that are both contextually defined and guided by national legislation. The normative framework, developed as part of the sustainability argument, with both its points of agreement and areas of contestation, not only guides those developing the argument, but also explicitly informs final decision-makers of the particular view from which it is made.

There are, however, a number of key challenges that would need to be overcome in implementing such an approach. Most fundamentally, perhaps, is the current bias within the environmental assessment community towards 'objectivity', instrumental rationality and scientific analysis. Challenging this bias is difficult, not only because it is supported by the dominant worldview within society, but also because in my experience, the broad community of practice of environmental assessment focuses predominantly on the methods and techniques with which to undertake assessment processes, rather than on the philosophical assumptions on which the field as a whole rests. Transforming environmental assessment into a *perspective* on whether a development proposal should proceed or not, and if so under what conditions, is likely to be seen by some practitioners as an 'unsafe' and 'groundless' way to proceed, that would enable any set of values to be promoted. For this reason, it is essential that the sustainability argument is developed in relation to the philosophical tenets presented in section 4.5.1 (which include enhancing what key stakeholders define as their valued functionings and capabilities) and is informed by the principles of sustainable development expressed in national legislation.

The process of identifying what stakeholders consider valuable functionings and capabilities is a particular challenge that needs to be overcome. Stakeholder values are diverse and in many instances, conflicting. In my view, this is a reality which will always exist and therefore should be accepted and acknowledged, rather than subsumed into a uniform expression of the 'goals of the community'. Transforming environmental assessment into a sustainability argument would provide scope for a nuanced discussion of the diverse range of stakeholder values and the various ways in which these are likely to be enhanced or constrained by the proposed development. Although the sustainability argument is formulated from the particular perspective of the sustainability team (which includes key stakeholders) and is rooted in their values, it would not be assumed that these values represent a consensus among all stakeholders. Rather, the perspective from which the argument is made would be explicitly described, showing where it either concurs with, or contradicts, other values and priorities expressed within the process of stakeholder engagement. The emphasis on developing a *perspective* implies the existence of other views. Nevertheless, the task of effectively identifying such values, whether they are conflicting or not, requires further research with the extensive inclusion of ideas from the humanities, such as psychology, anthropology, philosophy and ethics.

Another challenge involves identifying the key questions that should be answered when formulating the sustainability argument. These questions should arise out of discussion and debate and not the application of an 'objective' technique. This process calls for inter-disciplinary

interactions in which the participants are open to the views of others and able to transcend their disciplinary boundaries. Enabling such debate again requires further research, but most importantly perhaps, it calls for practice, experience and what Flyvbjerg (2001) calls *phronésis* (i.e. practical wisdom).

Current legislation in South Africa, which necessitates a very specific environmental assessment process to be followed, is another challenge that needs to be overcome. From my experience in the development of Strategic Environmental Assessment (SEA) in this country, it is not easy to legislate for contextually defined processes, as the law requires a very detailed prescription of what is, and what is not, permissible. However, we need to find a way to address this problem, as the application of a pre-determined, uniform approach to environmental assessment, is inhibiting the ability of multiple epistemologies and the diverse range of values that characterise this country, to effectively inform public debate on whether a development should proceed or not, and under what conditions.

Beyond addressing these challenges, future research should focus on implementing and testing the sustainability argument approach within particular contexts. There are numerous issues regarding the way in which the approach is implemented that should be investigated in such research. These issues include, for example:

- Conceptualising the social-ecological system in a manner that is accessible to all stakeholders;
- Effectively dealing with power relations in the process of formulating the sustainability argument;
- Ensuring stakeholder equity and inter-disciplinarity in the generation of scenarios;
- Ensuring that the results of modelling (particularly computer modelling) are presented in a way which is accessible to all stakeholders;
- Facilitating effective knowledge-sharing between stakeholder groups within the process of formulating the 'sustainability argument';
- Effectively facilitating value-based discussions within the context of developing the sustainability argument; and
- Translating personal views of stakeholders into a shared understanding of the social-ecological system.

If we are to move beyond the recurring problems of the current approach to environmental assessment, it is certainly worth embracing these challenges and exploring the 'sustainability

argument' in practice, as an alternative way of addressing environmental decision-making at the project-level.

REFERENCES

- Aalborg University (2008) *Bent Flyvbjerg*; Department of Development and Planning. Available [online]: <http://flyvbjerg.plan.aau.dk/>; 28 August 2008.
- Audouin, M.A. and Hattingh, J. (2008) Moving Beyond Modernism in Environmental Assessment and Management. In: Burns, M. and Weaver, A. (eds) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa. Pages 205-242.
- Barbour, T. and Brownlie, S. (2002). *Have Mandatory Environmental Impact Assessments Improved Decision-making in South Africa, and Are They Making a Significant Contribution to Sustainable Development?* Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 7-9 October 2002, Dikhololo, South Africa.
- Barry, J. (2001) Murray Bookchin. In: J. A. Palmer (ed) *Fifty Key Thinkers on the Environment*. Routledge, London. Pages 241-246.
- Baumann, Z. (1992) *Intimations of Postmodernity*. Routledge, London.
- Benton, T. (1994) Biology and Social Theory in the Environmental Debate. In: Redclift, M. and Benton, T. (eds) *Social Theory and the Global Movement*. Routledge, London. Pages 21-50.
- Best, S. and Kellner, D. (2001) *The Postmodern Adventure*. Routledge, London.
- Biehl, J. (1997) Introduction. In: Biehl, J. (ed) *The Murray Bookchin Reader*. Cassell, London. Pages 1-12.
- Binedell, M. and Hounsome, R. (1998) *Assessment of Cumulative Effects: Theory and Concepts*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 30 September - 2 October, Drakensberg, South Africa.
- Bisset, R. (1988) Developments in EIA methods. In: Wathern, P. (ed) *Environmental Impact Assessment: Theory and Practice*. Unwin Hyman, London.

- Blackburn, S. (1996) *Oxford Dictionary of Philosophy*. Oxford University Press, Oxford.
- Bookchin, M. (1971) Spontaneity and Organisation. In: Biehl, J. (ed) (1997) *The Murray Bookchin Reader*. Cassell, London. Pages 1-12.
- Bookchin, M. (1982) The Ecology of Freedom. In: Biehl, J. (ed) (1997) *The Murray Bookchin Reader*. Cassell, London. Pages 31-36.
- Bookchin, M. (1987) Social Ecology Versus Deep Ecology: A Challenge for the Ecology Movement. *Anarchy Archives*; Available [online]: http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/socecovdeepeco.html; Accessed 7 July 2006.
- Bookchin, M. (1993) What is Social Ecology? Available [online]: http://134.173.117.152/Anarchist_Archives/bookchin/socecol.html; Accessed 10 December 2007.
- Bookchin, M. (1994) Will Ecology Become 'The Dismal Science'? In: VanDeVeer, D. and Pierce, C. (eds) (2003) *The Environmental Ethics and Policy Book*. 3rd ed. Wadsworth, California. Pages 273-277.
- Bookchin, M. (1995) Urbanisation to Cities. In: Biehl, J. (ed) (1997) *The Murray Bookchin Reader*. Cassell, London. Pages 173-196.
- Brainy Quote (2008) Einstein. Available [online]: <http://www.brainyquote.com/quotes/quotes/a/alberteins100201.html>; Accessed 16 September 2008.
- Brown, L. (2000) Integrating Crosscutting issues in the Environmental Assessment of Development Assistance Projects. In: Lee, N. and Kirkpatrick, C. (eds) *Sustainable Development and Integrated Appraisal in a Developing World*. Edward Elgar, Cheltenham. Pages 34-45.
- Brownlie, S., Walmsley, B. and Tarr, P. (2006) *Situation Assessment on the Integration of Biodiversity Issues in Impact Assessment and Decision Making in Southern Africa*. compiled by SAIEA in association with deVilliers Brownlie and Associates for IAIA; input into the CBBIA (Capacity Building for Good Practice in Biodiversity and Impact Assessment) project; Available [online]: <http://www.saiea.com/cbiia/html/cbbia.html>; Accessed 26 January 2007.

