

The quality of Environmental Management Frameworks in South Africa

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ABSTRACT

Environmental assessments and authorisations surrounding project level developments are often made in isolation, without consideration of the regional or strategic context within which individual developments are done. This research investigates the quality of Environmental Management Frameworks (EMF) as strategic environmental instrument. EMF is a unique South African instrument that was first conceptualised in 1989, enacted in 2006 and updated in 2010. EMFs were developed to map environmental sensitivity to aid the screening out of undesired developments in sensitive environments and to minimise unnecessary project level assessments in preferred development areas. EMFs form an important link between environmental assessment (EA) processes and planning strategies such as Spatial Development Frameworks (SDFs) and Integrated Development Plans (IDPs), due to their spatial output of environmental sensitivity maps and their ability to feed strategic assessment processes required by SDFs. They have a legal mandate which ensures their assimilation and use.

This research uses a multiple case study approach to review seven EMF documents for their quality. The quality aspects identified are the process, methodology and documentation components, using the printed EMF documentation as primary information source. Quality review criteria were subsequently developed to investigate these inputs, using the legal mandate of EMF as basis. Each case was rated for compliance with the quality criteria using a six-level rating schedule. Further analyses were made by comparing the performance of cases against one another.

Public participation emerged as the weakest component of EMF practice, while aspects of sensitivity analysis also performed weaker than other aspects. More focus is required on aligning scales and resolutions of map inputs, mapping methods and general integration of spatial data, especially those of adjoining districts. The need to substantiate a rationale for buffer determination also requires further refinement. The practice of conducting EMF is well established and it can be valuable in sustainable development planning and decision-making. Recommendations to enhance the sustainability outcomes and hence effectiveness of this instrument are made, as well as future research objectives for increasing its utility.

Key words: Environmental Management Frameworks, EMF, Spatial Development Frameworks, SDF, quality review, performance evaluation, sensitivity mapping, environmental assessment, EA, strategic assessment.

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"The world is abundant, we require only a deference born of understanding to fulfill man's promise....he must become the steward of the biosphere. To do this he must design with nature."

(McHarg, 1969:5)

"...the role of assessment is changing as it moves upstream, targeting the early stages in the design of development proposals, and crucially the processes and contextual factors that shape these proposals."

(Bina, 2007:600)

"The purpose of EA can thus not solely be to provide information, but rather to fully engage with the messy world of political decision-making."

(Kidd & Retief, 2009:1047)

GLOSSARY of ABBREVIATIONS & ACRONYMS

ANC	African National Congress
BAP	Biodiversity Action Plan
CA	Competent Authority
CE	Council for the Environment
CODESA	Conference for a democratic South Africa
CONNIPP	Consultative National Environmental Policy Process
C-Plan	Conservation Plan
DEA	Department of Environment Affairs
DEAT	Department of Environmental Affairs and Tourism
DME	Department of Mineral and Energy Affairs
DWAF	Department of Water Affairs and Forestry
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act 73 of 1989
ECZ	Environmental Control Zone
EEU	Environmental Evaluation Unit
EIA Report	Environmental Impact Assessment
EIA	Environmental Impact Assessment
EIP	Environmental Implementation Plan
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EMP	Environmental Management Plan (or Environmental Management Programme)
GAPA	Gauteng Agricultural Potential Atlas
GG	Government Gazette
GIS	Geographic Information System(s)
GNR	Government Notice: Regulation
IAIA	International Association of Impact Assessment
IDP	Integrated Development Programme

IEM	Integrated Environmental Management
IR	Importance Rating
KPA	Key Performance Area
KPI	Key Performance Indicator
LUM	Land use management
NEMA	National Environmental Management Act 107 of 1998
NEPA	National Environmental Protection Agency ; <i>also National Environmental Policy Act - both applying to the USA</i>
NPAES	National Protected Area Expansion Strategy
OSDP	Open Space Development Plan
PPP	Public Participation Process
ROD	Record of Decision
RSA	Republic of South Africa
SA	South Africa
SAHRA	South African Heritage Resource Agency
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SOER	State of the Environment Report
UCT	University of Cape Town
UDM	United Democratic Front
UNEP	United Nations Environment Program

Chapter 1: Introduction

Environmental assessments and authorisations surrounding project level developments are often made in isolation, without due consideration of either the regional or strategic context within which individual developments are done, or the cumulative effects of development on the environment. With increasing concern and awareness of South Africa's limited and dwindling water resources, limited land and the non-renewability of many other resources, as well as the global effects of climate change, the call for more strategic environmental controls over and above project level EIA has been recognized, both internationally and locally (Dalal-Clayton & Sadler, 2005; Van Schalkwyk, 2006; Van Schalkwyk, 2008; Kidd & Retief, 2009:973). This chapter introduces the concept of Environmental Management Frameworks as strategic environmental instrument and the need to determine their quality. The arrangement of the chapter is as follows:

- 1.1 Overview of Environmental Management Frameworks**
- 1.2 Legal mandate of EMFs**
- 1.3 Problem statement and research aim**
- 1.4 Research questions**
- 1.5 Structure of the mini-dissertation**

1.1 OVERVIEW OF ENVIRONMENTAL MANAGEMENT FRAMEWORKS (EMFs)

Environmental Management Frameworks (EMFs) are one of South Africa's responses to introduce a strategic context into environmental planning and assessment, along with other instruments such as Strategic Environmental Assessment (SEA), Conservation Plans (C-Plans), Bioregional Plans, Spatial Biodiversity Assessments, State of the Environment Reports (SOERs) and Open Space Development Plans.

EMFs are distinctive South African-developed environmental management instruments that were first conceptualised in 1989, enacted in 2006, with guidelines as to their procedures and implementation published in 2006 and updated in 2010. They are referred to in the 2008 National Environmental Management Amendment Act, 62 of 2008, while 2010 heralded their legal entrenchment with Regulations (R547) published which determine their specific procedural and content requirements.

Following the democratisation of South Africa in 1994, developmental local government was introduced in 2001, encompassing regional 'wall to wall' municipalities, along with Integrated Development Planning (IDP) and its related Spatial Development Framework (SDF) requirements, as well as increased environmental responsibilities for both local and regional municipalities. EMFs are intended to map environmental sensitivity and to determine and advise geographically where certain types of development may be suitable and in which areas development should be avoided. They could therefore be regarded as suitable instruments to drive the environmental component of SDFs, due to their spatial output of environmental sensitivity maps and their ability to feed strategic assessment processes required by SDFs. They are also readily available as planning aid, especially due to their interfacing ability with land use management and other municipal databases in Geographic Information Systems (GIS) format.

A more detailed discussion of the evolution of EMF, including its origins in the South African-developed Integrated Environmental Management (IEM) approach follows in Chapter 2: Literature Review.

1.2 LEGAL MANDATE OF EMFs

Section 2 of this treatise provides detail about all references to EMF in former policy documents. Its actual legal entrenchment, however, is as a result of the following six Acts, Regulations and Guidance documents which are discussed in detail in Sections 2.2 and 2.3.1 of this treatise.

❖ *National Environmental Management Act, 107 of 1998 (NEMA)*

In terms of NEMA Section 24(2), Provincial Governments are legally required to develop Environmental Management Frameworks, or EMFs.

❖ *Regulation GNR 385 of April 2006*

The EIA Regulations of 2006 also require the compilation of EMFs by certain state departments, and particularly provincial governments.

❖ ***Guideline 6 of May 2006***

This document provides the purpose, objectives, principles and context of EMF.

❖ ***NEMA Amendment Act, 62 of 2008***

Sections 24(2) is expanded to provide for the mapping of geographical areas to indicate areas where development may take place without need for environmental assessment (EA), as well as areas where environmental authorisation may be required. Section 24(3) is added to provide for sensitivity mapping and significance determination that need to be considered in environmental authorisations.

❖ ***Regulation GNR 547 of June 2010***

EMFs are formally entrenched with GNR 547, as it provides for the EMF of a region to be initiated and formally adopted by a national or provincial government department. It also prescribes the procedures to be followed in conducting an EMF, the contents of the documents and the types of assessment required. It states that EMFs are to be considered in evaluating EIAs.

❖ ***Guideline 6 of June 2010***

The new guideline updates the 2006 guideline, expanding it to a thirty-nine page document, providing additional contextual descriptions and procedural prescriptions.

1.3 PROBLEM STATEMENT AND RESEARCH AIM

EMF practice is becoming well-established in South Africa, but no specific norms to determine the quality of EMFs have been forthcoming. The benefits of performance evaluation in environmental assessment – i.e. quality and effectiveness review – are explained in Section 2; in essence it entails that good quality documentation, procedural and methodological inputs result in better output quality of environmental decisions. While these procedures have been developed for and applied to Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), to date no performance evaluation techniques have been developed for EMF. This study addresses this need by developing criteria to investigate the quality of EMFs. The outcome of this study should facilitate increasing understanding of and the efficacy of use of EMFs, while enabling suitable norms and standards of practice to be instilled amongst practitioners and demanded by its users. Only if the instrument is proven to be effective in meeting its aims will its continued existence and use be justified.

The aim of this research is therefore to evaluate the output of EMF reports for their quality.

1.4 RESEARCH QUESTIONS

The following three key research questions are addressed in order to achieve the research aim:

- Research question 1:** What are the perspectives and debates relating to EIA and SEA report review and where does EMF fit in?
- Research question 2:** Can suitable review criteria be developed to review the quality of EMF reports in a conceptually justified, methodologically sound and practically viable manner?
- Research question 3:** What is the quality of EMF reports in South Africa?

1.5 STRUCTURE OF THE MINI-DISSERTATION

To facilitate the flow of argumentation and interpretation of results, this mini-dissertation is structured into five chapters, each linked to particular research questions.

Chapter 2 deals with the **literature review** component and answers research question 1.

Chapter 3 describes the **research design and methodology** and addresses research question 2. This includes the development of criteria to determine the quality of EMFs.

In *Chapter 4* the **data on the quality** of the EMF reports are **analysed**. The results address research question 3 through the application of the research design and methods described in Chapter 3.

Finally, the **discussion and conclusions** are presented in *Chapter 5*, summarising the outcomes of research question 3. This chapter continues with proposals to deal with the inadequacies identified, as well as providing pointers for future research and debate. The chapter's objective is to demonstrate that the research questions posed in section 1.4 have been answered.

Chapter 2: Literature review

This chapter addresses research question 1:

What are the perspectives and debates relating to EIA and SEA report review and where does EMF fit in?

The chapter is divided into six sections, as follows:

- 2.1 The evolution of Environmental Assessment (EA) theory**
- 2.2 Context of Integrated Environmental Management (IEM) & EA in South Africa**
- 2.3 The emergence & development of EMF**
 - 2.3.1 Original intent
 - 2.3.2 Newer conception 2006+
- 2.4 EMF as strategic environmental instrument**
 - 2.4.1 SEA & para-SEA
 - 2.4.2 Is EMF environmental assessment?
 - 2.4.3 Are EMFs unique?
 - 2.4.4 The screening role of EMF
 - 2.4.5 EMF practice
- 2.5 EA performance evaluation**
- 2.6 Conclusion**

2.1 THE EVOLUTION OF ENVIRONMENTAL ASSESSMENT THEORY

Environmental Assessment (EA) is a generic term for assessments of environmental impact to propose the least detrimental development options. The concept encompasses Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), as well as other forms of environmental evaluation where the aim is to propose the development option of least impact and to offer mitigation factors to minimise impacts.

The USA pioneered environmental assessment legislation in 1969 with its National Environmental Policy Act (NEPA), whereafter most of the West, Colombia and Thailand were following their example by the mid 1970s, with Africa coming on board from the mid-1980s (Sandham *et al.*, 2005:51). EIA has been practiced voluntarily in South Africa since the mid-1970s (Mafune *et al.*, 1997, Wood, 1999), becoming a statutory requirement in September 1997 with Regulations promulgated in terms of the Environmental Conservation Act, 73 of 1989 (ECA) (Fuggle, 2008:6).

Since its inception forty years ago, the development of and literature published on EA has been mostly oriented to practice, with little prominence given to the development of theory – resulting in its conception being mainly practice driven. Kidd & Retief (2009:971-3) identify three main themes in the evolution of EA theory internationally, as depicted in Figure 1, below:

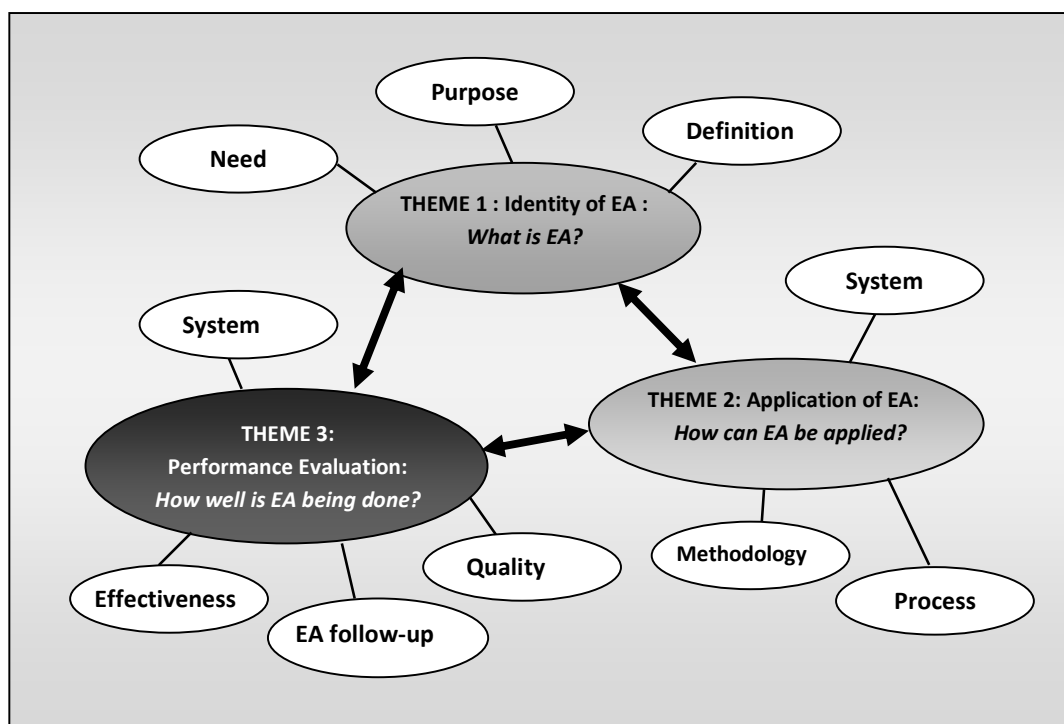


Figure 1: International themes for debate in EA (Source: Kidd & Retief, 2009:972)

The three main themes identified are:

- Identity – namely definition and purpose of EA
- Application of EA
- EA performance evaluation

The first two of these three themes are discussed in the section following, while the third, EA performance evaluation, is discussed in Section 2.5.

The definition, purpose and application of Environmental Assessment

In **defining the concept and purpose of EA**, the first theme, recent progress has been the building of theory between the disciplines of environmental assessment, planning and decision theory (Kidd & Retief, 2009:972), such as that postulated by *inter alia* Bartlett & Kurian (1999), Lawrence (2000), Leknes (2001), Nilsson & Dalkmann (2001), Weston (2004) and Richardson (2005). In this respect, Hill (2005) evaluated the South African EA legislation and its implementation in terms of compliance with its key goal, namely to have more sustainable development outcomes (Lawrence, 1997) – particularly in terms of its improving environmental planning and design and its influencing decision-making objectives. He identifies a strong perception within our legislation that EIA functions according to the information processing model (Bartlett & Kurian, 1999), which is rationalist and technical in outlook. (Hill, 2005:198). This is in agreement with other commentators who generally feel that the nature of EIA has been biased too much along the rational model of decision-making (Kornov & Thissen, 2000:191-193; Owens *et al.*, 2004:1945) – i.e. the information processing model. In deliberations about especially SEA, Bina is one of the strong proponents that EA should move from its technical-rational grounding and “...*switch emphasis towards more argumentative-subjectivist approaches, which can increase its effectiveness...*” (Bina, 2001:17). Jay *et al.* (2007:288) likewise argue that EIA should return to its “...*original, substantive aim of contributing to more sustainable forms of development...*”.

One of the main changes in the understanding of EA in South Africa since its commencement is the recognition that EA requires a wider ambit to include strategic level assessment, due to the limitations of project-level EIA (Kidd & Retief, 2009:973). This includes the more recent provision for Conservation Plans, Biodiversity Action Plans, SEA and EMF as more strategically focused EA instruments.

The focus of much debate in EA on the second theme, **application of EA**, has resulted in a wealth of literature (Kidd & Retief, 2009:973). This theme deals with concerns of procedural requirements and methodologies (micro level) as well as concerns like system requirements at the macro level. Connelly and Richardson (2004) add to the debate by emphasising that questions of value need to be added to

the EA (SEA) procedures debate, and that qualities of outcomes, as opposed to process, need to be accentuated. Their main argument is for drawing on environmental justice theories to contend with both value issues and to gauge the success of SEA. They propose that the achievement of sustainable development (as outcome of SEA) can be reached neither through rational, technocratic methodologies, nor through integrative, participative approaches; instead, politically acceptable consequences, which rely on the "*murky processes of bargaining*" (Connelly and Richardson, 2004:3), should determine SEA success. Kidd & Retief (2009:1047) succinctly mirror their sentiment with this statement:

"The purpose of EA can thus not solely be to provide information, but rather to fully engage with the messy world of political decision-making."

2.2 CONTEXT OF ENVIRONMENTAL ASSESSMENT & INTEGRATED ENVIRONMENTAL MANAGEMENT IN SOUTH AFRICA

Integrated Environmental Management (IEM) is a unique South African planning driven approach to environmental management (Fuggle, 2008). IEM is defined as :

" a combination of pre-active and preventive processes and procedures that maintain the environment in good condition for a variety of short and long range sustainable uses." (DEAT, 1998b:14),

while it is also explained as :

"the coordinated planning and management of...human activities...to achieve and balance...environmental objectives" (DEAT, 1998b:14).

The 1992 Guideline Series Document 1 explain IEM's aim as ensuring that:

"... environmental consequences of development proposals are understood and adequately considered in the planning process" (DEA, 1992).

At an early stage there was pressure that EIA should not be instituted as a process in South Africa, as the Council for the Environment (CE) was against the idea. The role of the CE was based on the US Environmental Protection Agency (EPA) model, whereby the *Council for Environmental Quality* was responsible for forming policies, and which worked as a functional group under the President, with the other leg being the EPA, whose role it is to administer the law and provisions of NEPA. The CE saw themselves as the equivalent of the US *Council for Environmental Quality* and fostered the idea that Department of Environment Affairs (DEA) should be similar the US EPA. This then served as the origin for the IEM concept (Claassen, 2009: pers comm).

Kidd & Retief (2009:974) categorise the progression of EA development in South Africa into four stages, which they label **Inception** (1970 - 1990s), **Formation** (Early to middle 1990s), **Formalisation** (Middle 1990s to middle 2000s) and **Refinement** (from 2006 onwards).

The **inception phase** displayed a strong association between physical planning and environmental management (Fuggle, 2008:4) and culminated in the formalised IEM concept in 1992, but was preceded by the following events depicted in Table 1:

Table 1: EA Inception phase: build-up to IEM (Sources: Kidd & Retief, 2009; Fuggle, 2008)

1972	Cabinet Committee on Environmental Conservation (CCEC) established as non-statutory body.
1975	Council for the Environment (CE) – the new name given to the 1972 CCEC, which remained a non-statutory body until 1983.
1976	South African Council for the Environment Report: The report proposed methods and procedures for environmental evaluation in South Africa.
1979	Symposium ‘Shaping our environment’: Emphasised the value of EIA as an aid to the management of environmental change to incorporating principles of EIA into guidelines for use by professional planners.
1980	White Paper on a National Policy Regarding Environmental Conservation: Aimed to formulate a national policy on environmental conservation and proposed that the environment (both natural and man-made) should become a normal consideration in the planning and development cycle of projects.
1980	Environmental Planning Professions Inter-disciplinary Committee: Proposed guidelines to assist planning professionals in taking environmental aspects into account.
1982	Environment Conservation Act (100 of 1982): Provided for the establishment of a statutory Council for the Environment(CE) to advise government on environmental policy, which played a significant role in the development of EIA thinking. Introduces public participation as mandatory process in environmental policy formation and regulation, as well as in the EIA process.
1982	The President’s Council: (an advisory council to the President) requested to advise on the principles according to which priorities between development and conservation can be stated.
1983	Formation of the Council for the Environment as a statutory body and a subcommittee for EIA: The EIA Committee initiated research, workshops and consultation on EIA to develop a mechanism that would suit the South African context.
1984	President’s Council: Published two reports that requested compulsory introduction of EIA for development projects outside Guide Plan areas.
1985	National Workshop on the significance and necessity of EIA. Government officials, professionals and academics indicated unanimous support for the introduction of EIA as part of a ‘comprehensive holistic planning procedure’.
1987	Working Group (consisting of the EIA Committee and members of the Council for the Environment): appointed to develop the philosophy on environmental assessment for South Africa.
1989	Environment Conservation Act (73 of 1989): Made provision for an environmental policy (Section 2) and EIA (Sections 22, 23 and 26).
1989	IEM report: <i>Integrated Environmental Management: A framework for harmony between development and environment</i> , published by the CE - set out the principles and a procedure for the evaluation of policy, programmes and projects.

The **formation phase** of EA development in South Africa entailed the formal adoption of IEM and the first two major EIAs undertaken in South Africa, of which one by DEAT in-house. Six years later the primary goal of IEM is stated as facilitating the reorientation of South Africa's economy toward environmental sustainability (DEAT, 1998b:14-15), which was to be done through the following five measures:

- establishing limits of acceptable environmental impacts
- providing a range of environmental management instruments
- setting approval conditions, with subsequent monitoring and management of impacts
- providing incentives to minimise negative impacts
- defining roles of developers, regulating authorities and other stakeholders.

The development of Integrated Environmental Management during the ten-year period 1989 to 1998, entailing portions of both Kidd & Retief's (2009) *Formation phase* and *Formalisation phases*, was characterized by the following milestone events, which include documents published and committees formed :

Table 2: Milestones in IEM development :1989 to 1998 (Sources: Fuggle, 2008; Claassen, 2009)

1989	Integrated Environmental Management: A framework for harmony between development and environment, 1989
1991	Report of the three Committees of the President's Council on a National Environmental Management System, 1991.
1992	The Integrated Environmental Management Procedure, 1992
1995	Consultative National Environmental Policy Process (CONNEPP), 1995
1996	Discussion document: Towards a New Environmental Policy for South Africa; Green Paper on a National Environmental Policy Strategic Environmental Assessment (SEA) – A Primer (CSIR, 1996)
1997	Draft White Paper on Environmental Management Policy ECA Regulations: R1182 of 1997
1998	White Paper on Environmental Management Policy National Environmental Management Act, 107 of 1998 (NEMA) A national strategy for Integrated Environmental Management in South Africa, 1998 Guideline Document: EIA Regulations – implementation of Sections 21, 22 and 26 of the Environmental Conservation Act

IEM was developed as a broader holistic environmental management philosophy for the particular South African context in reaction to a perceived limiting, reactive EIA process divorced from the planning process. However, the 1992 Rio Summit introduced the sustainable development concept,

which subsequently diverted IEM thinking and the ensuing Formalisation phase of South Africa's EA development (Kidd & Retief, 2009:978). Each of the milestone events in the EA evolution is discussed in more detail hereafter.

❖ ***Integrated Environmental Management: A framework for harmony between development and environment, 1989***

After the kick-off of IEM in 1989 with a publication "*Integrated Environmental Management: A framework for harmony between development and environment*" (Council for the Environment, 1989), Department of Environment Affairs (DEA) officials were given the brief to give effect to the recommendations of this document.

❖ ***Report of the three Committees of the President's Council on a National Environmental Management System, 1991.***

The President's Council issued two reports on environmental management, the more important one being: *Report of the three Committees of the President's Council on a National Environmental Management System, 1991 (PC 1/1991)*. After this report, the Council for the Environment (CE) fulfilled the role of making recommendations to Government – that is formulating and presenting draft 'policies'. As an outcome of this report, DEA officials similarly had to consider recommendations of the following publications and to give effect to them:

"Integrated Environmental Management in South Africa"

"Guidelines for environmental observation and environmental creation",

Report of the three Committees of the President's Council on a National Environmental Management System (Claassen, 2009: pers comm).

❖ ***The Integrated Environmental Management Procedure, 1992***

At this stage Richard Fuggle and others at the University of Cape Town (UCT) were asked by DEA to develop an Integrated Environmental Management procedure. A process of ongoing workshops between DEA and the Environmental Evaluation Unit (EEU) at UCT was undertaken, generating recommendations which later resulted in a compilation of the six-volume IEM Information Series of 1992, "*The Integrated Environmental Management Procedure*" (DEA, 1992) under the guidance of Messrs Claassen and Fourie of DEA. IEM was therefore formally birthed and at this stage of its development, it was sequentially adopting more of an EIA-type methodology, with screening and scoping as its main constituent elements (Claassen, 2009: pers comm).

The 1992 IEM 6-volume document served as the main backdrop to the Environmental Conservation Act, 73 of 1989 (ECA) Regulations that were developed; these regulations are regarded by early

practitioners as “good” and “simple” – i.e. not unduly complex and over-prescriptive. In the 1992/93 era, DEA officials were keen to implement the ECA Regulations, but seen against the background of the change in political climate and the imminent formation of a new democratic government, decisions to enable the promulgation of the regulations were not forthcoming (Claassen, 2009: pers comm).

❖ ***Consultative National Environmental Policy Process (CONNEPP), 1995***

Early in 1995, government embarked on the Consultative National Environmental Policy Process (CONNEPP), the outcomes of which were the publication of both the Green Paper (*Green Paper for public discussion: An environmental policy for South Africa*. DEA, Oct 1996) and later the *White Paper on Environmental Management Policy* in July 1997.

