AN ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR DWAF RELATED PROJECTS

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Dedicated to my husband and children:

Kobus du Plessis, Niël du Plessis (14) & Lirié du Plessis (3)

PREFACE

The South African water sector is facing diverse challenges, namely providing for the basic human and environmental needs, equitable and sustainable water resources, efficient supply and utilisation of water, as well as supporting economic and social development for present and future generations.

The concepts of Integrated Water Resources Management (IWRM), as enshrined in the National Water Act (Act 36 of 1998) and Water Services Act (Act 108 of 1997), are intended to enable the South African Department of Water Affairs and Forestry (DWAF) to meet the above-mentioned challenges by the establishment of purposeful policies, strategies, plans, systems and mechanisms.

The alignment of currently fragmented environmental management processes within DWAF, and other environmental legislation, strongly advocate for the development of an Environmental Management Framework (EMF). The implementation of an EMF for DWAF related projects and activities will not only promote environmental compliance, performance and sound management practices, but will also be the forerunner to streamline and fast track a management system for sustainable environmental planning and management for DWAF.

This author is of the opinion that DWAF can be at the forefront in South Africa in establishing and promoting a framework for greener governance through effective and sustainable integrated management. In order to implement integrated planning and environmental management to its fullest potential within the DWAF, it is suggested that a phased approach should be followed.

The implementation of an EMF within the DWAF will align South Africa with international trends and thinking with regard to environmental management systems and best practice approaches for government authorities and agencies. It will also allow for the implementation of effective and integrated water resources planning and management that are built on sound business principles and best practices.

V. Du Plessis

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ABSTRACT

The purpose of this study is to revise the Department of Water Affairs and Forestry's (DWAF's) current Integrated Environmental Management (IEM) procedure and to develop an Environmental Management Framework (EMF), so as to ensure that the environment is considered in a structured, formal manner at each decision-making stage of the projects development business process.

The proposed EMF provides process diagrams that align the IEM principles, the environmental assessment and management tools, and the engineering business process with the project life cycle approach for DWAF's water sector functional areas. Key decision-making points are introduced to the business process to ensure that all the specific requirements have been met before continuing to the next engineering stage of the business life cycle. Auditing nodes were identified within the life cycle approach and complement the decision-making points and strengthen the evaluation of environmental compliance and performance. These process diagrams is designed to prompt development planners and implementers to consider the environment at all stages of the business life cycle and practice sound environmental management.

The EMF is based on international best practice and follows the Deming model philosophy as well as principles and elements of an environmental management system. The EMF must be an integral part in the way the department conduct its business and not seen as an *ad hoc* function and the duties of the environmental officer.

To conclude, the EMF is the building block and interim management plan for an appropriate environmental management system in the future and the first step towards business excellence for the Department of Water Affairs and Forestry.

Key terms:
Environmental legislation,
Strategic environmental management,
Integrated Environmental Management (IEM),
Environmental assessment and management tools,
Project life cycle,
Engineering business process,
Total Quality Management (TQM),
Integrated Water Resources Management (IWRM),
Water sector.

OPSOMMING (ABSTRACT IN AFRIKAANS)

Die doel van hierdie studie is om die Departement Waterwese en Bosbou (DWWB) se huidige geintegreerde omgewingsbestuursproses (GOB) te hersien en in plek daarvan 'n omgewingsbestuursraamwerk (OBR) te ontwikkel om sodoende te verseker dat die omgewing in 'n gestruktueerde en formele wyse by elke besluitnemingsfase van 'n ontwikkelingsprojek se besigheidsproses oorweeg te word.

Die voorgestelde OBR voorsien prosesdiagramme wat die GOB-beginsels, die omgewingsimpakbepalingsproses en ander omgewingsbepalings- en bestuurshulpmiddels, asook die ingenieursbesigheidsproses in lyn te bring met die projeklewensiklusbenadering vir die DWWB se watersektor funksionele areas. Sleutel besluitnemingspunte is in die lewensiklusproses aangebring om te verseker dat aan al die noodsaaklike vereistes en resultate voldoen word, voordat daar na die volgende ingenieursfase in die besigheidslewensiklusproses aanbeweeg word. Ouditeringsnodes is binne die lewensiklusproses geidentifiseer en komplimenteer die besluitnemingspunte wat die evaluering van omgewingsvoldoening- en werksverrigting versterk. Hierdie prosesdiagramme is ontwerp om die ontwikkelingsbeplanners- en implementeerders aan te spoor om die omgewing tydens al die besigheidslewensiklusfases in ag te neem en sodoende volgehoue omgewingsbestuur.te praktiseer.

Die OBR is gebaseer op internasionale beste praktyk en volg die filosofie van die Deming model, asook die beginsels en elemente wat 'n omgewingsbestuurstelsel. Die OBR moet 'n integrale deel word van hoe die department sy besigheid bestuur en nie as 'n addisionele funksie gesien word of die take van die omgewingspersoneel nie.

Ten slotte, die OBR is die boustene en tussentydse bestuursplan vir 'n geskikte omgewingsbestuurstelsel in die toekoms en die eerste tree tot besigheidsuitmuntendheid vir die Departement van Waterwese en Bosbou.

Sleutelterme:
Omgewingswetgewing,
Strategiese omgewingsbestuur,
Geïntegreerde omgewingsbestuur,
Omgewingsbepalings- en bestuurshulpmiddels,
Projek lewensiklus,
Ingenieursbesigheidsproses, water sektor

ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE DEPARTMENT OF WATER AFFAIRS AND FORESTRY

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

A	**APP**	Approved Professional Person
B	**BATNEEC**	Best Available Technique Not Entailing Excessive Cost
	BDI	Business Development and Implementation
	BIA	Bio-physical Impact Assessment
	BP	Business Proposal
	BPEO	Best Practical Environmental Option
C	**CEIMP**	Consolidated Environmental Implementation Management Plan
	CERES	Coalition for Environmentally Responsible Economies
	CHE	Christian Higher Education
	CMA	Catchment Management Agency
	CMS	Catchment Management Strategy
	CONNEPP	Consultative National Environmental Policy Process
	CWSS	Community Water Supply and Sanitation
D	**DEAT**	Department of Environmental Affairs and Tourism
	DME	Department of Minerals and Energy
	DWAF	Department of Water Affairs and Forestry
	DWWB	Departement Waterwese en Bosbou
E	**EA**	Environmental Assessment
	EAPC	Environmental Assessment Planning Committee
	EAPM	Environmental Assessment Planning Meeting
	ECA	Environment Conservation Act (Act 73 of 1989)
	ECO	Environmental Control Officer
	E-DSS	Environmental Decision Support System
	EES	*Environmental Evaluation System*
	EIA	Environmental Impact Assessment

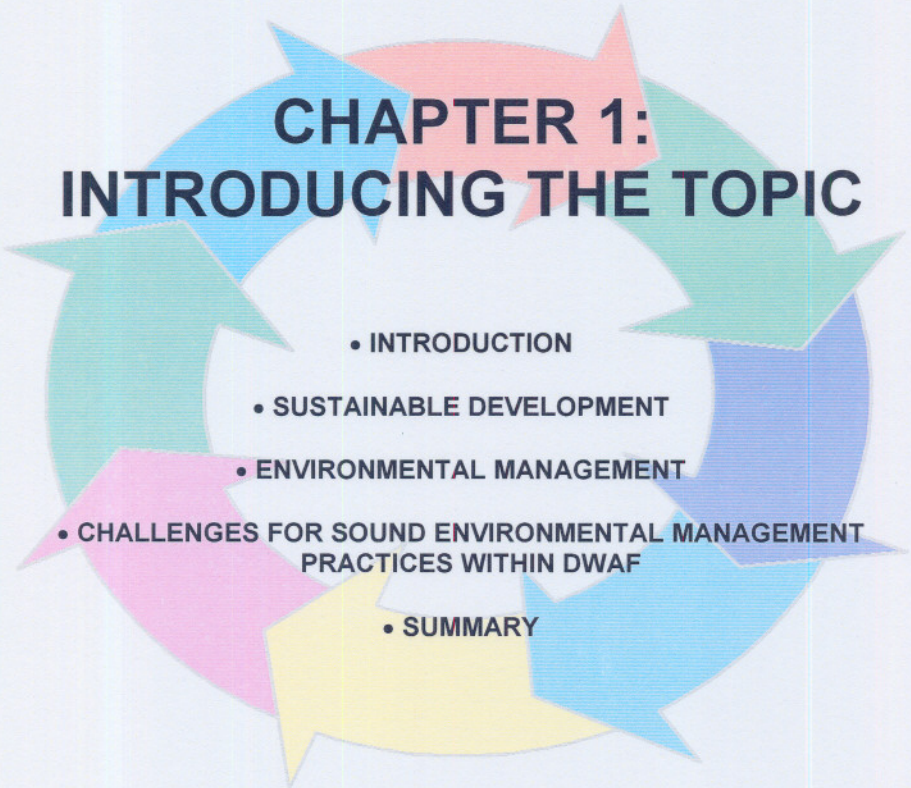
	EI&AR	Environmental Impact and Aspect Register
	EIMP	Environmental Implementation Management Plan
	EIMS	Environmental Impact Management System
	EIP	Environmental Implementation Plan
	EIR	Environmental Impact Report
	EM	Environmental Manager
	EMAS	Environmental Management and Audit Scheme
	EMF	Environmental Management Framework
	EMP	Environmental Management Plan
	EMPR	Environmental Management Programme Report
	EMS	Environmental Management System
	EO	Environmental Officer
	EPPIC	Environmental Planning Professions Interdisciplinary Committee
	ERA	Environmental Risk Assessment
	ESM&RS	Environmental Site Management & Rehabilitation Specifications
	ETG	Environmental Technical Group
G	**GEMI**	Global Environmental Management Initiative
	GG	Government Gazette
	GIS	Geographical Information System
	GN	Government Notice
	GOB	Geïntegreerde Omgewingsbestuur
	GRI	Global Reporting Initiative
H	**HIA**	Heritage Impact Assessment
I	**I&AP**	Interested & Affected Parties
	I&AR	Impact and Aspect register
	ICC	International Chamber of Commerce
	ICDP	Integrated Compensation Development Plan

	ICLEI	International Council for Local Environmental Initiatives
	IDP	Integrated Development Plan
	IEM	Integrated Environmental Management
	IEMF	Integrated Environmental Management Framework
	IFR	Instream Flow Requirements
	ISEA	Institute for Social and Ethical Accountability
	ISO	International Organisation for Standardisation
	ISP	Internal Strategic Perspective
	IUCN	The World Conservation Union
	IWRM	Integrated Water Resources Management
L	**LCA**	Life Cycle Assessment
	LG	Local Governement
M	**MDG**	Millennium Development Goal
	MPRDA	Mineral Petroleum Resource Development Act
N	**NAV**	Net Added Value
	NEMA	National Environmental Management Act (Act 107 of 1998)
	NEPA	National Environmental Policy Act
	NGO	Non-Government Organisation
	NIMS	National Imformation Management System
	NWA	National Water Act (Act 36 of 1998)
	NWRS	National Water Resources Strategy
O	**OBR**	Omgewingsbestuursraamwerk
P	**P- D-C-A cycle**	Plan-Do-Check-Act cycle
	PDCA	Plan-Do-Check-Act
	PFMA	Public Financial Management Act (Act 1 of 1999)
	PIP	Public Involvement Programme
	PM	Project Manager

	PMT	Project Management Team
	PP	Public Participation
	PSP	Professional Service Provider
	PU	Potchefstroom University
R	**R**	Regulation
	RAP	Relocation Action Plan
	RDM	Resource Directed Measures
	RE	Responsible Engineer
	ROD	Record of Decision
	ROIP	Relevante Omgewingsimpak prognose
	RQO	Resource Quality Objectives
S	**SA**	South Africa
	SAADF	Social Assessment and Development Framework
	SABS	South African Bureau of Standards
	SAHRA	South Africa Heritage Resources Authority
	SDI	Spacial Development Initiative
	SDC	Source Directed Controls
	SDMS	Sustainable Development Management System
	SEA	Strategic Environmental Assessment
	SFR	Stream Flow Reduction
	SIA	Social Impact Assessment
T	**TOR**	Terms of Reference
	TQM	Total Quality Management
U	**UN**	United Nations
	UNCED	United Nations Conference on Environment and Development
W	**WCD**	World Commission on Dams
	WCED	World Commission on Environment and Dams

WMA	Water Management Areas
WRM	Water Resources Management
WSA	Water Services Act (Act 108 of 1997)
WSSD	World Summit on Sustainable Development
WSDP	Water Service Development Plan

CHAPTER 1: INTRODUCING THE TOPIC



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- SUMMARY

CHAPTER 1: INTRODUCING THE TOPIC

"The main ingredients of an environmental ethic are caring about the planet and all of its inhabitants, allowing unselfishness to control the immediate self-interest that harms others, and living each day as to leave the lightest possible footprints on the planet."

Robert Cahn

1.1 INTRODUCTION

The twenty first century is an exiting time for environmental management practitioners and managers in South Africa. With new environmental and water legislation in place, which do not only represent the views of the people of the country, but also consider the wisdom of how to address the water and environmental problems that is facing South Africa, while it also promote mechanisms that should be implemented so as to preserve our natural resources for the future.

In recent years there have been a remarkable growth of interest in the sustainable and optimal planning and management of a development, so as to be in harmony with environmental requirements. The understanding of the concept of sustainable development has promoted and emphasised the important role of environmental law in a modern society, but most of all it advocates a paradigm shift in conducting business by including sound environmental management practices in the equation.

The complex link between business, economics, social and environmental dynamics are now a center-stage reality for each business. Softer issues such as morals, values and ethics are included in the scope of hard money-making professions due to modern movement in social responsibilities, human rights, environmentalism and human empowerment.

In response of these socio-economic and environmental challenges, the business world is undergoing tremendous changes in business ethics. The following diagram in Figure 1.1 summarises some of the key forces that shaped the evolution of sustainability thinking in business (KPMG, 1999:2-9).

FIGURE 1.1: The evolution of sustainability thinking in business (modified from KPMG, 1999:6).

The United Nations Millennium Development Goals (MDG) is encapsulated in the new dimension of sustainability thinking. The "*ensurance of environmental sustainability*" has been identified in the MDG as one on the eight key goals (www.un.org/millenniumsgoals, 2003) and is highlighted below for the purpose of this study:

1. Eradicate extreme poverty and hunger.
2. Achieve universal primary education.
3. Promote gender equality and empower women.
4. Reduce child mortality.
5. Improve maternal health.
6. Combat HIV/AIDS, malaria and other diseases.

7. Ensure environmental sustainability:

- Integrate the principles of sustainable development into country policies and programmes, reverse loss of environmental resources.
- Reduce by half the proportion of people without sustainable access to safe drinking water.
- Achieve significant improvement in lives of at least 1000 million slum dwellers, by 2020.

8. Develop a global partnership for development.

Therefore, environmental management is not about managing the environment, but it is about managing activities in terms of the environmental criteria and carrying capacities so as to sustain an organisation's asset values, in which the environment is a new assets. Environmental management is thus a management issue and not an environmental issue, and should be addressed in terms of management principles and strategies (PU for CHE, 2002).

1.2 SUSTAINABLE DEVELOPMENT

Sustainable development has been defined by the World Commission on Environment and Development (WCED) in the *"Our Common Future (1987)"* report and at the United Nations Conference on Environmental and Development in 1992 ("the Rio Earth Summit") as follows:

> ***Development which meets the needs of current generations without compromising the ability of future generations to meet their own needs***

Sustainable development challenges businesses to manage economic development processes in such a manner that community resources are utilised and life is supported, and that the benefits of development are equitably distributed so as to sustain these benefits for the long-term. This can only be achieved by preventing degradation of ecosystems (ICLEI, undated: 2-5) and corporate citizenship and an associated increase in accountability and responsibility (KPMG, 1999:7).

In order to strive towards a sustainable balance between *economic prosperity, social equity* and *ecological protection* in the long-term, businesses should assist society to achieve the above-mentioned three inter-linked components through the so-called Triple-Bottom Line of sustainability challenge and also adhere to the principles of sustainability as sited in IUCN (1991). Figure 1.2 illustrates the challenges for ensuring sustainable development and the thinking behind the Triple-Bottom Line approach.