- Burns, M.E.R. (2002) *Co-evolutionary Relationships Between Environmental Ethics and Environmental Assessment*. D.Phil. thesis, University of Stellenbosch, Stellenbosch, South Africa.
- Burns, M.E.R., Audouin, M.A. and Weaver, A. (2006) Advancing Sustainability Science in South Africa. *South African Journal of Science* **102**: 379-384.
- Burns, M. and Weaver, A. (eds) (2008) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa.
- Canadian Environmental Assessment Agency (CEAA) (1999) *Cumulative Effects Assessment Practitioners Guide*. Available [online] http://www.ceaa.gc.ca/013/0001/0004/index_e.htm; Accessed 17 October 2008.
- Capra, F. (1982) *The Turning Point*. Flamingo, London.
- Capra, F. (1997) *The Web of Life: A Synthesis of Mind and Matter*. Flamingo, London.
- Cashmore, M. (2003) The Role of Science in Environmental Impact Assessment: Process and Procedure Versus Purpose in the Development of Theory. *Environmental Impact Assessment Review* **24**: 403-426.
- Chuengsatiansup, K. (2003) Spirituality and health: An Initial Proposal to Incorporate Spiritual Health in Health Impact Assessment. *Environmental Impact Assessment Review* **23**: 3-15.
- Cilliers, P. (1998) *Complexity and Postmodernism: Understanding Complex Systems*. Routledge, London.
- Cilliers, P. (2000a) What Can We Learn From a Theory of Complexity? *Emergence* **2**(1): 23-33.
- Cilliers, P. (2000b) Knowledge, Complexity and Understanding. *Emergence* **2**(4): 7-13.
- Cilliers, P. (2001) Boundaries, Hierarchies and Networks in Complex Systems. *International Journal of Innovation Management* **5**(2): 135-147.
- Cilliers, P. (2003) Complexity, Ethics and Justice. *Humanistiek* **19**: 19-25.
- Cilliers, P. (2005a) Complexity, Deconstruction and Relativism. *Theory, Culture and Society* **22**(5): 255-267.

- Cilliers, P. (2005b) Knowledge, Limits and Boundaries. *Futures* **27**: 605-613.
- Cilliers, P. (2007) Making Sense of a Complex World. In: Aaltonen, M. (ed) *The Third Lens*. Ashgate Publishing, Aldershot. Pages 99-110.
- Cilliers, P. (2008a) Complexity Theory as a General Framework for Sustainability Science. In: Burns, M. and Weaver, A. (eds) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa. Pages 1-38.
- Cilliers, P. (2008b) Stellenbosch Writers; *Paul Cilliers*; Available [online] <http://www.stellenboschwriters.com/cilliersp.html>; Accessed 16 October 2008.
- Cilliers, P. (2008c) Knowing Complex Systems: The Limits of Understanding. In: Darbellay, F., Cockell, M., Billotte, J. and Waldvogel, F. (eds) *A Vision of Transdisciplinarity: Laying the Foundations for World Knowledge Dialogue*. EPFL Press and CRC Press, Luusanne. Pages 43-50.
- Cilliers, P. (2008d) Paul Cilliers; In: Gershenson, C. (ed.) *Complexity: 5 Questions*. Automatic Press/VIP, Copenhagen.
- Commonwealth Environmental Protection Agency (CEPA) (1994) Review of Commonwealth Environmental Impact Assessment. In: Glasson, J., Therivel, R. and Chadwick, A. (eds) (2005). *Introduction to Environmental Impact Assessment*. 3rd ed. Routledge, London.
- Cooper, D.E. (2001) Arne Naess. In: Palmer, J.A. (ed) *Fifty Key Thinkers on the Environment*. Routledge, London. Pages 211-216.
- Council for the Environment (1988) *Integrated Environmental Management in South Africa*. Council for the Environment, OM/EN 6/5/1. Pretoria, South Africa.
- Crocker, D.A. (1991) Functioning and Capability: The Foundation of Sen's Development Ethic; In: Aman, K. (ed.) *Ethical Principles for Development: Needs, Capacities or Rights?* New Jersey Institute for Critical Thinking, Upper Montclair, New Jersey. Pages 104-172.
- CSIR (1996) *Strategic Environmental Assessment: A Primer*. CSIR Report ENV/S-RR96001. Stellenbosch, South Africa.

- Cullinan, C. (2003) *Rethinking the Philosophy of Co-operative Governance from an Eco-centric Perspective*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIASa), 1 - 3 September 2003, Wilderness, South Africa.
- Dalal-Clayton, B. and Sadler, B. (2005) *Strategic environmental assessment: A sourcebook and reference guide to international experience*. Earthscan, London.
- De Jongh, P. (1988) Uncertainty in EIA. In: Wathern, P. (ed) *Environmental Impact Assessment: Theory and Practice*. Unwin Hyman, London. Pages 62-84.
- Department of Environment Affairs (1992) *The Integrated Environmental Management Procedure: Guideline Documents 1-6*. Department of Environment Affairs, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2000) *Strategic Environmental Assessment in South Africa: Guideline Document*. Department of Environmental Affairs and Tourism, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2002a) *Screening*. Integrated Environmental Management; Information Series 1. Department of Environmental Affairs and Tourism, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2002b) *Scoping*. Integrated Environmental Management; Information Series 2. Department of Environmental Affairs and Tourism, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2002c) *Stakeholder Engagement*. Integrated Environmental Management; Information Series 3. Department of Environmental Affairs and Tourism, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2002d) *Impact Significance*. Integrated Environmental Management; Information Series 5. Department of Environmental Affairs and Tourism, Pretoria, South Africa.
- Department of Environment Affairs and Tourism (2002e) *Specialist Studies*. Integrated Environmental Management; Information Series 4. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2004a) *Overview of Integrated Environmental Management*. Integrated Environmental Management, Information Series 0. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2004b) *Environmental Impact Reporting*. Integrated Environmental Management, Information Series 15. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2004c) *Strategic Environmental Assessment*. Integrated Environmental Management, Information Series 10. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2004d) *Cumulative Effects Assessment*; Integrated Environmental Management; Information Series 7. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2006a) *Regulations in Terms of Chapter 5 of the National Environmental Management Act, 1998*. Government Gazette No. R. 385; No. 28753. Government of South Africa, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2006b) *Guideline 5: Assessment of Alternatives and Impacts in Support of the Environmental Assessment Regulations, 2006*. Integrated Environmental Management Guideline Series. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

Department of Environment Affairs and Tourism (2006c) *South Africa Environment Outlook: A Report on the State of the Environment: Executive Summary and Key Findings*. Pretoria, South Africa.

Department of Environment Affairs and Tourism (2006d) *People-Planet-Prosperty: A Strategic Framework for Sustainable Development in South Africa: Draft Discussion Document for Public Comment*. Pretoria. Available [online]:
http://www.environment.gov.za/nssd_2005/public_participation/NSFD-Draft%20for%20Public%20Comment%20PDF.pdf; Accessed 30 May 2007.

Department of Environment Affairs and Tourism (2007) *Strategic Environmental Assessment Guideline*. Integrated Environmental Guideline Series 4. Department of Environmental Affairs and Tourism, Pretoria, South Africa.