At this stage, the implementing of the ECA Regulations was put on ice, with *Conference for a democratic South Africa* (CODESA) discussions and negotiations being a higher political priority at the time – with the expedient holding back of new legislation and regulations fitting into the political conundrum of the time. Many internal documents were developed by DEA during the era, with the uncertainty remaining as to whether the old or the new ECA Regulations were going to be implemented. At this stage, Pallo Jordan was made the new Minister of Environment and Bantu Holomisa his Deputy. Holomisa was responsible for commencing Phase I of the CONNEPP process, with DEA officials making major contributions to the CONNEPP process (Claassen, 2009: pers comm).

❖ ***Discussion document: Towards a New Environmental Policy for South Africa, 1996***

Under the CONNEPP process and Holomisa’s leadership, a gathering of over 500 persons from government, NGOs, environmental practitioners and political parties took place during August 1995 for a three day workshop that culminated in the creation of the *National Environmental Policy*. Following further consultation with government, this led to the following two discussion papers were which were issued and consulted on:

- *Green Paper on a National Environmental Policy, 1996*
- *Draft White Paper on Environmental Management Policy, 1997*

The outcome of these deliberations resulted in the final White Paper of 1998 (Fuggle, 2008:6), which is discussed on page 20.

❖ ***Strategic Environmental Assessment (SEA) – A Primer (CSIR, 1996)***

Apart from the process that led to the formal adoption of EIA regulations in 1997, provision was also made for more strategic level assessment in the form of SEA, whose aim was to assess policies and programmes. The 1996 CSIR document ‘*Strategic Environmental Assessment (SEA) – A Primer*’

introduced SEA as separate procedure outside the original IEM procedure (CSIR, 1996); while the 1998 IEM Discussion document similarly appears to have been developed without considering the SEA primer. This formalisation phase therefore resulted in greater refinement for the EIA procedure – culminating in the 2006 EIA Regulations, while the SEA concept has lost clarity and has not been legislated (Kidd & Retief, 2009:979-981).

❖ ***Environmental Conservation Act (ECA) Regulations: R1182 of 1997***

When Holomisa was replaced by Peter Mokaba as Deputy Minister (after Holomisa's resignation from the ANC and his formation of a new political party, the UDM), it appeared that Mokaba trusted nobody of the "old guard" who had been responsible for the IEM process thus far, and a new group of DEA officials were subsequently selected who collaborated with a University of Cape Town (UCT) group in drafting the new *National Environmental Management Act, 107 of 1998* (NEMA). NEMA was developed without virtually any of the prior CONNEPP deliberations, recommendations and consensus agreements; most of these were thrown out. At this stage, the Regulations which had been drafted for ECA were "proclaimed", after a meeting of the Provinces at Franschoek (Claassen, 2009: pers comm).

EIA became a legal requirement in September 1997 with Regulations promulgated in terms of Section 21 of the Environment Conservation Act, 73 of 1989 (ECA). Regulation R1182 listed activities "which may have a substantial detrimental effect on the environment" requiring EIA, while R1183 and R1184 contained EIA procedural and system requirements and delegated authority for authorisations to Provincial Governments. The reason why the ECA Regulations took so long to be promulgated/enacted, was that this happened in a time of political uncertainty, transition, as well as with the fast-tracking of new legislation (NEMA) by a totally new role player in the status quo at that point. This era also saw a big exodus of officials from the civil service; the DEA being no exception (Claassen, 2009: pers comm).

❖ ***White Paper on Environmental Management Policy for South Africa, 1998***

The stated goal of this policy document, which was gazetted on 15 May 1998, was:

"...to move from a previous situation of unrestrained and environmentally insensitive development to sustainable development with the aim of achieving a stable state economy in balance with ecological processes" (DEAT, 1998a:25).

The White Paper formed a basis for the drafting the National Environmental Management Act, 107 of 1998 (NEMA), which came into effect on 29 January 1999 (Fuggle, 2008).

❖ ***A national strategy for Integrated Environmental Management in South Africa (1998)***

In 1998 both the “*White Paper on Environmental Management Policy for South Africa*” (DEAT, 1998a) and “*A national strategy for Integrated Environmental Management in South Africa*” (DEAT, 1998b) were published. Interestingly, the new environmental framework legislation, the National Environmental Management Act, 107 of 1998 (NEMA) was gazetted in the same year. All three these publications were probably in response to the recommendations of the 1997 Draft White Paper on Environmental Management Policy for South Africa.

The ‘*National strategy for IEM*’ document states that in the 1997 ECA Regulations, EIA (with scoping) is overemphasised as “a central component of IEM” because it was the only aspect of IEM that had been enacted at that stage (DEAT, 1998b:10). The strategy document declares its aim to legislate the IEM procedure, in a context wider than the EIA Regulations and procedures that had been enacted in 1997. However, the intended legislation of the IEM procedure never transpired. This publication and its applicability to EMFs is discussed in more detail in the ensuing Section 2.3.1 (p 16).

❖ ***Guideline Document: EIA Regulations – implementation of Sections 21, 22 and 26 of the Environmental Conservation Act - 1998***

This guideline document was published in support of the EIA Regulations R1182, R 1183 and R1184 and provided direction to environmental practitioners, developers and competent authorities on the EIA process.

❖ ***National Environmental Management Act, 107 of 1998 (NEMA)***

NEMA, the new environmental framework legislation that replaced most of the Environmental Conservation Act, 73 of 1989 (ECA) was published in 1998 and came into force on 29 January 1999. In terms of Section 24(2) of NEMA, Provincial Governments are legally required to develop Environmental Management Frameworks, or EMFs. This then, is the first legal prescription and naming of the EMF which had been alluded to in preceding policy documents.

Finally, Kidd & Retief (2009:973) reflect that the absence of an obvious differentiation between IEM and EA has resulted in some perplexity, causing a departure from earlier concepts of IEM toward newer understandings of environmental management and assessment. Furthermore, the development of the refinement stage is not complete, as can be observed with the ongoing refinement of regulations, such as the 2010 update of the 2006 Regulations.

2.3 THE EMERGENCE AND DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT FRAMEWORKS

Conceptually, EMFs are strategic environmental management instruments, and help identify types of development suitable for specified areas, while earmarking areas in which activities can be excluded from the EIA requirements. EMFs map the environmental attributes of geographic areas in terms of sensitivity, significance, extent as well as the interrelationship between attributes. It includes not only the biophysical environment, but also the built environment. It moreover makes provision for future plans, or the 'planned environment' and it specifies the desired state of the environment and how this is to be attained and maintained. The tool includes the mapping of different sensitivity zones that are named 'environmental control zones', accompanied by prescriptions on the policy and management of such zones. These are in turn labelled environmental management policies and plans.

EMFs are mainly intended to inform the EIA authorisation process on the necessity or otherwise of project-level EIAs. Pre-determined activities, if aligned with environmental control zones, can then be excluded from EIA procedures. EMFs can also provide useful strategic information to the Integrated Development Planning (IDP) process, including Spatial Development Frameworks. While local authorities are currently not required to undertake EMFs, they can benefit from Provincial EMFs as inputs into their SDF and IDP process, especially regarding integration and the identification of potential conflict areas (SA, 2006a). Where municipalities do undertake EMFs, these can guide all environmental and spatial planning. These two uses hold promise to reduce the number of EIAs that are currently required, whilst focusing assessment to where it makes a more meaningful, strategic contribution to sustainable development.

2.3.1 Original intent of EMFs

EMFs were first conceptualised in 1989. The milestones in the evolution of EMF can be summarised as follows:

1989 & 1992	IEM Guidelines (need for strategic assessment)
1998	IEM Discussion Document: A national strategy for IEM in SA; with identification of and need for EMF spelled out.
2006	EIA Regulations GNR 385, Regulations 69-72 formalising EMF EMF Guideline 6:
2008	NEMA Amendment Act 62 of 2008, Section 24(2)(b)(c)
2010	EMF Regulations GNR 547 Legal requirements) EMF new Guideline 6: (upgrade, with far more detail than 2006 version).

The implications of the 1989 & 1992 IEM publications on EMFs were discussed in the previous section.

Although EMF was legally entrenched only in 2006 (by virtue of GNR 385), its first formal description is found in the 1998 DEAT strategy document, *Discussion Document. A national strategy for Integrated Environmental Management in South Africa*, as discussed above. It mentions that DEAT "is currently developing EMFs for each of the provinces" (DEAT, 1998b:21) and then continues to describe in broad terms the integration of spatial environmental information into sensitivity zones, the development of parameters and then the assessment and integration of socio-economic spatial plans, policies and visions to embody strategic management zones. The combination of the environmental sensitivity zones and the strategic management zones then form the Environmental management framework, or EMF (DEAT, 1998b:21-23). It is stated that the development of the management zones is to be "informed by intensive public participation" for sufficient portrayal of societal norms and values in the EMFs, while EMFs in combination with scoping are regarded as being able to prevent cumulative and synergistic impacts (DEAT, 1998b:23).

Table 3 : IEM procedural steps for four types of activities in its pre-2006 guise, indicating the potential screening role of EMF in Step 2. (Source: compiled from DEAT, 1998b:27-38)

PHASES	TYPES OF ACTIVITIES			
	<i>New land use schemes / zoning plans</i>	<i>New activities</i>	<i>Existing activities</i>	<i>Activities within approved IEM zoning plans / schemes.</i>
			Trigger	
1	Proposal for land use scheme / zoning plan	Activity proposal	Activity description	Activity description
2	Authority review in terms of EMF	Authority review in terms of EMF	Authority review in terms of provincial EMF	Authority review in terms of IEM-approved land use scheme / zoning plan
3	Scoping	Scoping	Scoping	
3a		Review		
4	Strategic Environmental Assessment	Environmental Impact Assessment	Environmental Optimisation Assessment	Environmental Optimisation Assessment
4a		Conditions agreement	Conditions agreement	Conditions agreement
4a	Review			
5	Establish EMP	EMP	EMP	EMP
D	Draft land use scheme / zoning plan			
6	Review	EMP Review	EMP Review	EMP Review
6a	Approval	EMP Approval	EMP Approval	EMP Approval
F	Final land use scheme / zoning plan			

The document also envisions the formation of provincial EMF working groups to ensure that key socio-economic management issues and stakeholder engagement are included in EMFs, while it prescribes the membership of the working groups: these are to include DEAT, other national departments, provincial and local government, as well as economic, environmental and social NGO "stakeholder representatives" (DEAT, 1998b:26).

The document also spells out the intended IEM procedures for land use schemes and zoning plans (pp 27 – 30), new activities (pp 30 – 33), existing activities (pp 33 – 36) and activities within approved IEM zoning plans and schemes (pp 36 – 38). The intended benefits of the differential procedures are to facilitate tiered decision-making, removal of unnecessary repetition of issues at project level EIA, while also reducing the breadth of scoping, all of which contribute to time and cost savings to developer and competent authority alike. The proposals also include assessment of existing activities, which had hitherto escaped scrutiny and had therefore discriminated against new developments (DEAT, 1998b: 27). The procedural steps for these four types of activities or summarised in Table 3 above, where the EMF or EMF outcome (i.e. the approved scheme in the last column) is used in step 2 to screen, review or evaluate the development application or proposal.

An eight year period of silence elapsed before anything more was said about EMFs. It would appear that the intended IEM vision for EMF never quite got off the ground and that the emphasis on EIA as central IEM component remained (Claassen, 2009: pers comm). The practice of EMF, interestingly, saw some experimental development of EMFs that were done between 1998 and 2006, i.e. between its description in the strategy document and its formalisation through GNR 385.

On 16 April 2006, the former Minister of Environmental Affairs and Tourism, Marthinus van Schalkwyk, announced the launching of the new EIA Regulations with his famous "*Environmental Protection: Quicker, Simpler, Better*" speech and press release, (Van Schalkwyk, 2006), which coincided with the publication of the new NEMA Regulations GNR 385 (SA, 2006b), in which Environmental Management Frameworks (EMFs) are enacted for the first time.

2.3.2 The newer conception of EMF: 2006 onwards

EMFs formed a big portion of environmental management thinking (or of the thrust behind it) in the first Regulations of NEMA. However, the original breadth of EMFs as envisaged in the 1992 document was never enacted in the NEMA Regulations. The problem here was that the Provincial Departments of the Western Cape, Kwa Zulu and Gauteng on the one hand, and the National Government on the other, were at loggerheads regarding the implementation of these Regulations. As consensus had to be

reached, decisions were later made '*more out of fatigue and desperation than wisdom*' (Claassen, 2009: pers comm.) regarding the final outcomes of deliberations between the National Department and the Provinces. In the final product, a lot of detail is retained, while not all overarching concepts had been sorted out.

❖ **NEMA Regulations GNR 385 & Guideline 6 (2006)**

The new regulations GNR385, GNR386 & GNR387 in terms of the National Environmental Management Act, 107 of 1998 (NEMA) were subsequently implemented on 3 July 2006, repealing the ECA Regulations. EMFs are described in GNR 385 (21 April 2006), Sections 69-72. According to **Section 71** of these regulations,

GNR 385 Section 71

*...a draft **Environmental Management Framework must:***

- (a) identify by way of a map or otherwise the geographical area to which it applies;*
- (b) specify the attributes of the environment in the area, including the sensitivity, extent, interrelationship and significance of those attributes;*
- (c) identify any parts in the area to which those attributes relate;*
- (d) state the conservation status of the area and in those parts;*
- (e) state the environmental management priorities of the area;*
- (f) indicate the kind of activities that would have a significant impact on those attributes and those that would not;*
- (g) indicate the kind of activities that would be undesirable in the area or in specific parts of the area;
and*
- (h) include any other matters that may be specified (SA, 2006b).*

In terms of Section 71, as well as Sections 69, 70 & 72, EMFs are screening tools by virtue of which sensitive areas and/or areas where development should proceed are mapped spatially.

In addition, Guideline 6: *Environmental Management Frameworks in support of the Environmental Impact Assessment Regulations*, 2006 was published in May 2006, very soon after the enactment of the new Regulations, indicating a strong intent by DEAT that this instrument was henceforth to be considered seriously. Guideline 6 is an eighteen page document which describes the process of compiling and applying an EMF, including the public participation process, information gathering and assessment. It also specifies the end products, including management proposals, implementation strategies and the documentation and GIS format (SA, 2006a: 491).

❖ **NEMA Amendment Act, 62 of 2008**

The 2008 Amendment Act of NEMA introduced two sections that deal with the 'identification of geographical areas'. In the one instance, Section 24(2) was extended to include such areas which may be demarcated to either exclude the EIA process, or to indicate that EA must specifically be done to get authorisation for development (though this is not quite the same as avoiding development). Section 24(3) was added, making provision that sensitivity mapping (GIS) and the significance of specific environmental attributes may be done, which have to be taken into account by competent authorities. These two provisions align directly with the specifics of EMFs – without mentioning EMF *per se*. One can therefore say that the use (or prescription) of EMF is entrenched hereby, while it does leave the opportunity for other instruments to also be used to perform this function in its stead.

NEMA S24(2) *The Minister, and every MEC with the concurrence of the Minister, may identify—*
(b) geographical areas based on environmental attributes in which specified activities may not commence without environmental authorisation from the competent authority;
(c) geographical areas based on environmental attributes in which specified activities may be excluded from authorisation by the competent authority;

NEMA S24(3) *The Minister, and every MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority (SA, 2008).*

❖ **NEMA Regulations R 547 & Guideline 6 (2010)**

During 2010 new EMF Regulations were promulgated which are very similar to the Guideline 6 of 2006. In addition, an update of the 2006 Guideline 6 (but also known as Guideline 6) was issued.

GNR 547, published on 18 June 2010, provides for the EMF of a region to be initiated and formally adopted by a National or Provincial Department and EMFs are thereby formally entrenched in South African legislation. The Regulations state that EMFs are to be used in the consideration of environmental authorisations (S 2(1)(c)), and aimed at promoting sustainability, securing environmental protection and promoting cooperative environmental governance (S 2(3)(a)(b)(c)). They also prescribe the public participation process (S 3(2) & S 3(4)), the environmental considerations and type of assessment required (S 3(3)), as well as content requirements (S 4) and provisions and procedures for legal adoption (S 5).

The wording of Section 4, *Content requirements* changed as follows: (f) & (g) have been altered, while (h), (i) & (j) were added. The old (h) now became (k).

GNR 547 Section 4: Content of environmental management frameworks

4. A draft environmental management framework must:

- (f) indicate the kind of **developments or land uses** that would have a significant impact on those attributes and those that would not;*
- (g) indicate the kind of **developments or land uses** that would be undesirable in the area or in specific parts of the area;*
- (h) **indicate the parts of the area with specific socio-cultural values and the nature of those values;***
- (i) **identify information gaps;***
- (j) **indicate a revision schedule for the environmental management framework; and***
- (k) include any other matters that may be specified (SA, 2010b).*

The new guideline updates the 2006 guideline, expanding it to a 39 page document, adding *inter alia* the following descriptions and prescriptions to earlier provisions:

- historical development,
- breakdown and description of EMF constituent parts such as Stratus Quo Assessment, Desired State of the Environment, Sensitivity analysis, Environmental Control Zones,
- management guidelines,
- institutional arrangements and
- promulgation and adoption of EMF (SA, 2010a).

2.4 EMF AS STRATEGIC ENVIRONMENTAL INSTRUMENT

2.4.1 SEA & para-SEA

It is useful to start by addressing EMF as a strategic environmental instrument against the literature on Strategic Environmental Assessment (SEA). Dalal-Clayton & Sadler (2005) consider SEA as encompassing various processes that assess environmental and sustainability consequences of alternatives and propositions at policy and planning level.

These authors categorise SEA models into four groups, of which one is 'para-SEA' – which they define as procedures that have “*some but not all of the features or characteristics of SEA*” (Dalal-Clayton & Sadler, 2005:46). They emphasise that these various approaches, applied especially in developing countries, result in continued expansion of the boundaries of SEA – which has both procedural and methodological consequences and they therefore regard SEA as one of the tools available to incorporate environmental and social considerations into policy and planning processes (Dalal-Clayton & Sadler, 2005:358).

Bina likewise regards the current evolution of SEA as being in a phase where increasing emphasis is placed on process, as opposed to deliverables and documentation, where it is progressively being aligned more to related concepts such as “sustainable strategising” and “policy appraisal” (Bina, 2008:142). She perceives a change in the importance of the prediction and evaluation of impacts in the SEA process and argues that these aspects are declining in priority, standing back for additional and complementary procedures which often react better to the challenge of incorporating the environment into policy formulation. Bina proposes that impact prediction and evaluation are becoming more receptive to participative approaches, with the traditional SEA data capture and analysis activities expanding to include analysis of the institutional context, applicable decision processes, and early consideration of stakeholders and role players necessary for an effective SEA process (Bina, 2008:143). Figure 2 illustrates this widening range of SEA activities, with the grey ovals being activities that are increasingly being assimilated into SEA.

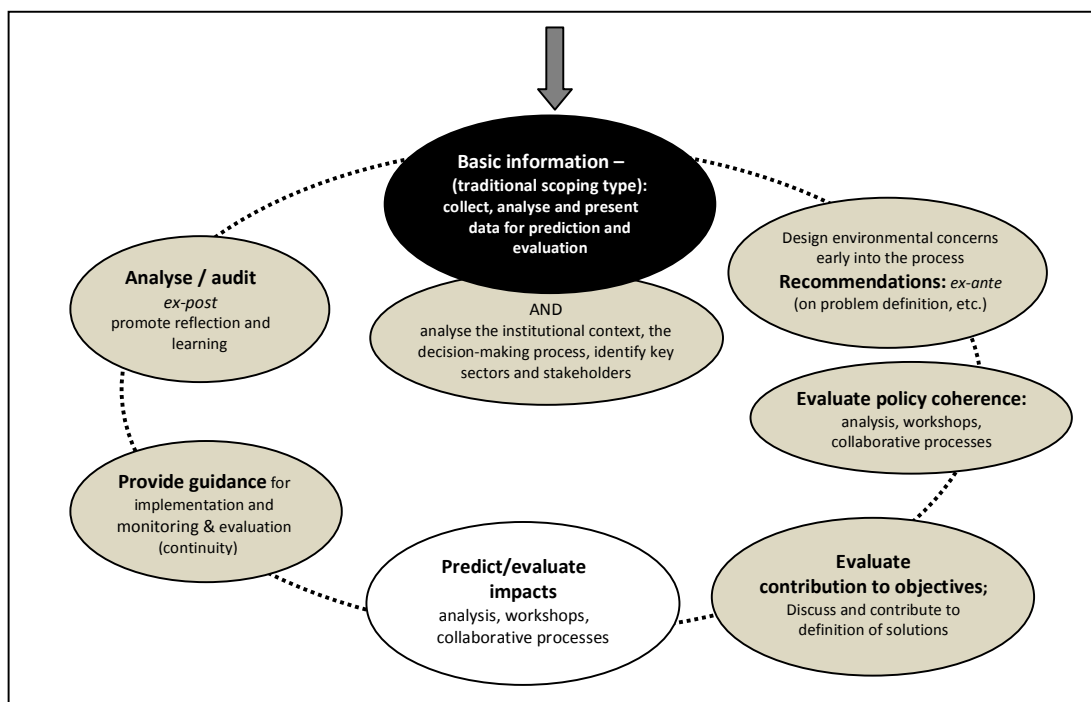


Figure 2: “The widening range of SEA activities” (Source: Bina, 2008:143).

2.4.2 Can EMF be regarded as Environmental Assessment?

Opinions differ as to whether EMF can be regarded as an Environmental Assessment tool. However, it does address some strategic and regional focus aspects that need to be considered in both environmental evaluation and spatial planning. In the light of the changing role of SEA described by Bina (2008), it could be argued that EMF accomplishes (or has the capacity to accomplish) certain SEA functionality, especially as it pertains to fulfilling the substantive purposes of EA. EMFs are regarded by some as not assessing the environment at all, but that they are merely an exercise in sensitivity mapping which guide land use options (Retief, 2009: pers comm.), while others regard them as a unique South African form of SEA (Audouin, 2009: pers comm.). Some practitioners again see EMF as the (potential) outcome or product of a SEA process (Claassen, 2009: pers comm.; DEAT, 2008). Other practitioners, by contrast, regard EMFs as forming a foundation for use as inputs in a SEA process, for example in the SEA required by Spatial Development Frameworks (SDFs) (Retief, 2010: pers comm.).

Anecdotal evidence suggests that the primary role of EMF to date has been to provide the environmental grounding for SDFs as required by municipal legislation in South Africa. In terms of legislation, each Municipality must compile an Integrated Development Plan, of which one of the constituent parts is a SDF. The purpose of SDFs is to create a strategic framework for the formulation of an appropriate land-use management (LUM) system, through which the following can occur:

- informing the decisions of development tribunals, housing departments and relevant development committees;
- creating a framework of investment confidence that facilitates both public and private sector investment.

However, EMFs are not explicitly linked to SDFs via regulations; the IDP/SDF Regulations require that 'strategic assessment' of the proposed plan (or framework – SDF) should be done and therefore SDFs require a SEA process to be compliant. It has, however, been observed in practice that EMFs are currently fulfilling this role. The SDF requirements are that maps should be included which should accurately indicate the following:

- preferential and focal areas for certain types of land use,
- areas for which certain types of land use are excluded, and
- locations of IDP projects, to provide evidence of compliance of the IDP with the spatial objectives and strategies reflected in these maps.

This is reminiscent of the 2008 amendments to NEMA Sections 24(2) & 24(3), as discussed in the foregoing Section 2.3.2 of this treatise. It can be seen that EMFs can accurately address these SDF

requirements – as long as one can reason that EMFs meet the terms of 'strategic assessment' processes and outputs.

In the opinion of the author, EMFs do assess the suitability and limitations of the environment for specific types of developments and should therefore be regarded as 'environmental assessment'. In the strict definitional sense of SEA, however, they do not '*assess the environmental impact of policies, programmes and plans*'. However, as sensitivity mapping and information tools, EMFs are playing a leading role in informing planning decisions and as such are adding more to the substantive outcomes of Environmental Assessment. If one considers the views of Dalal-Clayton, then EMF is fulfilling the (changing) role of SEA '*...to direct planning and decision-making towards environmentally sustainable framings and problems, objectives and alternatives*' (Dalal-Clayton, as quoted in Bina, 2008:601).

2.4.3 Are EMFs unique or do other instruments fulfil the same role?

On the one hand, Environmental Management Frameworks (EMFs) are **unique** in South Africa in name and concept – but not as sensitivity mapping device. They were developed to gauge and map sensitivity and to minimise unnecessary project level environmental assessments in areas earmarked for development, while they also add to conservation planning in directing high impact developments away from sensitive environments.

The concept of sensitivity mapping as planning aid is generally credited to landscape architect and planner Ian McHarg, whose seminal publication '*Design with Nature*' (Mc Harg, 1969), laid the foundation for this practice. To give an impression of the lasting legacy of this work, the second edition of his book was published verbatim as a 25-year anniversary edition in 1994 – the only alterations being an updated preface and the fact that it was issued in larger format to enable easier interpretation of the many illustrative maps. McHarg assigned sensitivity values to different environmental attributes, as well as cultural and aesthetical features of a landscape, while he also allocated values to elements that constrain development such as a shallow water table, soil, geotechnical and physiographical limitations. By overlaying transparencies that mapped these different sensitivities and constraints, the most suitable zones for development and transportation routes can be determined which will have the least impact on the environment and subjective societal values.

Subsequent developments in information technology and the mapping and overlay capabilities that emerged with the development of Geographic Information Systems (GIS) in the 1990s have resulted in the sensitivity mapping concept of McHarg being widely adopted into regional, economic, conservation and environmental planning, landscape architecture and geographical analysis in general. The rationale

of sensitivity mapping used in EMF methodology stems directly from McHarg's concepts and is used as starting point to determine where development should be focused and where it is to be avoided.