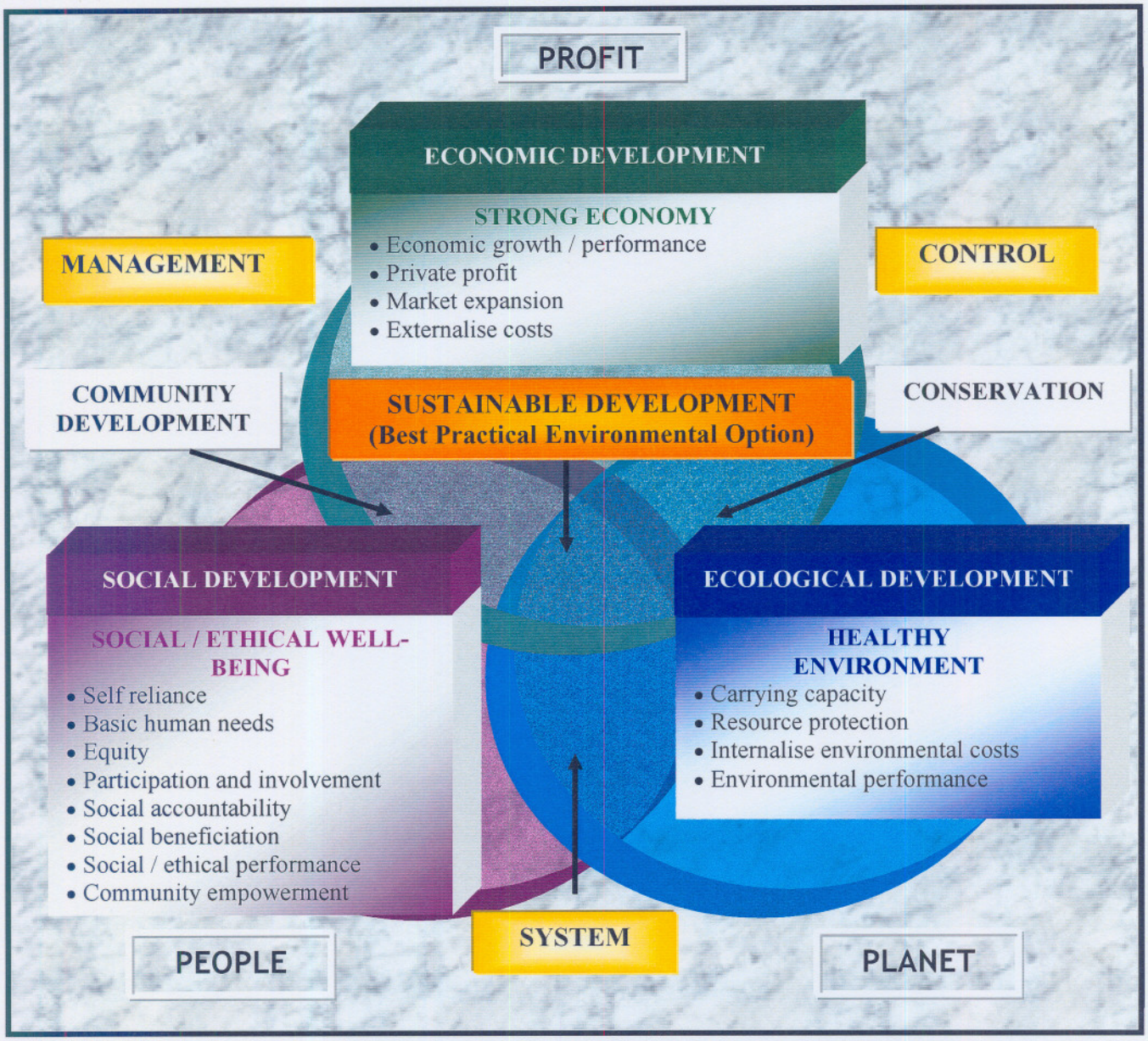


FIGURE 1.2: The Sustainable development challenge and Triple-Bottom Line thinking in business (modified from ICLEI, undated: 5; KPMG, 1999:8; van Wyk, 2001:3).

The three components of sustainable development are identified and defined in Figures 1.1 and 1.2 for sound decision-making in resource management. The three dimensions of sustainability, namely, (i) environmental sustainability, (ii) sustainable yield and (iii) project or development sustainability, make specific demands on both the acceptability and viability of a proposed development. These demands should be incorporated into the macro and micro framework, which direct and drive the planning (feasibility and decision-making stages), design and execution (construction and operation stages) of any proposed project (Nel, 1996:1-5).

Some of the principles underpinning the sustainability paradigm, which should be integrated into the planning, design and execution processes of the proposed project (Gardner, 1989:337-366; Nel, 1996:5-12), are listed below:

- **Equity principle**

This principle means fairness of access to basic resource needs for all and that the current generations should use the resources in such a way to optimise short-term benefits, without compromising the ability of future generations to meet their objectives. The proposed development should improve the quality of life for everybody affected by it.

- **Maintenance of Ecological Integrity principle**

Adherence to this principle depends on staying within the limits of ecological carrying capacity by promoting ecologically realistic consumption standards, and ensuring that ecological priorities are considered at decision-making.

- **Transfer of Technology principle**

This principle assumes the transfer of technologies, knowledge and skills (capacity) to empower everybody to actually benefit from the development intervention on a sustained basis. A capacity building programme needs to be identified, developed, implemented and integrated with the development proposal, as early as from the pre-feasibility stage to the actual commissioning and operational phases in order to ensure that the project is indeed sustainable.

- **Precautionary principle**

This principle dictates that a pre-active, precautionary approach be adopted when new developments are planned. The principle is based on analysis and the information feeds into the planning, decision-making, design, construction and operational phases of any development proposal. A fundamental requirement of this principle is to integrate a precautionary approach right from the beginning, before any irreversible decisions could be made or performed.

- **Participatory or Transparency principle**

This principle dictates that development planning and decision-making can not be made in a closed, top-down fashion. The principle demands a people centered, bottom-up approach to decision-making and planning that involves all stakeholders and interested and affected parties. This approach ensures that the development is undertaken with people, addressing their needs, rather than imposing solutions according to the perceived needs.

- **Verifiability principle**

This principle entails independent and objective monitoring and/or auditing of performance by both financiers and other stakeholders, or government agencies.

- **Net Added Value (NAV) principle**

The NAV principle considers the extent of the value added by a development project to the net resources / productivity / capacity over the long-term, rather than to focus only on the short-term return on investment.

The above-mentioned principles can be divided into two categories, namely: *substantive and process oriented. Substantive principles* relate to values and this category type describes *the purpose for decision-making*. These are the fundamental goals of planning, assessment and management for sustainable development, such as satisfying basic human needs, maintenance of ecological integrity, social justice, equity, provision for social development and cultural diversity. *Process principles* describe *the means of decision-making* and provide the strategies necessary for pursuing sustainable development, such as goal-seeking, alternative generation, system-oriented, adaptive, iterative and interactive approaches. The successful pursuit of sustainable development relies on a combination of substantive and process oriented considerations (Gardner, 1989:340-345).

In the early 1990's, environmental assessment and management focused more on the process oriented principle and less attention was given to social issues. However, this scenario changed in the late 1990's, where the focus has shifted to the substantive principles and social issues were given priority. This is due to the promulgation of new environmental and water legislation at the time.

Gardner (1989:346-366) reviewed nine approaches to environmental planning, assessment and management in terms of the principles of sustainable development. He found that, the ***integrated resource management approach*** frames decision-making in a proposed development as an iterative, interactive and comprehensive approach, which conceivably could provide a context for all the other approaches and principles mentioned above.

1.3 ENVIRONMENTAL MANAGEMENT

1.3.1 Environmental Management Business Perspective

Wheatley (1993: 27-28) identified three types of entities, which could harm the global environment:

(i) government and government controlled bodies, such as the civil service, local government and the military,

(ii) commercial business (companies, firms or corporations), and

(iii) ordinary individuals.

According to Wheatley, most environmental damage comes from the first two types of activity, namely; government and commercial businesses.

Although businesses' role in environmental damage, as well as the mitigation thereof, is far larger than the role of the individual, who is its ultimate end-user, customer or beneficiary, the government's role should not be ignored because of its regulatory function. The scale of impact is depicted below in Figure 1.3 to illustrate the impact of the government's functions on the environment. Government departments should take shared responsibilities to protect and manage the natural resources of this country.

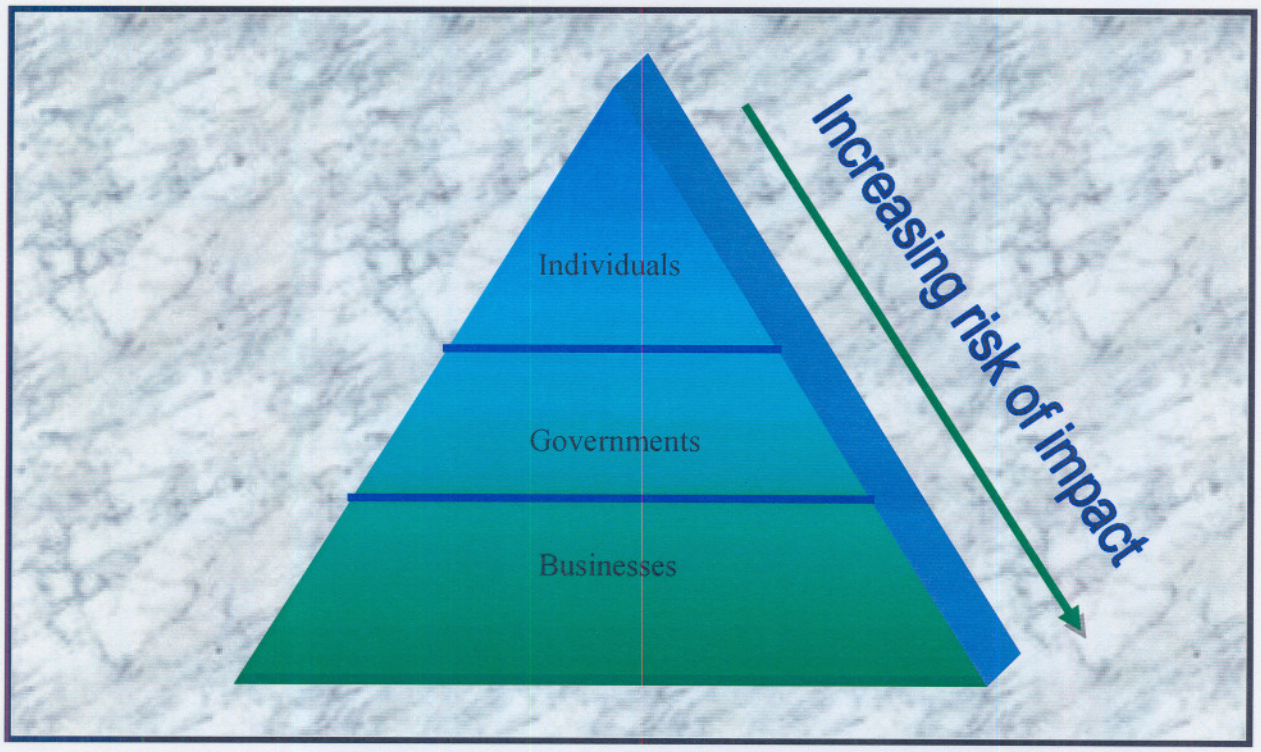


FIGURE 1.3: Scale of impact of three types of entities that harm the environment (Wheatley, 1993:27).

1.3.2 Integrated Environmental Management

It is the obligation of the government to give effect to the people's environmental rights as enshrined in the South African Constitution. To fulfil this obligation it is necessary to achieve sustainable development; however, this requires an integrated and co-ordinated environmental management approach.

At government level the South African Department of Environmental Affairs and Tourism (DEAT) is appointed as the lead agent responsible for developing an integrated, holistic environmental management system and for enforcing compliance against reasonable measures. The purpose of Chapter 5 of the National Environmental Management Act (Act 107 of 1998, the NEMA) is to promote the application of appropriate environmental management tools to ensure the environmental impact management of activities. In section 24 (1) of Chapter 5 it also places a duty on any organ of state charged by law in authorising, permitting or otherwise allowing the implementation of an activity, to consider, investigate and assess the potential impacts of activities that require authorisation by law.

NEMA also sets out minimum requirements for Environmental Impact Assessments (EIA's) as described in section 24 (7). Activities that require authorisation are those that could significantly affect the environment, socio-economic conditions, or cultural heritage, and should be considered, investigated and assessed prior to implementation.

According to Bennet *et. al.* (1993), there is a lack of a holistic and integrated approach which takes into account the project life cycle approach. The emphasis should change from that of retrospective remedial measures to environmental management, which is pre-emptive.

In this authors view, this approach should not only apply to corporate organisations, as proposed by Bennet *et. al.* (1993), but also to all spheres of government departments. Government should also recognise their wider responsibility and manage the entire business life cycle of their actions in an integrated holistic manner.

1.3.3 Integrated Water Resources Management

Integrated Water Resources Management (IWRM) promotes the co-ordinated development and management of water, land and related resources, in order to maximise the economic growth and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Global Water Partnership, 2000).

IWRM seeks integration within and between two basic categories:

- the *natural system* which is critically important with regard to resource availability and quality, and
- the *human system*, which determines the resource use, the production of waste and the pollution of the resource, as well as setting priorities for development.

The Dublin principles were carefully formulated through an international consultative process that culminated in the International Conference on Water and the Environment held in Dublin in 1992. These principles aimed to encourage change in those concepts and practices, which are fundamental to improved water resources management.

The Dublin principles also contributed to the Agenda 21 recommendations adopted at the United Nations Conference on the Environment and Development in Rio de Janeiro in 1992. Since then these principles have received universal support as the guiding principles that underpin IWRM.

The four Dublin principles are:

- Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;
- water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels;
- women play a central part in the provision, management and safeguarding of water; and
- water has an economic value in all its competing uses and should be recognised as an economic good.

These principles are also enshrined in the National Water Act (Act 36 of 1998, the NWA), which regard IWRM simultaneously as a *philosophy,* a *process* and an *implementation strategy* to achieve equitable access to, and sustainable use of, water resources by all stakeholders at catchment, regional, national, and international levels, while maintaining the characteristics and integrity of water resources at the catchment scale within agreed limits (DWAF, 2003).

1.4 CHALLENGES FOR SOUND ENVIRONMENTAL MANAGEMENT PRACTICES WITHIN DWAF

Management challenges for sound environmental management practices as currently experienced within DWAF, are highlighted below (modified from van Wyk, 2001):

- Top management buy-in,
- absence of an Environmental Policy,
- fragmentation of environmental management and environmental legislation,
- absence of information and information management systems,
- lack of integrated and holistic perspective,
- lack of post-implementation follow-up procedures to monitor, audit and manage activities that generate environmental impacts within established limits,
- lack of enforcement,

- balance the equation of environmental, social and economic benefits to strive towards a Triple-Bottom Line approach,
- lack of capacity, skills, competency and human resources at head office, regions and municipalities,
- lack of financial resources,
- lack of institutional infrastructure,
- degree of uncertainty with regards to risk based approach and reporting indicators, and
- the restructuring process of the department.

1.5 SUMMARY

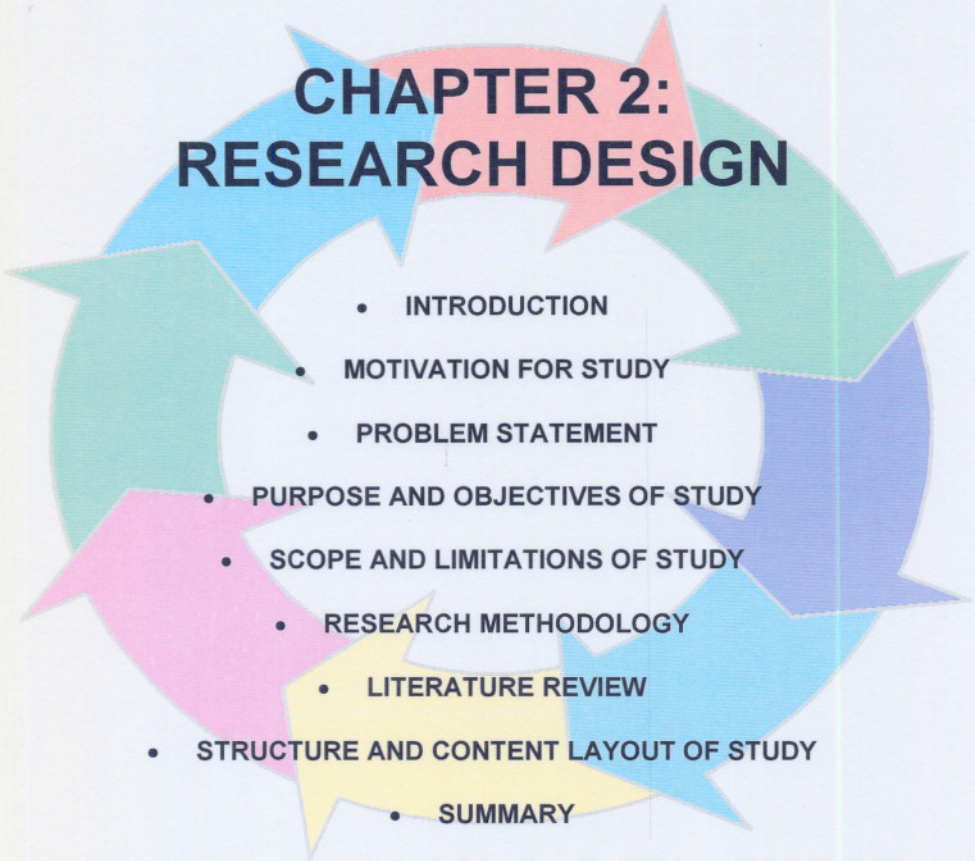
Water is the single most precious element for life on earth. It is essential for satisfying basic human needs, health, food production, energy and maintenance of regional and global ecosystems. In recognition of the central importance of freshwater resources to the planet's future, the United Nations General Assembly proclaimed the *year 2003* as *the International year of Freshwater*. The International year of Freshwater provided the world community an opportunity to raise awareness, promote good practices, motivate people and mobilise resources in order to meet the basic human needs and manage water in a sustainable manner (www.un.org/events/water, 2003).

One of the principles of sustainability, as sited in IUCN (1991), that needs to be developed, implemented and managed is that of the *"provision for a national framework for integrating development and conservation"*. This principle could be the umbrella framework that could ensure the achievement of the other principles, Agenda 21 and the Johannesburg Declaration, and could also be an audit reporting framework to ensure compliance to environmental legislation and other relevant legislation, especially for water related functions and projects in South Africa.