- Department of Provincial and Local Government (2001) *Local Government: Municipal Systems Regulations*. Government Gazette Vol. 431; No. 22328. Regulation Gazette No. 7071, Pretoria, South Africa.
- Des Jardins, J.R. (1993) *Environmental Ethics: An Introduction to Environmental Philosophy*. Wadsworth, California.
- Devall, B. and Sessions, G. (1985) Deep Ecology: Living as if Nature Mattered. In: VanDeVeer, D. and Pierce, C. (eds) (2003) *The Environmental Ethics and Policy Book*. 3rd ed. Wadsworth, California. Pages 263-268.
- Drengson, A.R. (1980) Shifting Paradigms: From the Technocratic to the Person-Planetary. *Environmental Ethics*, 2(3): 221-240; Fall.
- Dresner, S. (2002) *The Principles of Sustainability*. Earthscan, London.
- Du Pisani, J.A. and Sandham, L.A. (2006a) *Assessing the Performance of SIA in the EIA Context: A Case Study of South Africa*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAAsa), 28-30 August, Pilanesberg, South Africa.
- Du Pisani, J.A. and Sandham, L.A. (2006b) Assessing the Performance of SIA in the EIA Context: A Case Study of South Africa. *Environmental Impact Assessment Review* 26: 707-724.
- Du Plessis, C. (2008) *A Conceptual Framework for Understanding Social-Ecological Systems*; In: Burns, M. and Weaver, A. (eds) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa.
- Eckersley, R. (1992) *Environmentalism and Political Theory: Towards an Ecocentric Approach*. State University of New York, UCL Press, London.
- Elling, B. (2008) *Rationality and the Environment: Decision-making in Environmental Politics and Assessment*. Earthscan Publications Ltd., London.
- Flyvbjerg, B. (2001) *Making Social Science Matter: Why Social Inquiry Fails and How It Can Succeed Again*. Cambridge University Press, Cambridge.

- Flyvbjerg, B. (2002) Bringing Power to Planning Research. *Journal of Planning Education and Research* **21**(4): 353-366.
- Flyvbjerg, B. (2004). Phronetic Planning Research: Theoretical and Methodological Reflections. *Planning Theory and Practice* **5**(3): 283-306.
- Fox, W. (1989) The Deep Ecology-Ecofeminism Debate and its Parallels. *Environmental Ethics* **11**(1): 5-25; Spring.
- Freeman, S. (2001) *Empowerment for Change and Action*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 1-3 September, White River, South Africa.
- Friend, J.K. and Hickling, A. (1987) Planning Under Pressure: The Strategic Choice Approach. In: Glasson, J., Therivel, R. and Chadwick, A. (eds) (2005). *Introduction to Environmental Impact Assessment*. 3rd ed. Routledge, London.
- Fuggle, R.F. (1994) Environmental Evaluation. In: Fuggle, R.F. and Rabie, M.A. (eds) *Environmental Management in South Africa*. 2nd ed.; Juta & Co, Ltd, Cape Town, South Africa. Pages 762-780.
- Fuggle, R. (2004) *Competence and Process: Essential Elements in Impact Assessment*. Keynote address to the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 17-20 October, KwaZulu-Natal, South Africa.
- Gare, A.E. (1995) *Postmodernism and the Environmental Crisis*. Routledge, London.
- Glasson, J., Therivel, R. and Chadwick, A. (1999) *Introduction to Environmental Impact Assessment: Principles and Procedures, Process, Practice and Prospects* 2nd ed. UCL Press; London.
- Glasson, J., Therivel, R. and Chadwick, A. (eds) (2005). *Introduction to Environmental Impact Assessment*. 3rd ed. Routledge, London.
- Goodstein, E.S. (2008) *Economics and the Environment*. 5th ed. John Wiley & Sons, Hoboken.
- Govender, K. and Parks, L. (2003) *Bridge Over Troubled Waters – The Realities of Cooperative Governance Encountered During the Tyger Falls Development*. Proceedings of the annual

national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 1-3 September, Wilderness, South Africa.

Greyling, T. (1997) *Public Participation in EIAs in Southern Africa: What We Have Learned, and the Things We Are Still Grappling With*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 27-28 September, Pilanesberg, South Africa.

Greyling, T. (2000) *Integration of public issues and technical assessment in environmental impact assessments (EIAs) – Ne'er the twain shall meet?* Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 2-4 October, Breede River Valley, South Africa

Gutkind, E.A. (1962) *The Twilight of Cities*. In: Bookchin, M. (1982) *The Ecology of Freedom*. In: Biehl, J. (ed.) (1997) *The Murray Bookchin Reader*. Cassell, London. Pages 31-36.

Harding, S. (1997) What is Deep Ecology? *Resurgence* **185** (November-December). Available [online]: <http://www.resurgence.org/resurgence/185/harding185.htm>; Accessed 29 March 2006.

Harré, R. and Krausz, M. (1996) 'The Debate' from Varieties of Relativism. In: Smith M.J. (ed) (2005) *Philosophy and Methodology of the Social Sciences: Volume IV: Reinventing the Social Sciences: Towards a Postdisciplinary Future*. SAGE Publications, London. Pages 3-25.

Heylighen, F., Cilliers, P. and Gershenson, C. (2007) Complexity and Philosophy. In: Bogg, J. and Geyer, R. (eds) (2007) *Complexity, Science and Society*. Radcliffe Publishing, Oxford. Pages 117-134.

Hill, R.C. (2004) *Theory for the Practice of Environmental Assessment: Mutual Adjustment, Critical Rationality and Power in Planning and Decision-making*. D. Phil thesis, University of Cape Town, Cape Town, South Africa.

Hill, R.C. and Fuggle, R.F. (1988) *Integrated Environmental Management of Development in South Africa*. Paper presented at the Eighth Quinquennial Convention of SAICE in cooperation with the 1988 Annual Transportation Convention. 4 - 8 July, University of Pretoria, Pretoria, South Africa.

- Hulme, D. and Taylor, R. (2000) Integrating Environmental, Economic and Social Appraisal in the Real World: From Impact Assessment to Adaptive Management. *In: Lee, N. and Kirkpatrick, C. (eds) Sustainable Development and Integrated Appraisal in a Developing World*. Edward Elgar, Cheltenham. Pages 81-100.
- International Union for Conservation of Nature and Natural Resources. (IUCN) (1980) *World Conservation Strategy: Living Resource Conservation for Sustainable Development*, IUCN. Gland, Switzerland.
- Jay, S., Jones, C., Slinn, P. and Wood, C. (2007) Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review* **27**: 287-300.
- Jung, C.G. (1921) Psychological Types. *In: Storr, A. (ed) (1983) Jung: Selected Writings*. Fontana Press, London. Pages 97-105.
- Jung, C.G. (1951) Syzygy: Anima and Animus. *In: Storr, A. (ed) (1983) Jung: Selected Writings*. Fontana Press, London. Pages 109-117.
- Jung, C.G. (1990) Approaching the Unconscious. *In: Jung, C.G. (ed) (1990) Man and His Symbols*. Arkana, London. Pages 18-103.
- Kjörven, O. and Lindhjem, H. (2002) *Strategic Environmental Assessment in World Bank Operations: Experience to Date – Future Potentia*. Environment Strategy Papers No. 4, The World Bank, Environment Department, Washington DC.
- Kotze, L.J. (2003) *Co-operative Environmental Governance: Towards the Establishment of an Integrated Authorisation System in the North West Province*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIASa), 1-3 September, Wilderness, South Africa.
- Lavine, M.J., Butler, T., Meyburg, A.H. (1978) Bridging the Gap Between Economic and Environmental Concerns in EIA. *In: Bisset, R. (1988) Developments in EIA methods. In: Wathern, P. (ed) Environmental Impact Assessment: Theory and Practice*. Unwin Hyman, London.
- Lawrence, D. (1997) The Need for EIA Theory-Building. *Environmental Impact Assessment Review* **17**: 79-107.