On the other hand, EMFs are *not unique*, as the emergence of strategic environmental management instruments as background or matrix in which project level (that is, EIA) environmental decisions are made, has resulted in the development of a plethora of new environmental instruments. Each of these other instruments aims to address regional and/or strategic environmental management or planning issues in one way or another and each has a particular following in certain sectors, regions and applications.

The following examples explain the major uses and applications of other strategic environmental management instruments in South Africa, some of which have an overlapping role with EMF:

- **State of the Environment Reports (SOER)** have been compiled for various sectors (cities, rivers, air quality, climate) and all the provinces in South Africa, as well as nationally – see the South African Environmental Outlook for 1999 & 2006 – with many of these having been updated since their first appearance. SOER practice is therefore well established, and to a large extent other environmental processes encompass or start off with baseline studies that either duplicate existing SOER methodology or use existing SOER data. It can therefore be stated that SOERs are (often) contained in larger environmental processes, including C-Plans, SEA and EMF.
- **Strategic Environmental Assessment (SEA)**. Despite initial popularity from the late 1990s to mid 2000s, supported by guidelines and legal requirement in respect of SDFs, the overall attraction and practice of SEA appears to have dwindled in favour of EMF. SEA is defined as the assessment of the effect of the environment on development (in South Africa alone), or more generally as the assessment of the impact of development /application of policies, programmes and plans on the environment. A necessary part of SEA involves the development of a Strategic Environmental Management Plan (or Programme), (SEMP) - which is a collection of management provisions and actions to ensure that identified impacts of relevant policies, programmes or plans are monitored, managed and thereby minimised.
- **Conservation Plans** (or C-Plans) contain wide prescriptions on suitable uses and developments, management provisions and prerequisites before development may be considered. Generally they guide the developer and environmental practitioner as to what legal and environmental requirements (specialist studies, buffer zones, etc.) need to be applied. C-Plans are legally entrenched to address conservation in the highly developed and land-scarce Gauteng province, while in the Western Cape its practice is well entrenched due to the highly diverse and threatened Fynbos biome.

- **Biodiversity Action Plans (BAPs)** appear to be becoming a popular approach for mining areas, conservancies and other privately owned and managed conservation areas. To a large extent these are SEMP's developed specifically with biodiversity conservation and management objectives for the specific areas for which they apply to. The SEMP's of BAPs therefore differ from SEA SEMP's in that the former are conservation management plans for a specific land use (usually conservation – or mining or limited eco-tourism in combination with conservation) – while the latter provides general environmental management provisions for specific policies, programmes or plans under assessment.

2.4.4 The screening role of EMF

Screening is part of the environmental decision-making process that is initiated during the early stages of the development of a proposal. The screening process determines whether a development proposal requires environmental assessment (usually EIA or SEA), and if so, what level of assessment is appropriate.

Screening is defined variously as :

"...a process involving the determination of whether or not an individual proposal (project, programme, policy, etc.) requires further environmental assessment, and if so, what level of detail this assessment should entail" (Sadler, 1996).

"The process of determining whether or not an individual proposal requires detailed environmental assessment and the level of assessment that should occur" (UNEP, 1996 in DEAT, 2002).

"To determine whether or not a proposal should be subject to environmental impact assessment (EIA), and if so, at what level of detail" (IAIA, 1999 in DEAT, 2002).

In the pre-1998 IEM concept, the idea of Screening was as a first step to establish the extent of environmental assessment required; i.e. whether EIA, SEA or 'Rapid EIA' was required for the proposed development. Table 3 in Section 2.3.1 (p 16) describes the screening activity in Step 2, while Figure 7 below also illustrates how screening and the role of EMF were envisaged to fit into the EA process. The earlier intention of EMF was not as a screening tool to determine the type of EA to be done (or whether it was to be done at all), but rather that it would become a working document to implement findings from a SEA process. In this guise it could still be regarded as a screening tool, as it would ultimately still determine which types of development could go ahead and which were to be avoided in a given geographical area.

With the adoption of the 2006 NEMA Regulations (R385, R386 & R387), the following three aspects of the 1992 IEM intention for EA instruments were drastically changed:

- The Sector strategy as an outcome was scrapped
- EMF became 'watered down'
- Rapid EIA was scrapped, but the core idea was transformed into Basic Assessment (Claassen, 2009: pers comm.).

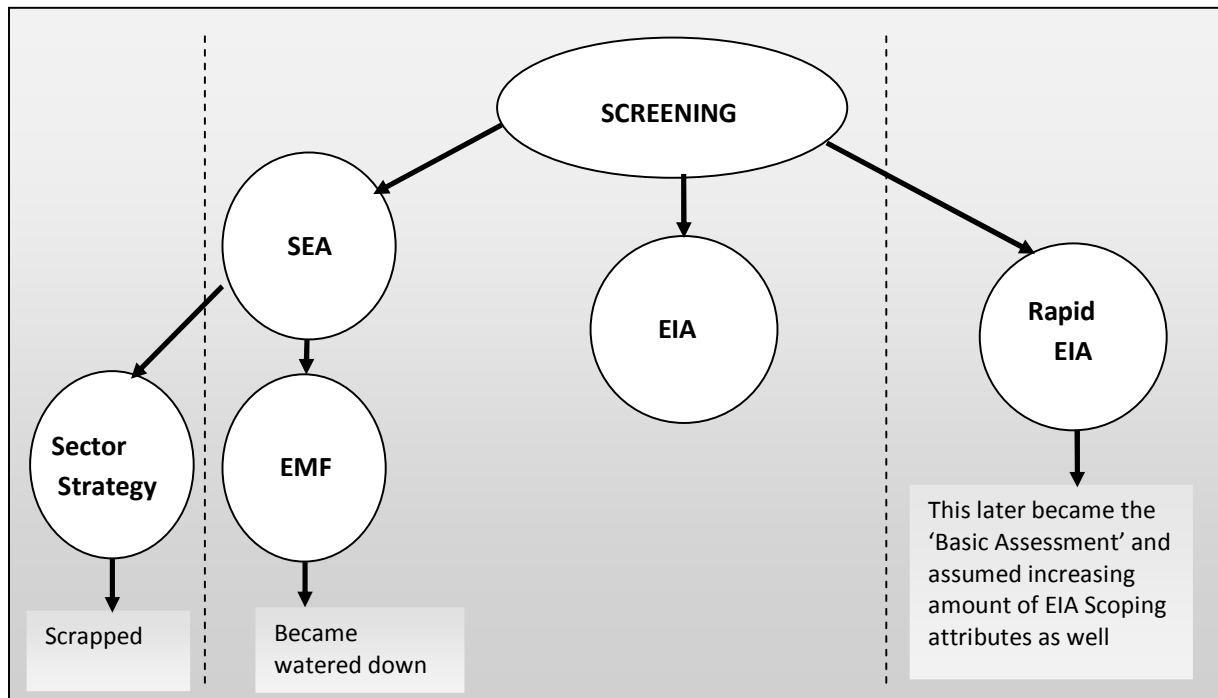


Figure 3: 1992 IEM Environmental management instruments and their fate after 1998
(after DEA, 1992; Claassen, 2009).

In its present format, however, EMFs can be regarded as screening tools, in that they determine sensitivity and steer high impact developments away from sensitive environments, while also potentially screening out unnecessary project level EIAs in development zones. EMFs fit into a tiered EA strategy where programmes and plans are 'screened' in that they are considered and deliberated at the provincial and municipal spatial planning forum in relation to EMF provisions and prescriptions – in a way similar to the aims of SEA. In this sense EMFs are pro-active, as they feed and inform the planning process and more particularly, spatial planning policies, programmes and plans such as Spatial Development Frameworks. This is in agreement with Kidd & Retief's (2009:973) contention that the original perceptions of IEM have moved away to newer environmental assessment understandings, due partially to an absence of a clear differentiation between the two concepts EA and IEM.

Where EMFs are adopted, the particular EMF will have legal standing and enforceability and will have to be taken account of where project-level EIA and other environmental authorisations are considered.

2.4.5 Current status of EMF practice in South Africa

There is a debate that there is limited capacity to conduct EMF. One could argue that competent authority (CA) capacity constraints of insufficient and inexperienced personnel may present obstacles to efficient EMF practice or implementation, as Kidd & Retief (2009:1046) argue in respect of environmental assessment in general. They reason that despite increased training, the out-migration and circulation of key personnel has resulted in a "lack in institutional memory", with accompanying inefficiency, exacerbated by a lack of incentives to retain and recruit the best skilled and experienced personnel. This is partially due to a growing demand for Environmental Assessment Practitioners (EAPs) in all tiers of Government, the mining, energy and water sectors, as well as in industry and the consultant sectors, causing fast turnaround and migration of officials to higher positions, or recruitment into private practice and other countries. The contribution of the Government's employment philosophy to this dilemma has been alluded to by Sandham & Pretorius where they state that it "...prevents the proper development of a stable core of skilled officials" and that it "...acts against optimal roll-out of the EIA system" (Sandham & Pretorius, 2008:238).

Nevertheless, the notion of limited capacity to drive EMF practice appears to be unfounded, since capacity to undertake this mainly consultant-driven process has expanded over the last decade. The following pointers provide an indication of the extent of EMF practice to date, as does Figure 4, below, which maps the status of EMFs commissioned by mid-2010 (DEA, 2010):

- **EMFs are extensively practiced.** To date, more than 35 EMFs have been commissioned, of which more than ten have been completed (DEA, 2010). Most of these are expected to be completed by early 2011. All of Gauteng Province is covered; many district and local municipalities in most provinces have commissioned EMFs, while they have been done for the Agricultural, Conservation and Water sectors. All nine provinces have had some EMF work done, with the Northern Cape Province (after Gauteng) having the largest proportion of its region covered.
- **EMFs are implemented across different scales.** Both the smallest local municipalities, such as in Gauteng, and two of the largest District Municipalities (Siyanda and Namakwa) have had EMFs done.

- **EMFs are initiated by different role players.** EMFs have been commissioned by provincial, district and local government, as well as by DEA and other government sectors; in addition it has also been initiated by private consortia. Examples of privately undertaken EMFs include the Loch Vaal EMF.

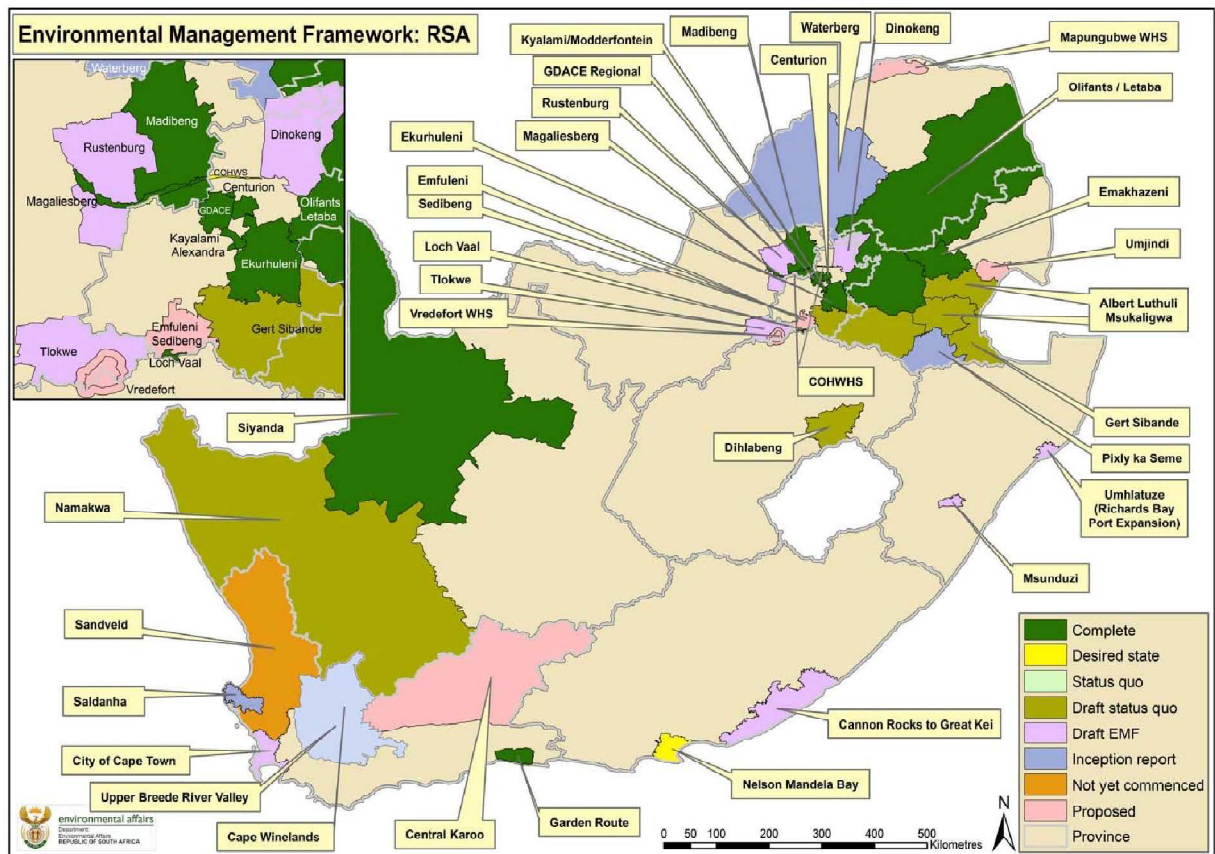


Figure 4: The extent and status of EMFs commissioned by mid-2010 (Source: DEA, 2010).

- **EMFs are mostly undertaken by private consultants.** However, there are examples of co-operative EMF undertakings between municipalities and consultants, as well as EMFs done exclusively in-house by municipalities such as Cape Town (Wiseman, 2010: pers comm.) and government departments like Water Affairs.
- **The purpose for which EMFs are undertaken, varies.** Most EMFs are done to inform municipal planning and to a lesser extent to inform EIA decision making. Others are instruments to direct planning and management of protected environments, such as Mapungubwe World Heritage Site (WHS), Vrededorf Dome WHS, Cradle of Mankind WHS, Magaliesberg Protected Environment.

It may be concluded that the implementation side of EMFs could present a problem, as that is where most reliance will be upon the government sector, especially local authorities. In order to gain a fuller

understanding of the success of implementation of EMFs, it would be necessary to undertake effectiveness review.

The **dearth of publications on EMF practice** is striking: South African literature on the subject is limited to a publication addressing the merits of employing EMFs as aid to conserve biodiversity against the threat of irrigated agriculture (De Villiers & Hill, 2008). Papers presented at the South African chapter of the International Association of Impact Assessment (IAIA) have similarly been very silent over most of the past decade, with earlier papers focusing on the pre-2006 conception of EMF (Van Viegen, 1998; Van Viegen, 2005). The upsurge of EMF practice over the last three years, however, has resulted in a corresponding increase in presentations made at annual IAIA conferences, notably in 2009 and especially in 2010. During 2008 DEAT hosted a three day workshop in Gauteng, which was attended by most of the metropolitan municipalities (DEAT, 2008) – this event probably resulted in much of the capacitating of governmental role players and in the subsequent roll-out of EMFs commissioned during 2009 and 2010.

2.5 ENVIRONMENTAL ASSESSMENT PERFORMANCE EVALUATION

Section 2.1 (*The evolution of EIA theory*) dealt with two of the three emerging themes in EA theory, namely the *identity* and the *application* of Environmental Assessment (EA). The current section addresses the third theme identified by Kidd & Retief (2009:971-3), namely EA *performance evaluation* in more detail. Performance evaluation investigates how well EA is being practiced and what it is achieving, by studying the quality and performance of EA and the system that circumscribes it, as well as conducting EA follow-up (Kidd & Retief, 2008:973, 1031).

Quality evaluation of EIA reports is one of the core “checks and balances” built into the EA process for the following three reasons:

- It verifies to competent authorities the **credibility of information** submitted in the report;
- it measures the **adequacy of the information** for reaching decisions; and
- it conveys **public confidence** in the EIA process (UNEP, 2002:349).

The importance of performance evaluation has grown in recent years; it presupposes that by gauging EA performance, the issues of purpose and application of EA - the first two themes – will also be answered and further advanced (Kidd & Retief, 2009:973). Figure 5 below depicts the interaction of

the three identified themes to the overall evolution of EA theory, highlighting the constituent parts of performance evaluation.

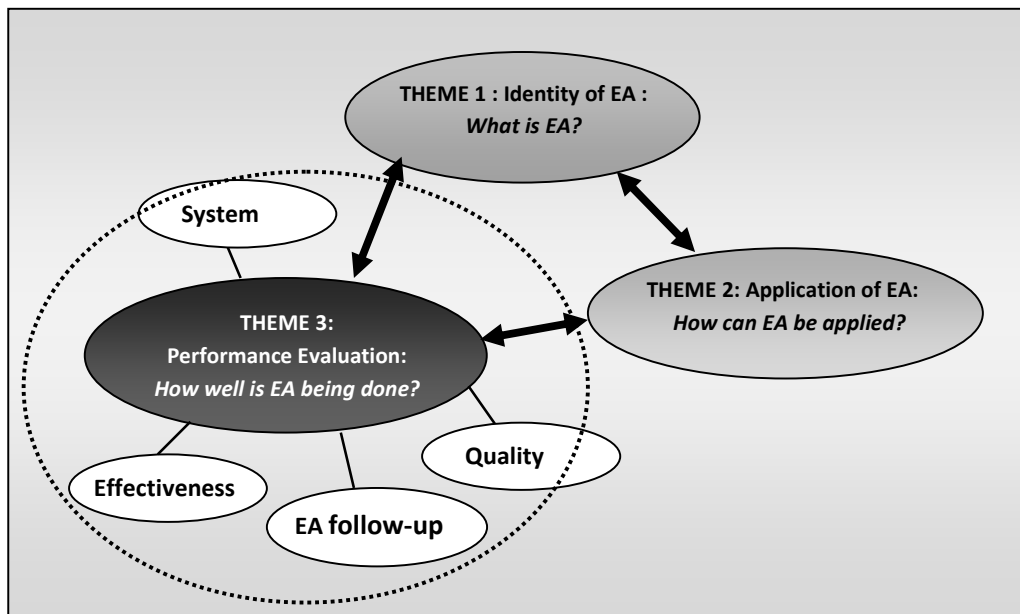


Figure 5: Performance evaluation as one of three major themes for EA theory evolution internationally (Adapted from Kidd & Retief, 2009:972)

Various authors recognise the need for systematic review of report quality as constituent of a properly –run EIA system (Sadler, 1996; Bonde & Cherp, 2000; Lee & George, 2000). A number of EA review packages and guidelines have been developed and adapted for both EIA (Lee & Colley, 1992; Glasson, 1996; Lawrence, 1997; Sandham & Pretorius, 2008) and SEA (Lee *et al.*, 1999; Simpson, 2001:4). The 1992 EIR review package of Lee and Colley of Manchester University is perhaps the most widely used (Kidd & Retief, 2009:1040) and consists of four review areas of an EIR that are evaluated for their conformance to listed criteria. These areas are: *Description of the environment*, *Identification and evaluation of key impacts*, *Alternatives and mitigation measures*, and finally: *Communication of results*. The review method concentrates on evaluation of the EIA Report (EIR or EIS), which by its nature would encompass certain procedural, process and methodology aspects. (Lee & Colley, 1992). Lee *et al.*'s (1999) approach is, however, based on rational decision-making (Cashmore *et al.*, 2004:298), addresses only the proximate aims of EIA (ignoring the substantive purpose of adding to sustainability), and reflects only on the quality and not the effectiveness of the EIA report. The Lee-Colley review package is, however, quick and easy to understand and the criteria used in the evaluation can easily be adapted to reflect requirements of the specific EA report type to be evaluated (Simpson, 2001:4).

Review packages as means of evaluating EIA report quality is one of a range of methods that can be used to assess the quality and adequacy of EIA reports. Other methods include, but are not limited to:

- General checklists testing for compliance with EIA legislation or guidelines;

- Project specific checklists that are based on a general or a sectoral compliance, but with specific adjustments to suit the project requirements and terms of reference (UNEP, 2002:358).

In order to expand the discussion beyond project-level EIA performance evaluation, the contributions of four theorists of EA performance evaluation will now be briefly investigated, namely Lawrence, Thissen, Sadler and Retief. These authors contribute to the debate by systemising the aspects of quality and effectiveness (Lawrence, 1997) and by extending its application to strategic level assessments (Thissen, 2000; Retief, 2007), while Sadler's (2004) model provides clarity on the different levels or tiers of EA application.

❖ **Lawrence (1997)**

Lawrence makes a clear distinction between quality aspects and effectiveness outcomes of EA performance evaluation. In this respect, he classifies the **quality** portion as consisting of:

- process elements
- methods used and
- documentation components,

while the Direct and Indirect outputs determine the **effectiveness**.

Direct outputs would typically be:

- to what extent EA has influenced decisions and designs
- to what extent EA has influenced the project proposal (i.e. in terms of location, alternatives, technologies, extent, etc.) – by having a more sustainable end product.

Indirect outputs are aspects more difficult to measure, yet which have a profound effect on society and the way the environment is perceived and 'treated'. These include:

- public awareness of environmental issues
- policies that result from the EA process
- change in organisations and value systems
- changes in local authority mindsets, efficiency and policies
- effectively changing the mindsets of other professions with which EAPs interact
- empowerment of stakeholders
- changes to technologies.

Lawrence's model is depicted in Figure 6, following:

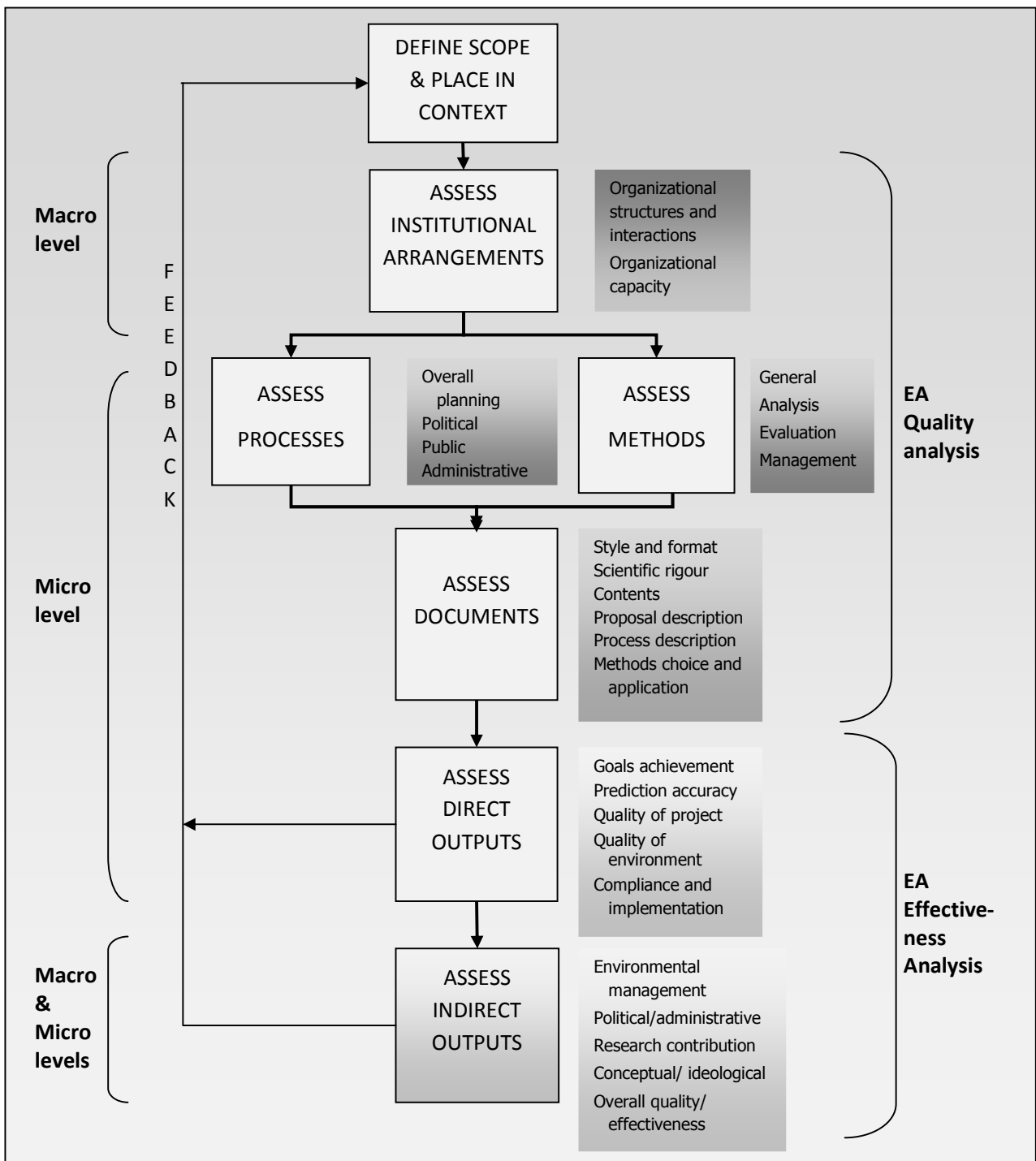


Figure 6: Lawrence’s EA performance evaluation model (Source: Lawrence, 1997:220)

Lawrence calls his framework “the ideal EIA quality/effectiveness analysis” and it was built on a collection of other approaches, focus areas and review criteria at the time. This framework requires the macro-context to be defined, following which the project (micro-) review is done for process,

methodological and documentation quality. The review is then also done for direct and indirect outputs or results, i.e. effectiveness. This well-structured model makes clear distinctions between levels as well as between quality and effectiveness components.