Once considering all the elements that must be taken into account when managing, controling, protecting, utilising, developing and conserving the water resource, one can start to appreciate the complexity of the subject matter and only then it becomes clear that an effective environmental management framework and system are essential to secure sustainability.

Therefore *an appropriate management framework, strategy, program and/or system needs to be developed, implemented and maintained in order to manage the effects of human activities on natural resources*, and in particular for the scope of this document, *water resources*.

CHAPTER 2: RESEARCH DESIGN



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- PURPOSE AND OBJECTIVES OF STUDY
- SCOPE AND LIMITATIONS OF STUDY
- RESEARCH METHODOLOGY
- LITERATURE REVIEW
- STRUCTURE AND CONTENT LAYOUT OF STUDY
- SUMMARY

CHAPTER 2: RESEARCH DESIGN

2.1 INTRODUCTION

Chapter 2, in short, describes the *"WHY?"*, *"WHAT?"* and *HOW?"* of the study.

In order to provide a better understanding of the *"WHY?"* of the study, i.e. why the study is regarded necessary, section 2.2 provides a *motivation* for the study which describes the need for an Environmental Management Framework (EMF) for DWAF related projects in the water sector. Section 2.3 concludes by formulating the *problem statement*.

The two sections that follow after section 2.3 explain the *"WHAT?"* of the study, i.e. what is the scope and extent of the study. Section 2.4 formulates the *purpose* of the study and sets out the main aim of the study into a number of *study objectives*, while section 2.5 broadly defines the *scope* of the study and also indicates certain *limitations* of the study.

The last part of Chapter 2 explains the *"HOW?"* i.e. the methodology that was followed to address the *"WHAT?"*-component of the study. Section 2.6 conceptualises the *research methodology* that was regarded as the most appropriate, by considering time and resources. Section 2.7 stipulates the role that the *review* of *relevant literature* sources played, and section 2.8 provides a *structured layout* of the study.

The second chapter, therefore, provides the framework and the boundaries within which the study were conducted. The research and capturing of the information in this mini-dissertation were an iterative and interactive process.

2.2 MOTIVATION FOR STUDY

Environmental management is fragmented, unco-ordinated and inconsistently applied in the Department of Water Affairs and Forestry (DWAF). The practice of sound environmental management within the department and the water sector is not frequently applied. A pro-active and preventive approach and specific procedures needs to be followed to ensure reasonable measures have been considered.

Although the water resource management branch has endured to apply integrated environmental management (IEM) for development projects, the DWAF-IEM procedures are outdated due to new legislation being promulgated, new environmental management tools that are available and the adoption of a project life cycle approach. The Water Services' functional area has just started to consider environmental attributes within their decision-making process.

An environmental management framework (EMF) will promote integrated and co-ordinated environmental planning and management as part of the decision-making process for the DWAF development projects and will form the building block for and appropriated environmental management system. Since it will take years to establish and tailor-make an appropriate environmental management system for the department and the water sector, based on SABS ISO 14001 standards and principles, an interim procedure and decision supporting system is necessary to ensure that the environment is consider throughout the project life cycle of development projects.

The EMF will thus guide sound environmental management practices and provide a decision support system for the DWAF officials to ensure adherence to environmental legislation and protection of the water resource. The framework could also assist in avoiding duplication of environmental initiatives and unnecessary cost implications.

The White Paper on the National Water Policy (1997b) explicitly requested, in principle 17, that water resource development and supply activities be managed in a manner that is consistent with the broader national approaches to environmental management. The IUNC (Caring for the Earth summit, 1991) identified nine inter-related principles for a sustainable society. The South African Constitution and national environmental management principles in NEMA also promote these principles. One of the principles that should be highlighted is the one that states that *"provision should be made for a national framework for integrated development and conservation"*. The National Environmental Management Act (Act 107 of 1998, the NEMA) also promotes that national and provincial government departments establish systems to give effect to these principles.

The NEMA (Chapter 3, section 11 (3)) requires that DWAF compile a Consolidated Environmental Implementation Management Plan (CEIMP) due to the departments' impacting (as Developer and/or Operator) and management (as Regulator) functions and activities on the environment. Chapter six (6) of the DWAF CEIMP (DWAF, 2001:80) promotes the development of an Environmental Management Framework (EMF) so as to ensure that environmental considerations are taken into account throughout the entire life cycle of the water related business processes and ensure adherence to environmental legislation.

2.3 PROBLEM STATEMENT

The IEM procedure of the Department of Water Affairs and Forestry was last updated in 1995. Since then, the Constitution (Act 108 of 1996) and other relevant legislation were promulgated, for example, but not exhausted, the National Environmental Management Act (Act 107 of 1998, the NEMA), the National Water Act (Act 36 of 1998, the NWA), the Public Financial Management Act (Act 1 of 1999, the PFMA), and the Water Services Act (Act 108 of 1997, the WSA). During the same period, South Africa became signatory to the Agenda 21 and the Johannesburg Declaration.

In light of the above-mentioned environmental legislation, the outdated DWAF IEM procedure, availability of new environmental assessment and management tools, the lack of social assessment and community beneficiation, the project life cycle process and business management process / system to be adopted by DWAF, *it necessitates the department to develop and implement an Environmental Management Framework within DWAF at a strategic level. This will result in the alignment of the IEM principles, the EIA process and other environmental management tools, within the context of the business engineering stages in the project life cycle process.*

The real challenge will not lie with the development of the appropriate environmental management framework or supporting tools and systems, but with the implementation of the framework within the department, due to human and financial constraints, lack of trained personnel in environmental management aspects and top management buy-in with regard to a paradigm shift in business governance and management so as to ensure environmental sustainability.

2.4 PURPOSE AND OBJECTIVES OF STUDY

2.4.1 Purpose of Study

The purpose of this study is to review the current IEM procedures applied by the Department of Water Affairs and Forestry (DWAF) and to develop an Environmental Management Framework for DWAF related projects for the water sector's component. This will ensure the implementation of Integrated Environmental Management (IEM) principles within departmental water sector projects and activities, in order to ensure compliance with environmental legislation and to promote sound environmental management practices.

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2.4.2 Objectives of Study

The *primary goal* of this study is to ensure that environmental considerations are efficiently and adequately taken into account at all stages of the planning, development and implementation phases of DWAF related projects for the water sector component. The following actions are required to achieve the purpose and the primary goal of the study:

- To revise the current IEM procedure of the DWAF and to ensure that development activities and projects meet the environmental legislation and associated requirements;
- To align, optimise and integrate the environmental management processes required by law (i.e. the principles of IEM and the EIA process, but not limited to) with the business engineering stages of the DWAF's development projects throughout the project life cycle;
- To align and integrate other environmental assessment and management tools (i.e. SEA, EMP, EMS, SIA, monitoring and auditing, etc.) within the project life cycle;
- To identify key decision-making points (stop-go points before commencing with next phase) in the business engineering stages for project planning and development;
- To design auditing nodes throughout the project life cycle so as to facilitate environmental compliance and performance and also trigger implementation of IEM principles and continual improvement in day-to-day activities; and
- To develop a proposed Environmental Management Framework, from above-mentioned actions, for DWAF related projects for the water services component, which fits within the functions of DWAF, complies with environmental legislation, is practical, cost effective, and does not cause unnecessary delays, produce deliverables (reports) and act as a decision support system.

2.5 SCOPE AND LIMITATIONS OF STUDY

This mini-dissertation will focus on the *water sector component of the Department of Water Affairs and Forestry*, which are the Water Resource Management and Water Services' functional areas. Although the roles and responsibilities related to delivery of water has been transferred to local government, the department are supporting local government to create and enabling an environment and processes through formulating policies, strategies, guidelines, tools and assist in empowering and capacity building. The department has still a management function as Regulator with regards to water service delivery and therefore included in this report. The Forestry component of the DWAF is not included in this report.

This study is focused on *development projects* of the water sector component of DWAF, which include the planning, development and operation of bulk water resource infrastructure, as DWAF as the Developer, Operator and Regulator, and water services planning, development and maintenance of water supply infrastructure, as DWAF as the Regulator. Other water sector impacting and management functions and activities will not be included in this report.

The document will focus on the *project life cycle level* of the business process and procedures of both functional areas and will not include the policy and programme level.

This mini-dissertation will focus on the development of a proposed *EMF* for DWAF related projects, which take into consideration the *ecological (biophysical) component*. Therefore, the social and economic components will not be discussed in detail in this report. A parallel process to consider the social and economic components is undertaken in the department and is called the Social Assessment and Development Framework (SAADF). The integration of the EMF and SAADF will promote sustainable development and utilisation of water resources.

The *Department of Water Affairs and Forestry is currently* in a *restructuring process*, as the other government departments. Although the business functions in the department will stay more or less the same, the institutional arrangements will surely change and that will have a bearing on the contents of this document.

The *National Environmental Management Act (NEMA) and EIA regulations are also under revision*, which will also have an effect on this document.

Therefore, it is suggested that the proposed EMF presented here should be reviewed within twelve (12) months.

2.6 RESEARCH METHODOLOGY

The following method of investigation was followed:

- The current DWAF-IEM procedure was revised and national environmental and water legislation and requirements reviewed and updated, as well as international best practices and principles internet and library searches conducted that is applicable to development activities and projects.
- Environmental management processes were aligned and optimised required by the water legislation (thus, DWAF internal processes) and these processes were aligned, integrated and harmonised with environmental management processes (i.e. IEM principles and EIA process) required by environmental legislation for DWAF water sector development projects and functions. The project life cycle approach were adopted and aligned with business engineering processes and stages. This was performed through comparing it to similar procedures and initiatives available in the literature (nationally and internationally) and through conducting internet and library searches (universities, government departments, and corporate institutions).
- Environmental assessment and management tools (SEA, EIA, EMP, EMS, SIA, monitoring and auditing, etc.) were aligned and integrated with the project life cycle approach for each of the business engineering stages of the departments planning, design and execution of development projects. This was done by giving credit to existing environmental systems available and those tools required by environmental law, by conducting internet as well as library searches (universities, government departments, and corporate institutions), workshops and one-on-one consultations.
- Key decision-making points and environmental management activities and deliverables have been identified for project planning and development so as to build in effective safeguards (stop-go points before commencing with next phase). This was accomplished through international literature and corporate institutions experiences in South Africa.
- Auditing nodes were designed and aligned with the key decision-making points throughout the project life cycle of the DWAF's water sector development projects, so as to ensure environmental compliance and performance. International and national literature was reviewed to establish effective and imperative nodes to conduct an environmental audit.

- Developed an Environmental Management Framework for DWAF related projects from the outcome (results) of the above-mentioned steps, and tested it against environmental specialists' experience and views of the Department of Environmental Affairs and Tourism. Information sessions and mini-workshops were conducted with DWAF's head office and regional personnel, and with the district municipalities so as to promote this proposed framework and to test the feasibility of such a framework in the water sector. Comments and recommendations from these sessions and workshops were incorporated into the framework.

Please note that the above-mentioned steps are an iterative and interactive process and that the Environmental Management Framework will not be able to be tested within this study period. Lessons learnt from previous development projects were used to partially overcome this obstacle

2.7 LITERATURE REVIEW

A review of national and international literature was carried out in order to determine the following:

- What principles, policies and regulatory requirements apply to sustainable development, integrated management approach and strategic environmental management?
- What does the project life cycle and business engineering processes entail?
- What does total quality management and environmental management systems entail?
- What environmental assessment and management tools and procedures are readily available, cost effective, and are not time and labour intensive?
- What are a stage-gate model / safeguards / stop-go points and how to design a similar model for DWAF's business processes?
- Where and how to include auditing nodes in the DWAF's business processes?
- What is the relationship between IEM principles, business engineering processes and a project life cycle approach?

Since the adoption of an Environmental Management System, based on SABS ISO 14001, is a voluntary process and focuses on industry, few government organisations have adopted the approach or a framework that provides an interim environmental decision support system. Local government in Canada has fortunately adopted a tailor-made management system based on the SABS ISO 14001 principles. The Department of Defense and some Water Boards in South Africa have adopted the EMS, based on ISO 14001, and could give guidance to the development of the EMF. SASOL has developed a Business, Development and Implementation (BDI) Model, which is supported by an EMS, based on ISO 14001 principles. This BDI model has stage-gates built into the model as safeguards or stop-go points to evaluate whether all the environmental requirements have been adhered to before continuing to the next business stage in the project life cycle. This model has been studied in order to design a similar and appropriate model, which is tailor-made for DWAF's functions.

2.8 STRUCTURE AND CONTENT LAYOUT OF STUDY

The EMF document is structured in a sequential manner to assist the reader to understand the background to and basis for developing the EMF, through to understanding what components make up the EMF and how these components are integrated and managed and illustrated in Figure 2.1.

Chapter One introduces the topic of the study, which provides background information to the need for the EMF and an introduction to some of the more important considerations for developing the EMF.

Chapter Two (this chapter) attempts to position the reader in order to have a better understanding of the research layout.

Chapter Three provides the regulatory framework and central guiding principles that govern environmental management in South Africa.

Chapter Four examines the evolutionary nature and trends of environmental management philosophies, practices, and processes on an international scale and in South Africa. It also presents an overview of the IEM concept and the challenges to introduce this approach in water resources management and supply activities.

Chapter Five provides an overview of the department's past and current approaches to IEM and the environmental management requirements as set out in DWAF's Environmental Implementation and Management Plan (EIMP) (DWAF, 2001).

Chapter Six outlines how the proposed EMF integrates and aligns IEM principles with the DWAF's water sector component and project business phases and life cycle approach. The chapter details how and where IEM and the relevant environmental assessment and management tools should be included as part of the project life cycle approach from "cradle-to-grave". This chapter furthermore attempts to introduce decision-making points and model (stop-go points or safeguards) and auditing nodes in order to ensure that environmental considerations are incorporated in the water resources management activities of DWAF.

Chapter Seven draws conclusions and gives recommendations as to ensure successful implementation and continual improvement of EMF.

2.9 SUMMARY

This chapter aims to describe the purpose and the need of the study for the Department of Water Affairs and Forestry water sector component related to development projects. It also ensures that the reader understands the contents and structure of this document.

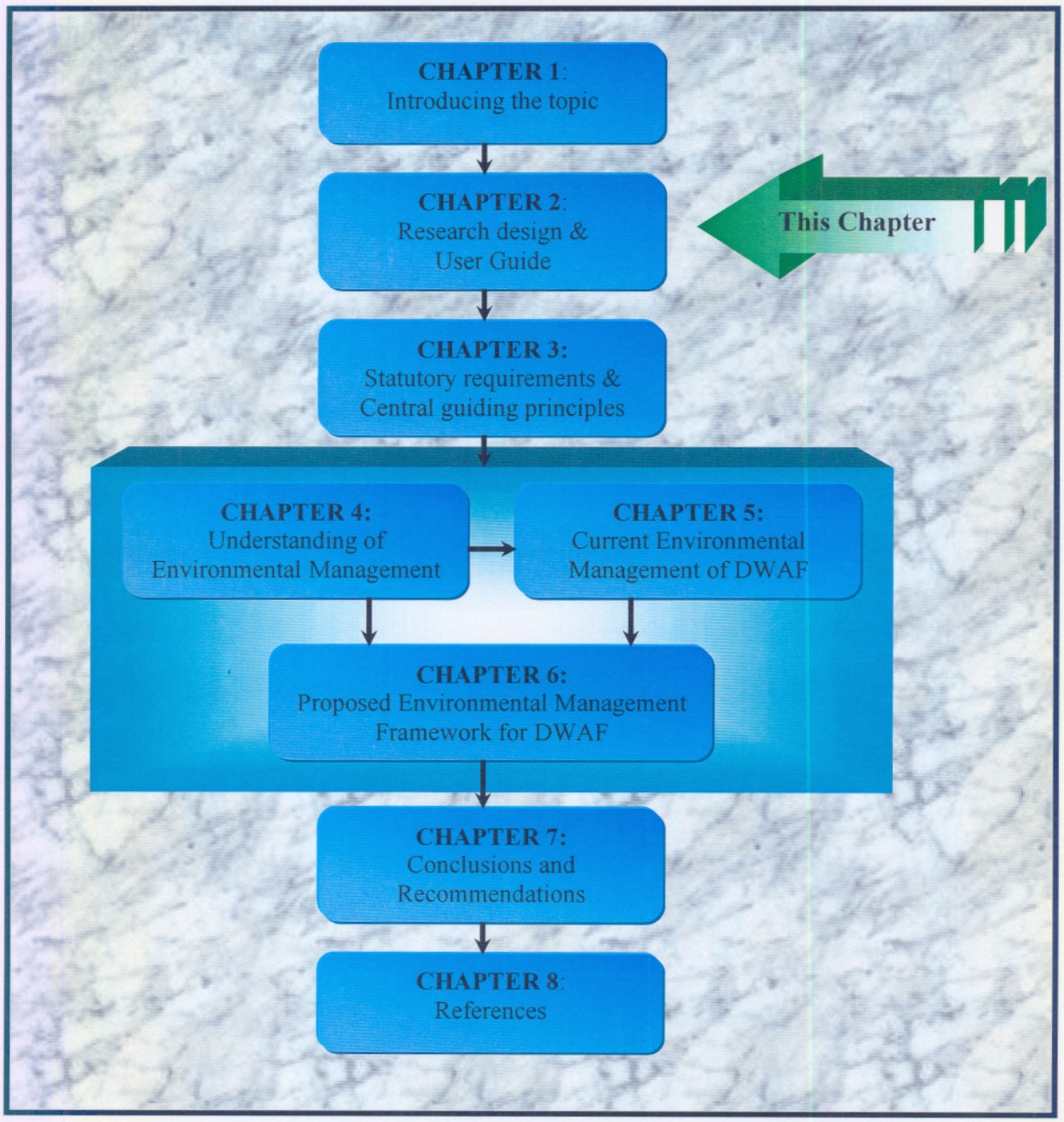


FIGURE 2.1: Structure and content layout of study (Road map).