- Lawrence, D.P. (2007) Impact Significance Determination – Designing An Approach. *Environmental Impact Assessment Review* **27**: 730-754.
- Lebel, G.G. and Kane, H. (1997) *Sustainable Development: A Guide to 'Our Common Future' - The Report of the World Commission on Environment and Development*. World Commission on Environment and Development. The Centre for Our Common Future, Geneva, Switzerland.
- Lee, N. and Kirkpatrick, C. (2000) Integrated Appraisal, Decision Making and Sustainable Development: An Overview. In: Lee, N. and Kirkpatrick, C. (eds) *Sustainable Development and Integrated Appraisal in a Developing World*. Edward Elgar, Cheltenham. Pages 1-19.
- Lloyd, P.J. (1995) Environmental Protection in South Africa. *South African Journal of Science* **91**: 331-334.
- Lux, K. (2003) The Failure of the Profit Motive. *Ecological Economics* **44**: 1-9.
- Lyotard, J.F. (1988) *The Postmodern Condition: A Report on Knowledge*. Theory and History of Literature, Volume 10. University of Minnesota Press, Minneapolis.
- Magee, B. (2001) *The Story of Philosophy*. Doring Kindersley, London.
- Malchup, F. (1961) Are the Social Sciences Really Inferior? In: Smith, M.J. (ed) (2005) *Philosophy and Methodology of the Social Sciences: Volume II: Understanding Social Scientific Practice*. SAGE Publications, London. Pages 137-157.
- Mauter, T. (2000) *Dictionary of Philosophy*. Penguin Books, London.
- Max-Neef, M.A. (1991) *Human Scale Development: Conception, Applications and Further Reflections*. Apex Press, New York.
- Max-Neef, M. A. (2005) Commentary: Foundations of Transdisciplinarity. *Ecological Economics* **53**: 5-16.
- Meadows, D.H., Meadows, D.I., Randers, R. and Behrens III, W.W. (1974) *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. 2nd ed. Pan Books, London.

- Merchant, C. (1987) Environmental Ethics and Political Conflict: A View from California. *Environmental Ethics* **12**(1): 45-68, Spring.
- Modak, P. and Biswas, A.K. (1999) *Conducting Environmental Impact Assessment for Developing Countries*. United Nations University Press, Tokyo.
- Morin, E. (2007) Restricted Complexity, General Complexity. In: Gershenson, C., Aerts, D. and Edmonds, B. (eds) *Worldviews, Science and Us: Philosophy and Complexity*. World Scientific, Singapore. Pages 5–29.
- Naess, A. (1988) Self-Realisation: An Ecological Approach Towards Being in the World. In: VanDeVeer, D. and Pierce, C. (eds) (2003) *The Environmental Ethics and Policy Book*. 3rd ed. Wadsworth, California. Pages 268-273.
- Naidu, S. and Will, C. (2003) *The Voice of the Poor in Decision-making: A Focus on Public Participation in Strategic Environmental Assessment (SEA)*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 1-3 September, Wilderness, South Africa.
- New Partnership for Africa's Development (NEPAD) (2001) *New Partnership for Africa's Development*. NEPAD, Abuja, Nigeria.
- Nisbet R. (1980) History of the Idea of Progress. In: Gare, A.E. (1995) *Post modernism and the Environmental Crisis*. Routledge, London.
- Norton, B.G. (2005) *Sustainability: A Philosophy of Adaptive Ecosystem Management*. The University of Chicago Press, Chicago.
- Nowotny, H., Scott, P. and Gibbons, M. Introduction: 'Mode 2' Revisited: The New Production of Knowledge. *Minerva* **41**: 179-194.
- O'Riordan, T. (1981) *Environmentalism*. Pion, London.
- O'Riordan, T. (1995) Environmental Science on the Move. In: O'Riordan, T. (ed) *Environmental Science for Environmental Management*. Longman Scientific and Technical, Essex.
- Oelofse, C., Scott, D., Ricardo, D., Houghton, J., Oelofse, G., and Wiseman, K. (2002) *Ecological Modernisation or Alternative Approaches: New Tools for Sustainability for South Africa*.

- Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 7-9 October, Dikhololo, South Africa.
- Organisation for Economic Co-operation and Development (OECD) (2006) *Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation*. OECD Publishing, Paris.
- Pepper, D. (1984) *The Roots of Modern Environmentalism*. Croom Helm Ltd., Kent.
- Peter, C. (2008) Complexity Based Modelling for Sustainability and Resilience of Social-Ecological Systems. In: Burns, M. and Weaver, A. (eds) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa. Pages 471-505.
- Plumwood, V. (1991) Nature, Self, and Gender: Feminism, Environmental Philosophy, and the Critique of Rationalism. *Hypatia* 6(1): 3-27; Spring.
- Plumwood, V. (1993) *Feminism and the Mastery of Nature*. Routledge, London.
- Plumwood, V. (1995) Women, Humanity and Nature. In: Brennen, A. (ed) *The Ethics of the Environment*. Dartmouth Publishing, Aldershot. pp211-234.
- Pohl, C. and Hadorn, G.H. (2007) Principles for Designing Transdisciplinary Research: Proposed by the Swiss Academies of Arts and Sciences. Oekom, Munich, Germany.
- Pope, J., Annandale, D. and Morrison-Saunders, A. (2004) Conceptualising Sustainability Assessment. *Environmental Impact Assessment Review* 24(6): 595-616.
- Preston, G.R., Robins, N. and Fuggle, R.F. (1994) Integrated Environmental Management. In: Fuggle, R.F. and Rabie, M.A. (eds) *Environmental Management in South Africa*. 2nd ed. Juta & Co Ltd, Cape Town, South Africa. Pages 748-761.
- Quinlan, T. (1993) Environmental Impact Assessment in South Africa: Good in Principle, Poor in Practice? *South African Journal of Science* 89: 106-109.
- Rainforest Information Centre. (2009) *Max-Neef on Human Needs and Human-scale Development*. Available [online] at: <http://www.rainforestinfo.org.au/background/maxneef.htm>; Accessed 9 November 2009.

- Reid, D. (1995) *Sustainable Development: An Introductory Guide*. Earthscan Publications Ltd., London.
- Republic of South Africa. (1996) *The Constitution of the Republic of South Africa, 1996; Act No. 108 of 1996*. Government of South Africa, Pretoria.
- Republic of South Africa. (1998) *National Environmental Management Act (NEMA) Act No. 107 of 1998*. Government of South Africa, Pretoria.
- Resilience Alliance. (2006) *Glossary*. Available [online] at: <http://www.resalliance.org/>; Accessed 7 February 2008.
- Retief, F., Rossouw, N., Jones, C. and Jay, S. (2004) *Status of Strategic Environmental Assessment (SEA) Practice in South Africa*. Proceedings of the annual international conference of the International Association for Impact Assessment (IAIA), 24-30 April, Vancouver, Canada.
- Richardson, T. (2005) Environmental Assessment and Planning Theory: Four Short Stories About Power, Multiple Rationality, and Ethics. *Environmental Impact Assessment Review* **25**: 341-365.
- Right Livelihood Award Foundation. (2006) *Max-Neef*. Available [online] at: <http://www.rightlivelihood.org/max-neef.html>; Accessed 9 November 2009.
- Rihani, S. (2002) *Complex Systems Theory and Development Practice: Understanding Non-linear Realities*. Zed Books, London.
- Robeyns, I. (2005) The Capability Approach: A Theoretical Survey. *Journal of Human Development* **6**(1): 93-117.
- Rossouw, R., Audouin, M.A., Lochner, P., Heather-Clark, S. and Wiseman, K. (2000) Development of Strategic Environmental Assessment in South Africa. *Impact Assessment and Project Appraisal* **18**(3): 217-223.
- Sadler, B. (1996) *International Study of the Effectiveness of Environmental Assessment: Final Report: Environmental Assessment in a Changing World: Evaluating Practice to Improve Performance*. Prepared for the Canadian Environmental Assessment Agency and the