❖ *Thissen (2000)*

Thissen's model is an "end-of-pipe" approach to performance evaluation and he therefore developed criteria for evaluating the quality of inputs, results, as well as effectiveness criteria. This model is applicable to strategic assessment at the policy level and it argues that overall effectiveness is determined by results, how they are used and what their influence is. The Thissen framework is useful for structuring criteria in policy analysis and it reflects six such categories, namely: input, content, process, results, use and effect criteria, as depicted in Figure 7, hereafter.

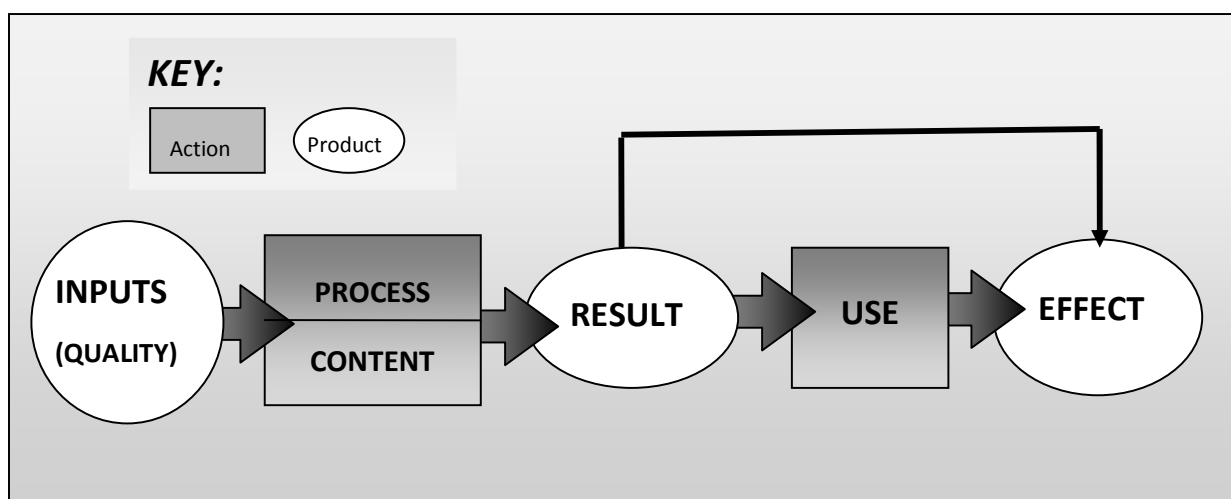


Figure 7: Thissen's End of Pipe model for performance evaluation (Thissen, 2000:122)

Thissen argues that subsets of criteria have to be applied to specific cases and, like Lawrence, he distinguishes between input quality and output effectiveness. He suggests that there is agreement on the need to evaluate on the institutional or systems level distinctly from evaluations on the project or individual assessment level.

Finally, he argues that EA evaluation criteria should be identified as:

- attributes of the activity itself,
- direct results of the activity,
- of the use the results are put to, and
- the influence of the analysis on decision-making and problem solving.

❖ **Sadler (2004)**

Sadler's model distinguishes between the level (or scale) of assessment as indicated by the concentric circles in Figure 8, hereunder: on the outer circle meta-level assessment is done, which is usually generic in nature and encompasses global or country-scale assessments such as climate change and fossil fuel availability.

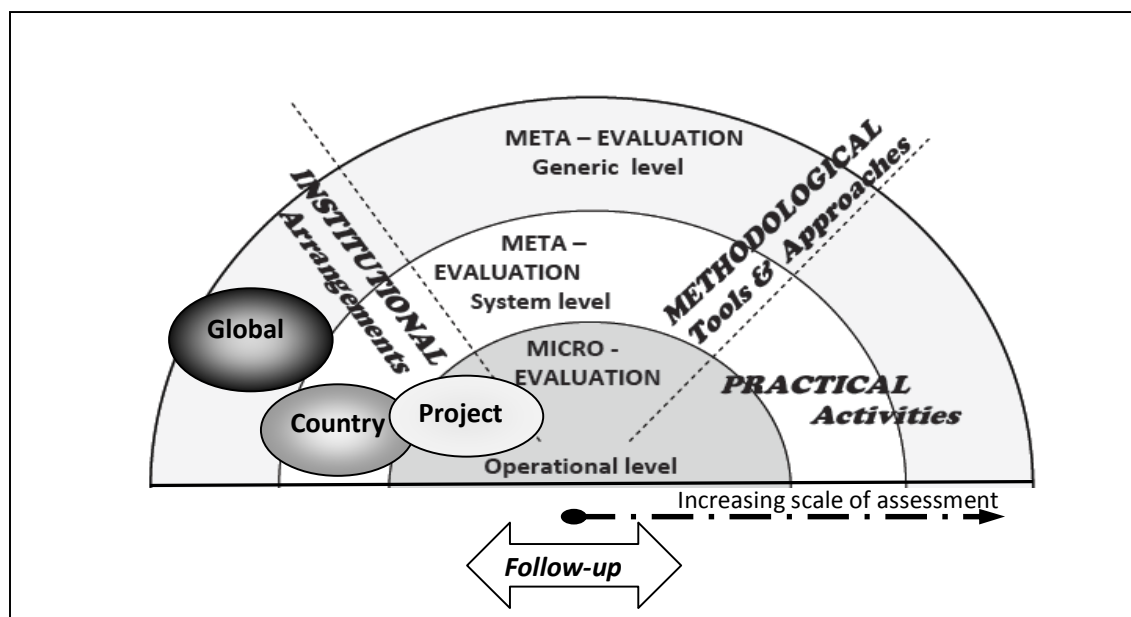


Figure 8: The Sadler model for EA performance evaluation (Source: Sadler, 2004)

On a lower level one undertakes macro-evaluation, which is typically on the system level (e.g. weather systems in South Africa or the Southern Ocean, or groundwater flow in the Upper-Orange catchment area). At the smallest scale micro-evaluation is carried out, which is at the operational level. This is typically project-level EIA as we know it, while meta and macro evaluation would be more the ambit of Strategic Environmental Assessment (SEA) – or assessments at policy level. Sadler divided his model into three sectors of operation, namely:

- the **institutional arrangements** in place, encompassing legislation, legal requirements and prescriptive guidelines, institutional capacity and organisation to make decisions on EA, co-ordination between planning and environmental authorities, and similar co-operative governance issues.
- The **methodological aspects** (sector) encompasses the approaches and tools used to assess, e.g. significance determination, inclusion or not of public engagement, documentation requirements and so forth.
- **Practical activities** look at the procedural steps and the actual work done on the ground.

❖ **Retief (2007)**

Retief’s framework (see Figure 9, below) focuses on performance evaluation of SEAs for plan and programme level assessments, and is a refinement of the other models discussed. It makes use of the “effectiveness triangle” (Sadler & Verheem, 1996), which links theory with practice, and then with performance. This approach is iterative in that performance (i.e. effectiveness evaluation) is used to feed back to the input components.

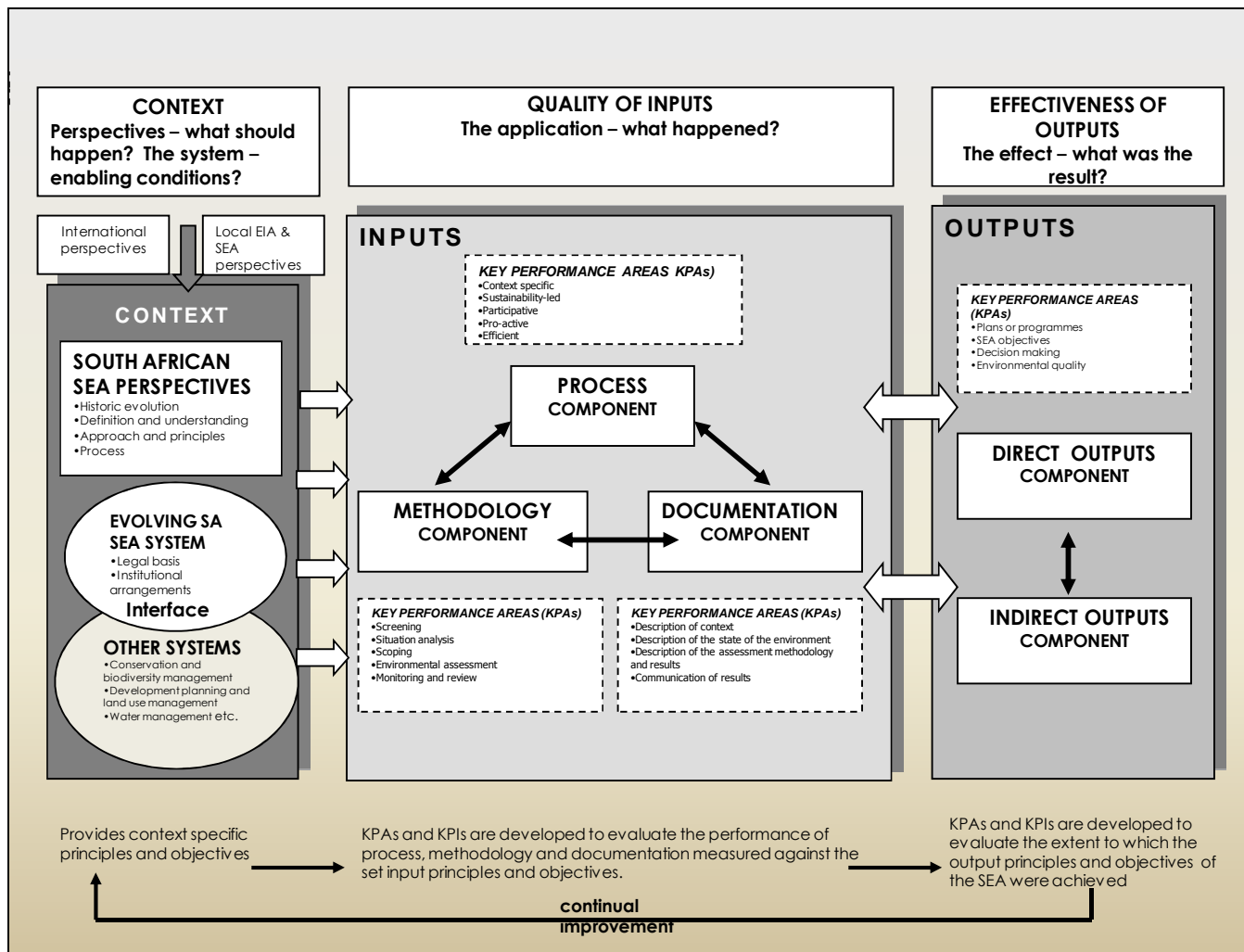


Figure 9: Retief’s conceptual model for performance evaluation (Retief, 2007)

Retief developed this conceptual framework for the South African scenario and it is therefore context specific - but it can be adapted to other contexts in which it is to be applied, in line with SEA perspectives internationally. The context for which it is developed is taken as the point of departure and therefore the specific South African SEA (or EA) perspective – including its history, the legislative

regime and its assimilation into practice; as well as international perspectives, provide the basis from which and how EA is practiced and perceived.

Retief's framework indicates that there are three components which collectively provide **inputs to the quality** of EA, namely *documentation*, *process* and *methodology*. The quality of input components (methods, legal framework and regulations, documentation) are to be distinguished from the effectiveness of outputs – which measures the degree of influence that SEA has had on decision-making. The **outputs of the system** ultimately constitute the measure of its success, and the *direct outputs* (such as an increase in environmental quality) and *indirect output components* (e.g. changes in perception about the environment) are therefore used to measure effectiveness.

This model is further discussed and developed for application to EMFs in Section 3.2.

2.6 CONCLUSION

This chapter reviewed **EA theory**, identifying *identity*, *application* and the *evaluation of EA performance* as the main three themes of EA debate. From this discussion it was distilled that EA needs to partake in the political decision-making scenario to be relevant, while the necessity to include strategic level assessment in addition to project-level assessment was pointed out. The recent emergence of more strategically focused EA instruments such as SOER, C-Plans, SEA and EMF can be seen as a response to this need.

The ensuing deliberation illustrated that EMFs are not entirely new, as they were conceptualised as early as 1989 in the first **IEM** developments. EMF's first formal description is found in the 1998 DEAT IEM discussion document; however, EMF was legally entrenched only in 2006. It was developed to gauge and **map sensitivity** and to screen out undesired developments in environmentally sensitive areas, and to minimise unnecessary project level environmental assessments in areas earmarked for development. In this sense, EMF can be regarded as a **screening** tool, while EMFs also address strategic and regional aspects to be considered in both environmental evaluation and spatial planning, thus guiding more sustainable development outcomes. In the light of the changing role of SEA, EMF can accomplish certain SEA functionality and could therefore be regarded as an **environmental assessment** tool.

While EMFs are **unique** South African-developed environmental management instruments with spatial sensitivity mapping outputs, there are various similar instruments vying for use, but with different end users in mind. EMFs will probably be used mostly to feed and inform the planning process and more particularly, spatial planning policies, programmes and plans such as Spatial Development Frameworks on provincial and municipal levels. They are therefore pro-active instruments with a **legal mandate** which ensures their assimilation and use, especially in regional municipal planning. South Africa furthermore appears to have sufficient **capacity to conduct** the EMF process, while the implementation of the outcomes could be further refined – as this is an element of the institutional capacity of the end user, which is chiefly local government.

Despite a dearth of literature on EMF, the upsurge and wide extent of EMF practice as evidenced during 2008 – 2010, leads one to conclude that the practice of EMF is **well established** in South Africa. EMF can accordingly become a very viable instrument in ensuring that environmental considerations are integrated into strategic spatial planning and decision-making.

The importance of **performance evaluation** of EA in investigating how well EA is being practiced and what it is achieving, was highlighted. The development of Retief's (2007) quality and effectiveness conceptual framework for SEA evaluation was traced in the light of other performance evaluation models, where he argues that the specific country or contextual EA perspective provides the basis from which and how EA is practiced and perceived in that contextual setting. The process of evaluation of EMF in South Africa should therefore be developed and advanced from the particular contextual, legal and implementation peculiarities found here.

Determining the quality of EMFs being undertaken in South Africa from within its specific contextual constraints is accordingly an essential next step in the evolution of EMF and forms the focus of the next three chapters. Chapter 3 starts this by describing the research methodology used and consequently developing a contextual framework and review criteria for EMF quality evaluation.

Chapter 3: Research design and methodology

This chapter **addresses research question 2:**

Can review criteria be developed to review the quality of EMF reports in a conceptually justified, methodologically sound and practically viable manner?

No empirical EMF performance evaluation research has hitherto been undertaken and the design of a research strategy and methodology therefore required some deliberation. This research is built on the established procedures of both EIA and SEA performance evaluation, with EIA quality review having a history from the early 1990s (Lee & Colley, 1992; Sandham & Pretorius, 2008), followed by SEA performance evaluation since 2002 (Retief, 2007).

The chapter consists of six sections. It delves into the research methodology and design, substantiates the research method through developing a conceptual framework, whereafter quality review criteria are developed. Next the case study selection is motivated, followed by a section on limitations of the research and finally, conclusions. The chapter is structured as follows:

3.1 Research methodology

3.1.1 Research design

3.1.2 Documentation review

3.1.3 Evaluation research and case study research

3.2 Conceptual framework for studying EMF quality review

3.3 Development of review criteria & procedure

3.4 Selection of case studies

3.5 Limitations of this research

3.6 Summary

The products developed in this Chapter will be applied in Chapter 4: Analysis.

3.1 RESEARCH METHODOLOGY

3.1.1 Research design

This investigation is done through developing a conceptual framework for EMF quality review. The focus of investigation is mainly on documentation quality and discernable process requirements. Quality review questions are consequently developed, containing the essential elements and legal requirements for EMFs as contained in Regulations GNR 385 (SA, 2006a) and R 547 (SA, 2010b), as well as the respective Guideline 6 documents on EMFs of both 2006 and 2010 (SA, 2006b; SA, 2010a). The review questions are then applied on the various EMF project files, regarding each as a separate case study. The documentation itself therefore serves as the primary data source for the research, with the measuring mechanism being the quality review questions.

3.1.2 Documentation review

The interpretation of a documented product requires the researcher to proceed with due caution, acknowledging the specific context, time and purpose for which it was drafted (Yin, 2003: 87), while it represents the advantage of re-analysis due to its modest nature and enduring form (Robson, 2002:348-359). Documentation availability is a decisive factor for case study selection (Eisenhardt, 1989) and was accessed from available, historic case studies of EMF documents for this investigation.

Seven EMF case studies are reviewed for their quality according to the review battery developed. The findings are documented and analysed in Chapter 4, using multiple case analysis to determine if individual cases conform to the majority of indicators or performance norms developed and to compare findings between cases. Chapter 5 discusses the findings of the study, and puts forward recommendations to enhance the sustainability outcomes and hence effectiveness of EMF as environmental instrument, as well as future research objectives for increasing the utility of the instrument.

3.1.3 Evaluation research & case study research

Case studies are a research method that focuses on grasping the dynamics within a single scenario (Eisenhardt, 1989:534). The approach can consist of various data collection methods, or the combination of methods, such as archives or documents, interviews, observations or questionnaires; it could furthermore make use of quantitative or qualitative data – or a combination of both (Eisenhardt,

1989:534-5). Case studies can be used to provide description, test theory and to build theory (Eisenhardt, 1989:535).

Evaluation research is a research approach with a particular focus and uses a multiple case study design (Robson 2002; Yin 2003). Due to its ability to deal with detail and complexities, the use of case studies as research strategy for evaluation research has recently grown in popularity (Maxwell, 2000; Yin, 2003). The number of cases selected depends on the researcher's required confidence about the results, because multiple cases yield more convincing conclusions compared to independent systematic conclusions garnered from one case study only (Yin, 2003:51-53). Regarding the number of cases to research, data complexities associated with more than ten cases are to be avoided, while with fewer than four cases, there is unconvincing empirical grounding. Eisenhardt (1989:545) therefore recommends that the ideal number of cases is between four and ten.

In case study research, the different cases constitute the replication of multiple experiments (Yin, 2003:32). This means that with the multiple case study approach, each case study should be examined through 'replication logic' and not 'sampling logic'; this has the aim of comparing several cases against similar criteria in order to discern trends or patterns in report quality. Therefore this analysis is focused toward context specific conclusions which could be expected to replicate under similar circumstances within a broader context, while it avoids broad generalizations that could be universally applicable. Individual cases should therefore not be regarded as 'sampling units' (Yin, 2003:47).

Analysis within cases involves the detailed write-up for each case, which is mostly descriptive, yet helpful in dealing with the big data volumes. The central idea is to become thoroughly acquainted with each case as an individual unit, allowing the distinctive patterns of each case to come forward before the researcher strives for generalisation across different cases (Eisenhardt, 1989: 540). Leonard-Barton (1988, in Eisenhardt, 1989: 540) suggests the use of tabular exhibits and graphs to display information on each case. In summary, within-case analysis enables gaining familiarity with data and enables provisional theory building (Eisenhardt, 1989: 533).

Cross-case analysis entails the search for emergent patterns between cases and increases the chance of reaching unique findings that are present in the data. By investigating the data in 'many divergent ways', the bias that can easily enter the researcher's investigation can be countered, forcing the examiner to extend beyond preliminary or obvious impressions – and thereby to observe evidence through multiple frames or lenses (Eisenhardt, 1989: 533, 540-541). One tactic is the selection of pairs of cases and then to compare differences and similarities between each pair, forcing the researcher to search for understated correspondences and distinctions between pairs. These 'forced comparisons' can result in the discovery of new categories or concepts. Another approach is to select categories or

dimensions and then to investigate for within-group similarities combined with intergroup differences (Eisenhardt, 1989: 541).

Finally,

"...theory developed from case study research is likely to have important strengths like novelty, testability, and empirical validity, which arise from the intimate linkage with empirical evidence. Second, given the strengths of this theory-building approach and its independence from prior literature or past empirical observation, it is particularly well-suited to new research..." (Eisenhardt, 1989: 548).

3.2 CONCEPTUAL FRAMEWORK TO STUDY EMF QUALITY

A review framework or conceptual framework is described by Miles & Huberman (1994:18) as one that

"... explains, either graphically or in narrative form, the main things to be studied – the key factors, constructs or variables – and the presumed relationships among them. Frameworks can be rudimentary or elaborate, theory driven or commonsensical, descriptive or causal."

A protocol contains the mechanism, procedures and general conventions to be followed in gathering and analysing data, while also providing the foundation for testing and validating the results. It usually includes a conceptual framework, as well as data collection procedures and questions for evaluation (Yin, 2003:67-77). Yin (2003:67) considers the development of a case study review protocol desirable under all circumstances, but crucial for multiple case study approaches.

Retief's (2007) conceptual framework for evaluating the effectiveness of Strategic Environmental Assessment (SEA) in South Africa, as discussed in Section 2.5 of this treatise (pages 35-36), is used as foundation for the conceptual framework for the EMF quality review developed in this research. Retief (2007) incorporates the "*effectiveness triangle*" into his model, as does Lawrence (1997) and Thissen (2000), while Sadler (2004) also integrates some aspects of it. The effectiveness triangle in respect of EMF evaluation (see Figure 10) consists of three apexes, namely *EMF perspectives* (understanding – or theory supporting the concept – built up from legislation and guidance publications), *EMF quality* (how EMF is applied in practice) and *EMF effectiveness* (the effect or result of EMFs being done).

Determining the quality therefore entails the following sequence of events:

- criteria or review questions are generated from answering the question "*What should happen?*"
- these criteria are then applied to the inputs of EMF documents;
- the extent of compliance with the criteria determines the quality of each EMF document.

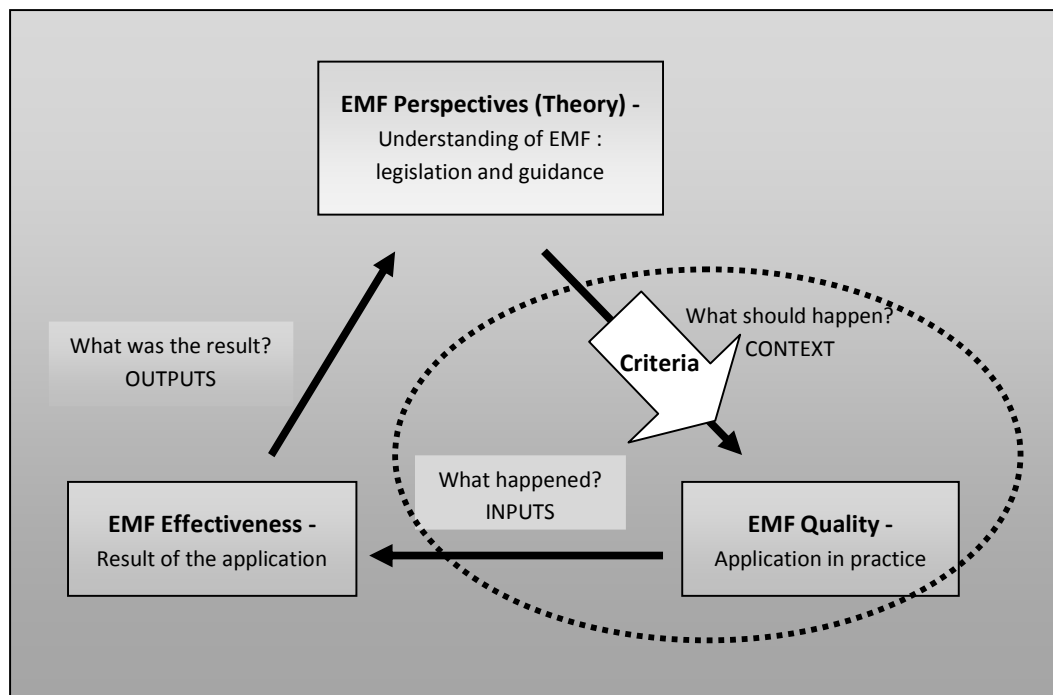


Figure 10: The EMF effectiveness triangle and the area of this investigation

(adapted from Sadler & Verheem, 1996)

This research therefore distils evaluation criteria from the current legislation, guidance and understanding of EMF, whereafter the evaluation of EMF documents using these criteria enables one to gauge EMF quality, or to establish how successfully these criteria have been executed. The area of this investigation is depicted by the dotted line in the lower right sector of Figure 10, above.

This EMF effectiveness triangle is translated into the three legs or pillars of the ensuing EMF Conceptual Framework in Figure 11; the three pillars being CONTEXT, INPUTS and OUTPUTS. These three components reply to the following questions:

- CONTEXT :What should happen?
- INPUTS : What has happened?
- OUTPUTS : What was the result?

The first pillar – **context** - provides background and understanding of how the EMF concept has developed: the theory, history, institutional policies and milieu within which it emerged. All of Chapter 2 of this treatise describes the context of EMF. This then provides the basis from which and how EMF is practiced and perceived and can also be considered as the system-enabling conditions; it forms the basis the enquiry: “*What should happen?*”

The central pillar consists of **inputs** to the EMF process, which are **documentation, process** and **methodology** aspects. This component investigates the **quality** of inputs and asks the question: "What happened – how were the EMFs conducted or carried out?" This aspect will form the focus of this research.

The third pillar of the effectiveness triangle evaluates the **effectiveness** of applying the EMF instrument, as measured in **outcomes** – both direct (such as an increase in environmental quality) and indirect (e.g. changes in perception about the environment). It answers the question: *What was the result?* This conceptual framework encompasses the full spectrum of effectiveness review, of which quality review is only a part.