CHAPTER 3:
STATUTORY REQUIREMENTS AND CENTRAL GUIDING PRINCIPLES

- INTRODUCTION
- LEGAL FRAMEWORK
- STATUTORY REQUIREMENTS & CENTRAL GUIDING PRINCIPLES
- SUMMARY

CHAPTER 3: STATUTORY REQUIREMENTS AND CENTRAL GUIDING PRINCIPLES

3.1 INTRODUCTION

There have been major changes in South Africa's policies and legislation over the last decade. South Africa has one of the most liberal constitutions in the world, with a Bill of Rights that guarantees *inter alia* the right to an environment that is not harmful to people's health and well-being. The Consultative National Environmental Policy Process (CONNEPP), the White Paper on Environmental Management Policy for South Africa (1998) and the National Environmental Management Act (Act 107 of 1998, the NEMA) represent the attempts by the Department of Environmental Affairs and Tourism (DEAT) to give effect to this constitutionally guaranteed right. The same applies to the White Paper on National Water Policy (1997b) and the National Water Act (Act 36 of 1998, the NWA) and the Water Services Act (Act 108 of 1997, the WSA) of the Department of Water Affairs and Forestry (DWAF).

Concern for the environment is a modern-day phenomenon. The impacts of population numbers and over consumption of resources have made it a necessity. Throughout the world governments, international organisations, major corporations as well as the public are insisting that planning and decisions must consider the impact of human actions on the receiving environment.

The purpose of Chapter 3 is to elaborate on salient statutory requirements and policy principles that apply to environmental management in South Africa. It should be noted that the aim of this chapter is not to examine the detail of water and environmental legislation, *per se*, but to highlight the relevant sections applicable to this study (Figure 3.1).

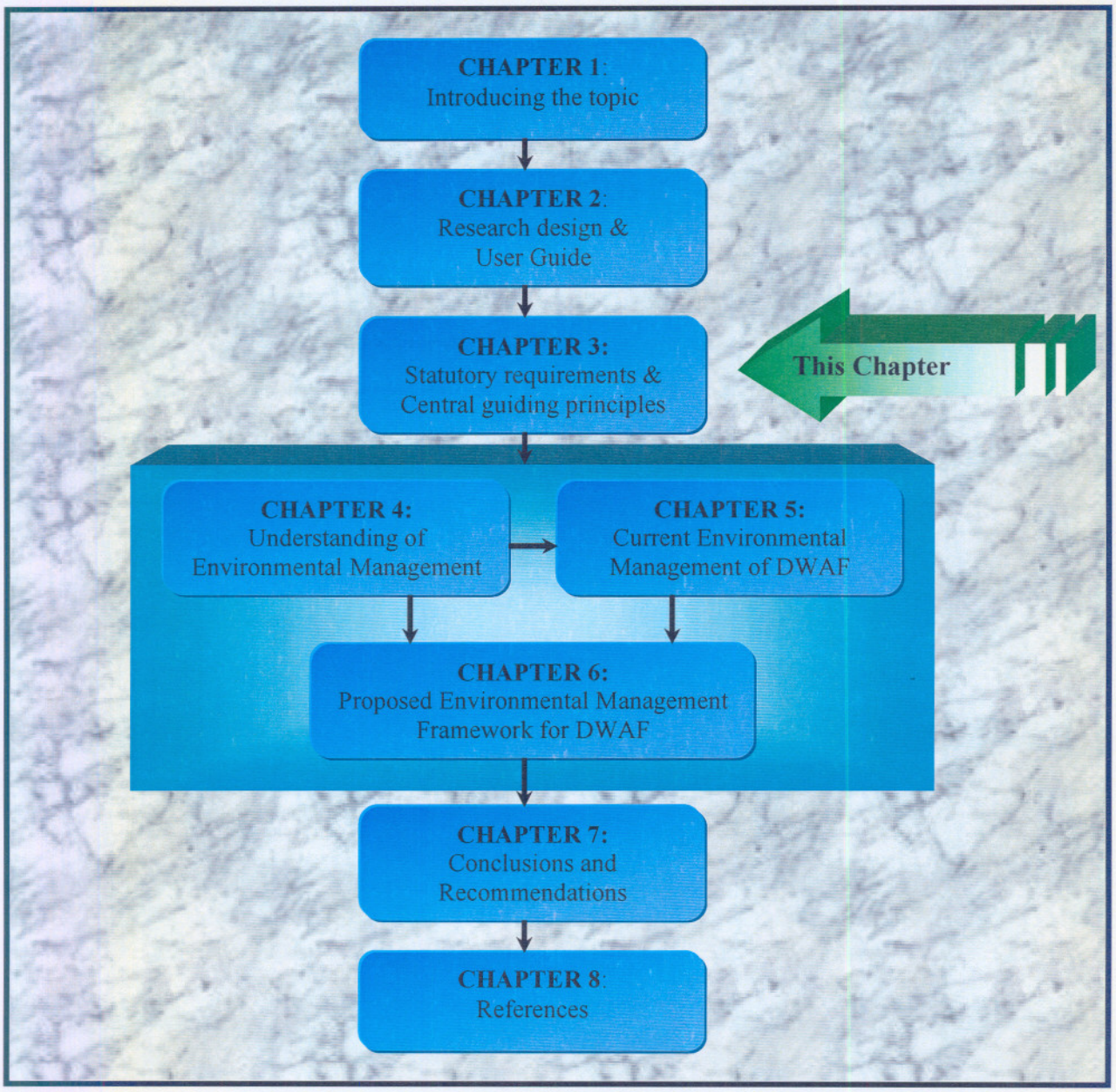


FIGURE 3.1: "Roadmap" of study: Chapter 3.

3.2 LEGAL FRAMEWORK

According to Steyn (1999:1), South Africa has entered a new era of law-making. An era where policy is translated into constitutional-driven, binding law. According to this author, environmental legislation is committed to giving effect to the concept *"sustainable development"*. Both concepts *"equity"* and *"efficiency"* have also gained prominence in recent promulgated laws.

Water resources management and developing activities, including water services in South Africa is governed and influenced by a hierarchical suit of environmental management legislation (Figure 3.2), which ranges from:

- South Africa's water resource management and service delivery related *international obligations*, of which Agenda 21 (1992) and the recent four documents produced on the World Summit for Sustainable Development (2002) are the prominent examples;
- to the *South African Constitution*, 1996 (Act 108 of 1996), consisting the supreme law of the country and guaranteeing the rights of all people in South Africa;
- to *environmental framework legislation*, such as the National Environmental Management Act 1998 (Act 107 of 1998), which principally enact section 24, (environmental rights) and section 41 (containing provisions on co-operative governance) of the Constitution;
- through to *sectoral legislation*, of which the National Water Act, 1998 (Act 36 of 1998) and Water Services Act, 1997 (Act 108 of 1997), and the Environment Conservation Act (Act 73 of 1989) are the most prominent examples.

The said legislation can be made by parliament, the nine provincial governments or by local government, and are respectively termed *Acts of Parliament, Provincial Acts* or *Bylaws.*

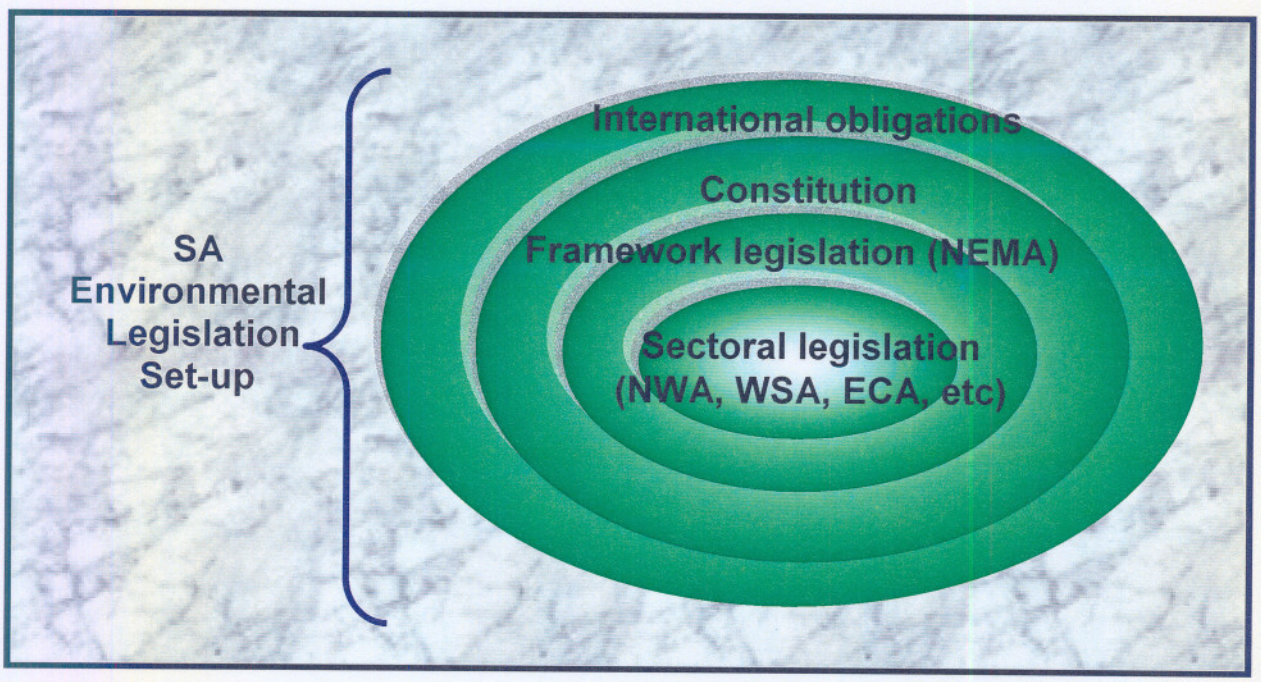


FIGURE 3.2: Hierarchy of South African environmental management related legislation.

The Environment Conservation Act, (ECA) has been largely repealed and replaced by the National Environmental Management Act (NEMA). Not only does NEMA reflect the changes in South Africa's political structure, but also the considerable changes and advances in the international environmental field.

The NEMA is the framework legislation for environmental management. It includes environmental management principles and has a people-centered approach to environmental management, transparency, access to information and co-operative governance and shared responsibilities. Therefore it encourages co-regulation, shared responsibility and sense of ownership.

The National Water Act (NWA) provides the principles and legal framework for water resources management, within a framework of equitable access, beneficial utilisation and environmentally sustainable practices, as well as equitable and inclusive decision-making. The central guiding principles of the National Water Act are sustainability, equity and efficiency.

Currently environmental functions are very fragmented, but to achieve sustainable development all organs of state must comply with the national policy on environmental management. There are, for example, *twelve acts* that refer exclusively to environmental conservation (e.g. the Environment Conservation Act (Act 73 of 1989)), five acts are primarily concerned with environmental conservation (e.g. the Forest Act (Act 122 of 1984)), five acts can be described as semi-environmental legislation (e.g. the Health Act (Act 63 of 1977)) and four acts that incidentally refer to environmental conservation (e.g. Sea Fisheries Act (Act 58 of 1973)) (Du Plessis, 1999b; Fuggle & Rabie, 1992; Kidd, 1997).

3.3 STATUTORY REQUIREMENTS AND CENTRAL GUIDING PRINCIPLES

3.3.1 Water and International Law

International law primarily consists of conventions and treaties of global interests and importance. South Africa has an *international obligation* and commitment to other countries, which governs additional facets of international relationships between South Africa and these countries (Figure 3.2).

South Africa is signatory to several *international protocols* which are important for water management policy, such as, *inter alia*, the Ramsar Convention on the Protection of Wetlands, the Convention to Combat Desertification, the Convention on Biological Diversity, the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basal Convention), the Framework Convention on Climate Change, and the Convention concerning the protection of the world cultural and natural heritage (World Heritage Convention) (DEAT, 1999).

At the Earth Summit in Rio de Janeiro, Brazil, in 1992, the United Nations Conference on Environment and Development (UNCED) produced five documents, *inter alia* the *Rio Declaration on Environment and Development* and *Agenda 21*. The Rio Declaration on Environment and Development consists of 27 principles, which define the rights and responsibilities of nations as they pursue human development and well-being, while Agenda 21 provides an international blueprint for sustainable development for the 21st century (UNCED, 1992, DEAT 1998a: 3; DEAT, undated: 2). These documents represent the commitment of the international community to address all aspects of the environment and development on a global scale.

The most prominent legislation that deals with these 27 principles as set out in the Rio Declaration on Environment and Development are the National Environmental Management Act (Act 107 of 1998), the National Water Act (Act 36 of 1998) and the Water Services Act (Act 108 of 1997).

Chapter 18 of Agenda 21 outlines a *"new approach to freshwater development, management and use"* to meet growing demands from different user sectors. Chapter 18 consists of seven programmes (A to G) with each containing a number of principles, objectives and targets (UNCED, 1992: 166):

Program A: Integrated water resources development and management;

Program B: Water resource assessment;

Program C: Protection of water resources, water quality and aquatic ecosystems;

Program D: Drinking water supply and sanitation;

Program E: Water and sustainable urban development;

Program F: Water for sustainable food production and rural development; and

Program G: Impacts of climatic change on water resources.

Chapter 18 focuses on the broader integrated approach to the development, management and use of water resources. Water legislation in South Africa recognises and gives affect to most of these principles, objectives and targets, as set out in Chapter 18 of Agenda 21.

During a special session the United Nations General Assembly reviewed and appraised the implementation of Agenda 21 in 1997, 5 years after the Earth Summit in 1992, for progress made since the United Nations Conference on Environment and Development. The Earth Summit+5 were documented and Local Agenda 21 initiatives implemented at local authority level in South Africa through the United Nations Development Capacity 21 programme.

At the 2002 Johannesburg Summit, "World Summit on Sustainable Development (WSSD)", the delegates reaffirmed the commitments made to the Rio principles, the full implementation of Agenda 21 and the Programme for the Future Implementation of Agenda 21. Commitments were also made to achieve the internationally agreed development goals, including those contained in the United Nations Millennium Development Declaration and in the outcomes of the major United Nations conferences and international agreements since 1992. Corresponding targets were added to these commitments. Although South Africa did not participate officially at the Earth Summit in 1992, they committed to agreements taken during the WSSD, namely *Johannesburg Declaration* and *Johannesburg Plan of Implementation* (www.un.org/esa/earthsummit, 2003).

Other landmark international events that have influenced the direction of water management in South Africa include the UN Conference on the Human Environment (Stockholm, 1972); the International Drinking Water Supply and Sanitation Decade launch (Mar del Plata, 1977); the Drinking Water and Environmental Sanitation Conference on the Implementation of Agenda 21 (Noordwijk, Meeting of Ministers, 1994); the Global Water Partnership meeting (Stockholm, 1996); and the First World Water Forum of the World Water Council (Marrakesh, 1997).

These meetings began with a clear focus on meeting the needs for services of the unserved. Attention has increasingly turned to the need to protect and sustain the water resources, which everyone depends on and in particular emphasises the sustainable management of water as a limited natural resource. There is also a growing recognition for the management of the demand for water as an economic good, so as to make sure that water use is as sufficient as possible, both in terms of quantities of water utilised and the impact on water quality (DWAF, 1997). The above-mentioned were formulated in recommendations from these meetings and were incorporated in the National Water Policy of South Africa (1997b) and in the National Water Act (1998) as guiding principles.

3.3.2 Water and the Constitution

The *South African Constitution* (Act 108 of 1996) is the highest law of this country and is positioned on the next tier (Figure 3.2). The Constitution was written with people in the centre of its concern so as to ensure that the basic rights of the individual are contained in the Bill of Rights. Chapter Two, the *Bill of Rights*, is the heart and soul of the Constitution and affirms the values and rights of: *"human equality, dignity and life"* and of: *"protected environment, property and access to sufficient water"*.

All legislation, including water legislation, must follow the spirit and letter of the Constitution and should give effect to the values promoted in the Constitution. The Constitution contains a number of chapters and sections that have direct and indirect relevance to environmental law, in general, and water resource management and service delivery, in particular. The first principle in the White Paper of the National Water Policy, 1997b, stated that South Africa's water legislation shall be "*subject to and consistent with the Constitution in all matters*" and "*will actively promote the values enshrined in the Bill of Rights*".

The e*nvironmental rights* are guaranteed in section 24 of the Bill of Rights in the Constitution (Act 108 of 1996) (Table 3.1). Section 24 in the Constitution has implications for all environmental policies and legislation and the implementation thereof. In keeping with this right, *"sustainable development"* should be strived towards, which means that biophysical, social and economic considerations should be taken into account (Steyn, 1999:2).

The Constitution on its own can not ensure the effective management of the environment and natural resources. Numerous Acts will have to be promulgated or revised to comply with all the requirements contained in the Constitution. These environmental Acts that must give affect to the Constitution can be classified as *framework* and/or *sectoral environmental legislation*, which are positioned at the next two tiers (Figure 3.2).