- International Association for Impact Assessment. Cat. No. EN106-37/1996/E., Minister of Supply and Services, Canada.
- Sadler, B. and Jacobs, P. (1990) A Key to Tomorrow: On the Relationship Between Environmental Assessment and Sustainable Development. In: Sadler, B. and Jacobs, P. (eds) *Sustainable Development and Environmental Assessment: Perspectives on Planning for a Common Future*. Canadian Environmental Research Council, Quebec. Pages 3-31. Available [online]: http://epe.lac-bac.gc.ca/100/200/301/ceaa-acee/sustainable_devt-e/sustde.pdf; Accessed 17 October 2008.
- Sadler, B. and Verheem, R. (1996). *Strategic Environmental Assessment: Status, Challenges and Future Directions*. MER Series. Report No.53; Ministry of Housing, Spatial Planning and the Environment of The Netherlands, The Hague.
- SAIEA (2003) *Environmental Impact Assessment in Southern Africa*. Southern African Institute for Environmental Assessment (SAIEA), Windhoek, Namibia.
- Salleh, A.K. (1984) Deeper than Deep Ecology: The Eco-Feminist Connection. *Environmental Ethics* 6(4): 339-346; Winter.
- Salleh, A.K. (1992) The Ecofeminism/Deep Ecology Debate. *Environmental Ethics* 14(3): 195-216; Fall.
- Scholes, R.J. and Biggs, R. (2004) *Ecosystem Services in Southern Africa: A Regional Assessment: The Regional Scale Component of the Southern African Millennium Ecosystem Assessment*. Council for Scientific and Industrial Research (CSIR), Pretoria, South Africa.
- Scott, D. and Oelofse, C. (2001) Social Impact Assessment as a Development Tool: Principles and Practices in a Developing Context. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAAsa), 1-3 September, White River, South Africa.
- Sen, A. (1984) *Resources, Values and Development*. Basil Blackwell, Oxford.
- Sen, A. (1988a) *On Ethics and Economics*. Blackwell Publishing, Massachusetts.

- Sen, A. (1988b) The Concept of Development. *In: Chenery, H. and Srinivasan, T.N. (eds) (1988) Handbook of Development Economics: Volume 1.* North- Holland, Amsterdam. Pages 9-26.
- Sen, A. (1999) *Development as Freedom.* Anchor Books, New York.
- Sen, A. (2000) *What Difference Can Ethics Make?*. Paper presented at the international meeting on 'Ethics and Development'; Inter-American Development Bank in collaboration with the Norwegian Government; 7-8 December, Washington DC. Available [online]: http://www.iadb.org/Etica/Documentos/dc_sen_queimp-i.pdf; Accessed 17 October 2008.
- Shandler, D., Browne, J., Chapman, K. and Coetzee, M. (1999) *A Value-based Approach to Integrating Environmental Management, Poverty and Development Issues.* Proceedings of the annual national conference of the International Association for Impact Assessment: South African Affiliate (IAIAsa), 26-29 September, Bloemfontein, South Africa.
- Sippe, R. (1999) Criteria and Standards for Assessing Significant Impact. *In: Petts, J. (ed) Handbook of Environmental Impact Assessment: Volume 1: Environmental Impact Assessment: Process, Methods and Potential.* Blackwell Science, Oxford. Pages 74-92.
- Skolimowski, H. (1992) *Living Philosophy: Eco-Philosophy as a Tree of Life.* Arkana, London.
- Smith, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations.* *In: Sen (2000).* Keynote address at the international meeting on 'Ethics and Development'. Inter-American Development Bank in collaboration with the Norwegian Government. December 7-8, Washington D.C, Available [online]: http://www.iadb.org/Etica/Documentos/dc_sen_queimp-i.pdf; Accessed 17 October 2008.
- Smith, M.J. (2005) Knowing, the Known and Knowledge of the Social: An Introduction to the Philosophy and Methodology of the Social Sciences. *In: Smith, M.J. (ed) Philosophy and Methodology of the Social Sciences: Volume 1: Canons & Custodians: Scientific Inquiry in the 20th Century.* SAGE Publications, London. Pages xvii-xli.
- Sowman, M., Fuggle, R. and Preston, G. (1995) A Review of the Evolution of Environmental Evaluation Procedures in South Africa. *Environmental Impact Assessment Review* **15**: 45-67.
- Spinks, A., Luger, M., Shippey, K. and de Villiers, C. (2003) *EIAs as an Obstacle to The Capnvironmental Management in South Africa: A Practitioner's Perspective.* Proceedings of

the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 1-3 September, Wilderness, South Africa.

Stein, M. (1998) *Jung's Map of the Soul: An Introduction*. Open Court; Peru.

Streeten, P., Burki, S.J., Ul Haq, M., Hicks, N. and Steward, F. (1981) *First Things First: Meeting Basic Needs in Developing Countries*. In: Crocker, D.A. (1991) *Functioning and Capability: The Foundation of Sen's Development Ethic*; In: Aman, K. (ed.) *Ethical Principles for Development: Needs, Capacities or Rights?* New Jersey Institute for Critical Thinking, Upper Montclair, New Jersey. Pages 104-172.

Sustainability Institute (2008) *Paul Cilliers*; Available [online]:

<http://www.stellenboschwriters.com/cilliersp.html>; Accessed 16 October 2008.

Swilling, M. (2005); *Transdisciplinarity, Sustainability and Research: Proposal for a new DPhil in Transdisciplinary Studies*. Address to the 2nd World Congress on Transdisciplinarity; Vitoria, Brazil.

Taylor, C.N., Bryan, C.H. and Goodrich, C.G. (1990) *Social assessment: theory, process and techniques*. Studies in Resource Management No. 7, Centre for Resource Management, Lincoln University, Canterbury.

Tennøy, A., Kværner, J. and Gjerstad, K.I. (2006) *Uncertainty in Environmental Impact Assessment Predictions: The need for Better Communication and More Transparency*. *Impact Assessment and Project Appraisal* **24**(1): 45-56.

Therivel, R., Wilson, E., Thompson, S., Heaney, D. and Pritchard, D. (1992). *Strategic Environmental Assessment*. Earthscan Publications Ltd, London.

Thoreau, H.D. (2005) *Where I Lived and What I Lived For*. extract from *Walden* (1854). Penguin Books; London.

United Nations. (UN) (1992) *Agenda 21*; UN Department of Economic and Social Affairs: Division for Sustainable Development. Available [online] at: <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm>; Accessed 5 November 2008.

- United Nations. (UN) (2002) *Plan of Implementation of the World Summit on Sustainable Development*. Available [online]:
http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/WSSD_PlanImpl.pdf;
Accessed 16 November 2007.
- United Nations. (UN) (2003) The Johannesburg Summit Test: What Will Change?. *In: WSSD Summit Coverage. 26 August to 4 September, 2002*. Available [online]:
<http://www.un.org/jsummit/>; Accessed 29 August 2008.
- United Nations. (UN) (2006) *The Millennium Development Goals Report*. United Nations, New York. Available [online]:
<http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2006/MDGReport2006.pdf>;
Accessed 17 October 2008.
- United Nations. (UN) (2007) *The Millennium Development Goals Report*. United Nations, New York. Available [online]: <http://www.un.org/millenniumgoals>; Accessed 17 October 2007.
- United States. (US) (1969) *The National Environmental Policy Act of 1969*. US Government Printing Office, Washington DC. Available [online]:
<http://ceq.hss.doe.gov/nepa/reggs/nepa/nepaegia.htm>; Accessed 29 August 2008.
- Van der Hayden, F., Balance, A. and Evans, J. (1998) *Evaluating Cumulative Effects in Environmental Assessments: A South African Expertise Audit*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAsa), 30 September - 2 October, Drakensberg, South Africa.
- Van Huyssteen, E. and Oranje, M. (2008) From Promising Preaching to Piloting the Promise and Teaching what is Promising in Planning Practice. *In: Burns, M. and Weaver, A. (eds) Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa. Pages 507-536.
- Vanclay, F. (1999) Social Impact Assessment. *In: Petts, J. (ed) Handbook of Environmental Impact Assessment: Volume 1: Environmental Impact Assessment: Process, Methods and Potential*. Blackwell Science, Oxford. Pages 301-326.
- Velasquez, M.G. (2006) *Business Ethics: Concepts and Cases*. 6th ed. Pearson Education International, New Jersey.