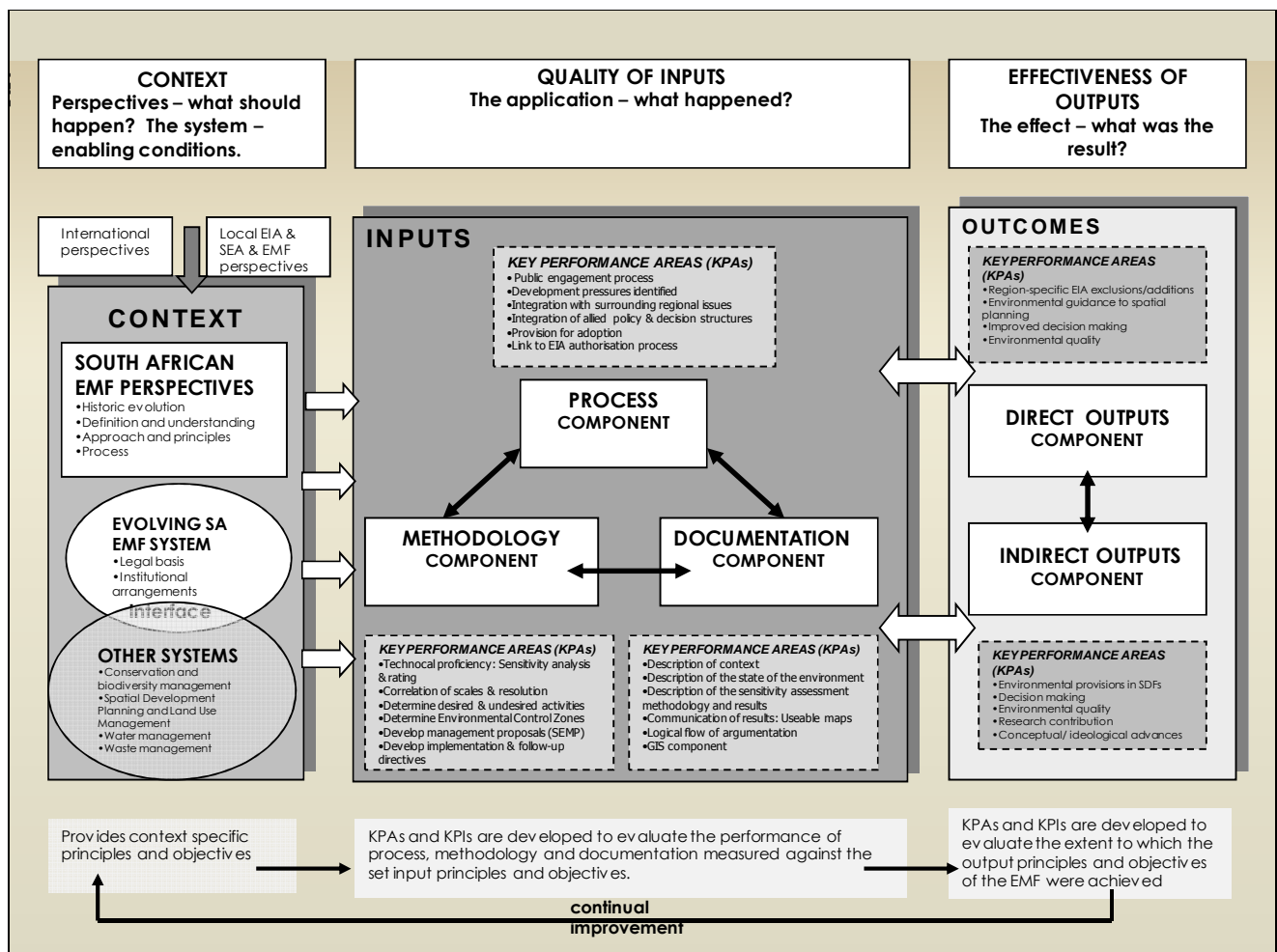


Figure 11: Conceptual Framework for effectiveness review of EMF (adapted from Retief, 2007 & Lawrence, 1997)

The **outcomes** portion of this conceptual framework will therefore not be applicable in the present research, which is confined to the quality (and NOT the effectiveness as well) of EMFs. This last pillar in turn feeds the understanding of what the instrument is and how it should develop over time (definition, expansion, goals and aims) – as can be seen by the feedback loop 'continual improvement' linking back to the first pillar, namely "Context". Although the third pillar is beyond the scope of this study, it supports this research by emphasising where quality review fits in and helps in the deliberation of future research areas, which will be addressed in Chapter 5.

This study will therefore focus on the development of **criteria** to determine the **quality** – i.e. the success of application in practice. This quality component will be gauged in respect of mainly **documentation** inputs, as well as discernable **process** and **methodology** aspects. The quality of EMFs will therefore be measured by investigating the following:

- Quality of documentation
- Quality of the process followed in conducting /compiling the EMF
- Quality of the methodology followed

The legal context of South African EMF will be the point of departure to determine documentation, process and methodology related aspects of EMF practice and is covered in the next section.

3.3 DEVELOPMENT OF REVIEW CRITERIA & PROCEDURE

Some of the salient legal prescriptions for EMFs which were discussed in Sections 1.2 (p 2 & 3) and 2.3.2 (pp 17-20) are summarised in Table 4 below, where the last two columns refer to the applicable legislation (Regulations) and guidelines for the respective years – 2006 and 2010. The first column displays the key criteria that were developed which correlate to specific requirements of the legal mandate.

Table 4: Quality review criteria developed from the legal mandate for EMF

EMF quality Criteria developed	2006 legal mandate	2010 legal mandate
1. How valid is the methodology used for the sensitivity mapping and has this concept been adequately defined?	<i>Guide 6: (GG 28854 of 19 May 2006)</i> : 3.1, 4.1, 4.2, 4.4, 4.5.3 <i>GNR 385 of 2006:</i> 71 (a)(b)(c)(d)(e)(f)	<i>Guide 6 (GG 33306 of 18 June 2010):</i> 2.3, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9 <i>GNR 547 of 18 June 2010:</i> 2(1), 2(3), 3(2)(b), 3(3), 4

2. To what degree have desired and undesired activities been identified in relation to the spatial sensitivity analysis?	Guide 6 of 2006: 2.2, 3.1, 4.4.2, 4.5.1 GNR 385 of 2006: 71 (g)	Guide 6 of 2010: 4.1, 4.2, 5.7, 5.8, 5.11, 5.12 GNR 547 of 2010: 4(f)(g)
3. How adequately have the EMF outcomes been analyzed in relation to the broader decision making context?	Guide 6 of 2006: 2.2, 3.1, 4.2.2, 4.5, 5 GNR 385 of 2006: 71 (d)(e)	Guide 6 of 2010: 3, 4.3, 5.6 GNR 547 of 2010: 2(1)(b)(c), 2(3)
4. To what extent have the outcomes of the public participation process been integrated with the EMF?	Guide 6 of 2006: 3.1, 4.1, GNR 385 of 2006: 70 (2)(b)(c)	Guide 6 of 2010: 2.3, 5.1, 6, 7 GNR 547 of 2010: 3(2)(a),(c)-(f), 3(4), 5(4), 5(6), 5(7).
5. How sufficient are the provisions for the implementation of the EMF outcomes?	Guide 6 of 2006: 2.2, 4.2.1, 4.5.1-4.5.4, 5 GNR 385 of 2006: 72	Guide 6 of 2010: 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 7, 8. GNR 547 of 2010: 2(1) (a) (b) (c), 3(3)(c)(d), 4 (d)(e)(f)(g)(j), 5.

Only five review criteria were developed from the legal mandate. Other obvious quality metrics like report structure and legibility were not considered, as it was assumed that these would be attained in a document of the calibre and scope of an EMF. An attempt was not made to develop an exhaustive list of sub-criteria, but rather to explore the adequacy of EMF practice in order to discern the key strengths and weaknesses. This research should therefore be seen as exploratory research, with the focus on criteria which could elucidate the practice and performance of the core aspects of EMF. Table 4 serves to validate the applicability of the quality criteria developed and applied in this research by linking the review criteria to the legal mandate which they are derived from. The criteria developed are therefore justified by the legal mandate for EMF.

Table 5: EMF quality rating schedule

EMF quality rating schedule	
Symbol	Explanation
A	Relevant tasks well performed; no important tasks left incomplete.
B	Generally satisfactory and complete; only minor omissions/ inadequacies.
C	Just satisfactory despite omissions / inadequacies
D	Parts well attempted – but just unsatisfactory due to omissions / inadequacies
E	Not satisfactory due to significant omissions or inadequacies.
F	Very unsatisfactory – Important tasks/s poorly done or not attempted.
NA	Not applicable / not enough information / irrelevant.

Each of the EMF documents selected was studied and subjected to these review criteria, with each criterion receiving a ranking score from A (well performed) to F (very unsatisfactory), as per the EMF quality rating schedule in Table 5, above. This rating schedule is commonly used in the social sciences and results in an ordinal grading of six different outcomes, of which three are 'passes' and three are 'failures', thus avoiding the indecision reached with a three or five category scoring system where an average value (neither good, nor bad) can be attained, indicating neither compliance nor failure. In the rating system proposed, a C is 'just satisfactory', while a D is 'just unsatisfactory'. A seventh category, 'NA' – not applicable/relevant is also possible, where the criterion simply cannot be applied to the document in question. This rating should be avoided as far as possible.

The review procedure involved the subjecting of each EMF document (or case study) to the test criteria, through careful scrutiny and study of each document, making notes of all relevant observations. Each document was then rated in respect of each of the review criteria or review areas in a rating matrix.

Table 6: EMF quality review criteria and rating matrix

Quality Criterion (Review area)		Quality rating (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
1	How valid is the methodology used for the sensitivity mapping and has this concept been adequately defined?							
2	To what degree have desired and undesired activities been identified in relation to the spatial sensitivity analysis?							
3	How adequately have the EMF outcomes been analyzed in relation to the broader decision making context?							
4	To what extent have the outcomes of the public participation process been integrated with the EMF?							
5	How sufficient are the provisions for the implementation of the EMF outcomes?							
	OVERALL RATING							

Table 6 is a framework of the rating matrix that was used for filling in the quality rating score A - F for each case study in respect of each review area and which was subsequently populated as per

Chapter 4 of this investigation. The '*Overall rating*' is an assessment of how well each case study performed in each of the five review areas. The method used was to assign an overall impression of each document reviewed - taking into consideration its performance in each the five categories – in order to arrive at an overall rating for each case study, while arriving at an 'arithmetic mean' was avoided. In this investigation – which should be regarded as exploratory research – equal importance (weights) were provisionally assigned to each of the five review areas.

3.4 SELECTION OF CASE STUDIES

In order to ensure a broad spectrum of cases within a representative context, the following three criteria were applied to screen the potential cases:

- *Criterion 1:* Cases should ideally represent examples from the main types of EMF conducted in South Africa, in order to extend potential relevance beyond the particular case.
- *Criterion 2:* Cases should represent work conducted by different consultants, so that a broad range of EMF interpretations is covered, while avoiding replication of similar approaches.
- *Criterion 3:* Cases selected should reflect enough variety in terms of scale (size of region), physiography (climate and relief differences), and level of development (urban/rural and conservation/high development pressure) to be representative of EMF practice to date.

Documentation was the key source of data for the project. Because of the limitation of access to documentation, availability was a particular constraint for case study selection.

The following seven EMF case studies were selected (see Table 7, below), based on the representivity criteria described, as well as the availability of EMF documents.

Table 7: EMF case studies selected for quality review.

#	EMF name	Province	Date	Description	Consultant
EMF #1	TSHWANE Zone of Choice	Gauteng	2007	Small geographical area, urban, with some low density agricultural holdings to north of Pretoria; Apies River.	Environomics
EMF #2	MAGALIES Protected Environment	North-west	2007	Conservation area centred around Magaliesberg range at Rustenburg. Mining and urbanisation pressures.	K2M /NWU

EMF #3	LESEDI Local Municipality	Gauteng	2006	Rural agricultural area, with limited industries. Centred around the heritage town of Heidelberg. Few inactive gold mines; Suikerbosrant, some wetlands.	Izwelisha (Pty) Ltd & Imvelo EIM Services
EMF #4	TLOKWE Local Municipality	North-west	2010	Small local municipality, rural, agricultural; water issues of Mooi River and Vaal River; centred around Potchefstroom	Bohlweki
EMF #5	MIDVAAL Local Municipality	Gauteng	2007	Rural Gauteng along Klip River, Vaal River & Vaal Dam. Rural areas between developed areas. Includes Henley-on Klip, tourism, conservancies and leisure resorts	ILISO
EMF #6	SIYANDA District Municipality	Northern Cape	2008	Very large rural district in arid region (Kalahari) with sparse population. Localised irrigation on Orange River.	Environomics
EMF #7	WEST RAND District Municipality	Gauteng	2006	District municipality with mainly urban character, gold and uranium mining & sinkhole legacies. Includes undeveloped and mining-owned land.	SEF/Bohlweki

3.5 LIMITATIONS OF THIS RESEARCH

The following limitations of this research need to be pointed out:

- This research did not investigate the electronic files (shape files) of the GIS or explore the functioning of the GIS *per se* for any of the case studies, but focused on the printed paper documentation. In many cases the description of the scales or resolution of the different maps which made up the sensitivity mapping were not stated in the hardcopy document. As GIS technology is extensively used in many EMFs, this could limit the breadth of the investigation; however, the point of departure is that the printed documentation should be self-explanatory and useable in its own right without necessarily relying on its electronic GIS component.
- Only five review criteria were developed, without generating sub-criteria. The rationale for this was explained in the foregoing Section 3.3: as this is exploratory research, the expected outcomes were that the criteria selected would illuminate successes and shortcomings of the core aspects of EMF practice and performance.

- Four of the seven case studies are from the same province, namely Gauteng, due to the relative unavailability of documentation for review. It would have been preferable to investigate EMFs from more provinces, including ones with coastal zones and more divergent environmental issues. As many EMFs are currently in process, it is expected that many representative case studies will be possible in the near future; it is nevertheless contended that the cases selected represent a good spectrum of current practice.

Future research of EMF quality or effectiveness should therefore endeavour to:

- Include the GIS component in its analysis.
- Develop additional review criteria, as they become evident or necessary from both this research and from practice.
- Select case studies that are more representative geographically, typologically and to display diversity of practitioners.

3.6 SUMMARY

This chapter described the research method, which is a multiple case study approach to review seven EMF documents for their quality. A conceptual framework was developed, focusing the research to the quality of inputs into the EMF process, which consisted of the process, methodology and documentation aspects of the EMF. It was motivated that the EMF documentation would be the source of information, while process and methodological aspects of the EMFs would be drawn from the documentation. Review criteria were subsequently developed to investigate these inputs, using the legal mandate of EMF as basis. Seven EMF documents were then selected for analysis, based on availability as well as representivity. The major limitation of the research was highlighted, i.e. that the GIS component of the cases was not investigated as a quality component in its own right.

The application of the review criteria to the selected case studies and the analysis of outcomes is dealt with in the next chapter, Chapter 4.

Chapter 4: Data analysis

This chapter addresses research question 3,

What is the quality of EMF reports in South Africa?

by using the following evaluation procedure:

Each of the seven case studies (see Table 7) is scrutinised and observations recorded against each of the five quality criteria developed (Table 4), also recording general observations. The detailed observations are used to make comparisons between cases, whereafter each case is rated for compliance with each of the criteria, using the quality rating schedule (Table 5). This means that each criterion of each case is assigned a quality rating and this is displayed in a quality rating matrix as in Table 6. Further analyses are made by comparing the performance of cases against each other; from where inferences and interpretations are distilled.

The detailed review comments are recorded in Annexure A. This chapter discusses the results obtained from this quality review and is divided into eight sections, as follows:

- 4.1 Overall performance**
- 4.2 Review area 1: Sensitivity**
- 4.3 Review area 2: Desired and undesired activities**
- 4.4 Review area 3: Integration with decision-making context**
- 4.5 Review area 4: Public participation process**
- 4.6 Review area 5: Provision for implementation of EMF outcomes**
- 4.7 General observations & suggestions**
- 4.8 Recapitulation**

4.1 OVERALL PERFORMANCE

The seven case studies, on average, all performed satisfactorily in respect of the five key criteria against which they were evaluated, with three cases performing generally satisfactorily (B) overall, while four were just satisfactory (C) overall, as depicted in Table 8 below. This is an assessment arrived at by considering the scores achieved for each of the five stated criteria, without allowing for differential weighting of the criteria. A refinement of this quality evaluation procedure would be to consider assigning relative weights or priorities to the different review criteria, as well as developing additional pertinent quality review questions.

Table 8: Summary of EMF report quality results

Quality Criterion		Individual EMF quality ratings (A - F)								
KEY: Quality rating A Well performed B Generally satisfactory C Just satisfactory D Just unsatisfactory E Not satisfactory F Very unsatisfactory		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7		
		1	How valid is the methodology used for the sensitivity mapping and has this concept been adequately defined?	B	A	B	C	D	B	B
		2	To what degree have desired and undesired activities been identified in relation to the spatial sensitivity analysis?	B	A	A	B	C	B	A
		3	How adequately have the EMF outcomes been analyzed in relation to the broader decision making context?	A	A	B	B	B	A	C
		4	To what extent have the outcomes of the public participation process been integrated with the EMF?	F	C	F	C	C	F	B
		5	How sufficient are the provisions for the implementation of the EMF outcomes?	B	B	B	B	B	B	A
OVERALL RATING		C	B	C	B	C	C	B		

The cross-case analysis reveals the following:

All the case studies obtained a score of C or better (i.e. satisfactory - see Table 5: EMF quality rating schedule in Section 3.3) in respect of the following three review criteria:

2 Identification of desired and undesired activities in relation to the outcomes of the sensitivity analysis.

3 Analysis in relation to the **broader decision making context**.

5 Provision for implementation of the EMF outcomes.

Of these three 'satisfactory' performance areas, **Review area 2** emerged as the top-scoring aspect of EMF quality with 42.8% of cases performing well (A) and a similar percentage of 42,8% of cases performing generally satisfactory (B), leaving only 14.3% to a C score. **Review area 3** shares this top position of quality compliance by likewise having 42.8% of cases performing well (A), 42.8% of cases performing generally satisfactory (B) and 14.3% performing just satisfactory (C). All cases performed well in respect of **Review area 5**, where six cases or 85.7% obtained a generally satisfactory (B) score, while one case (14.3%) performed well (A). The lowest score in respect of Review area 5 is a B, which implies that the general compliance with this quality criterion surpassed all other criteria. Review areas 2 and 3, in contrast, had the most A scores (3 each) recorded, but they both also had one C rating each.

Six of the seven cases performed satisfactorily in **Review area 1: sensitivity**, with one case attaining a 'just unsatisfactory' (D) score. This means that 85.7% of cases complied with the criterion, broken down as follows: 14.3% well (A), 57.1% generally satisfactory (B) and 14.3% just satisfactory (C).

The review area that performed the worst was **4: Integration of Public Participation outcomes**. Although four of the seven cases (57.1%) passed with scores ranging from generally satisfactory (B) – 14.3% and just satisfactory (C) –42.9%, the remaining 3 cases (42.9%) performed very unsatisfactory (F), not making the required standard.

The results of each of the five review areas are presented in more detail in the ensuing sections, followed by general observations under each of the review areas.

4.2 SENSITIVITY

The scores achieved in this review area were as follows 1 A, 4 Bs, 1 C & 1 D.

Quality Criterion		Individual EMF quality ratings (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
1	How valid is the methodology used for the sensitivity mapping and has this concept been adequately defined?	B	A	B	C	D	B	B

The seven documents investigated all made use of a sensitivity ranking exercise, whereby the key environmental (or also other development constraints) were identified. Not all the cases explained the methodology, but there appears to be a consistent understanding by the different practitioners as to what was expected. Where a document did not explain the rationale and technique in a convincing way, it creates the impression that the practitioner is unsure of either the technique required or the outcome, or both. The credibility of the EMF will be enhanced if its author makes it evident that he is in control of the process and methodology. The cases were accordingly rated on the completeness of their explanation, the methodology employed and the logic of the final output.

All seven cases commenced with identifying the key environmental issues in its region followed by an evaluation of existing land use practices and future development expectations or pressures. These would be overlain in a Geographic Information System, resulting in a sensitivity ranking map. Common denominators of key sensitive environments were water resources, ridges, biodiversity and heritage, while some cases justifiably added additional environmental sensitivities particular to their context, such as aesthetical considerations (**EMF #2**), susceptibility to wind erosion (**EMF #6**) and industrial pollution (**EMF #7**).

Of the seven cases, only **EMF #2** achieved a top score (A: well performed) –it explained the rationale and took the reader through the steps to arrive at the final sensitivity ranking. It made use of specialist investigations to determine sensitivities of different attributes and did not rely on a solely desktop-based analysis. This case formulated a development vision, objectives, targets and indicators in respect of six themes. Each of these aspects was weighted and scored from 1 to 5 in a grid cell analysis procedure, using GIS, of which an example is presented in Figure 12, hereafter. The process compiled vector data for each selected variable, which was converted to raster format using a 20m x 20m grid. With the appraisal of the various classes within each variable as basis, individual grid scores were then re-evaluated. The final step made use of map algebra using grid cell values as input, modifying them with the weighting of each variable – which ultimately determined overall potential sensitivity values

for each raster cell. The emerging sensitivity values are categorised into three levels of sensitivity: high, medium and low. The document portrays vivid maps of the different attributes in the hardcopy paper format, as well as in the GIS.

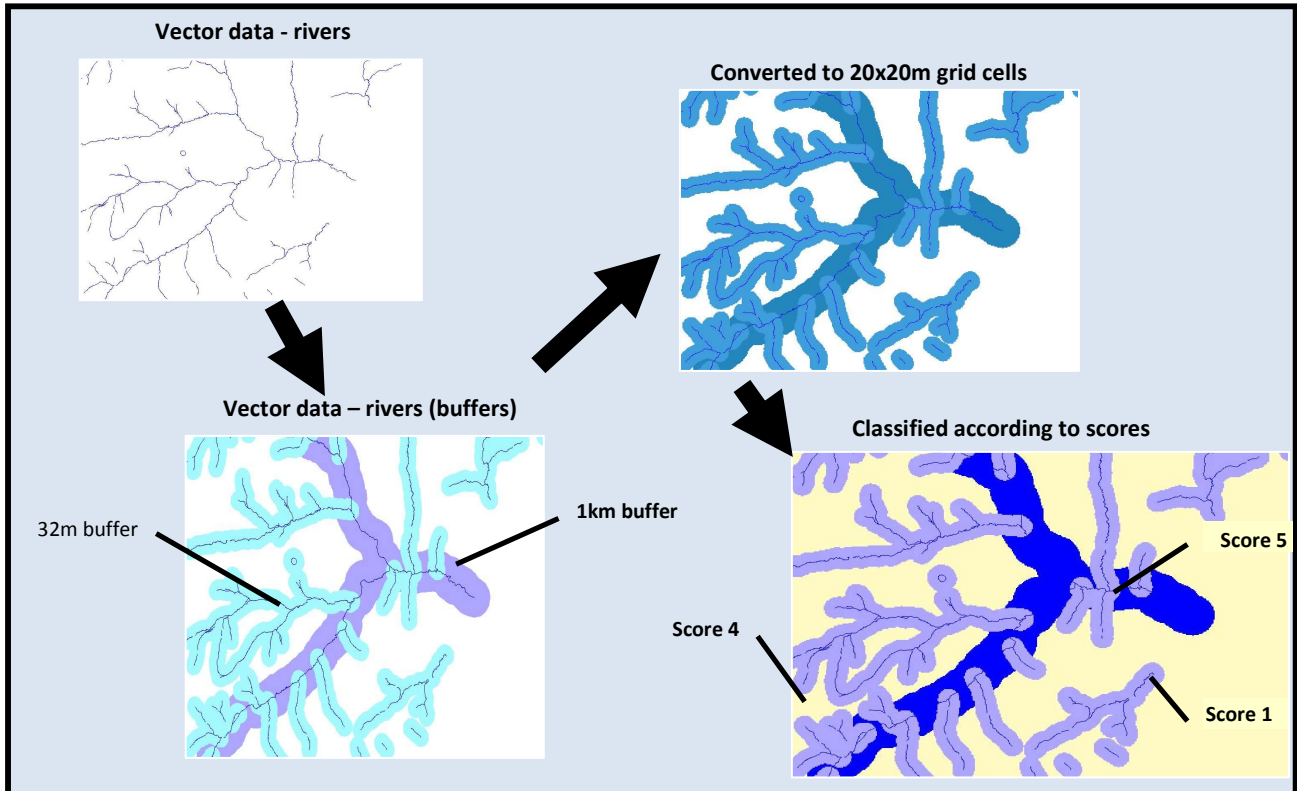


Figure 12: Schematic depiction of grid cell analysis used in EMF #2's sensitivity analysis.

(Source: K2M TECHNOLOGIES / NORTH WEST UNIVERSITY, 2007).

The next best performing category (B: generally satisfactory) was achieved by four of the seven EMF cases. **EMF #7** was good in explaining the rationale, and taking the reader through the steps to arrive at the final sensitivity ranking, as well as making use of specialist investigators to determine sensitivities of key environmental attributes; however, it missed out on a top score by omitting certain key environmental constraints like groundwater pollution risk and mining as contributor to environmental degradation. This document developed *Importance Ratings* for each of the identified attributes and was also supported by excellent maps in the text. The three other cases which achieved a B score (**EMFs #1, #3 and #6**) were less thorough in explaining their rationale and procedures, but the outcomes were all based on what seems to be key sensitive environmental attributes and in general these all had good supportive maps that clearly depicted the sensitivities of key environmental attributes.

EMF #4 scored a C. No specific methodology is motivated, but the key sensitive environmental types were identified in earlier documents (Municipal Open Space System). No rationale is given for the sensitivities arrived at; however the final product seems to make sense and is uncomplicated.

EMF #5 scored a D. The status quo information is gleaned from desktop studies alone, without ground truthing. The explanation of the sensitivity analysis is very rudimentary, although this document does develop management guidelines for identified control zones. There is no explanation as to ranking, buffers or the extent of protection needed.

General observations: sensitivity

The definition of environmental sensitivity is lacking in the relevant legislation and guidance documents. The **credibility of sensitivity methodology** used causes a perception of poor quality or the lack in confidence in the results of many EMF documents. This is as a result of poor description of methods and non-disclosure of data sources that were used, which renders the traceability of certain key data sets impossible; this causes the quality of data to be non-verifiable.