TABLE 3.1: Environmental rights as guaranteed in the Bill of Rights of the South African Constitution (Act 108 of 1996).

Section 24:	***"Everyone has the right"*** – (a) to an environment that is not harmful to their health or well-being, (b) to have an environment protected for the benefit of present and future generations, through *reasonable* legislative and other *measures* that (i) prevent pollution and ecological degradation (ii) promote conservation and secure ecologically sustainable development and use natural resources while promoting justifiable economic and social development

3.3.3 Framework environmental legislation: National Environmental Management Act (Act 107 of 1998)

3.3.3.1 White Paper on Environmental Management Policy for South Africa (1998)

In 1995 the Consultative National Environmental Policy Process (CONNEPP) began the process of drawing up what eventually became the White Paper on Environmental Management Policy for South Africa (1998). The purpose of the policy is twofold:

- to inform the public what government's environmental objectives are and how they intend to achieve their objectives;
- to inform government agencies and organs of state what their environmental objectives are and to guide them in developing strategies to achieve those objectives.

The White Paper sets out an environmental vision and principles, as well as strategic goals and objectives (Table 3.2).

The *White Paper* further deals with aspects of environmental governance. This includes, *inter alia, essential requirements for effective environmental governance, role of the lead agent, co-ordination of functions and an integrated and comprehensive management system.*

TABLE 3.2: Environmental strategic goals and objectives.

Environmental strategic goals and objectives:
- Effective institutional framework and legislation;
- Sustainable resource use and impact management;
- Holistic and integrated planning and management;
- Participation in environmental governance;
- Environmental education and empowerment;
- Information management for sustainable development; and
- International co-operation.

3.3.3.2 The National Environmental Management Act (Act No 107 of 1998)

The National Environmental Management Act (NEMA) was written as *"framework legislation"*. The objective of framework legislation is to give an overall template of environmental law in the country and provide guidance to sectoral legislation. According to Nel and Du Plessis, (2001:1) the current trend is to introduce environmental framework legislation in order to ensure "an integrated, ecosystem-orientated legal regime that permits a holistic view of the ecosystem, of the inter-relationships and inter-actions within it, and the linkages in environmental stresses".

According to Steyn (1999:2) the NEMA can be described as the *"primary"* or *"parent"* environmental statute in that it guides decision-making or administration of all legislation in South Africa concerned with the environment. Nel and Du Plessis (2001:35-37) states that NEMA complies to characteristics of framework legislation, because it is flexible, deals with the issue of overarching and sectoral-specific issues and include policy and/or principles. According to these authors, NEMA does not achieve to make provision for a strong environmental lead agent which could be due to the present reality of the South African administration dispensation. The NEMA, regardless of the former statement of Nel and Du Plessis (2001:37), contains a number of principles and provisions that have a bearing on the governance of water, which will be discussed in the next section of this chapter.

Another very important feature of NEMA's principles is the detailed definition of *'sustainable development'* and the move from BATNEEC (best available technique not entailing excessive cost) to BPEO (best practicable environmental option).

The following sections in NEMA have essential implications and requirements to governing and protecting water resources in South Africa, as for the specific scope of this study.

(i) Principles (Chapter 1: section 2)

NEMA (Act 107 of 1998) sets out a wide range of principles, which relate to issues of integration, justice, equity, responsibility, participation, intergovernmental co-ordination as well as environmental integrity (Table 3.3).

The principles contained in the NEMA apply to all organs of state (Table 3.3). They apply alongside other constitutional rights and are set within the current South African socio-economic framework. They provide a framework for the formulation of Environmental Implementation Plans (EIP's) and Environmental Management Plans (EMP's) as well as for decision-making by organs of state.

(ii) Procedures for co-operative governance (Chapter 3: sections 11 – 16)

This basically consists of *Environmental Implementation Plans* and *Management Plans*. The purpose of these plans is to coordinate and harmonise environmental policies, programmes and decisions of national, provincial and local government. They are also intended to minimise duplication of procedures and functions and promote consistency in the exercising of functions. They are further intended to give effect to the principles of co-operative governance, secure protection of the environment, prevent unreasonable actions by provinces and enable the Minister to monitor the achievement and promotion of a sustainable environment.

(iii) Integrated Environmental Management (Chapter 5: sections 23 –24)

This chapter focuses on Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs) to be conducted and implemented for individual activities and will be discussed in detail in Chapter 4.

TABLE 3.3: National environmental management principles as stipulated in the National Environmental Management Act (Act 107 of 1998).

- Environmental management must serve physical, psychological, developmental, cultural and social interests equitably;
- Development must be socially, environmentally and economically sustainable;
- Sustainable development requires consideration of, bio-diversity conservation, pollution prevention and waste minimisation, and protection of the cultural heritage;
- Principles for sustainable development are lengthy and are outlined as follows:
  - Responsible and equitable use of non-renewable resources.
  - Renewable resources must be used to the extent that they do not exceed the level of their own integrity;
- There must be a risk averse and precautionary approach to development;
- Negative impacts must be anticipated, prevented and /or minimised;
- Best Practical Environmental Option (BPEO) must be followed;
- Development must take the need for environmental justice and equity into account;
- There must be a complete life-cycle responsibility for the safety, health and environmental consequences of policies, programmes, projects, products, processes or activities;
- There must be adequate public participation in environmental governance;
- The socio-economic and environmental impacts of all activities must be considered;
- There must be intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment;
- International environmental obligations must be discharged in the national interest;
- The government is the custodian of the environment;
- The polluter pays principle applies; and
- There must be provision of protection for sensitive areas.

(iv) Compliance, enforcement and protection (Chapter 7: sections 28-34)

These sections make provision for duty of care principles and remediation of environmental damage and control of emergency incidents. Although *reasonable measures* are not defined in NEMA, section 28 (3) provides a wide ranging list of measures to avoid significant impacts. It also protects the workers in their work place and whistle blowers.

(v) Environmental management co-operation agreements (Chapter 8: section 35)

The move towards co-regulation is facilitated by Chapter 8, environmental management co-operation agreements, which provides for the opportunity for any person to enter into agreements with the Minister or MEC for purposes of promoting compliance with the principles of the Act.

Historically there are four main strategies to deal with the concept of "*environmental governance*":

- Command and control;
- Fiscal / market based / economic instruments;
- Civil instruments; and
- Controlled self-regulation or co-regulation.

The NEMA has moved away from the *command and control* approach towards the use of *civil instruments* and *co-regulatory instruments*. It can be seen as a combination of all three. However, NEMA does not yet make use of *economic instruments* (Nel, 2000).

The use of civil instruments can be seen in the extensive use of public participation. The Environment Conservation Act (Act 73 of 1989) had some elements of public participation, but focused more on affected parties. The NEMA allows for participation by interested and affected parties. The NEMA accommodates the following principles on public participation:

- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured; and
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.

3.3.4 Sectoral water legislation: National Water Act (Act 36 of 1998) and the Water Services Act (Act 108 of 1997)

3.3.4.1 The aim of the National Water Act (Act 36 of 1998)

The purpose of this Act is to ensure that the nations water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account (amongst other factors) the following:

- meeting the *basic human needs* of present and future generations;
- promoting *equitable access* to water;
- *redressing* the results of past racial and gender discrimination;

- promoting the efficient, sustainable and beneficial use of water in the public interest;
- facilitating *social and economic development*;
- providing for growing demand for water use;
- *protecting aquatic* and associated ecosystems and their *biological diversity;*
- reducing and *preventing pollution* and degradation of water resources;
- meeting *international obligations*;
- promoting *dam safety*;
- *managing floods and droughts*, and
- to achieve this purpose, to establish suitable institutions and to ensure that they have appropriate community, racial and gender representation.

(i) Water management strategies (Chapter 2: sections 5-10)

The National Water Resources Strategy (NWRS) provides the framework for the protection, use, development, conservation, management and control of water resources for the country as a whole. Water resources management is done in an integrated manner and takes cognisance of the Water Services Act (Act 108 of 1997) to strive towards water sector support (DWAF, 2002).

Several mechanisms in the National Water Act (Act 36 of 1998) are promoting Integrated Water Resource Management (IWRM) as well as the concept of sustainable development, namely; *inter alia*, the establishment of a National Water Resource Strategy (NWRS) and Catchment Management Strategies (CMS), the determination of the "Reserve", licensing of water use, implementations of various institutions, monitoring assessments and access to information systems.

(ii) Protection of the water resource (Chapter 3) and use of water (Chapter 4)

Water resource management focuses on the requirements of the resource and has two very important components, namely; *"protection"* and *"utilisation"*. Utilisation of the water resource has impacts on the resource, which must be controlled in order to protect water resources (DWAF, 1997).

The protection of water resources is fundamental related to their use, development, conservation, management and control. Series of measures are incorporated to ensure the comprehensive protection of all water resources. These measures are to be developed progressively within the contexts of the national water resources strategy and the catchment management strategies (DWAF, 1998).

Reasonable measures are inflicted, *inter alia*, in section 19 of the National Water Act (NWA) that promotes the prevention and remedying the effect of pollution and section 20 of the NWA that make provision for the control of emergency incidents. These sections give affect to the *"polluter pays principle"* so as to manage and protect water resources.

The procedure for a *license application for a water use,* section 41 of the NWA, make provision for directing *environmental compliance* as contained in regulations made under section 26 of the Environment Conservation Act (Act 73 of 1998). Controlled activities, as specified under section 37 of this Act, require a water use license and is therefore also subject to comply with environmental requirements as set out in the Environment Conservation Act. Any Environmental Impact Assessment (EIA) must comply with the minimum requirements set out in section 24 (7) of the NEMA.

(iii) Government waterworks (Chapter 11: section 109-110)

This chapter gives the minister the power to establish and operate government waterworks in the public interest, for example water storage dams, water transfer schemes and flood attenuation works. The Minister must however satisfy certain procedural requirements before constructing a government waterworks, including the duty to obtain an *environment impact assessment* and invite public comment.

(iv) ***Monitoring, assessment and information (Chapter 14: sections 137 and 139)***

Monitoring, recording, assessing and disseminating information on water resources is critically important for achieving the objectives on the Act. The Minister should establish *national monitoring systems* so as to facilitate the continued and co-ordinated monitoring of various aspects of water resources by collecting relevant information and data through established procedures and mechanisms.

This is necessary to assess, among other matters, *the rehabilitation of water resources and the health of aquatic ecosystems.* This link up with the responsibility of the Minister to establish *national information systems* to store these data and information, so as to be readily accessible for use by water users and the general public.

3.3.4.2 The purpose of the Water Services Act (Act 108 of 1997)

The *main objective* of this Act is to provide for:

- The right of *access to basic water supply* and to *basic sanitation* necessary to secure sufficient water and an environment not harmful to human health or well-being;
- The *setting of national standards and norms and standards for tariffs* in respect of water services;
- The preparation and adoption of *water services development plans* by water service authorities;
- A *regulatory framework* for water services institutions and water services authorities;
- The establishment and disestablishment of *water boards* and *water services intermediaries*;
- The *monitoring of water services* and intervention by the Minister or by the relevant Provinces;
- *Financial assistance* to water services institutions;
- The *gathering* of information in a national information system and the *distribution* of that *information*;
- The *accountability* of water services providers; and
- The *promotion of effective water resource management and conservation.*

(i) Access to basic water supply and sanitation (Chapter I: section 3)

The obligation to implement measures to provide access to basic water supply and basic sanitation in the Water Services Act should take cognisance of mechanisms put in place in other laws to give affect to sustainable development:

- *The National Water Act:*
  - section 7: giving affect to the national water resources strategy;
  - section 15: giving effect to the determination of class or resource quality objectives;
  - section 18: giving effect to the Reserve.

- *Environment Conservation Act:*
  - particular GN R 1182, items 1 (i), (j), (k), (l) and (n).

- *National Environmental Management Act:*
  - section 2: (environmental principles), in particular section 2 (1) & 2 (4) (d).

(ii) Norms and standards of tariffs (Chapter II: sections 9-10)

Prescribing norms and standards in respect of tariffs for water services by the Minister should consider the following relevant legislation:

- Pricing strategy published in terms of the National Water Act as GN 1353;
- When setting norms and tariffs of water pricing, the Minister must implement the *"polluter pays"* principle contained in section 2 (4) (p) of the NEMA.

3.3.4.3 Guiding principles for IWRM

Agenda 21, an international plan for sustainable development, and other International Agreements that South Africa has signature too guided the development of the Water Policy as illustrated in Figure 3.3. In particular the Dublin principles contributed to the Agenda 21 recommendations adopted at the United Nations Conference on the Environment and Development in Rio de Janeiro in 1992. Dublin principles aimed to encourage change in concepts and practices, which are fundamental to improved water resources management. These principles have received universal support as the guiding principles that underpin IWRM.

The National Water Policy (1997b) promotes the principles and values enshrined in the Bill of Rights in the Constitution. The National Water Act (Act 36 of 1989) and Water Services Act (Act 107 of 1997) are the legislative tools to implement and achieve the vision in the National Water Policy for the water sector (Figure 3.3).

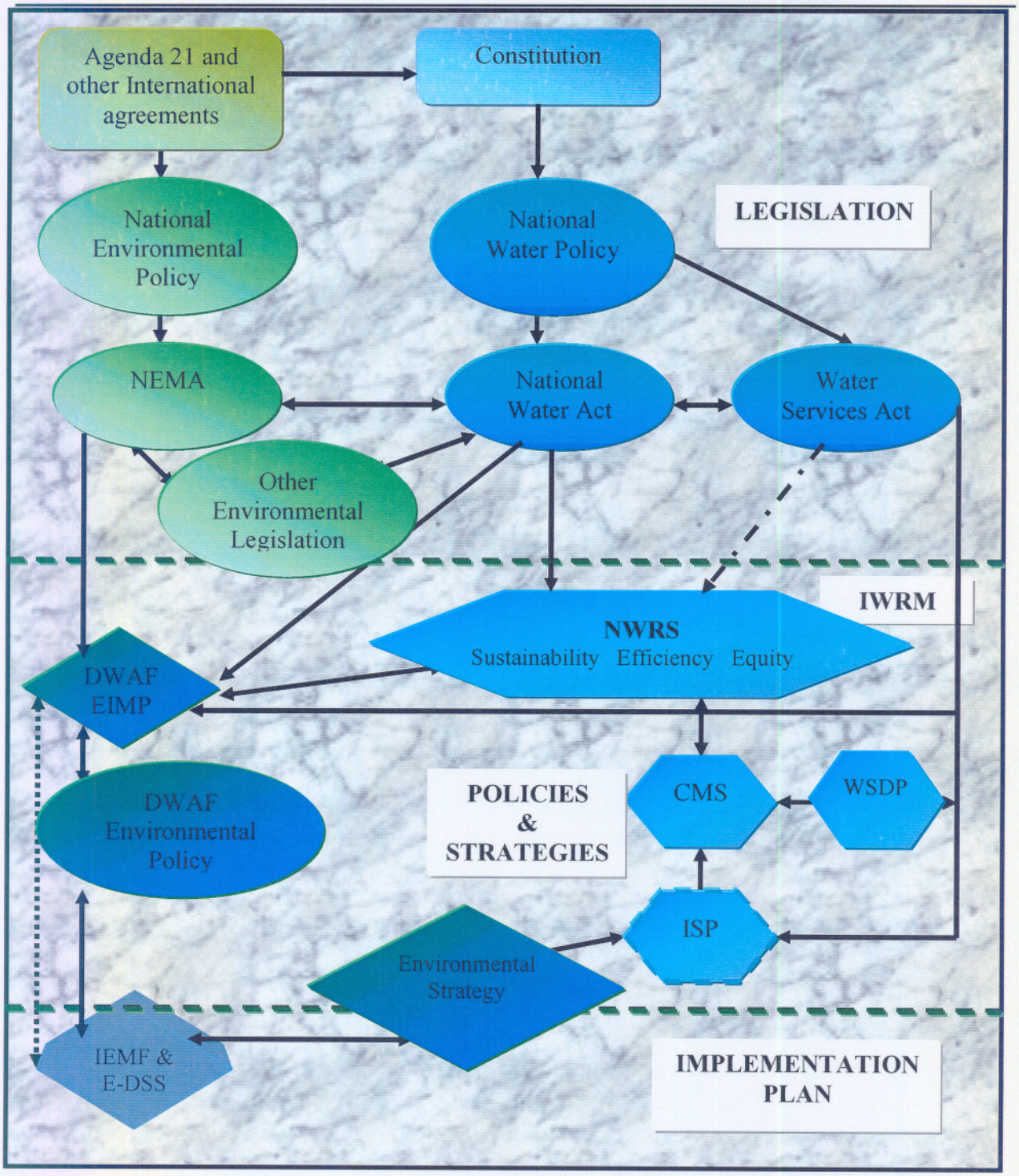


FIGURE 3.3: Environmental legislation influencing DWAF functions and policies to achieve environmental compliance and performance.

Three key principles from the Water Policy and National Water Act guide how water resources will be managed in South Africa. These principles are also enshrined in the NEMA and based on sustainable development principles:

- ***To achieve equitable access to water***
  - access to water services;
  - use of water resources; and
  - benefits from the use of water resources.
- ***To achieve sustainable use of water***
  - progressive adjustments to water use;
  - balance water availability and requirement; and
  - implement measures to protect water resources and the natural environment.
- ***To achieve efficient and effective water use***
  - water should be used to our best possible advantage.