- Von Frans, M.-L. (1990) The Process of Individuation. *In: Jung, C.G. (ed) (1990) Man and His Symbols*. Arkana, London. Pages 158-229.
- Walker, B., Carpenter, S., Anderies, J., Abel, N., Cumming, G., Janssen, M., Lebel, L., Norberg, J., Peterson, G.D. and Pritchard, R. (2002) Resilience Management in Social-ecological Systems: A Working Hypothesis for a Participatory Approach. *Conservation Ecology* **6**(1): 14.
- Warren, K.J. (1987) Feminism and Ecology: Making Connections. *Environmental Ethics* **9**(1): 3-20; Spring.
- Warren, K.J. (1990) The Power and Promise of Ecological Feminism; *Environmental Ethics* **12**(2): 125-146; Summer.
- Warren, K.J. and Cheney, J. (1995) Ecological Feminism and Ecosystem Ecology. *In: Brennen, A. (ed) The Ethics of the Environment*. Dartmouth Publishing, Aldershot. Pages 235-317.
- Wathern, P. (1988) An Introductory Guide to EIA. *In: Wathern (ed) (1988) Environmental Impact Assessment: Theory and Practice*. Unwin Hyman, London.
- Weaver, A. and Rossouw, R. (1998) *The Use of Theory of Constraints Processes in Managing Issues-Focused EIA*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAAsa), 30 September - 2 October, Drakensberg, South Africa.
- Weaver, A., Hounsome, R. and Ramasar, V. (1999) *Can EIA in its Present Form Contribute to Poverty Alleviation? A Think-Piece*. Proceedings of the annual national conference of the International Association for Impact Assessment (South African Affiliate) (IAIAAsa), 26-29 September, Bloemfontein, South Africa.
- Weaver, A. and Sibisi, S. (2007) The Art and Science of Development. *Business Day*, 12 September 2006. BDFM Publishers, Johannesburg, South Africa.
- Weaver, P.M. and Rotmans, J. (2008) *Working Papers 1: Integrated Sustainability Assessment – What? Why? How?* MATISSE (Methods and Tools for Integrated Sustainability Assessment). Available [online]: <http://www.matisse-project.net/>; Accessed 25 September 2009.

- Wikipedia (2008) Amartya Sen. Available [online]: http://en.wikipedia.org/wiki/Amartya_Sen;
Accessed 28 August 2008.
- Wilber, K. (2000) *Sex, Ecology, Spirituality: The Spirit of Evolution*. 2nd rev.ed. Shambhala, Boston.
- Wilber, K. (2001a) *The Marriage of Sense and Soul: Integrating Science and Religion*. Gateway, Dublin.
- Wilber, K. (2001b) *A Brief History of Everything*. Gateway, Dublin.
- Wilber, K. (2001c) *A Theory of Everything*. Gateway, Dublin.
- Will, C. (2008) An Approach to Tracking whether Change is Sustainable in Complex Social-Ecological Systems. In: Burns, M. and Weaver, A. (eds) *Exploring Sustainability Science: A Southern African Perspective*. Sun Press, Stellenbosch, South Africa.
- Wood, C. (2003) *Environmental impact assessment: A comparative review*. 2nd ed. Prentice Hall, Pearson Education Ltd. Essex.
- World Bank. (2005) *Integrating Environmental Considerations in Policy Formulation: Lessons from Policy-Based SEA Experience*. Report No. 32783. Environment Department, The World Bank, Washington DC.
- World Commission on Environment and Development. (WCED) (1987) *Report of the World Commission of Environment and Development: 'Our Common Future'*. A/42/427, United Nations. Available [online]: <http://www.worldinbalance.net/pdf/1987-brundtland.pdf>;
Accessed 10 December 2007.
- Wynne, B. (1994) Scientific Knowledge and the Global Environment. In: Redclift, M. and Benton, T. (eds) *Social Theory and the Global Movement*. Routledge, London. Pages 169-189.
- Ziman, J. (1987) *An Introduction to Science Studies*. Cambridge University Press, Cambridge.
- Zimmerman, M. (1987) Feminism, Deep Ecology, and Environmental Ethics. *Environmental Ethics* 9(1): 21-44; Spring.
- Zimmerman, M. (1994) *Contesting Earth's future: Radical Ecology and Postmodernity*. University of California Press, California.

APPENDIX A:

Schedule for Informal Interviews with Decision-Makers,
Environmental Assessment Practitioners and Researchers

Schedule for Informal Interviews with Decision-Makers, Environmental Assessment Practitioners and Researchers

22 August 2006

A. INTEGRATION WITH OTHER DISCIPLINES

1. Do you work with other disciplines? Which ones do you typically work with and why do you do this?
2. How do you use the information generated from other disciplines?
3. What benefits do you derive from working with a range of disciplines?
4. *Scientists*: What are the key obstacles to effectively cooperating with other scientists and using their information?
5. *Environmental Assessment Practitioners*: What are the key obstacles to integrating the information from a range of disciplines into an environmental assessment report?
6. Do you make any effort to overcome these obstacles? How do you do this?

B. STAKEHOLDER INTERESTS AND PERSONAL CONVICTIONS

1. How do you invite effective consideration and response to stakeholder interests in the work that you do?
2. What obstacles are there to effectively engaging with stakeholders in your work?
3. Do you make an effort to overcome these obstacles? How?
4. At what stage in your work, if at all, is the normative question of what *should/ought* to be done considered (what would be good/bad, right or wrong)? Why at this particular stage?
5. Do your personal convictions influence the work that you do? If yes, is this in a direct or indirect way? Can you give an example?
6. Can you give an example where you had to make a professional decision, in which you went against the grain of your personal convictions? How did you deal with the tensions that resulted?

C. INFLUENCING DECISION-MAKING

Researchers and Environmental Assessment Practitioners

1. In your field of work, do you provide information, data or recommendations that lay the basis for decisions made at a national, provincial or local government level?
2. Assuming that you work within recognised guidelines for environmental decision-making, how would you describe the nature or type of information that you provide?
3. Do you think that your work informs or influences decision-making? If it influences decision-making, how does it do this?
4. Does the outcome of your activities lead to 'good' environmental decisions? If not, what would be the typical problems that you experience? How have you dealt with these?
5. Have you been in a situation where your recommendations have been changed or over-ridden? What were these changes. Why do you think these changes were made?
6. Have you ever made recommendations, within environmental guidelines, that went against the grain of your personal convictions? Can you give an example?
7. Can you suggest ways in which your field of work could more effectively enhance environmental decisions.

Decision-makers

1. In your field of work, do you receive information, data or recommendations from scientists that lay the foundation for decisions made within a particular sphere of government?
2. How would you describe the nature or type of information that you receive?
3. Do you ever feel that aspects of the scientific reports that you receive are value-laden or subjective, aimed at influencing you? How do you recognise this? How do you deal with this?
4. Have you ever been in a situation where you have over-ridden recommendations provided to you by the scientific or environmental assessment community? What were the changes that you have made? Why have you made these changes?
5. Have you ever made environmental decisions, within recognised guidelines, that went against the grain of your personal convictions? Can you give an example?
6. Can you suggest ways in which science and/or environmental assessment reports can more effectively enhance the decision-making process?

APPENDIX B:

Radical Environmental Philosophies

Radical Environmental Philosophies

There are three main radical responses to the modernist, technocentric agenda within environmental philosophy, namely deep ecology, social ecology and eco-feminism (Zimmerman, 1994). A summary of these approaches is presented in Table B.1 that follows. For ease of reading, the references for the description of each approach have not been placed in the text, but in the last row of the table. An earlier version of this table was published in Audouin and Hattingh (2008).