Other aspects of sensitivity analysis that are pertinent from this investigation is that **the scales of different data sets** are not clear, or they are often incompatible. For instance, when data sets from large-scale /coarse-grained maps such as 1:250 000 geology maps or 1:50 000 topographical maps are overlain by finer scale 1:10 000 vegetation surveys; the data sets are not truly comparable, as the coarser-grained data will result in generalisations and coarser (or more uncertain) boundaries. The resulting boundaries of sensitive areas are therefore not nearly as accurate as one might like to believe, with resulting implications of whether a development may be allowed or not – i.e. is it “in” or is it “out” of the sensitive area? The scales and compatibilities of scales are therefore often not correlated and synchronised accurately enough to allow meaningful inferences from ad-hoc GIS overlays.

A neglected aspect of sensitivity analysis encountered in this survey was **aesthetical or visual impacts**. The use of viewsheds to determine and limit visual impacts, as well as the value placed on scenic routes and areas of natural and architectural beauty was absent in all but EMF #2.

A last general observation relating to sensitivity mapping is that the **weighting of different environmental attributes** and especially the interaction between different environmental attributes are not clearly explained or investigated in most of the case studies – with the result that it creates the impression that the practitioners concerned do not clearly understand these concepts.

4.3 DESIRED AND UNDESIRED ACTIVITIES

As stated previously, this review area was one of the two top performers in the EMF quality review undertaken, with scores as follows: 3 As, 3 Bs & 1 C.

Quality Criterion		Individual EMF quality ratings (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
2	To what degree have desired and undesired activities been identified in relation to the spatial sensitivity analysis?	B	A	A	B	C	B	A

All EMF cases investigated were therefore of satisfactory standard, with six of the seven in the top two brackets (well performed – A, and generally satisfactory – B). The ‘accepted’ methodology to progress from the sensitivity maps to the optimal use layouts is largely borrowed from McHarg (1969) and overlays the sensitive area maps with maps depicting geotechnical, geographical and topographical constraints to development – as well as other limitations which would make development more costly or risky, such as high land values and esteemed aesthetical or neighbourhood attributes. The resulting composite map indicates zones which would be most suitable for development, as well as indicating clearly which areas are most sensitive and where development should be avoided.

The **three cases that performed best (A)** are EMFs #2, #3 and #7. **EMF #2** made use of a clearly described and well developed rationale to determine the desirability of activities, by developing an activity description framework to screen the compatibility of specified developments in relation to the sensitivity mapping for the geographic area. Activity descriptions are based on EIA regulations as well as typical planning and land use management documents, making use of legal definitions. Each activity is then categorised in terms of its compatibility within the protected area (compatible, potentially compatible and incompatible) in a tabular format. Hereafter the location of the intended activity is checked on the sensitivity map to gauge the sensitivity of the specific location. The table is expanded to include a ranking for every activity in terms of meeting each of six environmental objectives. The aim is for competent authorities to use this procedure to determine the compatibility and desirability of various proposed development activities at a given location. **EMF #3** used the McHarg (1969) method and generated development suitability zones (p 52 of EMF #3) by drawing on a geotechnical classification system for township development using twelve constraint types such as soil, slope, seepage, flooding, geological, biodiversity and conservation attributes (including the following sensitive environment types: water bodies, natural primary grasslands, mountain slopes and ridges, woody savannah areas). Development Control Zones and land use guidelines are subsequently generated from the ECZ. The Land Use and Development Control Zones that are developed are very comprehensive and detailed lists of compatible activities and land uses are consequently generated for

each type. The link between the sensitivity analysis and the desired and undesired activities is therefore very interwoven and thorough. In **EMF #7** the desired and undesired activities identified link directly to the sensitivity ranking analysis and the methodology to achieve this is made understandable to the reader. The environmental sensitivity (importance rating, or "IR"), in combination with existing land uses, served as data layers in a GIS, in which multi-criteria analysis was performed to arrive at eight ECZs. They are: *Ecological, Agricultural, Low density development, Urban agricultural, Mining and industrial, Tourism transition, Urban areas, Protected areas*.

In each of the **three B performers (EMFs #1, #4 and #6)**, the ECZs that were developed also evolved directly from the sensitivity analysis. With slight variations between the three cases, the following aspects are representative of the approach used by all three: Development parameters are developed indicating areas and describing constraints for each of the ECZs, which ranged from four to eight in number between the different cases. Generally these three cases each identified and generated desired and undesirable activities in a tabular or matrix format, including a general management strategy, applicable design standards for suitable developments (including natural resource management guidelines in the one case) for each of the zones. In another case, motivation for buffer zones around sensitive areas is given. In **EMF #6** a lot more detailed mapping and ground truthing was provided for the one very sensitive and localised ECZ (the Gariiep Alluvial vegetation). Special strategies were also developed for the protection of this sensitive ECZ. In the same case study, a three-tiered method of *Policies* (on top), followed by *Strategies* (mid-level) and *Guidelines* (bottom tier) are presented for each of seven ECZs developed in identifying desired and undesirable activities.

The single **C performer, EMF #5**, developed seven ECZs from the sensitive area maps, but the methodology is not explained anywhere. The final output was nevertheless logical, sensible and usable.

General observations: desired / undesired activities

A limiting aspect of the typical output of these EMFs – namely lists or tables of both desired and undesirable activities for each ECZ that are identical or very similar to the familiar EIA screening lists – is that as soon as EIA regulations change, the table (or matrix) would be outdated: as in all these cases where the new 2010 regulations have superseded the 2006 regulations that were in force for six of the seven case studies. EMF #7 predates the 2006 EIA regulations and therefore used more general thresholds, which remain more relevant after two subsequent changes or updates in the applicable regulations.

4.4 INTEGRATION WITH DECISION-MAKING CONTEXT

The scores achieved in this review area were as follows: 3 As, 3 Bs & 1 C.

Quality Criterion		Individual EMF quality ratings (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
3	How adequately have the EMF outcomes been analyzed in relation to the broader decision making context?	A	A	B	B	B	A	C

Two of the three cases that emerged with an **A score**, **EMF #1** and **EMF #2**, were both commissioned to provide better direction to their future management in terms of environmental protection and optimal land use, while the other cases can be considered more 'general' in outlook. The two cases therefore display a more focused integration with their decision-making context; it appears as if their mandates and *raison d'être* were clearer.

EMF #1 considered all provincial and municipal level strategic environmental and planning documents and policies at length, including the Open Space Framework and the integrated transportation plan for Tshwane, while also dealing with all appropriate developmental issues in the text. As an example, the life expectancies and capacities of transportation, sewage and water provision were all addressed (but not electrical infrastructure), while the Provincial and regional roads that affect the development of the area were also pointed out. The EMF integrates well with the corresponding open space framework (TOSF), stating that it adds '*a further dimension that defines the sensitive aspects of the open space system with a greater degree of accuracy*'. A chapter is dedicated to 'Strategies' (Chapter 12), describing general and specific environmental strategies to integrate and enhance smooth roll-out of the EMF findings and recommendations with its decision-making context.

In **EMF #2** the analysis of all pertinent policies and other strategic processes was well integrated in the development of this EMF. The Provincial Growth and Development Strategy (PGDS), the Provincial SFD/IDP and three local SDFs and IDPs were consulted, as well as two SEAs applicable to the region. None of these strategic documents consulted were more than four years old. Policies, strategies and recommendations from the sources mentioned were identified and built into key issues, challenges, development objectives and into the decision-making rationale for the activity description framework. The development of 'Guidelines for use in the EIA process' (Chapter 6 of EMF #2) is also a very useful output that clearly guides the user and helps to identify other key role players, decision makers and processes, as well as its legal and institutional context (cooperative governance issues).

The third A-performer, **EMF #6**, likewise displayed excellent integration of its decision-making context into its three-tiered approach of policies, strategies and guidelines. It provided alternative courses of action in its strategies section, i.e. whether its outcomes should be implemented through the normal land use decision-making processes by adopting the guidelines as local authority policy for the area, or whether it should be adopted through other vehicles such as SDFs or national policies like the National Protected Area Expansion Strategy (NPAES).

The three cases which achieved a **B score** were well executed in most respects, but each had some shortcoming as described hereafter. With **EMF #3** the upward linkages to strategic decision processes was good, but linkages to other authorisation processes such as MPRDA, water use licences and EIA approvals for development proposals are not made or developed. Likewise with **EMF #4** the outcomes related positively to broader planning policies and constraints, especially the water sector, but there was limited development of how the final outcomes would relate to future EIA processes. Finally, **EMF #5** also thoroughly considered planning and land use management (LUM), as well as all applicable environmental policies and protected areas. Its shortcoming, however, was the backward integration of the outcomes which relate mostly to the Midvaal municipality itself - i.e. its own assimilation into the SDF and IDP – while largely ignoring its role, relevance and influence on neighbouring districts and *vice versa*.

The **EMF #7** document included and integrated information from its surrounding environmental, planning and conservation context, but it only justified a **C score**. Its shortcoming was that the integration with mining activity and especially geo-hydrology (potential groundwater pollution) is under-developed and its importance underestimated, as is the risk of surface water pollution due to these activities. Apart from these limitations, the remainder of development activities considered in the SEMP appear fairly complete and they are categorised well under the ECZs.

General observations: integration with decision context

The clear execution of the required integration of the decision-making context in the three top-scoring case studies (EMFs # 1, #2 and #6) point to exceptional understanding or proficiency of the client in what they wanted to achieve, or that the understanding and capabilities of the practitioners concerned was on a level above the norm. Which one of these aspects was the deciding factor cannot be determined with certainty at this level of investigation, but one can accept that both factors were synergistic.

4.5 PUBLIC PARTICIPATION PROCESS

The essence of the public participation process required in an EMF process is stated as follows in GNR 547 Section 3(4):

*(4) **Public participation** as contemplated in subregulation (2)(c) must ensure that participation by potential interested and affected parties in the development of the environmental management framework is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity, sufficient understanding and skill, best suited to the local interests and groups in each geographical area, to provide comment during the process of developing the environmental management framework (SA, 2010b).*

Quality Criterion		Individual EMF quality ratings (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
4	To what extent have the outcomes of the public participation process been integrated with the EMF?	F	C	F	C	C	F	B

Public participation emerged as the weakest component of EMF practice in this study; three of the seven cases (42,9%) did not address this aspect at all (EMFs #1, #3 and #6). Even the terms of reference and introductory sections of these three EMFs provided no hint as to a stakeholder engagement process being either required or undertaken. These cases all achieved an F (very poorly performed) rating.

Of the remaining four cases, one achieved a B, while three cases scored C ratings.

EMF #7 achieved an **B-score**: the stakeholder engagement undertaken was well documented, providing comprehensive report-back of advertisements, meetings, workshops, responses and the process in general. Mention is made of communication or engagement with a 180-strong stakeholder database including government, mining, industry and general public representatives, in addition to the project steering committee. Appendices also provide complete lists of stakeholders. Background information documents, a stakeholder awareness workshop (November 2004), questionnaires to stakeholders to determine the desired state of the environment, as well as the public review phase of the Draft EMF document were all documented. Despite the comprehensive stakeholder engagement process, the response was poor – with only ten stakeholders having completed the desired state questionnaire presented to them at the January 2006 public meeting.

The resulting *Desired state of the environment* outcome had surprisingly little to say about mining in the region, considering its wide extent and broad economic base in this district – as well as the severe air, surface water and groundwater pollution legacies of the district.

The following three cases scored **Cs: EMF #2, EMF #4 and EMF #5.**

In **EMF #2** the need to '*consult with relevant interested and affected parties*' was listed as one of the study objectives (p2 of Status Quo report), yet there was no further reference to meetings or consultations occurring to support this. Nevertheless, Section 3 (Key Issues and challenges) provides a comprehensive list of inputs from interested and affected parties stretching over eight pages, but without reference to dates or sources. It is assumed that these responses came from the earlier SEA process from which the EMF had been derived. Nevertheless, these outcomes were well integrated into the formulation of key issues and challenges and subsequent development vision and objectives, targets and indicators that are formulated in Section 4 of the document. This EMF consequently scored a C.

EMF #4 addressed some aspects of the public participation process better than the other two C cases, but did not warrant a B score. In this EMF, the stakeholder engagement process was formally advertised, conducted and minuted with a response register. Most of the requests were 'noted', or they were of a nature that could be answered at the public meeting without requiring further action. Other requests were of political nature (e.g. dissatisfaction with service delivery) – which is hard to integrate into an EMF document. However, there is no evidence that any of the public's concerns were adopted or addressed in the outcomes of the EMF.

With **EMF #5**, which also scored a C, there is documentary evidence of one stakeholder meeting with the public (3 May 2007) and one regulatory authorities' meeting (7 March 2007). Certain undertakings made in the regulatory meeting (pp 129-130) were not effected – without explanation. Furthermore, an 'environmentally focused' vision was adapted from the earlier Midvaal IDP (2006/7) vision. This vision and desired environment targets were formulated by a workshop of the regulatory authorities' meeting, which was later presented at the public participation meeting of 3 May 2007. The deliberations issues report of the public meeting, attended by fourteen people, records mainly environmental and developmental transgressions (by mines, industry and property developers), as well as municipal management and community issues. It does not include any responses or comments from the public about the adoption of the desired state of the environment goals.

General observations: public participation

No reference to any stakeholder input being assimilated into the EMF was found in five of the documents. In the four EMFs where public meetings actually took place, Comment and Response registers were included – but again there is no evidence that any of their concerns was specifically adopted or addressed. It should be noted that it is the responsibility of the environmental assessment practitioner to identify, contact and liaise with all relevant stakeholders. Although this aspect may have been waived by the clients (proponents) themselves in some instances, it is nevertheless a legal requirement and non-compliance therewith cannot be summarily excused.

If proper stakeholder engagement processes were undertaken, one would expect the documented record to provide proof of its consideration and assimilation in the EMF document, or else that this deficiency would be identified and addressed as a shortcoming of the process. From a documentation review perspective, there would be more credibility in the stakeholder engagement processes if actual reference to the public meetings and stakeholder processes was made in the documentation and especially if dates of such meetings were mentioned.

4.6 PROVISION FOR IMPLEMENTATION OF EMF OUTCOMES

All seven of the EMF cases complied with this review area, with one case achieving an A score, while six attained B scores.

Quality Criterion		Individual EMF quality ratings (A - F)						
		EMF 1	EMF 2	EMF 3	EMF 4	EMF 5	EMF 6	EMF 7
5	How sufficient are the provisions for the implementation of the EMF outcomes?	B	B	B	B	B	B	A

The top score (**A**) was earned by **EMF #7**. Its SEMP has three types of guidelines, namely Land Use guidelines, General Development guidelines and Administrative guidelines for each ECZ – which are further developed into importance ratings, implementation plans and auditing systems. The Administrative guidelines provide clarity on procedural steps to officials, developers and consultants, while the Land use guidelines identify areas of potential conflict between development proposals and sensitive environments, amongst other things. The Importance Rating guideline is very useful as an EIA information tool, providing guidance on procedures and all specialist studies and inputs that may

be needed for different type of developments in any of the ECZs. The Implementation Plan identifies training needs for officials working with or closely with the EMF. Overall this section is very thorough and usable. It also provides clear flowcharts on the process to be followed, as well as on how to use the SEMP, as depicted in the extract (Figure 13) below. Guidelines were subsequently generated for each ECZ from the Strategic Environmental Management Plan, or SEMP for EMF #7.

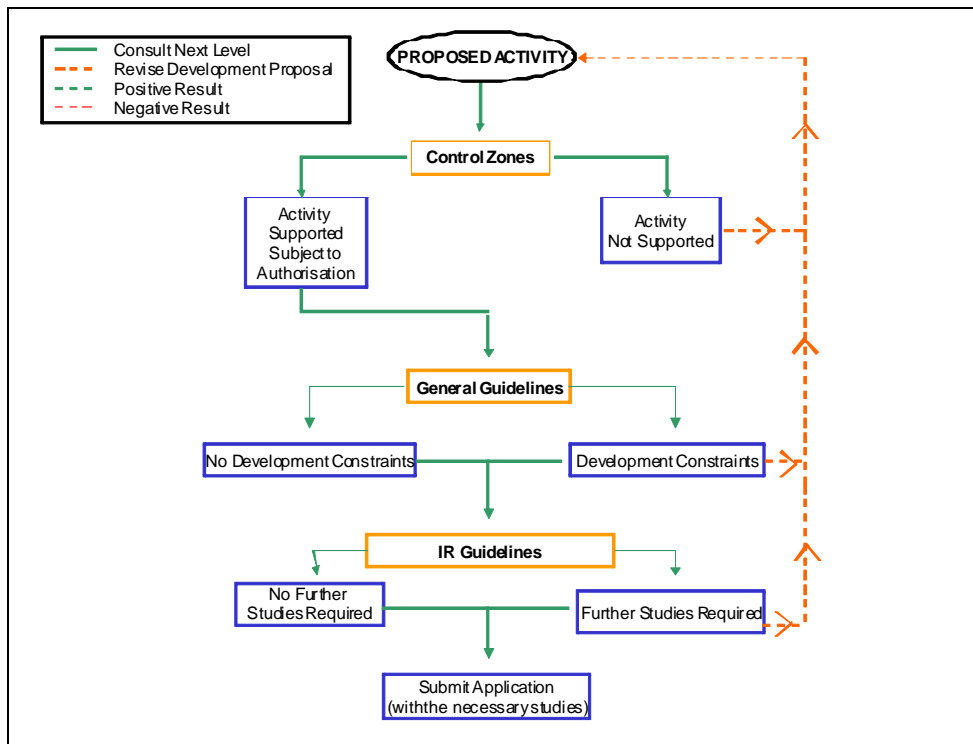


Figure 13: Example of flowchart from EMF #7, indicating how the EMF documentation is to be consulted and used by the developer or consultant. (Source SEF / Bohlweki, 2006)

The six EMFs that earned B scores had in common that they each developed SEMP with management proposals for each of the ECZs under consideration. Most of the cases had a tiered structure using three levels of outcomes – which direct effort and facilitates EMF outcomes at the correct level of decision-making. The specifics of these cases are as follows:

EMF #1's 'Strategies' section is dedicated to implementation issues 'to create a mechanism for implementing action to address the most pertinent issues that came out of the EMF' (p 66 of EMF #1). It identifies priority issues and explains the necessity for cooperative governance (without detailing specific potential interactions) and explains the role that the EMF should play in devising strategies. Thereafter five specific environmental strategies are described, which relate to socio-economic, developmental, urban management, as well as purely environmental protection/management issues. The concluding chapter summarises all aspects that need to be considered by decision-makers and

future users of the EMF; however, it fails to encourage its own assimilation into future SDFs and planning issues.

EMF #2 provides detailed procedural descriptions and flowcharts of the subsequent processes to be followed with development applications, including the screening procedure and specifics of the EIA process, such as specialist studies and other consultations that would foreseeably be required. It is pro-active in identifying potential key role players, decision makers and processes that may need to be taken into account. It also provides a section on the way forward, including procedures to adopt the EMF (in terms of Section 5 of GNR 547), training, capacity building and determining future research needs. The development of 'Guidelines for use in the EIA process' (Chapter 6) is also a very useful output that clearly guides the user of the EMF to necessary future steps not only in implementing the EMF, but also helps to identify other key role players and decision makers and processes, as well as its legal and institutional context (cooperative governance issues).

The **EMF #3** document identifies sixteen types of management areas like mining, landfill, commercial and primary agricultural areas, developed areas (urban: open space, industrial, informal settlements, CBD and other heritage), as well as four environmentally sensitive/pristine/significant landscapes. The action plans and control guidelines are comprehensive. This EMF is nevertheless very implementation oriented in that many strategies and procedures to capacitate officials and the public at large are included. A shortcoming is that the potential implications of subsequent EIAs and other authorisation processes are not addressed.

The main outcome of **EMF #4** is its Environmental Management Plan, which provides both a general management strategy and natural resource management guidelines as well as applicable design standards for suitable types of development for each of its six management zones. A responsibility matrix is generated which provides some clarity as to future needs and responsibilities to achieve objectives.

EMF #5's SEMP that is developed is to be used as input to the local SDF and IDP process (p 81 of EMF #5) and also to enable municipal officials and decision-makers to understand their respective environmental management mandates.

In **EMF #6** the 'Strategies' section is presented where four specific management strategies are developed for each of four ECZs. Under each of the topics in this section, there is a sub-heading called 'Implementation', which spells out the mechanisms necessary to adopt or implement recommended outcomes. For example, it suggests that the provisions should either be implemented through the normal land use decision-making processes by adopting the guidelines as local authority policy for the area, or that it should be adopted through other vehicles such as SDFs or national policies such as the National Protected Area Expansion Strategy (NPAES).

General observations: implementation of outcomes

The cases researched generally had **little mention of monitoring and follow-up** provisions. This is a distinct weakness of present EMF requirements and practice. These actions are necessary to ensure that recommendations are implemented and that the EMF is assimilated into other relevant policy and legal mechanisms such as planning and policy instruments.

4.7 GENERAL OBSERVATIONS & SUGGESTIONS

Apart from the analysis of the five review criteria, the following general or cross-cutting observations were recorded during the scrutiny of the seven case studies:

General structure, focus and legibility of EMF

In order to set the context and potential role of each EMF, introductory sections that firstly put the reader in the picture about the following would make the documents more readable and applicable:

- Intended focus and purpose, as well as the expected outcomes and implementations of the EMF process, and the utility of its end product (document, SEMP, guidelines, GIS – with link-on utility for municipal management).
- A clear description of the EMF process, its rationale and limitations of the present study.
- The current state of the environment – highlighting key issues.
- Identification of development pressures and constraints.
- Synopsis that gives overview of environmental status quo, especially where the Status Quo Document and the EMF are developed as two separate documents; where this is the case, the EMF main document needs a salient summary of the findings and implications of the (often large) state of the environment (SOER) study.
- The need for interactive spatial planning and the environmental framework within which it should be done.
- The potential role that an EMF can play in addressing these issues.
- Future refinements and improvements.
- Guidelines and future steps to enable adoption of the EMF, as well as the benefits of such a decision.
- Clear indications as to who should use, apply or adopt outcomes of the EMF – including pointers to the SDF - and where the existing SDF should take note of EMF findings. This is important

because the next round of SDFs should assimilate the findings of the EMF for the EMF to have any input in future spatial planning initiatives.

Although these listed 'uncertainties' are understandable in the light of the novelty of the EMF instrument (process and product), as well as the client's understanding of its potential utility, it is nevertheless the EAP's responsibility and duty to make it clear at the end of the report – at least in a section like 'the way forward' or to make recommendations about future cycles, to overcome present shortcomings and limitations (e.g. ground truthing and zooming in on issues/ sensitive environments that were discovered during the EMF process).

A clear statement of direction and purpose is lacking in most EMF documents. Most EMFs provide the reasons as stated in the EMF regulations (or guidelines) for why they are undertaken, but without focusing on the specific regions' core problems, pressures, constraints and issues. Likewise the Status Quo of the Environment sections in most reports lacked clear state SOER methodology, i.e. they simply state the status quo, without necessarily identifying development pressures, responses and mitigations. The general lack of explaining what the EMF is about, why it is undertaken and what it set out to prove, indicate to the reader that:

- the consultant is unclear about why he is doing it, or
- the consultant is unclear about how to do it (is confused about the methodology), or
- the client is unclear about why the process is undertaken or what he will do with its outputs.

While the sequence of events in compiling an EMF starts with the state of the environment (or **Status Quo** of the environment), this part is usually a very **lengthy report**. A SOER is a necessary starting point for any environmental investigation, but one needs to determine how often a comprehensive SOER update is needed. Once an EMF has been done for a region, it would be more expedient to investigate changes from a known baseline condition – in other words to gauge changes in the system, whether for better or for worse, rather than to undertake a duplicate study every few years. However, this is only possible where a monitoring system is in place to monitor defined indicators, which will enable gauging changes in the state of the environment.

A synoptic overview of key findings and implications of the Status Quo report in an introductory part of the EMF document would be more meaningful than labouring the user with too much detail. Similarly, the methodologies for sensitivity and other technical matters, including lists of land uses, need to be generated – but they should rather be in separate chapters or annexures that follow the main document. To be a strategic working document, the EMF needs to focus on intentional, meaningful information. It needs to explain where it gets information and it needs to justify its inferences methodologies, but the detail and tedium of these processes can be relegated to subordinate positions in the documentation.

Although most EMFs have elaborate **GIS mapping and software** imagery, which are potentially interactive with land use plans and other town planning, zoning, rate payer and land ownership databases - the EMF document would be much enhanced if it portrayed A4 or A3 images of these maps in a paper format in the hardcopy EMF document; especially so for the compilation maps that are constantly referred to (e.g. sensitivity maps, land use types and ECZs). In other words, one should not allow the sophistication of electronically based information technology to detract from the usefulness of a visible map (even useable, big A1 or A0 wall-mounted maps) that are in view in officials' offices and who need to be familiar with their content. Given the price tag of the average EMF, an add-on of proper wall maps of salient outputs would have a marginal effect on total cost of the instrument, but possibly a much bigger positive return on its utility.

Regarding the identification of **key sensitive areas**, the following were observed:

- **Aesthetic values** were generally ignored (e.g. scenic routes, visual impacts and mitigations of mining and industrial developments).
- **Cultural places** and sense of place: e.g. tourism, CBD, sense of history were only included where heritage assessments had identified them; the case studies also display a general lack of consideration for architecture and historic buildings, structures, as well as the will to preserve them.
- One of the EMFs missed the importance of groundwater pollution risk in an area characterised by mining.