The National Water Act was also written in line with the National Environmental Management principles and other relevant environmental legislation and regulations. The National Water Policy White Paper (1997) and the National Water Act is based on 28 fundamental principles. The fundamental principles are presented in Table 3.4 below.

Although all 28 principles are very important for an environmental manager with respect to Integrated Water Resource Management (IWRM), the Principles 7 and 17 are the primary principles that promote environmental management, *per se* with regard to water resource planning, management and development activities, including related water services activities.

TABLE 3.4: Fundamental principles in National Water Policy White Paper (1997b) and the National Water Act (Act 36 of 1998) that promotes environmentally sustainable development and management.

Concept	*Principle No*	*Description*
LEGAL ASPECTS OF WATER	1	The water law shall be subject to and consistent with the Constitution in all matters including the determination of the public interest and the rights and obligations of all parties, public and private, with regards to water. While taking cognisance of existing uses, the water law will actively promote the value enshrined in the Bill of Rights.
	2	All water, wherever it occurs in the water cycle, is a resource common to all, the use of which shall be subject to national control. All water shall have a consistent status in law, irrespective of where it occurs.
	3	There shall be no ownership of water but only a right (for environmental and basic human needs) or an authorisation for its use. Any authorisation to use water in terms of the water law shall not be in perpetuity.
	4	The location of the water resource in relation to land shall not in itself confer preferential rights to usage. The riparian principle shall not apply.
THE WATER CYCLE	5	In a relatively arid country such as South Africa, it is necessary to recognise the unity of the water cycle and the interdependence of its elements, where evaporation, clouds and rainfall are linked to groundwater, rivers, lakes, wetlands and the sea, and where the basic hydrological unit is the catchment.
	6	The variable, uneven and unpredictable distribution of water in the water cycle should be acknowledged.
WATER RESOURCE MANAGEMENT PRIORITIES	7	The objective of managing the quantity, quality and reliability of the nation's water resources is to achieve optimum, long term, environmentally sustainable social and economic benefit for society from their use.
	8	The water required to ensure that all people have access to sufficient water shall be reserved.
	9	The quantity, quality and reliability of water required to maintain the ecological functions on which humans depend shall be reserved so that the human use of water does not individually or cumulatively compromise the long term sustainability of aquatic and associated ecosystems.
	10	The water required meeting the basic human needs referred to in Principle 8 and the needs of the environment shall be identified as "the Reserve" and shall enjoy priority of use by right. The use of water for all other purposes shall be

		subject to authorisation.
	11	International water resources, specifically shared river systems, shall be managed in a manner that optimises the benefits for all parities in a spirit of mutual co-operation. Allocations agreed for downstream countries shall be respected.
WATER RESOURCE MANAGEMENT APPROACHES	12	The national Government is the custodian of the nation's water resources, as an indivisible national asset. Guided by its duty to promote the public trust, the National Government has ultimate responsibility for and authority over, water resource management, the equitable allocation and usage of water and the transfer of water between catchment and international water matters.
	13	As custodian of the nation's water resources, the National Government shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest, sustainability, equity and efficiency of use in a manner which reflects its public trust obligations and the value of water to society while ensuring that basic domestic needs, the requirements of the environment and international obligations are met.
	14	Water resources shall be developed, apportioned and managed in such a manner as to enable all user sectors to gain equitable access to the desired quantity, quality and reliability of water. Conservation and other measures to manage demand shall be actively promoted as a preferred option to achieve these objectives.
	15	Water quality and quantity are interdependent and shall be managed in an integrated manner, which is consistent with broader environmental management approaches.
	16	Water quality management options shall include the use of economic incentives and penalties to reduce pollution; and the possibility of irretrievable environmental degradation as a result of pollution shall be prevented.
	17	Water resource development and supply activities shall be managed in a manner, which is consistent with the broader national approaches to environmental management.
	18	Since many land uses have a significant impact upon the water cycle, the regulation of land use shall, where appropriate, be used as an instrument to manage water resources within the broader integrated framework of land use management.
	19	Any authorisation to use water shall be given in a timely fashion and in a manner which is clear, secure and predictable in respect of the assurance of availability, extent and duration of use. The purpose for which the water may be used shall not arbitrarily be restricted.
	20	The conditions upon which authorisation is granted to use water shall take into consideration the investment made by

		the user in developing infrastructure to be able to use the water.
	21	The development and management of water resources shall be carried out in a manner, which limits to an acceptable minimum the danger to life and property due to natural or manmade disasters.
WATER INSTITUTIONS	**22**	The institutional framework for water management shall as far as possible be simple, pragmatic and understandable. It shall be self-driven and minimise the necessity for State intervention. Administrative decisions shall be subject to appeal.
	23	Responsibility for the development, apportionment and management of available water resources shall, where possible and appropriate, be delegated to a catchment or regional level in such a manner as to enable interested parties to participate.
	24	Beneficiaries of the water management system shall contribute to the cost of its establishment and maintenance on an equitable basis.
WATER SERVICES	**25**	The right of all citizens to have access to basic water services (the provision of potable water supply and the removal and disposal of human excreta and waste water) necessary to afford them a healthy environment on an equitable and economically and environmentally sustainable basis shall be supported.
	26	Water services shall be regulated in a manner, which is consistent with and supportive of the aims and approaches of the broader local government framework.
	27	While the provision of water services is an activity distinct from the development and management of water resources, water services shall be provided in a manner consistent with the goals of water resource management.
	28	Where water services are provided in a monopoly situation, the interests of the individual consumer and the wider public must be protected and the broad goals of public policy promoted.

Principle 7: "The objective of managing the quantity, quality and reliability of the nation's water resources is to achieve optimum, long term, environmentally sustainable social and economic benefit for society from their use". This principle states that a balance between protection (Chapter 3 of the National Water Act) and utilisation (Chapter 4 of the National Water Act) of the water resource must be establish in such a way that the resource are not damage beyond recovery. Water resource provides various services and must be utilised for the benefit of the people, while the utilisation of the water resource should be managed and impacts controlled to remain within the capacity of the sustainable utilisation in order to protect the resource. Therefore this principle supports the so-called Triple-Bottom Line initiative for sustainable development.

Principle 17: "Water resource development and supply activities shall be managed in a manner, which is consistent with the broader national approaches to environmental management." This principle aligns the water legislation with environmental legislation, and states that there will always be a need for an environmental impact evaluation on any water scheme. The development and use of all water resources will be undertaken in accordance with the principles of Integrated Environmental Management (IEM), published by the Department of Environmental Affairs and Tourism (DEAT). These principles require the assessment of the possible impact of a proposed project, and the design of measures to reduce negative impacts and enhance positive impacts (DWAF, 1997b). This principle also promotes IWRM approach for the water sector by referring to water resource management and supply activities.

Principles 25 to 28 are of utmost importance relating to water services provision and the linkage with water resource management and protection.

3.3.4.4 Integrated Water Resource Management

The IWRM framework and approach recognise those complementary elements of an effective water resource management system must be developed and strengthened concurrently. These complimentary elements include (http://www.dwaf.gov.za/IWRM, 2004):

- ***the enabling environment:*** the general framework of national policies, legislation and regulations and information for water resource management stakeholders,

- ***the institutional roles:*** the roles and functions of the various administrative levels and stakeholders, and
- ***the management instruments:*** these include operational instruments for effective regulation, monitoring and enforcement that enable decision-makers to make informed choices.

Cross-sectoral integration has to occur within and between categories (Figure 3.4). The cross-sectoral integration between water use sub-sectors, and the role of IWRM in their linkages is illustrated in the Figure 3.4 (modified from the Global Water Partnership, 2002 and http://www.dwaf.gov.za/IWRM, 2004).

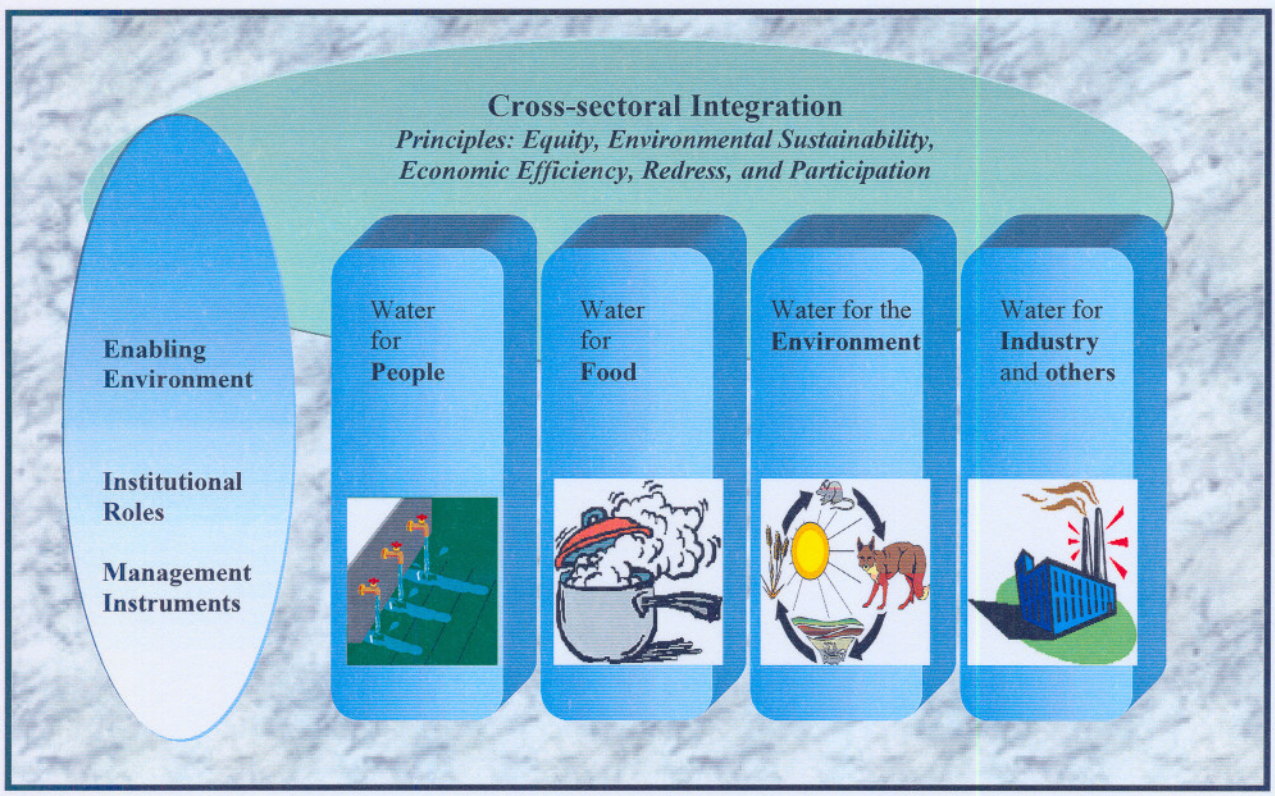


FIGURE 3.4: IWRM guiding principles and complimentary elements that support cross-sectoral integration.

3.3.5 Other sectoral legislation

3.3.5.1 The Environment Conservation Act (Act 73 of 1989)

(i) Introduction

The compulsion to carry out an Environmental Impact Assessment (EIA) for any proposed development was hailed as a major breakthrough in the environmental field and a step long overdue. Such legislation has been in force in many other parts of the world for the last two decades and has significantly reduced the significant environmental impacts of development projects.

The Environment Conservation Act reads with the National Environmental Management Act (Act 107 of 1998) and forms part of the framework of environmental legislation in South Africa. In 1989 the Environment Conservation Act was enacted in order to co-ordinate all matters concerning environmental conservation.

The Minister may by notice in the *Government Gazette* identify those activities, which may in his opinion have a substantial detrimental effect on the environment. Such a list of activities was published on 5 September 1997 (GN R1182 in GG 18261 of 1997). Regulations were issued with regard to matters dealing with environments impact assessment (GN R1183 in GG 18261 of 1997). Sections 21, 22 and 26 and the regulations are repealed by NEMA, but the commencement of this repeal will be on a date as determined by the Minister in the *Government Gazette* (Du Plessis, 1999).

(ii) Protection of Natural Environment (Part III: sections 16-18)

Section 16 makes provision for a competent authority, after consultation with the relevant land owners, to declare any area to be a protected natural environment if in his/her opinion there is adequate grounds for doing so, in terms of such elements as ecological processes, and natural beauty. The competent authority may then issue directions in respect of the area in order to ensure that the general objectives of the Environment Conservation Act (Act 73 of 1989) are followed.

Section 17 provides for the establishment of an advisory committee in respect of protected natural areas. It stipulates who the members shall be and how the committee shall function.

Section 18 provides for the declaration and control of a special nature reserve by the Minister for the purpose of the protection of the environment or special characteristics of such an area. All activities within such an area are strictly controlled, and only scientific or official activities are allowed to take place or the area may be viewed on account of its special characteristics.

(iii) Control of Environmental Pollution (Part IV: sections 19-20)

This act does not deal extensively with environmental pollution and waste management. Water and air pollution is not dealt with as they are addressed in the National Water Act (Act 36 of 1998) and the Atmospheric Pollution Prevention Act (Act 45 of 1965).

Section 19 covers the prohibition and control of littering. Section 20 deals with waste management. This covers the establishment, operation and permitting of disposal sites. The Environmental Conservation Amendment Act (Act 50 of 2003) was enacted in February 2004, to provide for the transfer of the administration of waste disposal sites from the Minister of Water Affairs and Forestry to the Minister of Environmental Affairs and Tourism and to regulate financial matters relating to identified waste types to regulate product control for waste management. The Minister of Environmental Affairs and Tourism is therefore responsible for waste disposal site e.g. classification of waste, handling, storage, recovery, re-use and the permitting and control of disposal sites.

(iv) Regulations (Part V and VI: section 21-28)

Sections 21 and 22 have been provisionally repealed as indicated above, but are currently still in force until such time as the Minister is satisfied they have been adequately replaced with equivalent legislation, possibly within the National Environmental Management Act or at a provincial level. Section 21 deals with the identification of activities, which will probably have a detrimental effect on the environment. Categories of activities are given, which significantly, exclude mining activities. The activities cut across the three environmental media, land, water and air.

Section 26, is in the same position of being provisionally repealed. It deals with regulations regarding environmental impact reports. The Minister or a competent authority is empowered to make regulations for *environmental impact reports* with regard to the identified activities.

In terms of section 24 the Minister may make regulations with regard to waste management. These regulations may cover a wide range of waste management issues, among others for example; waste reduction, recovery or re-use, location of disposal sites, administrative arrangements for the control of disposal sites, and any other matter the Minister deems it necessary to make regulations on.

Section 24 A deals with regulations for littering. It authorizes the competent authority to make regulations with regard to the control of the dumping of litter.

Section 28 deals with general regulatory powers by specifying the minimum that must be contained in any regulations that are made in terms of the Environment Conservation Act. Section 28 A provides for any person, local authority or government institution to apply to the Minister for exemption from the application of any provision or regulation that has been made in terms of the Act.

3.3.5.2 The National Heritage Resources Act (Act 25 of 1999)

This Act introduces an integrated and interactive system for the identification, assessment and management of the natural heritage resources of South Africa and to lay down general principles for governing heritage resource management.

Each state department may not take any action that adversely affects such a resource. Any demolishing of structures older that 60 years or archaeology and/or palaeontological resources, and burial grounds and graves, require a permit from the South African Heritage Resources Authority (SAHRA) or relevant provincial heritage resources authority.

Protection of heritage resources under this Act is based on a grading system in terms of which places and objects, which forms part of the national estate are graded as either grade I, II or III.

Section 5 provides the general principles for heritage resources management and stipulates criteria that must be taken account of with the identification, assessment and management of heritage resources.

3.3.5.3 The Mineral and Petroleum Resources Development Act (Act 28 of 2002)

This act has been promulgated in October 2002, but only enacted in May 2004 and replaces The Mineral Act (Act 50 of 1991). This Act makes provision for equitable access to and sustainable development of the nation's mineral and petroleum resources and states that it will give affect to section 24 of the Constitution.

This Act promotes Environmental Impact Assessments, Environmental Management Plans and Programmes and Chapter 4 deals with mineral and environmental regulation. Sections 37 and 38 deals with Integrated Environmental Management duties of the holder of an authorisation and align responsibilities to the NEMA principles (section 2). Pollution incidents are discussed under sections 45 and 46 and should be read with the National Water Act (section 19) and the National Environmental Management Act (section 30). This Act actually defines sustainable development and promotes the project life cycle process.

3.3.5.4 Other relevant legislation

Responding to requests for environmental information and accessing environmental records held by private bodies and by the state is regulated by the *Promotion of Access to Information Act (Act 2 of 2000)*. The *Promotion of Administrative Justice Act (Act 3 of 2000)* gives effect to citizens' Constitutional right to administrative action that is lawful, reasonable and procedurally fair.

The *Local Government Municipal System Act (Act 33 of 2000)* prescribes that an Integrated Development Plan (IDP) should be prepared as principal planning instruments so as to guide all planning and development in municipalities and supercede all other plans that guided development at local government level. These plans should inform all planning, budgeting, management and decision making in a municipality and should integrate sectoral issues such as roads, water, environment, health and welfare.

The following Acts and Bills should be considered in future, when enacted:

- The Disaster Management Act (Act 57 of 2002);
- National Environmental Management: Protected Areas Act (Act 57 of 2003);
- National Environmental Management: Biodiversity Act (Act 10 of 2004);
- Environment Conservation Amendment Act (Act 50 of 2003);
- National Environmental Management Amendment Act (Act 46 of 2003);
- National Environmental Management Second Amendment Act (Act 8 of 2004);
- Environment Impact Assessment Amended Regulations (GN R764 in GG 26503 of 2004); and the
- National Environmental Management: Air Quality Bill (GN R1109 in GG 25289 of 2003).