Appendix Table B.1: Summary of Radical Environmental Philosophies

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
Cause of the environmental problem	The root cause is the dominant philosophy or worldview of techno-industrial societies that sees humans as separate from nature and as superior to it. This dominant worldview results in nature being seen as mainly a resource for economic growth and technological progress, goals which are highly valued in mainstream Western society. The associated excessive materialism and consumerism, diverts us from the more important work of spiritual growth and maturity.	Ecological problems have their roots in authoritarian, hierarchical social structures, especially those of capitalism and state socialism, which enable powerful elites to suppress others, while exploiting the environment for their own profit. The mentality of domination (which is also seen in racism and sexism) inherent in such hierarchical structures, extends to the natural world and it results in human exploitation of the non-human world.	The cause of the environmental problem is a way of thinking that has resulted in both the domination of nature and the domination of women. This way of thinking is called the 'logic of domination' which says that men/humans are different and superior to women/nature.
View of the world	All life is involved in a process of unfolding its innate potential. Arne Naess, who coined the term 'deep ecology', calls this the process of self-realisation. In humans this involves an increasingly deeper and broader sense of self that moves from identification with the personal ego, that strives for its own gratification, to identification with others such	There is a link between the way people deal with each other and the way they deal with the environment. Therefore ecological problems cannot be fully understood and addressed without dealing with the fundamental social, political, cultural and ethical questions at their core. The entire system of domination within current social structures should be challenged from an	There are connections between the domination of women and the domination of nature. The philosophical element of these connections is what Warren calls the 'logic of domination' inherent in the patriarchal conceptual framework of mainstream Western culture. This patriarchal conceptual framework places more value on what is traditionally

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>as family and friends, to identification with our species as a whole and finally to inclusion of the non-human world as part of the bigger Self.</p> <p>The natural process of identification with others leads to greater sensitivity, consideration and empathy for them (e.g. sharing in the suffering of those we may not know personally). As Arne Naess puts it: "We see ourselves in others". He therefore argues for the widening and broadening of our sense of self to include both the human and the non-human world, as no laws or moral rules are needed to make us to care for that which we see as part of ourselves. Naess further explains that joy and meaning in life are increased through this process of self-realisation which enables the fulfilment of the potential and uniqueness of all beings.</p> <p>This ecological consciousness is best achieved through a process of questioning the fundamentals (deep-questioning) which underlie our understanding of society, economy and the relationship between man</p>	<p>ecological point of view, as it is linked to the domination of nature.</p> <p>Humans, like other mammals, are a product of the natural evolutionary process that tends towards increasing complexity and flexibility. In other words, humans arose out of the evolution of the non-human. They have, however, created a social world that often threatens both the human and non-human.</p> <p>As man is a result of the continual evolution of nature, he is not separate from it. The human and non-human are part of a non-linear, evolutionary and increasingly complex system.</p> <p>All living beings are not equal. Although the non-human (or 1st nature) and human (or 2nd nature) are intrinsically linked, 2nd nature is distinguished from 1st nature by its increased capability for developing rationality, communication and culture. The uniqueness of human beings should not be denied.</p> <p>The evolution of 2nd nature (humans) is an unfinished development of nature as a whole. Overcoming current environmental problems</p>	<p>viewed as male, rather than what is seen as female.</p> <p>Western philosophical tradition has identified maleness with the sphere of rationality and the mind which is typically contrasted to the sphere of women, emotions, the body, passions, nature, the non-human world, faith, matter, physicality and experience.</p> <p>Value-hierarchical thinking, which divides reality into elements which are 'up' or more valuable and elements which are 'down' or less valuable, has led to a justification (termed the logic of domination) of maintaining the subordination of an 'inferior' group by a 'superior' group. This thinking has influenced Western culture which has placed the male, reason and the mind above the female, emotions, the body and matter, leading to the subordination of the female by the male and of non-human nature by human nature. In value-hierarchical thinking then, some elements or characteristics are given more value than others, rather than merely recognising and valuing diversity. Also this</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>and nature, amongst other factors.</p> <p>All beings have value that extends beyond their use to humans (i.e. they have intrinsic or inherent worth) and therefore have an equal right to life and the fulfilment of their own form of self-realisation.</p> <p>All beings (human and non-human) are part of an interrelated whole.</p> <p>Economic growth as conceived and implemented today is incompatible with many of the basic tenets of deep ecology, such as the belief that humans have no right to reduce the richness and diversity of life forms, except to satisfy basic vital needs.</p>	<p>depend on transcending 2nd nature in a new system of human/nature relationship that decreases the problems experienced in both society and the environment. This would result in a conscious, ethical and ecological society.</p> <p>In nature, stability and integrity is a result of increasing complexity and diversity and not of simplicity, uniformity and homogeneity.</p> <p>Wholeness is not a mere adding of parts into a uniform whole or the reduction of phenomena into the lowest common denominator. Ecological wholeness is 'unity in diversity'.</p> <p>Communities are fundamentally influenced by their history, which is as important as social forms and structures. Humans create their society and are also created by it.</p> <p>Modern capitalism is amoral, because the market has priorities of its own that are not based on any particular ethical principles but on the laws of supply and demand.</p> <p>Humans should strive for fully conscious activity which is self-determined, being free from external and internal (e.g. belief system that limits the</p>	<p>thinking reflects an 'either-or' approach where opposites are seen as exclusive rather than complementary in a 'both-and' relationship.</p> <p>Rejects any way of thinking about nature that reflects an attitude of domination. A world is needed where difference does not lead to domination.</p> <p>Humans and non-humans are co-members of an ecological community. Their differences are recognised, but this does not mean that one is superior to another.</p> <p>Abstract individualism is rejected. Relationships, including that with the non-human environment, are an integral part of who an individual is. Such relationships are not an extrinsic 'add-on feature' of human beings. Individuals are beings-in-a-web-of-relationships. It is not possible to give a description of what it means to be human without recognising that humanity is part of an ecological community.</p> <p>Scientific and technological responses to the environmental problem are a part of the</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
		<p>individual's idea of what s/he can achieve) controls. In this way, individuals can attain their potential as conscious, thinking human beings.</p>	<p>solution. The perspectives of women and indigenous peoples should also be recognised as relevant data.</p> <p>A person's view of the world and the type of theorising they undertake is influenced by the conceptual framework they employ – their way of thinking or worldview. An oppressive patriarchal framework leads to environmental problems and the oppression of women.</p> <p>There is no one, single 'objective' (value-neutral, unbiased) view of the human and non-human relationship that is correct.</p> <p>Knowledge is socially constructed. Objects are both materially given and socially constructed. How particular objects are viewed is influenced by the social context, cultural norms and other factors. For example, in South Africa a particular tree may be seen as a rare component of the ecological environment to be preserved, while in Australia, the same tree could be seen as an alien invasive that should be removed.</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
Proposals	<p>An ecological worldview is needed in which people not only identify the self with the personal ego, or the social group, but also with the non-human world.</p> <p>A shift is needed away from a human-centred view of the world (anthropocentric) to an ecosystem-centred view (eco-centric).</p> <p>More searching and fundamental questions must be asked about the values (i.e. the normative aspects) which underpin our social and economic systems, and the way in which we view the relationship between humans and nature (e.g. ontological questions). For example, what kind of society would be best for maintaining ecosystems?</p> <p>Sessions and Naess identified basic principles from which others could develop their own versions of deep ecology. In summary these principles (called the Deep Ecology Platform) are that:</p> <ul style="list-style-type: none"> ▪ Human and non-human life has value in itself, independent of the 	<p>Diversity in social structures and in the environment should be maintained, as this is a pre-requisite for a harmonious human/nature relationship.</p> <p>The split between humans and nature inherent in the dominant Western worldview should be overcome and the mentality of human domination of nature transformed into one of complementarity between the human and non-human world. Humans should be supportive and protective of the needs of nature. There should also be an ethics of complementarity between and within social institutions.</p> <p>There should be recognition that human well-being is intricately linked to the well-being of the natural world.</p> <p>An understanding is needed of the forms and patterns within social and natural communities that give it its character. This understanding should relate to the community as a whole, not only to its component parts. In particular, it is important to identify patterns of domination and oppression and to evaluate these in terms of</p>	<p>Environmentalism should be informed by a feminist perspective, because of the connections between the domination and nature and the domination of women.</p> <p>Make visible and challenge the disproportional effect that environmental degradation has on women, the poor, dislocated indigenous persons and developing countries.</p> <p>A shift is needed away from ethics as a matter of pre-determined, individual and abstract rights, rules and principles exclusively, to ethics that recognise the particular context in which these general rights and rules are applied and the important relationships within that context. The context should influence what is considered appropriate behaviour towards the non-human environment.</p> <p>Story-telling, myths, rituals and first person narratives are important means of identifying patterns of meaning that emerge in the social and ecological environment. Logic should be mixed with story.</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>usefulness of the non-human world for humans;</p> <ul style="list-style-type: none"> ▪ Richness and diversity of life forms contribute to the realisation of these values and are also values in themselves; ▪ Humans have no right to reduce this richness and diversity except to satisfy vital needs; ▪ The flourishing of human life and cultures is compatible with a decrease of the human population. For non-human life to flourish, such a decrease is needed; ▪ Present human interference in the non-human world is excessive and rapidly getting worse; ▪ Policies must therefore be changed in a way that deeply affects basic economic, technological, and ideological structures and results in a 	<p>principles of justice and equity.</p> <p>As evolution is an intrinsic part of the nature of reality, the history of a social or ecological community should be considered as important as its current form and structure.</p> <p>We cannot assume that humans can fully understand and control the complex, continually changing interrelationship between the human and non-human environment through science. Therefore it cannot be assumed that humans can change this system as they wish. A high degree of spontaneity and unpredictability within the system must be accommodated. An attempt can be made to understand trends within the system and to navigate our way through them, but full control over these trends cannot be assumed.</p> <p>The idea of freedom should be manifested through 'libertarian municipalism'. This involves turning local municipalities into direct democracies and coordinating these municipalities through a bottom-up system, as opposed to the top-down system of the nation-state. This approach is different from bioregionalism as it is based on</p>	<p>A central place should be given to the values of care, love, friendship, trust and appropriate reciprocity. These are values that recognise that our relationships to others is central to an understanding of who we are.</p> <p>Non-hierarchical modes of conflict resolution (e.g. mediation) are needed.</p> <p>The perspectives of indigenous people and women's felt experiences concerning the non-human environment should be taken seriously and considered as 'data'.</p> <p>Theory building and knowledge is socially constructed and historically situated. It is therefore not static, but consistently emerging and changing over time.</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>significantly different state of affairs;</p> <ul style="list-style-type: none"> ▪ An ideological change is needed from increasingly aiming for a higher standard of living to appreciating life quality. There will be an awareness of the difference between big and great; and ▪ Those who support these points have an obligation to try to implement the changes needed, either directly or indirectly. <p>In addition, Naess developed a four-level system for deep questioning, which flows both from top-down and from bottom-up, and includes: uncovering a person's ultimate norm from which all actions result; questioning based on the principles of the Deep Ecology Platform; exploring ones own situation to identify alternative ways of implementing the norms identified in the first two levels, and finally, identifying specific ways of implementing the general actions or policies developed in the previous stage.</p>	<p>politically defined communities and boundaries, rather than ecologically defined ones. The idea of self-sufficient communities inherent in bioregionalism is also rejected in favour of ecological and economic interdependence and voluntary political association between autonomous, self-determined communities.</p> <p>Social structures should be based on small-scale, egalitarian communities which aim to serve common needs and goals. The democratic principles of full participation and freedom should be the prevailing norms and any institutions or practices that allow one group to dominate another should be avoided. Decision-making should be decentralised and the community should be freed from any outside control.</p>	