Scale issues are often hidden and not always evident from the hardcopy alone. However, further scrutiny of GIS files will reveal that sensitivity maps are typically compiled where the resolution of data of the different layers are at widely varying scales; for instance, geology maps of 1: 250 000 would be overlain with soil maps at scale 1: 50 000, while vegetation data are recorded at 1: 10 000. Overlaying the coarser scale maps over ones with finer resolution causes generalisations and '**straight edge effects**'; it is therefore necessary to align the scale of observation and the resolution of different data sets to produce accurate sensitivity maps. Figure 14 following demonstrates how the importation of a coarse scale map from the provincial C-Plan results in data generalisation when scales are jumped. Because it is not always possible to align scales, in such cases the report should state (or warn about) the possibility of wrong interpretation from mismatched scales.

Scrutiny of adjoining EMFs (such as the cases of EMF #3 and EMF #5), reveals that **the mapping of adjacent regions do not interface**, as attempts are usually not made to harmonise or align geographical maps with those of adjacent studies. One therefore observes leaps and **jumps of occurrences in physiographic data**, as illustrated in Figure 15 below. These abrupt changes are a result not only of variation in scales, but are also due to different handling (ordinal grouping) of data by practitioners on different EMF projects.

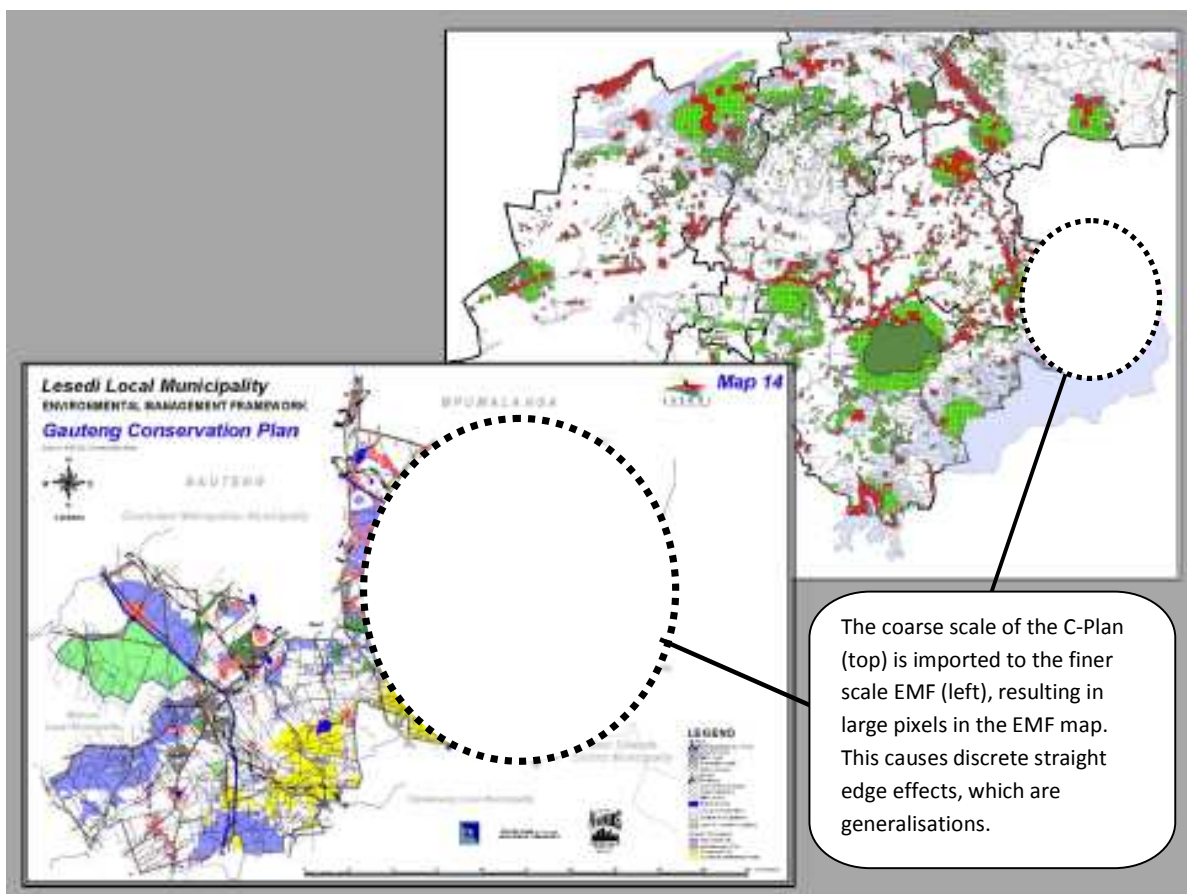


Figure 14: Example of jumping scales : importing coarse resolution maps: EMF #3 & Gauteng C-Plan
 (Sources: Lesedi, 2006; GDACE, 2005)

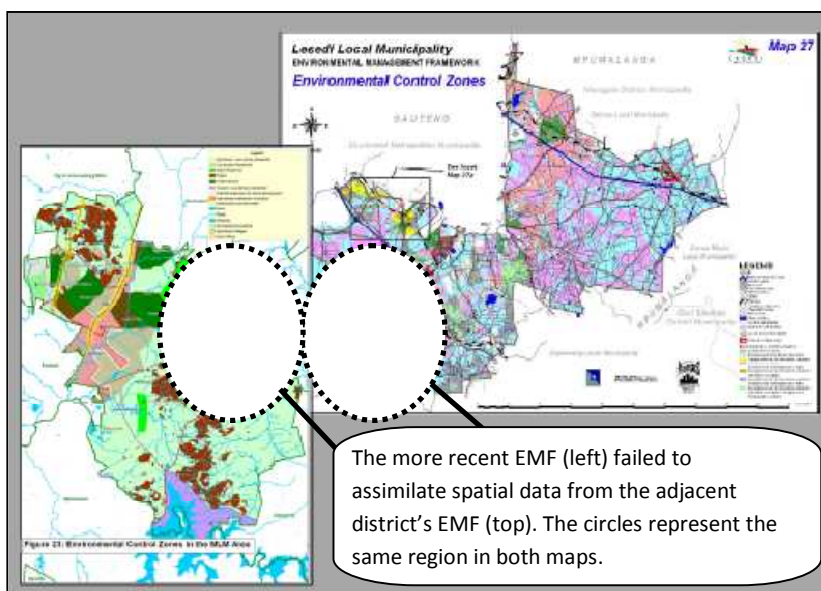


Figure 15: Lack of integrating adjacent data sets: EMF # 5 & EMF # 3
 (Sources: ILISO, 2007; Lesedi, 2006)

Furthermore, the rationale for **buffer zones around sensitive areas** is generally not explained or justified. Usually statutory zone sizes or 'accepted' practice of buffer sizes is applied without explanation, such as the generally used 33m (100 foot) for water features. In dealing with protective boundaries around features such as ridges, riparian zones and conservation areas, it would be necessary to develop a new rationale and to motivate specific buffers as a result of investigating the specific circumstances. The same would hold true for aesthetic zones and visual impacts; here viewsheds from preferred vantage points need to be considered in the methodology. Figure 16 below illustrates two examples of where a constant width buffer was applied throughout, in two different cases reviewed, to a conservation area and river channels, respectively

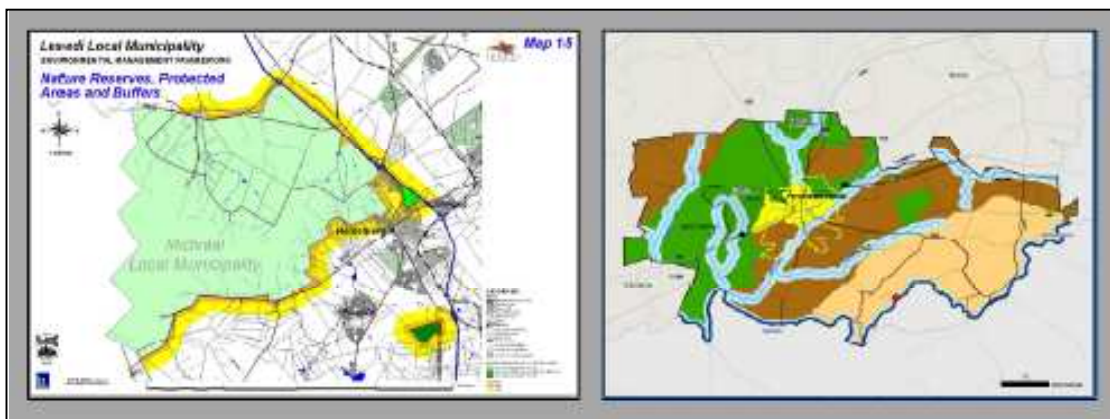


Figure 16: Examples of arbitrary buffer zones applied: EMF # 3 & EMF # 4

Sources: Lesedi, 2006; NWDACERD, 2010)

Sensitive environments are usually bounded by physiographic or **resource boundaries**. In working with limited geographical areas in EMF, the study (sensitivity mapping) is usually confined to the political boundaries of the region in question. However, limited evidence was found in this research that practitioners consider wider resource boundaries such as catchments, ecosystems and geological features to delimit the extent and boundaries of sensitive areas.

In general, the EMFs researched did not make specific provisions for their **adoption in terms of Regulation 5**. Adoption renders an EMF a much more powerful environmental management tool and ensures that its provisions have statutory entrenchment. Although it is appreciated that these are early stages of EMF practice, it is felt that the future utility and need for adoption should be promoted by the environmental assessment practitioners responsible for each EMF.

4.8 RECAPITULATION

This chapter has reported on the findings of the analysis of the EMF quality review for the seven EMF cases under scrutiny.

The review area needing most attention is the public participation process. (review criterion 4) – in which three of the case studies did not make the required standard. With review criterion 1 (the definition of sensitivity and the methodology to determine it) only one of the cases fell short of the standard. The EMF cases reviewed all fared satisfactorily with the other three review criteria.

Observations and inferences are made in respect of the five review areas, namely:

- Sensitivity mapping
- Desired / undesired activities
- Integration with decision context
- Public participation
- Implementation of outcomes

In addition, detailed deductions are also made on the following themes:

- Other mapping and scaling issues
- General structure, focus and legibility of EMF
- Statement of direction and expected outcomes

Due to a rather lengthy discussion on the key findings emanating from of the analysis undertaken in this chapter, and in order to avoid unnecessary repetition, the results of the analysis are summarised in the next chapter, under *Section 5.1: Summary of results*. Chapter 5 is also the final chapter, which draws conclusions, describes the way ahead and pinpoints areas for future research.

Chapter 5: Discussion and conclusion

The purpose of this research was to develop a performance evaluation technique for EMF by developing review questions to investigate the quality of EMFs. More specifically, its aim was to evaluate the output of EMF reports for their quality, by providing answers to the following three questions:

- | | |
|-----------------------------|---|
| Research question 1: | What are the perspectives and debates relating to EIA and SEA report review and where does EMF fit in? |
| Research question 2: | Can suitable review criteria be developed to review the quality of EMF reports in a conceptually justified, methodologically sound and practically viable manner? |
| Research question 3: | What is the quality of EMF reports in South Africa? |

This chapter demonstrates that these three research questions have been answered.

Chapter 2: *Literature review* surveyed the perspectives on EA theory and performance evaluation, as well as the context, historical development and institutional grounding for EMF, thereby answering research question 1.

Chapter 3: *Research design and methodology* answered research question 2 by describing the research methodology, developing a contextual framework for the research from tested procedures applied to EA review and continued to develop five quality review criteria by justifying them from the legal mandate for EMF. The criteria developed are:

- *How valid is the methodology used for the sensitivity mapping and has this concept been adequately defined?*
- *To what degree have desired and undesired activities been identified in relation to the spatial sensitivity analysis?*
- *How adequately have the EMF outcomes been analyzed in relation to the broader decision making context?*
- *To what extent have the outcomes of the public participation process been integrated with the EMF?*
- *How sufficient are the provisions for the implementation of the EMF outcomes?*

The review method and subsequent selection of seven case studies were also motivated.

Chapter 4: *Data analysis* gave effect to the review method and quality criteria developed by applying them to the seven EMF case studies selected. Chapter 4 recorded the outcomes for each of the review areas, as well as general observations, thus answering research question 3. The full review report is attached as Annexure A.

The present chapter will summarise the results of the analysis and give direction to the way forward, including suggestions for future research. It is structured as follows:

- 5.1 Summary of results**
- 5.2 Conclusion and the way forward**
- 5.3 Areas for future research**
- 5.4 Final word**

5.1 SUMMARY OF RESULTS

Application of the quality review criteria to the seven EMF case studies reveal the following key results:

PUBLIC PARTICIPATION

Public participation emerged as the weakest component of EMF practice. Possible reasons could be either the lack of prescriptions in the terms of reference when these projects were commissioned, or that the stakeholder engagement processes was waived by the client (or avoided by the consultant) due to budget constraints. It is contended that the shortcomings of deficient public engagement process need to be mentioned, admitted and highlighted as limitations of the process so that the EMF procedure can be transparent. The responsibility remains with the environmental practitioners concerned to clarify the issue of compliance with the public engagement requirement; the EMF documentation therefore needs to give complete report, including dates of meetings, issues raised and how these were attended to, or at least to state why the process did not occur.

Many of these EMFs were a first-time process for the geographic areas concerned. These processes were undertaken to commence a cycle of providing environmentally sensitive inputs into the wider strategic development planning initiatives, such as SDFs (local or regional) and Open Space Development Frameworks. In all cases, the implications of the EMFs have to be assimilated into the SDFs or their IDPs in a future planning cycle. One therefore foresees that there will be more pressure to incorporate public participation issues in EMF practice in future

It is a very difficult (or else very costly) exercise to undertake stakeholder consultation on the strategic level – whether for planning (SDF/IDP) or any strategic environmental process (such as SEA, EMF or large EIAs), and this may also have contributed to its poor performance in this review. A third contributing factor may be that none of the EMFs investigated had made any assertion that a future ‘adoption’ (in terms of Section 5 of GNR 547 of NEMA) of the EMF was envisaged; this implies that the current EMFs are geared more toward directing planning initiatives and not yet to limit the volume of EIA applications.

SENSITIVITY ANALYSIS AND DESIRABILITY OF ACTIVITIES

The lack of a clear understanding, **common definition and agreed methodology to determine sensitivity** are limiting the potential quality of the EMFs, as is evident from the different approaches taken by practitioners in this research. Sensitivity is a function not only of the existing state of the environment or ecosystem in question, but also of the envisaged activity that will take place. The rationale and methodology of the sensitivity analyses are generally not well explained, causing a perception of poor quality or a lack in confidence in the results of many EMF documents.

The majority (85%) of cases did not mention the issue of **scale and resolution difficulties**, shortcomings and discrepancies at all. The resulting boundaries of sensitive areas are therefore not nearly as accurate as one might like to believe, resulting in uncertainty of whether a development at a given location is “in” or “out” of the sensitive area. The scales and compatibilities of scales are therefore often not correlated and synchronised accurately enough to allow meaningful inferences from ad-hoc GIS overlays.

The **weighting of different environmental attributes** and especially the relative weighting and interaction between these environmental attributes are not clearly explained or investigated –resulting in a perception that the practitioners concerned did not understand the concepts clearly themselves.

A sensitivity analysis aspect that was largely ignored (by 85% of cases researched) was **aesthetical sensitivity and/or visual impacts**. The use of viewsheds to determine and limit visual impacts, as

well as the value placed on scenic routes and areas of natural and architectural beauty was absent in all but one of the EMFs. Sensitivity values need to be assigned not only to land, green and scenic areas and parks, but also to a wider zone (buffer) surrounding it, which can be determined using viewsheds. Similarly, the undesirability of large structures like mine tailings dams can also be determined and limited through using 'visual sensitivity' techniques. One of the EMFs made reference to landing strip siting, using **sound levels** to determine **sensitivity** around the facility. There are cases where pertinent environmental issues such as known groundwater pollution in a mining area were not addressed or captured in the EMF concerned.

A limiting aspect of the typical output of these EMFs – namely **lists or tables of both desired and undesirable activities** for each ECZ that are identical or very similar to the familiar EIA screening lists - is that as soon as EIA regulations change, the table (or matrix) would be outdated.

INTEGRATION WITH DECISION-MAKING CONTEXT

All the EMFs researched performed satisfactorily in response to this review criterion.

EMFs commissioned without a clear reason and objectives result in 'fuzzy' analysis and outcomes, while conversely, **clearly defined purpose and objectives** result in a more understandable and useful EMF outcomes. The formulation of clear terms of reference by the proponent or institution commissioning the EMF will ensure that these outcomes can be improved.

An EMF process **cannot afford to miss the impacts and effects of a key industry that is prevalent in its region**. Each EMF should be approached as a unique case with unique environmental, social and developmental attributes and constraints. The essence is to identify the key issues of the region and to integrate and prioritise other attributes and constraints around it.

PROVISION FOR IMPLEMENTATION OF OUTCOMES

The cases researched generally had little mention of monitoring and follow-up provisions. These are necessary to ensure that recommendations are implemented and that the EMF is assimilated into other relevant policy and legal instruments, such as planning and other legal instruments. This is a distinct weakness of the present system; however, it is contended that in most cases the terms of reference failed to specify what exactly the final product was to achieve.

The consultancy-driven nature of EMF may result in **limited capacity by the final users** that will be implementing the EMFs. The use of GIS in EMFs make them a sophisticated tool requiring skilled

personnel; operating a GIS is not the issue, but rather the data management requirement to update and maintain such a system. The constant updating of information that may be required could be problematic in an environment that is already characterised by high personnel turnover. Most EMFs are commissioned by either provincial authorities or municipalities (sometimes jointly), but with the same intended end purpose; while some are commissioned by the Department of Environmental Affairs (DEA) nationally. The reasons behind this are often capacity related, in that higher authorities are aiding the less competent local authorities to undertake the EMF process. This could result in **confusing mandates** to some extent.

EMFs by their nature need to be assimilated into SDFs and IDPs in the municipal planning context. Their outcomes also need to be assimilated into C-Plans and higher-tier Environmental Implementation Plans (EIPs) and SDFs (e.g. the outcomes of a municipal EMF need to be taken account of in sectoral EIP and provincial SDF processes). Other cases of alignment between Biodiversity Action Plans and sectoral EMFs or EIPs of government departments will also be required. One can therefore foresee that **various alignment problems could be encountered** to effectively implement EMFs.

5.2 CONCLUSION AND THE WAY FORWARD

This section comments on the problems identified in the foregoing section and suggests solutions; it also distils other inferences from the analysis, such as readability, the roles of stakeholders and decision-making. Where necessary, related issues have been grouped under the most representative headings. This section is arranged along the following sequence:

- ***General readability***
- ***Sensitivity***
- ***Scale***
- ***Desired and undesired activities***
- ***Government and public stakeholders***
- ***EMF & planning***
- ***Decision-making***

GENERAL READABILITY

Introductory sections that firstly put the reader in the picture about the following would make the **documents more readable** and applicable: guidelines and future steps to enable adoption of the EMF; clear indications as to who should use, apply or adopt outcomes of the EMF; clear steps to

integrate the EMF findings (and its GIS database) into the SDFs; aligning the SEMP with IDP in general. This is important because the next round of SDFs should assimilate the findings of the EMF for the EMF to have any input in future spatial planning initiatives. The limitations of the EMF need to be addressed and made known to the reader, but again one can argue that the terms of reference issued to consultants at the tender stage of EMFs need to be clearer on the expected outcomes. However, it remains the **EAP's responsibility** and duty to make limitations clear at the end of the report – at least in a section like 'the way forward' - or to make recommendations about future cycles, in order to overcome present shortcomings and limitations. For example, suggestions like future ground-truthing to verify desktop findings, or to focus future surveys on pertinent issues or sensitive environments that were discovered during the EMF process, would be instructive and pro-active.

SENSITIVITY

A **common definition and understanding of environmental sensitivity** and how to determine it, needs to be formulated and entrenched. It is suggested that it be prescribed in relevant legislation, while accepted methodologies should be agreed upon and taken up in guidance documents. This will allow for comparability between different EMFs, especially ones that border geographically, as well as allowing for consistency in decision-making.

Sensitivity rankings should make provision for both the inherent **sensitivity of habitats, and the sensitivity to specific types of development**. The limiting effect of certain physiographic features on development could be used to a greater extent to improve this methodology. Likewise cognisance should be taken of visual impacts and the techniques and technologies available to incorporate these sensitivities. Other areas that need to be considered in sensitivity mapping are land values, neighbourhood and cultural values (sense of place), surface and groundwater pollution, sound pollution, light pollution and air pollution – as and when these are pertinent in the geographic area under consideration. It remains the responsibility of the environmental practitioner to ensure that all the key issues are captured and that sensible Environmental Control Zones are defined.

SCALE

Scale and spatial resolution have to be dealt with due caution and expertise. More focus is required on aligning scales and resolutions, mapping methods and general integration of spatial data, especially those of adjoining districts. The pitfalls and generalisations associated with the use of non-aligning scales should be recognised and future updates of EMFs need to address increasingly finer scales and resolution (as well as ground-truthing) to enhance the comparison of different data sets. Guidelines should also address issues of scale and resolution and the potential pitfalls of wrongly applying scales, while issues on the use of and the limitations of GIS should also be addressed.

DESIRED AND UNDESIRED ACTIVITIES

In identifying **desired and undesired activities**, more 'original' activities and thresholds that are not so dependent on the longevity of specific EIA regulations will be preferable. The broader activity categories of the original ECA regulations, but tailored to specific environmental and social constraints of the region in question would be more appropriate, while typical town planning development and zoning definitions and descriptions should also be explored. More deliberative thought and interaction with the planning authorities, stakeholders and political decision-makers concerned may add value to this aspect (desired and undesirable activity identification) of the EMF.

The desirability and undesirability of particular activities need to be motivated and promoted – in order for ground rules to be determined and laid down. Once an EMF is adopted, the provisions of what constitutes such activities will be fixed, needing huge administrative and political processes to make such resolutions undone again. There is therefore a danger that the desired/undesired activities of EMFs will remain 'strictly advisory' on the one hand, with a possible resistance emerging as to their 'adoption' - while if provisions are adopted without proper thought and deliberation, it would be hard to reverse provisions that could be either too lax (favouring developers) or too restrictive (favouring environmental protection).

GOVERNMENT AND PUBLIC STAKEHOLDERS

The need for **public engagement** in the EMF process, as well as ways to facilitate and enhance this, demands serious attention and should be addressed by the authorities. The best results of including stakeholder participation could be through representative forums, ideally combining with planning processes, such as IDPs and SDFs undertaken by municipal authorities. More specific scope of work requirements (or terms of reference) by the institutions commissioning the EMFs would improve the current confusion and poor performance in this review area.

From the government's perspective, **increased clarity on the specific mandates** of different departments of **government** need to be disseminated, and their respective responsibilities and contributions to environmental processes like EMFs propagated, as government stakeholders other than the environmental departments often do not comment on environmental processes when requested to do so. This will facilitate co-operative governance and the integration of decision-making between different sectors and tiers of government, with the expectation of improved EMF practice.

EMF & PLANNING

This research has underscored the **intricate link between meaningful EA and the planning process**. Although this topic was explored in earlier days of EA debate, it seems to have been neglected in the more recent past. EAPs should know more about the role of planning and *vice versa*.

Similarly, SEA should be re-investigated and the actual role that EMF is playing in the South African context should be given credit: if it is taking over the role of SEA in actually promoting sustainability upstream of development decisions, it should be allowed to be used to enhance ecological integrity and the elusive ideal of sustainable development. Likewise, clear steps are needed to integrate the EMF findings (and its GIS database) into the SDFs, as well aligning the SEMP with the IDP in general. The very fact that the IDP process is an iterative process with a five year cycle creates both a market (for EAPs) and a potentially very powerful sustainability tool that could be fine-tuned over time. However, it is the role of the environmental practitioner to sell this idea, which should hold benefit for municipal management and planning, for the environment and sustainability, and thus human health.

DECISION-MAKING

Adoption of EMFs as regulatory tools needs more attention. It is foreseen that, as the role and potential of EMFs is better understood and as its quality improves, there will be more confidence and understanding (from the legal profession, planners, municipal officials, politicians and environmental practitioners) on how to structure the inclusion of EMF provisions; there will be little value added if adopted EMFs have to be updated every time that EIA regulations change and therefore it is of limited value if EIA-type regulations are simply used where EMFs are formalised and adopted. This calls for clearer deliberation on actual thresholds and buffer zones for the particular region and sensitive areas under consideration. Similarly, the provisions of adopted EMFs need to be assimilated in town planning provisions, such as zoning, bylaws, and the provision for penalties for contravention. The test of compliance and the expected efficacy of EMF is only possible if it is successfully implemented, which means that **monitoring and follow-up** will have to be improved.

Key issues of the region should be identified and integrated, prioritising other attributes and constraints around it to feed the **decision-making context**. Future drafting of EMF scopes of work, or terms of reference, should ensure that the expected outcomes of the EMF process are clearly defined. Cognisance should be taken of the following potential strategic integrative roles of EMFs:

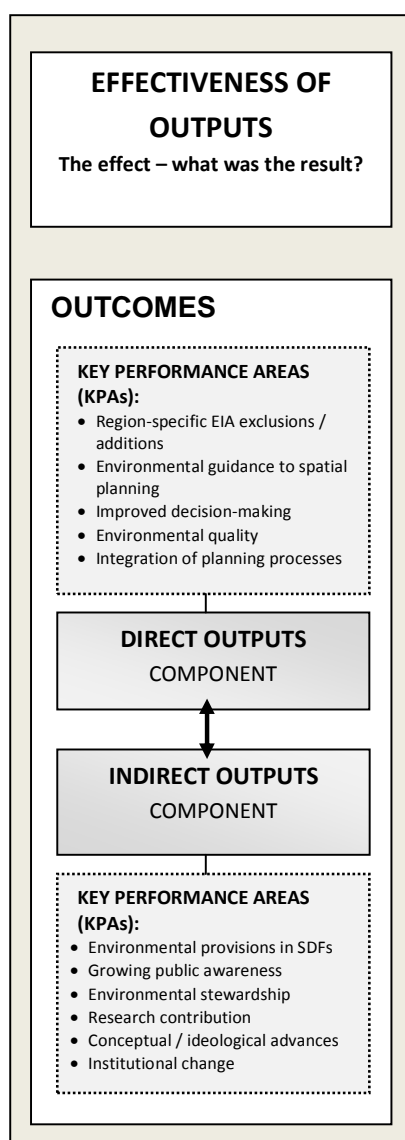
- SDF and municipal planning
- Land Use Management (LUM) and municipal management
- its potential role to limit unnecessary project-level EIAs
- the geographic database capabilities and its potential link to land ownership, property zoning and valuation and tax base, in a well developed GIS.