3.3.6 Fundamental guiding principles

The state should also support its subject with regard to the application of international law principles such as sustainable development, holism, decision-making, the use of the precautionary principle, the need for rehabilitation, and others.

3.3.6.1 Holism

Legislation requires developers to consider projects holistically, as elements of the environment are interlinked. A small change in a system can be amplified through the whole system. Through public participation better estimates of impacts can be performed.

3.3.6.2 Sustainable Development

The Bruntland Commission accepted the concept of sustainable development as the basis for environmental management. NEMA (1998) followed suite by stating that "development must be socially, environmentally and economically sustainable" and the MPRDA (2002) has actually defined sustainable development.

3.3.6.3 The Precautionary principle

If it is uncertain if a project will cause negative impacts, this principle requires decision-makers to assume that impacts will be detrimental. The responsibility therefore rests with the developer to prove the contrary. The principle rests on the need to recognise that harm to the environment can be irreversible, and therefore it is better to avoid any possible harm than to try to remedy it later.

3.3.6.4 The Polluter Pays principle

The principle entails that a person involved in any pollution activity should be responsible for the costs of preventing or dealing with any pollution caused by that activity. It ensures the remediation of the environment by holding the responsible parties accountable.

3.3.6.5 Public participation

Effective public involvement is an essential component of many decision-making structures, including those for the application of environmental law principles. Effective community involvement is the only way in which the power given to communities can be used efficiently.

3.3.6.6 Life cycle approach (cradle-to-grave)

What is remarkable is the radical extension of liability through the introduction of life-cycle responsibility. This principle reads that "responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle". This principle of cradle-to-grave responsibility (as it is usually called) is extensively accepted and applied in the field of environmental management. In terms of this principle a person never loses the responsibility for its actions. This responsibility exists at any given moment regardless of when responsibility was first established.

3.3.6.7 The Stockholm Declaration

The Stockholm Declaration is regarded as an important basis for the development of international environmental law. The declaration lays down that the States shall co-operate to develop further international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such states to areas beyond their jurisdiction. The Stockholm Declaration created a stimulus for the creation of hard, soft and textbook international environmental law. Firm rules of law, such as *"treaties"*, are classified under *"hard law"* and *"recommendations or declarations"* made by international conferences under *"soft law"*. Soft law rules fix norms of behaviour and can develop into customary law (Kiss, 1997).

3.3.6.8 The greening of investment

The environment has become one of the most important ethical subjects influencing investment. National and international agencies and bodies have adopted green investment policies. This paper stresses the linkage that a healthy environment leads to a healthy economy (Barnard, 1999).

3.3.6.9 The CERES principles

The Coalition for Environmentally Responsible Economies (CERES) lays down good environmental management practices after a major oil and soil spill in Alaska. Substantial moral pressure is brought to bear on companies to subscribe to and comply with these principles.

3.3.6.10 International agreements

Virtually without exception, international agreements prescribe compliance with environmentally acceptable practices.

3.4 SUMMARY

Thirty years ago, in Stockholm, it was agreed to respond urgently to the problem of environmental deterioration. Ten years ago at the Earth Summit, held in Rio de Janeiro, it was agreed that the protection of the environment and social and economic development are fundamental to sustainable development, based on the Rio principles. To achieve such development, a global programme entitled Agenda 21 and the Rio Declaration on Environment and Development were adopted. Five years ago these commitments was reviewed and reaffirmed. At the recent Johannesburg Summit (2002) a common path and targets towards the vision of sustainable development were set with the Johannesburg Declaration and Johannesburg Plan of Implementation.

According to Nel and Du Plessis (2001: 6) a fundamental requirement of both policy statements and principles defined in terms of environmental framework legislation should be the desire to enhance sustainability. Sustainability principles are defined in, *inter alias,* the CERES principles, Agenda 21, Responsible Care, ICC principles for Sustainable Business Development and Caring for the Earth.

The World Commission on Dams (WCD, 2000:202) was established to address the main issues associated with large dams in the context of the international debate on sustainable development. Five core values were identified by the WCD, namely; equity, efficiency, participatory decision-making, sustainability and accountability. These values accord well with key socio-political values as expressed in South African policy and legislation, and in particular for this study, with the water legislation.

The South African Constitution (Act 108 of 1996) read with the Environment Conservation Act (Act 73 of 1986) and its environmental policy. The National Environmental Management Act (Act 107 of 1998) forms the framework of environmental legislation in South Africa. The common law and legislation should be interpreted in the light of these legislative measures. The South African common law and legislation must, however, also be interpreted in the light of the international law, since that international law becomes more and more important as a source of environmental law.

In the administration of environmental law, South Africa shares a common problem with the rest of the world. The many legislative measures that manage environmental impacts are fragmented and fall under the control of a variety of enforcement agencies. As environmental legislation is contained in many Acts of parliament, ordinance, rules and regulations, relevant legislation is difficult to access and conflicting measures are inevitable. The fragmentation of control detracts from effective management and lends itself to either conflicting control or to a complete absence thereof (Barnard, 1999).

In view of the above the author concludes that reasonable measures should be adhered to as set out in section 24 of the Constitution, in section 28(3) of the National Environmental Management Act, and in section 19(1) of the National Water Act to reduce the liability and risk to water resource degradation and pollution.

CHAPTER 4:
AN UNDERSTANDING OF ENVIRONMENTAL MANAGEMENT

- INTRODUCTION
- BACKGROUND
- INTERNATIONAL TRENDS ON ENVIRONMENTAL MANAGEMENT PRACTICES
- SOUTH AFRICAN PERSPECTIVE ON ENVIRONMENTAL MANAGEMENT PRACTICES
- CRITICAL PATHWAY FOR SOUND ENVIRONMENTAL MANAGEMENT PRACTICES
- SUMMARY

CHAPTER 4: AN UNDERSTANDING OF ENVIRONMENTAL MANAGEMENT

4.1 INTRODUCTION

Chapter 4 explains what the concept *"Environmental Management"* means (Figure 4.1). Key milestones towards environmental management in South Africa will be highlighted is section 4.2, while section 4.3 provides a summary of *"international trends"* and section 4.4 of *"South African trends"* with regards to environmental management. Section 4.3 also describes *"Environmental Governance"* and other environmental best practices such as the *"Deming Model (Plan-Do-Check-Act approach)"* and *"SABS ISO 14001:1996 principles on Environmental Management Systems"*. Section 4.4 describes *"Integrated Environmental Management"* and associated *environmental assessment and management tools*. This chapter concludes with section 4.5, giving guidance to *a critical path for sound environmental management practices in South Africa.*

4.2 BACKGROUND

South Africa has a long history of the promulgating various environmental legislation. One can trace this right back to the Dutch settlement at the Cape when attempts were made to prevent the wholesale slaughter of game. In the early part of this century various game reserves were brought into existence as well as legislation regulating aspects of the environment related to agriculture. The three post war decades saw intensified environmental concern and the passing of legislation which dealt with, among other things, marine resources, soil conservation, advertising along roads, water and air pollution, noise, pesticides and nature conservation (Fuggle & Rabie, 1992:19-23). The main feature of this legislation was its piecemeal nature. It tended to deal reactively with problems as they arose.

The real rise in environmental concerns came globally with the increasing environmental crises of the 1960's and 1970's. Until then institutional arrangements were better suited towards regulating the exploitation of the environment rather than its protection. Authorities were used to dealing with the environment in a piecemeal fashion as problems arose, and legislation tended to reflect this (Fuggle & Rabie, 1992).

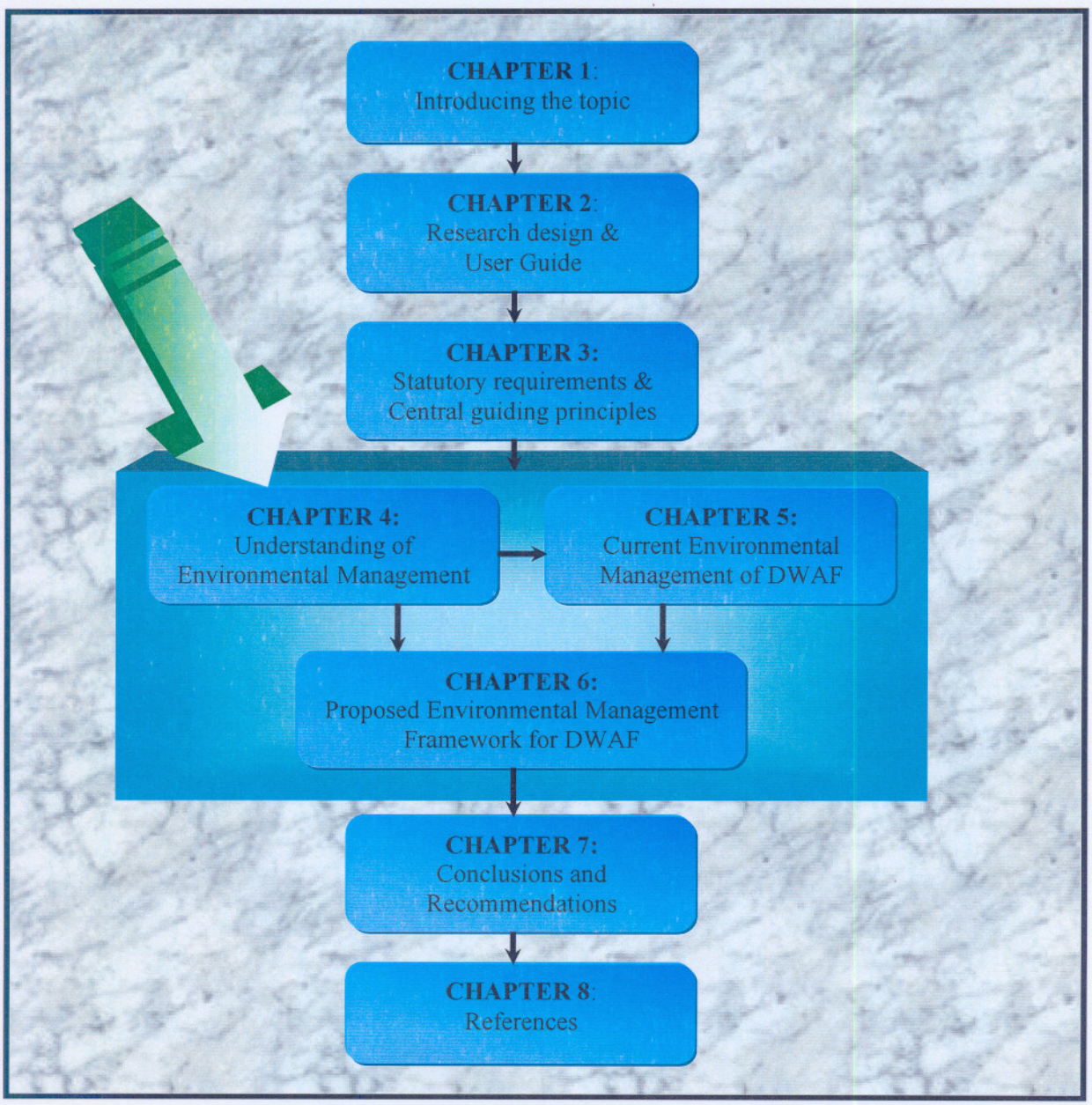


FIGURE 4.1: "Road map" of study: Chapter 4.

A turning point came with the promulgation of the National Environmental Policy Act (NEPA) in the United States of America in 1970. This legislation attempted to establish an institutional framework for the management of human-environment interactions in a holistic manner. Over the next few years' similar legislation followed in other countries, such as Canada, Australia and several European countries (Fuggle and Rabie, 1992).

However, political agendas and economic recession took center stage in South Africa in the 1970's and 1980's and as a result it was almost two decades before a similar framework environment act was enacted. This came in the form of the Environment Conservation Act (Act 73 of 1989). While this legislation lacked many of the elements of NEPA, it was by far the most all-encompassing South African environmental legislation up to that date. A decade later most of the sections of the Environment Conservation Act (Act 73 of 1989) were repealed with the promulgation of the environmental framework legislation, namely the National Environmental Management Act (Act 107 of 1998).

4.3 INTERNATIONAL TRENDS ON ENVIRONMENTAL MANAGEMENT PRACTICES

4.3.1 Background

The concept of *Environmental Assessment* (EA) was getting prominence in the 1970's to describe the evaluation of the potential impacts that a development project would have on the environment. The concept of *Environmental Impact Assessment* (EIA) was born out of a marked desire to balance the environmental interests in the larger scheme of developmental issues and concerns. The development of this tool was spurred on by the inadequacies of earlier techniques and methods in addressing the increasing scale, complexity and uncertainty of development proposals, and public activism aimed at addressing issues pertaining to environmental quality, equity and justice. Since then environmental assessment has become a standard procedure worldwide for the evaluation of development projects (Fuggle & Rabie, 1992).

The era of environmental assessment has resulted in a marked change in the evaluation and design of projects from the 1930's, where projects were largely the domain of engineers, to the 1990's where public participation requirements ensure the full integration of public interest and views into the project planning, design and decision-making process (Table 4.1).

The progression from NEPA in the 1970's to the publication of the "*Our Common Future*" in the 1980's, and to the 1990's has seen significant improvements in both the practice and the science of environmental assessment. These improvements have been necessitated out of identified positive and negative aspects of the process. These aspects are listed in Table 4.2.

TABLE 4.1: Broadening the participation process in project planning, design and evaluation.

Design Team	*Era*
Engineers	1930's
Engineers + Economists	1940's
Engineers + Economists + Natural Scientists	1970's
Engineers + Economists + Natural Scientists + Social Scientists	1980's
Engineers + Economists + Natural Scientists + Social Scientists + Affected People + NGO's	1990's

TABLE 4.2 Positive and negative aspects of environmental assessment (modified from DWAF, 2003).

Positive aspects:	**Negative aspects:**
• Facilitates more informed decision making to include environmental issues • Assists in the selection of alternatives and influences project selection and design • Directs content of formal approvals • Predicts adverse effects	• Inconsistent application locally, nationally and internationally • Operates as "stand alone" process and doesn't recognise the existence of other tools • Weak follow-up following project implementation • Cumulative effects are not properly addressed • Limited or poor public consultation • Voluminous descriptive reports that do not assess impacts adequately • Insufficient process which is considered to be time consuming and costly

In addition to the above-mentioned, it has been recognised that environmental issues should be considered in the planning and policy formulation process and that environmental assessments as currently constituted could not meet these requirements. In order to respond to these identified weaknesses, a tiered approach to environmental assessment and management (in recognition of weak follow-up processes) has been developed (Figure 4.2).

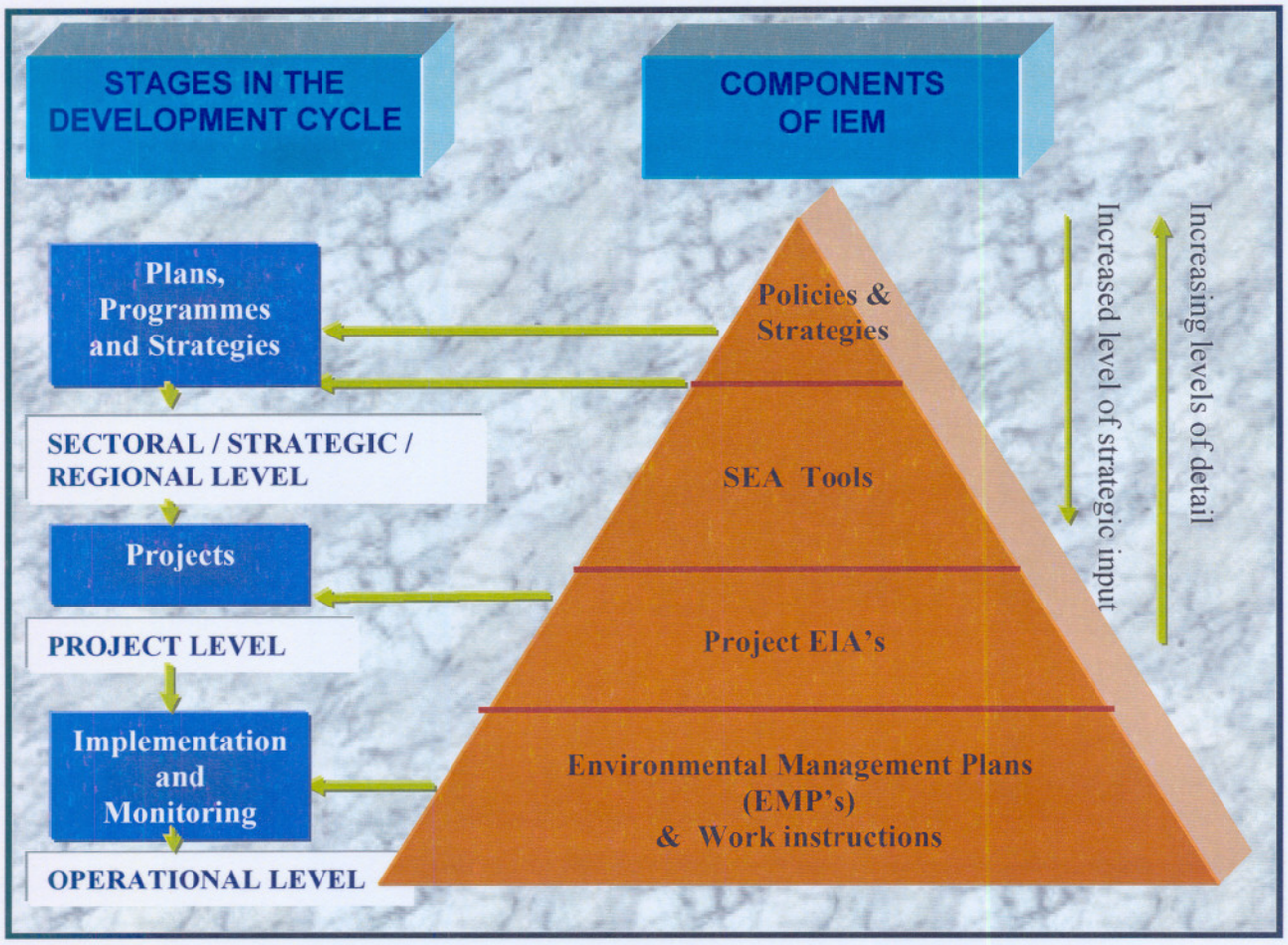


FIGURE 4.2: Tiered approach to environmental management (Top-down / Bottom-up) (DEAT, 2000:12).