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>In more detail, the four levels are as follows:</p> <p>Level 1: Uncovering a person's ultimate norm from which all actions result. This norm will always belong to the philosophical or religious domain. For example, Arne Naess' ultimate norm is self-realisation. These norms are not absolute truths but hypotheses from which other norms, for example minimise ecological footprint, are derived.</p> <p>Level 2: Questioning based on the views that form part of the Deep Ecology Platform (see principles above). These views can be adapted to the relevant context. The Deep Ecology Platform was developed as a set of principles that could be accepted by deep ecology supporters irrespective of their ultimate norm.</p> <p>Level 3: Exploration of one's own situation and the broad options available for action based on the norms identified in levels 1 and 2. This level includes the identification of broad policies.</p>		

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>Level 4: Specific ways to implement the general policies and action identified in level 3. For example, documenting extinction of species and/or focusing on the alleviation of poverty.</p> <p>Policies advocated by Arne Naess include: a radical reduction of the world's population; the abandonment of the goal of economic growth in the developed world; the conservation of biotic diversity and the development of small, simple, self-reliant communities.</p>		
References	<p>Cooper, D.E. (2001) Arne Naess. <i>In: Palmer, J.A. (ed) Fifty Key Thinkers on the Environment</i>. Routledge, London. Pages 211-216.</p> <p>Devall, B. and Sessions, G. (1985) <i>Deep Ecology: Living as if Nature Mattered</i>. <i>In: VanDeVeer, D. and Pierce, C. (eds) (2003) The Environmental Ethics and Policy Book</i>. 3rd ed. Wadsworth, California. Pages 263-267.</p>	<p>Barry, J. (2001) Murray Bookchin. <i>In: Palmer, J.A. (ed) Fifty Key Thinkers on the Environment</i>. Routledge, London. Pages 241-246.</p> <p>Bookchin, M. (1982) The Ecology of Freedom. <i>In: Biehl, J. (ed) (1997) The Murray Bookchin Reader</i>. Cassel, London. Pages 31-36.</p> <p>Bookchin, M. (1987) Social Ecology versus Deep Ecology: A Challenge for the Ecology Movement. <i>Anarchy Archives</i>. Available at</p>	<p>Capra, F. (1997) <i>The Web of Life: A synthesis of Mind and Matter</i>. Flamingo, London.</p> <p>Plumwood, V. (1995) Women, Humanity and Nature. <i>In: Brennen, A (ed) The Ethics of the Environment</i>. Dartmouth Publishing, Aldershot. Pages 211-234.</p> <p>Warren, K.J. (1987) Feminism and Ecology: Making Connections. <i>Environmental Ethics</i> 9(1): 3-20; Spring.</p>

	<i>Deep Ecology</i>	<i>Social Ecology</i>	<i>Eco-feminism</i>
	<p>Harding, S. (1997) What is Deep Ecology? <i>Resurgence</i> 185. Available at http://www.resurgence.org/resurgence/185/harding185.htm. Accessed 29/03/06.</p> <p>Naess, A. (1988) Self-Realisation: An Ecological Approach towards Being in the World; <i>In</i>: VanDeVeer, D. and Pierce, C. (eds) (2003) <i>The Environmental Ethics and Policy Book</i>, 3rd ed. Wadsworth, California. Pages 268-273.</p>	<p>http://dwardmac.pitzer.edu/Anarchist_Archives/bookchin/socecovdeepeco.html. Accessed 07 July 2006.</p> <p>Bookchin, M. (1993) What is Social Ecology?; Available at http://134.173.117.152/Anarchist_Archives/bookchin/socecol.html. Accessed 10 December 2007.</p> <p>Zimmerman, M. (1994) <i>Contesting Earth's Future: Radical Ecology and Postmodernity</i>. University of California Press, California.</p>	<p>Warren, K.J. (1990) The Power and Promise of Ecological Feminism. <i>Environmental Ethics</i> 12(2): 125-146; Summer.</p> <p>Warren, K.J. and Cheney, J. (1995) Ecological Feminism and Ecosystem Ecology. <i>In</i>: Brennen, A. (ed) <i>The Ethics of the Environment</i>. Dartmouth Publishing, Aldershot. Pages 235-317.</p>