The EMF's ability to address these roles needs to be promoted by practitioners so that institutional clients can gain the maximum benefit of the final EMF product. It is hoped that this will also ultimately lead to more sustainable outcomes and better environmental management.

The next section explores avenues of future research in this field.

5.3 AREAS FOR FUTURE RESEARCH

This exploratory research can be built upon in a number of ways. The **first** is to extend it by refining quality review criteria and developing sub-criteria to zoom in on key areas such as sensitivity analysis and GIS aspects. General report presentability criteria, such as those in the Lee-Colley review package could also be included. **Secondly**, quality review of specific types of EMF can be undertaken, which can develop and apply criteria that are specific to the type of application (e.g. conservation EMFs, land use planning EMFs, transportation EMFs). In the **third** instance, the interface between SDF and EMF presents interesting research possibilities, including the role that EMF plays in improving sustainable outcomes in spatial planning and how the approach to planning changes over time to include environmental considerations .



Other possibilities also exist in determining the contribution of the standard or methodology of sensitivity analysis to the quality of EMFs.

The iterative cycle of the IDP process offers much scope in updating and refining EMF studies on a regular basis, and one could have the optimistic expectation that the quality and effectiveness of EMF practice will improve over time.

An obvious but very interesting research challenge that stems from the current research is to expand quality review to include **effectiveness review of EMF**. Figure 17 is the effectiveness portion of the conceptual framework developed in Chapter 3 and is included here to stimulate further reflection on the possibilities that present themselves. The following are a few thoughts on how to commence with EMF effectiveness research design:

Where EMFs are commissioned by either the national or provincial government (DEA or provincial IEM authorities), processes to more effectively gauge effectiveness outcomes could easily be integrated into the EMF scope of work when such projects are put out on tender. A detailed project progress reporting structure during the course of the EMF process would enable tracking of issues pre- and post-implementation: this can include key issues, role players and the steps taken to address stakeholders' inputs, amongst other things. This suggests that it could be possible to build in effectiveness review 'friendliness' into the terms of reference and EMF process, which would enable easier follow-up.

Figure 17: Guideline for EMF effectiveness research

Effectiveness review therefore need not be a very costly exercise, as long as the process makes provision for it up-front. However, this would foreseeably be more difficult to implement and standardise with local municipal proponents, compared to national or provincial scale projects, due to the lack of standardisation at the local level.

The potential value added through effectiveness review is that it helps us to ascertain whether we are doing the right things – i.e. whether EMFs are contributing to better planning and environmental decisions being made; or whether the state of our environment is improving in response to improved environmental planning, legislation and EIA practice. Determining whether politicians are making better decisions because better environmental tools (than e.g. EIA or SEA) are used, is another possible outcome.

The research method should consider interviews with key role players during the EMF process, as well as follow-up with subsequent users of the EMF documentation, like municipal managers, municipal environmental managers and officials of the relevant EIA authorities.

5.4 FINAL WORD

Because EMF and its interface with SDF and planning processes make provision for the political nature of decision-making, it promises to have a much better potential to achieve these substantive outcomes of EA than other environmental management tools used to date.

EMF appears to be here to stay and could be a meaningful sustainability tool if its quality and effectiveness improve over time. If EMF has the potential make a difference, then let the supporting elements, including integration with planning programmes and further research, be put in place to ensure that it achieves its potential.

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Annexure 1: Detailed review comments

	Sensitivity
EMF #1	The methodology followed is to first identify key sensitive areas. These are: ridges, high quality Marikana Thornveld, presence of orange and red data species in watercourses and high quality veld, and watercourses with associated elements. The report states that 'the <i>features of all data categories discussed...were assessed according to their sensitivity</i> , followed by a description that a compilation of the key sensitive areas (the five types listed above) together with an assessment of the extent of land alteration through existing land uses was done. This involves some GIS overlay of the combined key sensitive areas and the land use map, but no specific explanation as to the rationale used or method employed is given. The study covers a small geographical area and therefore some of the attributes (vegetation) are recorded at a very fine scale of 1:2000 – it is therefore claimed that a 'site specific' sensitivity mapping is done. It is claimed that the EMF sensitivity analysis adds ' <i>a further dimension that defines the sensitive aspects of the of the open space system with a greater degree of accuracy</i> '.
EMF #2	The whole region is a protected area, and as such a 'sensitive area'. A clearly defined and methodology was used and its rationale explained. It commences with the identification of key issues and challenges (Chapter 3), followed by the formulation of a development vision, as well as development objectives, targets and indicators in respect of six theme areas in Section 4 of the EMF document. The theme areas included are water resources, biodiversity, heritage, aesthetics, the built environment and the socio-economic environment. Each of these aspects was weighted and scored from 1 to 5 in a grid cell analysis procedure, using GIS. The process compiled vector data for each selected variable, which was converted to raster format using a 20m x 20m grid. With the appraisal of the various classes within each variable as basis, individual grid scores were then re-evaluated. The final step made use of map algebra using grid cell values as input, modifying them with the weighting of each variable – which ultimately determined overall potential sensitivity values for each raster cell. Sensitivity values are outputs, categorised into three levels of sensitivity.
EMF #3	From the very detailed status quo of the environment section (pp. 12-119), this EMF identifies the ten most significant constraints to development, of which six are due to environmental sensitivity, as opposed to development, service provision, pollution sources and urban open space constraints. From this premise, three broad environmental constraint groupings are made, namely: ecological and hydrological constraints, topographical and geotechnical constraints and agricultural potential constraints. The three sensitivity maps for these attributes are then overlain in a GIS, resulting in a sensitivity map having eight Environmental Control Zones (ECZs). The zones include each of the three environmental constraint groupings in isolation, as well as a 'Low' control zone and also four more groups from combinations or hybrids of the original three types. Elsewhere (pp. 94-96) the rationale for buffer determination is given. No mention is made of scale compatibilities or of limitations of the approach.
EMF #4	The relatively small geographic area (2673,7 km ²) is very flat, having the Vaal River as its eastern and southern boundary. The exception is the mountainous Vredefort Dome area in the south east. The sensitive areas identified are: protected areas and conservancies (9 identified), dolomite aquifers, hills and ridges, wetlands, high biodiversity areas and cultural heritage sites. These are mapped from the Status Quo assessment, which appears to have been a desktop study using existing sources of environmental data and specialist studies. Environmental types were identified in earlier documents (Municipal Open Space System). No rationale is given for the sensitivities arrived at.
EMF #5	is gleaned from desktop studies alone, without ground truthing. The explanation of the sensitivity analysis is very rudimentary, although this document does develop management guidelines for identified control zones.. The first mention of sensitivity mapping is on page 82 of the EMF where it states: "... <i>baseline information was transformed into secondary information that attaches value to different features which culminated in Environmental Control Zones (ECZs)</i> " (P81). It refers to 'non-negotiable parameters' for which management guidelines are developed. The 'parameters' identified are: nature reserves, wetlands, ridges, water courses and heritage sites. There is no explanation as to ranking, buffers or the extent of protection needed.
EMF #6	This vast region, covering 102 661 km ² , is bigger than Gauteng province and approximates the size of North-West province. It has a sparse population of approximately 202 000 (which translates to a population density of under 2 persons per km ²) and is a very arid region characterised by mining, game and livestock farming and irrigation agriculture along the Orange River along its southern boundary. The EMF report makes use of a sensitivity index (p67) which is based on the most significant environmental constraints of the area, namely: erosion potential of soils, conservation priority of veld, shape and form of variation in topographical features, water courses and transformed areas. The index assigns weights to these areas. The key issues that are identified in the survey are: Lower Gariep Alluvial vegetation along the Orange River, protection of vegetative groundcover (risk of overgrazing), and inappropriate irrigation practices impacting soils and groundwater, rehabilitation of mining areas, firewood harvesting and service provision to remote areas.
EMF #7	AN importance Rating (IR) was developed for each of the following environmental attributes: ecological, agricultural, industrial pollution, industrial pollution buffer zones, geotechnical suitability. The ecological component was assessed by an ecological specialist who classified [wetland, red data species occurrences, ridges etc] into high (H), medium (M) and low (L) [significance] categories; heritage was likewise assessed and rated by a specialist familiar with the region into H, M & L significance categories. For agricultural importance, soils were rated by a specialist according to the Gauteng Agricultural Potential Atlas (GAPA); industrial pollution, including landfill and mine residue sites were buffered according to the GDACE 2002/3 buffer zone methodology into H, M or L, while the geotechnical assessment and rating to H, m & L was done according to Gauteng [Development Planning and Local Government, 2002] (DPLG)

	Desired/undesired activities
EMF #1	<p>This aspect is addressed in that following on the sensitivity analysis and mapping, development parameters are developed (Ch9, pp 57-59), indicating areas (Map 20) and describing constraints in terms of each of four types of area. These areas are: high natural feature constraints, medium natural feature constraints, low to no constraints, and residential areas. For each of the four categories, compatible, inappropriate and activities 'that may be compatible', but which require an EA process are identified (in broad terms). A matrix is then developed where each of the categories in relation to listed EIA activities that may be allowed/desirable is indicated, indicating the appropriate level of EA to be undertaken.</p> <p>A similar matrix is developed for undesirable activities, whereby all currently listed EIA-attracting activities are listed on a grid against the three types of area demarcated for exclusion from EA. The three areas identified are: commercial areas, industrial areas and built-up areas.</p> <p>A restrictive aspect of the output is that as soon as EIA regulations change, the table (or matrix) would be outdated: as is in this case where new regulations have superseded the matrix compiled three years ago. It would therefore be better to generate more 'original' activities and thresholds that would still be applicable and which need not be so dependent on the longevity of specific regulations. Perhaps broader categories more in line with the original ECA regulations, but tailored to specific environmental and social constraints of the region in question would be more appropriate.</p>
EMF #2	<p>This EMF makes use of a clearly described and well developed rationale to determine the desirability of activities. It develops an activity description framework to screen the compatibility of specified developments in relation to the sensitivity mapping for the geographic area. The EMF can therefore help determine whether an activity would be allowed at all, and if so, whether an EIA would be required. Activity descriptions are based on EIA regulations as well as typical planning and land use management documents, making use of legal definitions. Each activity is then categorised in terms of its compatibility within the protected area (compatible, potentially compatible and incompatible) in a tabular format. Hereafter the location of the intended activity is checked on the sensitivity map to gauge the sensitivity of the specific location. The table is expanded to include a ranking for every activity in terms of meeting each of six environmental objectives (see description under 'sensitivity analysis'). The aim is for competent authorities to use this procedure to determine the compatibility and desirability of various proposed development activities at a given</p>
EMF #3	<p>Using a methodology similar to McHarg's (1969), development suitability zones are generated (p52) drawing on a geotechnical classification system for township development using twelve constraint types such as soil, slope, seepage, flooding, geological, biodiversity and conservation attributes (including the following sensitive environment types: water bodies, natural primary grasslands, mountain slopes and ridges, woody savannah areas). Development Control Zones and land use guidelines are subsequently generated from the ECZ.</p> <p>The Land Use and Development Control Zones that are developed are very comprehensive and detailed lists of compatible activities and land uses are generated for each type. The link between the sensitivity analysis and the desired and undesired activities is therefore very interwoven and thorough.</p>
EMF #4	<p>The sensitive environment map that is generated consists of six management zones, which are: urban, agricultural, Vredefort Dome, Vaal River Corridor, Green Zone (conservation) and blue zone (water courses). A general management strategy, compatible and incompatible land uses, applicable design standards for suitable developments and natural resource management guidelines are generated and motivated for each of the six zones. Motivation for buffer zones around sensitive areas is given where applicable.</p>
EMF #5	<p>ECZs are developed from the sensitive area maps, but the methodology is not explained anywhere. However, in identifying desires and undesirable activities, a three-tiered method of <i>Policies</i> (on top), followed by <i>Strategies</i> (mid-level) and <i>Guidelines</i> (bottom tier) are presented for each of seven ECZs developed. The seven are: 'Open space, conservation and tourism', 'Ridges', 'Rivers, tributaries and wetlands', 'Conservancies', 'Vaal Dam area – low density development', 'Agriculture – low density development' and 'High density – residential and industrial'. Although specific developmental and design guidelines are given this EMF does not address the issue of identifying desirable and undesirable activities in any direct way.</p>
EMF #6	<p>The ECZs that are developed evolved directly from the sensitivity analysis. The following ECZs are consequently formulated: sensitive groundwater areas, potential wind erosion areas, vegetation conservation areas, another three zones that are a combination of the first three case, as well as a 'Low Control Zone' where more leniency can be applied toward development activities. The Gariep alluvial vegetation is then given special attention, as this is considered the most vulnerable (sensitive) environment and under threat. Consequently management guidelines are developed for all the ECZs, but a lot more detailed mapping and ground truthing of the Gariep Alluvial vegetation was undertaken and special strategies developed for their protection. The EMF proposes that no development be allowed on the remaining pristine areas where this vegetation occurs.</p>
EMF #7	<p>The desired and undesired activities identified link directly to the sensitivity ranking analysis. The environmental sensitivity (IR), in combination with existing land uses served as data layers in a GIS, in which multi-criteria analysis was performed to arrive at the ECZs produced. The methodology to achieve this is made understandable to the reader. The guidelines subsequently generated for each ECZ form the Strategic Environmental Management Plan, or SEMP. Eight ECZs emerge, namely Ecological, Agricultural, Low density development, Urban agricultural, Mining and industrial, Tourism transition, Urban areas, Protected areas.</p>

	Decision-making context
EMF #1	<p>Firstly this EMF clearly considered all municipal level strategic and planning documents, as well as the Gauteng C-Plan and regional SDFs. This includes the Open Space Framework, The integrated transportation plan – while dealing with all appropriate developmental issues in the text. As an example, the life expectancies and capacities of transportation, sewage and water provision were all addressed (but not electrical infrastructure), while the Provincial and regional roads that affect the development of the area were also pointed out. In a certain sense it appears that it would be easier to encompass all contributing strategies and policies in an EMF that covers a very small geographical area such as this one – where most of the necessary information would be available from the client.</p> <p>The EMF integrates well with the corresponding open space framework (TOSF), stating that it does not aim to <i>'modify, justify or replace the TOSF'</i> (p 53), but rather that it adds <i>'a further dimension that defines the sensitive aspects of the of the open space system with a greater degree of accuracy.'</i></p>
EMF #2	<p>The analysis of all pertinent policies and other strategic processes appears to be very well integrated in the development of this EMF. The Provincial Growth and Development Strategy (PGDS), as well as the Provincial SFD/IDP were consulted, as well as two SEAs that were developed and also three local SDFs and IDPs. None of these strategic documents consulted were more than four years old. Policies, strategies and recommendations from the sources mentioned were identified and built into key issues, challenges, development objectives and into the decision-making rationale for the activity description framework. The development of 'Guidelines for use in the EIA process' (Chapter 6) is also a very useful output that clearly guides the user of the EMF to necessary future steps not only in implementing the EMF, but also helps to identify other key role players and decision makers and processes, as well as its legal and institutional context (cooperative governance issues).</p>
EMF #3	<p>This report thoroughly considers and integrates the provisions of existing environmental and development policy and guidelines (Section 3.19, pp 104-109). This includes relevant SOER, Gauteng SDF, Gauteng Urban Edge Policy, Sedibeng and Lesedi SDFs, as well as local Heidelberg planning initiatives of 1998 and 2001. The upward linkage is therefore good, but linkages to other authorisation processes such as MPRDA, water use licences and EIA approvals for development proposals is not made or developed.</p>
EMF #4	<p>The following higher-order planning and environmental policies and planning documents are taken into consideration in the formulation of this EMF: Mooi River Urban Design framework, North West SDF 2008, Tlokwe DSF, North-West Biodiversity Conservation Assessment 2008, North-West SOER – as well as the presence of conservancies, reserves, Tlokwe IDP. Outcomes relate positively to a broader planning policies and constraints, especially the water sector. There is limited development of how the final outcomes will relate to future EIA processes.</p>
EMF #5	<p>The influence of most relevant environmental policies and documentation are listed and explained (Gauteng C-Plan, Sedibeng SOER 2004, Gauteng SOER 2004, Gauteng ridges policy), as well as applicable planning and Land Use management (LUM) schemes (Sedibeng SDF 2004, Sedibeng District Open Space System (SDOSS) 2005, Gauteng Urban Edge 2001, Midvaal IDP & SDF 2006/7, Gauteng SDF) and protected areas such as reserves and conservancies (7) are also included. However, the backward integration of the outcomes relate mostly to the Midvaal municipality only, i.e. it addresses its own assimilation into the SDF and IDP.</p>
EMF #6	<p>Under each of the topics in the Strategies section, there is a sub-heading called 'Implementation'. These spell out the mechanisms necessary to adopt or implement recommended outcomes. As example, it suggests whether the provisions should be implemented through the normal land use decision-making processes by adopting the guidelines as local authority policy for the area, or whether it should be adopted through other vehicles such as SDFs or national policies such as the National Protected Area Expansion Strategy (NPAES).</p>
EMF #7	<p>This document includes information from the following planning policy documents to determine future land use projections: SDFs of Mogale City, Merafong City, Randfontein and Westonaria, as well as the West Rand SDF 2005 and Gauteng SDF 2000. It also consulted the Cradle of Humankind Master Plan and the suite of Gauteng (GDACE) environmental decision support tools, including the Gauteng SOER 2004, C-Plan 2 2003, Gauteng Open Space P 3 2003 see p 61, Ridges policy and others. As mentioned earlier, the integration with mining activity and especially geo-hydrology (potential groundwater pollution) is under-developed and its importance underestimated, as is the risk of surface water pollution due to these activities. Apart from these shortcomings, the remainder of development activities considered in the SEMP appears fairly complete, while they are categorised well under the ECZs.</p>

Public participation	
EMF #1	There is no evidence or mention of a stakeholder engagement process, nor does it mention in its terms of reference that such a provision has been waived by the client.
EMF #2	Although the need to <i>'consult with relevant interested and affected parties'</i> is listed as one of the study objectives (p 2 of Status Quo report), there is no further reference to meetings or consultations occurring to support this. However, Section 3 (Key Issues and challenges) provides a comprehensive list of inputs from interested and affected parties stretching over eight pages, but without reference to dates or sources. It is assumed that these responses come from the earlier SEA process from which the EMF is derived. Nevertheless, these outcomes are well integrated into the formulation of key issues and challenges and subsequent development vision and objectives, targets and indicators that are formulated in Section 4 of the document.
EMF #3	The introductory and scope of work and objectives sections provide no hint as to a stakeholder engagement process being either required or undertaken. Similarly, no mention is made in the desired state of the environment section that any public participation processes were entered into.
EMF #4	This EMF process was one of very few that actually had a public engagement process, formally advertised and conducted and minuted with response register. Most of the requests were 'noted', or they were of a nature that could be answered at the public meeting without requiring further action. Other requests were of political nature (e.g. dissatisfaction with service delivery) – which is hard to integrate into an EMF document. On the positive side, the very process of an EMF facilitates the integration of environmental and socio-economic considerations into the planning process.
EMF #5	There is documentary evidence of one stakeholder meeting with the public (3 May 2007) and one regulatory authorities' meeting (7 March 2007). Certain undertakings made in the regulatory meeting (pp 129-130) were not effected – without explanation. Furthermore, an 'environmentally focused' vision was adapted from the earlier Midvaal IDP (2006/7) vision. This vision and desired environment targets were formulated by a workshop of the regulatory authorities' meeting, which was later presented at the public participation meeting of 3 May 2007. The deliberations issues report of the public meeting, attended by fourteen people, records mainly environmental and developmental transgressions (by mines, industry and property developers), as well as municipal management and community issues. It does not include any responses or comments from the public about the adoption of the desired state of the environment goals.
EMF #6	No record of public participation process.
EMF #7	<p>The stakeholder engagement undertaken is well documented, providing comprehensive report-back of advertisements, meetings, workshops, responses and the process in general. Mention is made of a 180-strong stakeholder database with whom was communicated, including government, mining, industry and general public representatives, in addition to the project steering committee. Appendices also provide complete lists. Background information documents, a stakeholder awareness workshop (November 2004), questionnaires to stakeholders to determine the desired state of the environment, as well as the public review phase of the Draft EMF document are all documented. Despite the comprehensive stakeholder engagement process, the response was poor – with only ten stakeholders having completed the desired state questionnaire presented to them at the January 2006 public meeting.</p> <p>The resulting Desired state of the environment outcome had surprisingly little to say about mining in the region, considering its wide extent and broad economic base in this district – as well as the severe air, surface water and groundwater pollution</p>

Implementation	
EMF #1	This document has a section 'Strategies' dedicated to implementation issues <i>'to create a mechanism for implementing action to address the most pertinent issues that came out of the EMF'</i> (p 66). The document identifies priority issues and explains the necessity for cooperative governance (without detailing specific potential interactions) and explains the role that the EF should play in devising strategies. Thereafter five specific environmental strategies are described, which relate to socio-economic, developmental, urban management, as well as purely environmental protection/management issues, but a detailed environmental management plan(EMP) is not developed. However, it fails to encourage its own assimilation into future SDFs and planning issues, but the concluding chapter sum arises all aspects that need to be considered by decision-makers and future uses of the EMF.
EMF #2	The EMF provides detailed procedural descriptions and flowcharts of the subsequent processes to be followed with development applications, including the screening procedure and specifics of the EIA process, such as specialist studies and other consultations that would foreseeably be required. It is pro-active in identifying potential key role players, decision makers and processes that may need to be taken into account. It also provides a section on the way forward, including procedures to adopt the EMF (in terms of Section 5 of GNR 547), training, capacity building and determining future research needs. However, the development of an EMP (or SEMP) that was stated as an objective of the study (p2 of the Status Quo report) is not mentioned again or delivered. Likewise, the monitoring and reporting systems stated as study objectives <i>'to gauge the success of the implementation of the above-mentioned strategy'</i> (p2 of Status Quo report) do not see the light in the final document. It is possible that these are intended as future deliverables (or that the budget ran out), but this is not stated or explained, leaving the reader to doubt or to keep on searching in vain for these promised deliverables.
EMF #3	Two implementation sections that are well developed are Section 5: 'Environmental management guidelines and action plans' (pp132 et seq.) and Section6: Land use and development control guidelines (pp. 151 <i>et seq.</i>). Section 5 identifies sixteen types of management areas and applies to developed areas (urban: open space, industrial, informal settlements, CBD and other heritage; mining, landfill, commercial and primary agricultural, as well as four environmentally sensitive/pristine/significant types. The action plans and control guidelines are comprehensive and probably approximate the role of an Environmental Management Plan (EMP) for the area. However, an EMP per se is not developed, nor are the potential implications of subsequent EIAs and other authorisation processes addressed. This EMF is nevertheless very implementation oriented in that many strategies and procedures to capacitate officials and the public at large are included.
EMF #4	The main outcome of this EMF is its Environmental Management Plan, which provides both a general management strategy and natural resource management guidelines and applicable design standards for suitable types of development for each of the six management zones. A responsibility matrix is generated which provides some clarity as to future needs and responsibilities to achieve objectives.
EMF #5	The SEMP that is developed is to be used as inputs to the local SDF and IDP process (p81) and also to enable municipal officials and decision-makers to understand their respective environmental management mandates. The SEMP develops management parameters for each of the eight ECZ types in three tiers – which directs effort and facilitates EMF outcomes at the correct decision-making levels, namely policy, strategy and implementation levels.
EMF #6	A section labelled 'Strategies' (Chapter 5) is presented in which four specific management strategies are developed for each of the following zones: Conservation of high quality vegetation, protection of sensitive features on large properties, protection of sensitive environments abutted by small properties, and development of sensitive areas in the Orange River floodplain. The strategies discussions for each of these are broken down into problem description, intent of strategy, statement strategy parameters, implementation, and scope of application. However these strategies are not developed to the project level or scale and therefore serve as a general guideline only.
EMF #7	The SEMP has three types of guidelines, namely Land Use guidelines, General Development guidelines and Administrative guidelines for each ECZ – which is further developed into importance ratings, implementation plans and auditing systems. The Administrative guidelines provide clarity on procedural steps to officials, developers and consultants, while the land use guidelines identify areas of potential conflict between development proposals and sensitive environments, amongst other things. The Importance Rating guideline is very useful as EIA information tool, providing guidance on procedures and all specialist studies and inputs that may be needed for different type of development sin any of the ECZs. The Implementation Plan identifies training needs for officials working with or closely with the EMF. Overall this section was very thorough and usable. It also provides clear flowcharts on the process to be followed, as well as on how to use the SEMP.

Other / general	
EMF #6	The summary of the 130-page Status Quo report into a more manageable 74 pages (including excellent map) in the main document is helpful. This summary discusses the main issues under each environmental or development topic, formulating opportunities and constraints, as well as the desired state for each of the attributes under discussion. This focuses the outcomes, highlights key issues and helps in forming a strategy to understand the relative sensitivities of the environment, as well as directing conservation priorities.
EMF #7	Very good mapping in main document, provides clarity to text. Overall very well executed, especially the sensitivity analysis, public participation and implementation aspects. The document is very readable, self explanatory to the user and relatively concise at 108 pages. It portrays professionalism.