The tiered approach recognises that alternative environmental assessment and management tools should be implemented dependent on situation requirements (Figure 4.2). The tiered approach also recognises the relationship between the tools and that, in an ideal sequence, strategic environmental assessment (SEA) should provide detail to inform the project specific environmental impact assessments (EIA's) that should again aide the environmental management process and plans. As currently applied in South Africa, this above-mentioned scenario is not the case.

4.3.2 Environmental Management and Governance

Integrated Environmental Management principles and governance is the outcome of the integration of environmental policies and governance instruments, where sustainability will be achieved through sound management of these instruments (Nel and Du Plessis, 2001:13).

Where as in the past environmental law relied almost exclusively on legislative instruments, sustainable development promotes for a broader mix of instruments in the pot, including "market-based" instruments. Meaning environmental performance will be rewarded. Environmental governance, in general consists of a combination of four instruments, these being: (i) Command and control, (ii) Market-based, (iii) Civil instruments, and (iv) Co-regulation (Figure 4.3).

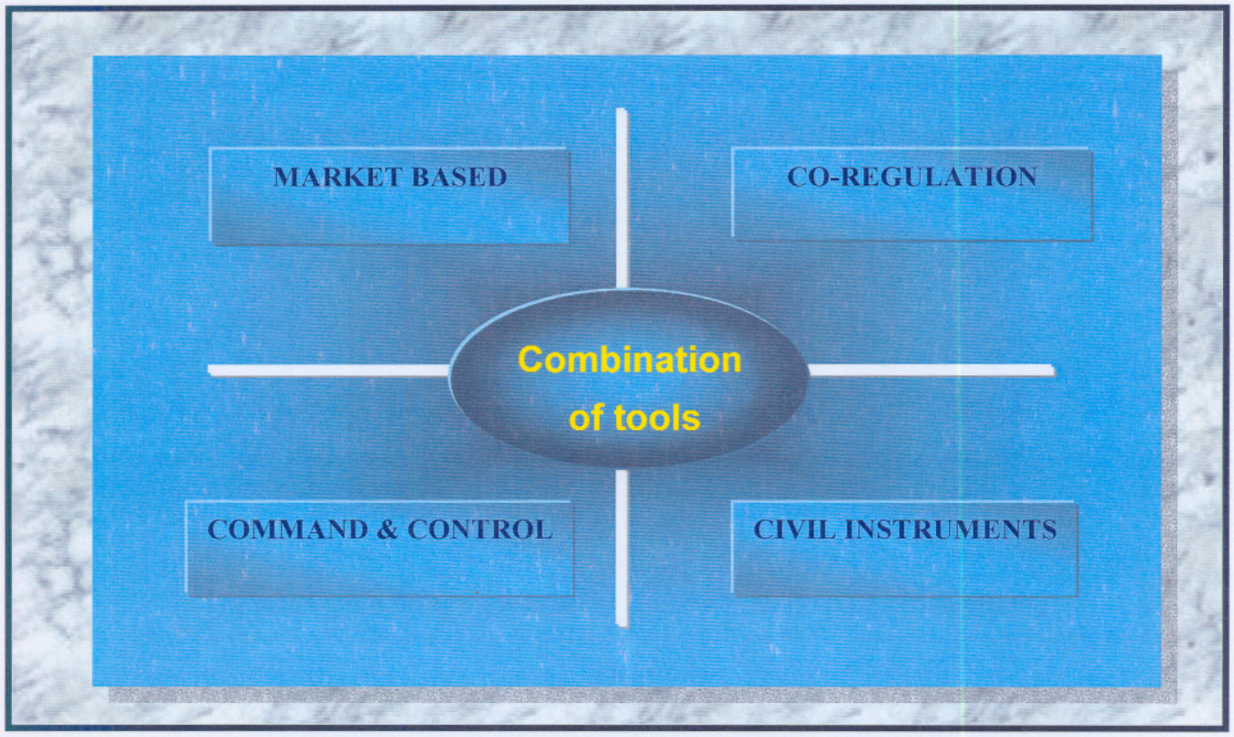


FIGURE 4.3: Environmental management and governance instruments (modified from Nel and Du Plessis, 2001:13 and van Wyk, 2001).

Law establishes opportunities for interventions, such as incentives, disincentives and the creation of management tools. According to Kiss (1997), most economic instruments must be adopted by using legal measures. For example specific taxes on polluting emissions, subsidies to non-polluting activities, the creation of tradable permits for polluting eco-auditing and eco-labeling in general, are results from legal instruments. Legislation was also the pacesetter for distinctive environmental law principles such as the *"polluter pays principle"* and the *"precautionary principle"*. Thus, take the preventive action route and requires that environmental damage should be rectified at source, and that the polluter should pay.

South Africa is shifting away from command and control instruments towards co-regulation and shared responsibility with the promulgation of the NEMA (Act 107 of 1998). South Africa is implementing some elements of civil instruments through participatory process in environmental assessments, but is applying limited market-based instruments.

Command and control instruments, traditionally being used to manage water use, are well developed in South Africa. This approach mainly relies on the water use licensing process, which forms a key component of the water legislation. Integrated Water Resources Management (IWRM) relies strongly on civil instruments, which call for stakeholder participation in all the facets of water management.

4.3.3 Total Quality Management (Deming Model)

Bennet (1993:32) defines Total Quality Management (TQM) as *"a management approach for long-term success through customer satisfaction, which is based on the participation of all members of an organisation in improving processes, procedures, products, services and the culture they work in"*.

The definition reveals several key element of TQM, these being:

- It is a management approach;
- It is a long-term process;
- It involves everyone in the organisation;
- Customer satisfaction; and
- It is based on continual improvement.

Customer satisfaction should be seen in a broader perspective than just suppliers and purchasers, and should include the environment as a customer.

The *"Plan-Do-Check-Act cycle"* (Deming model) is a systematic method for continual process improvement based on the principle that you need to understand a situation or process before you can improve it (Figure 4.4). Team planning and checking phases of the cycle is an essential change in organisational thinking that emphases information management systems (GEMI, 1993:7).

Environmental management theory and practices interface to a large extent with principles of and developments in Total Quality Management (TQM) and has internalised typical TQM principles and elements, which underpin the modern environmental management strategies. The NEMA principles and SABS ISO standards (co-regulation) are based on principles and elements of TQM (PU for CHE, 2002).

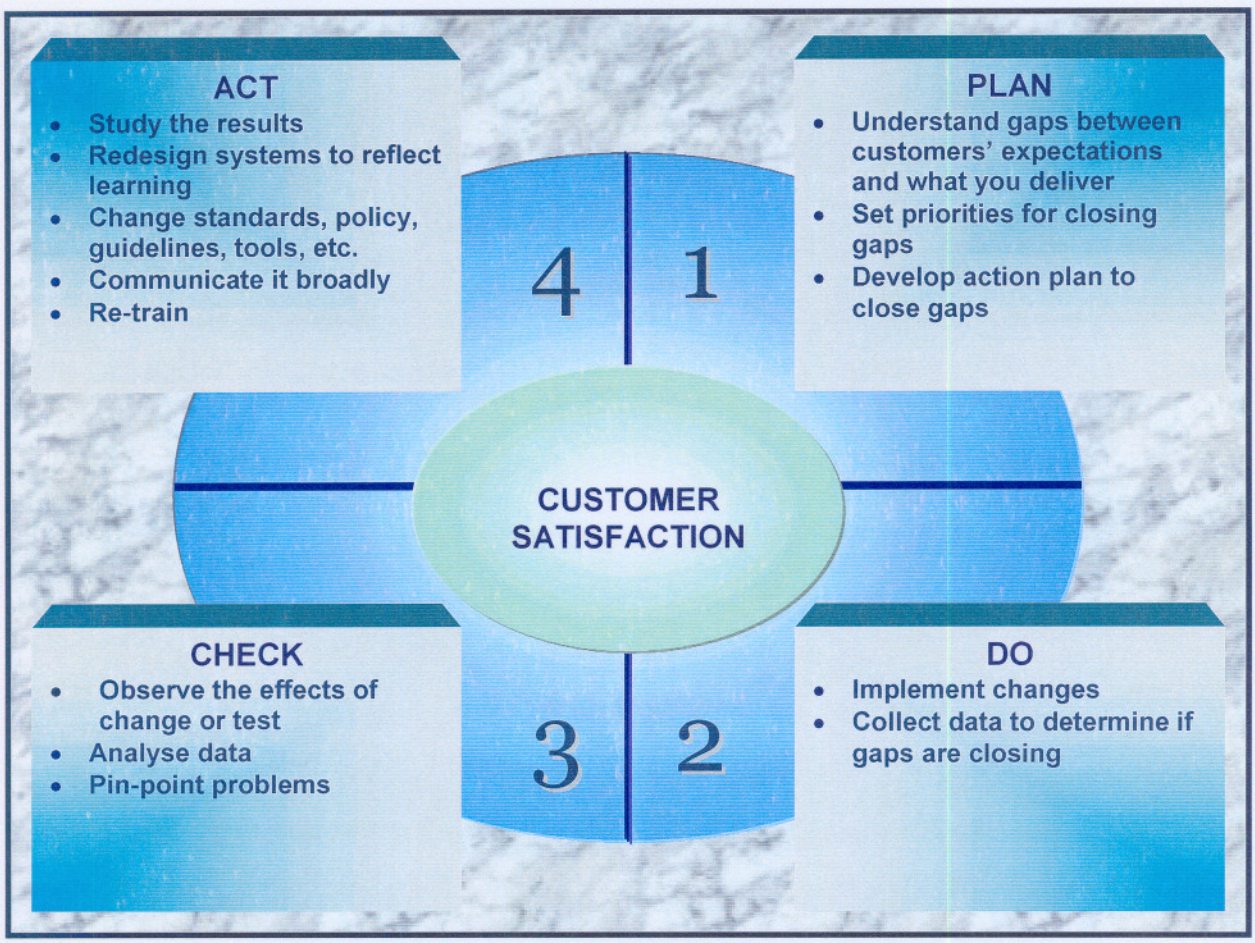


FIGURE 4.4: Deming Model for Total Quality Management based on the Plan-Do-Check-Act cycle (GEMI, 1993).

4.3.4 SABS ISO 14001:1996 for Environmental Management System

4.3.4.1 Environmental Management System (EMS) principles and elements

The EMS model follows the basic view of an organisation, which subscribes the following five principles in Figure 4.5 (ISO 14004, 1996:3-4):

- *Principle 1: Commitment and policy*

  An organisation should define its environmental policy and ensure commitment to its EMS.
- *Principle 2: Planning*

  An organisation should formulate a plan to fulfil its environmental policy.
- *Principle 3: Implementation*

  For effective implementation, an organisation should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.
- *Principle 4: Measures and evaluation*

  An organisation should measure, monitor and evaluate its environmental performance.
- *Principle 5: Review and improvement*

  An organisation should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

With this in mind, the EMS is best viewed as an organising framework that should be continually monitored and periodically reviewed to provide effective direction for an organisation's environmental activities in response to changing internal and external factors. Every individual in an organisation should accept responsibility for environmental improvement (ISO 14004, 1996:3).

4.3.4.2 An EMS is a step towards business excellence

(i) Why a management system (PU for CHE, 2002)

- Functions, responsibilities and accountability are most likely to be lost, neglected, ignored or externalised without a proper management system,
- Opportunity to integrate environmental management with business processes,
- Environmental management performance is ensured in terms of a consistently managed system,
- Auditing of a system provides confidence that the environmental issues are consistently addressed,
- Minimise potential environmental risks and liabilities, and
- Complying with environmental management requirements.

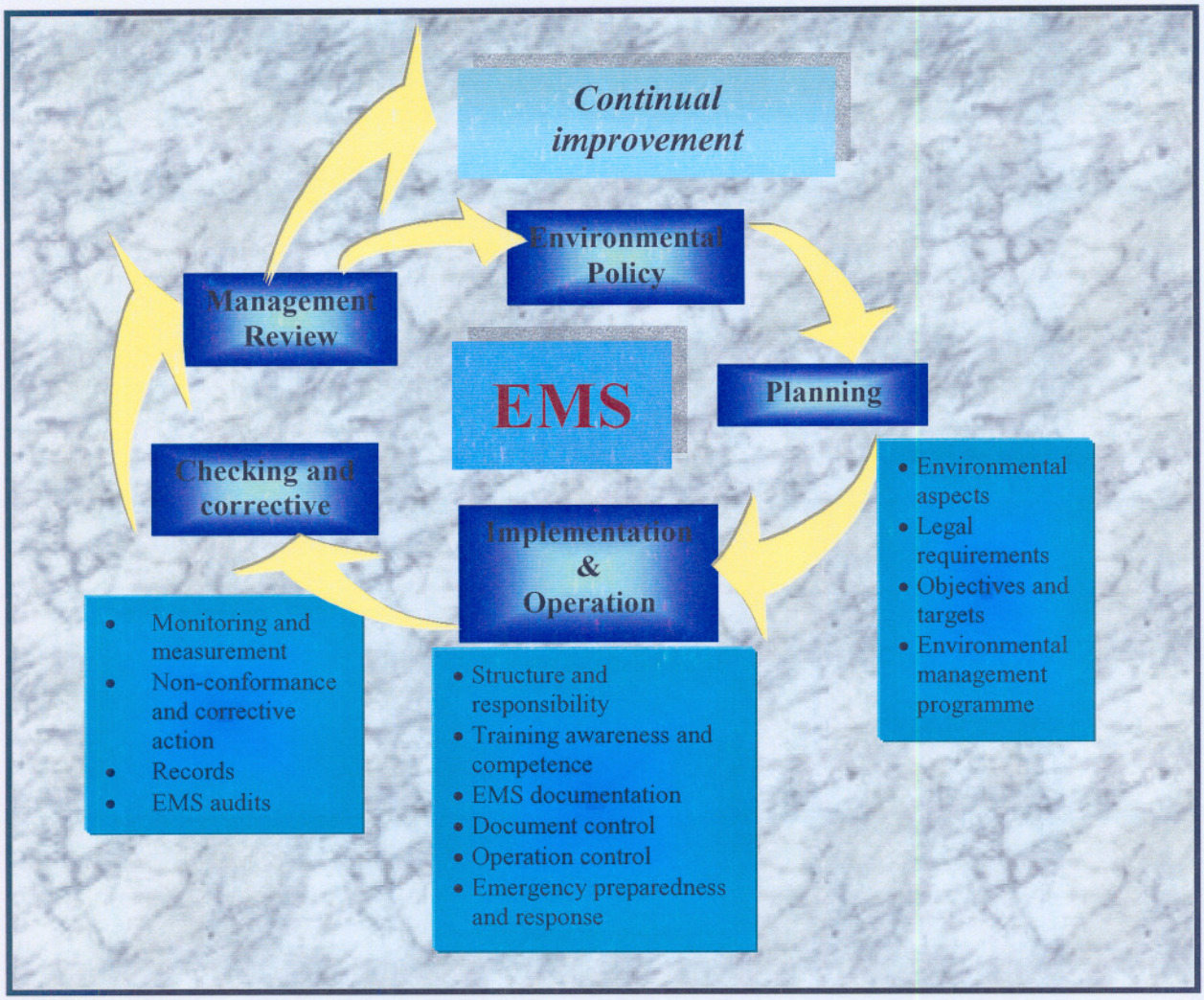


FIGURE 4.5: Overview of ISO 14001 EMS (PU for CHE, 2002).

(ii) Benefits

- Adopting of a rational management system approach to plan, drive and deliver on specific issues in a sustainable manner and adopting continual improvement concept,
- EMS can be based on the Deming model (Plan-Do-Check-Act) approach to manage issues,
- Build management capacity within the organization,
- Allows managers to address their environmental challenges in a constant way for e.g. pollution, waste, uncontrolled resource consumption, risks, and to meet stakeholder expectations,
- An EMS provides managers with assurance of e.g. compliance to legal requirements,
- Improve efficiency in the organisation's environmental responsibilities,
- Raise environmental awareness, and

- Improvement of managing the organisation's non-financial assets.

Change in environmental performance will not happen overnight. A management system will ensure that a pro-active approach will be followed rather than a reactive approach (Figure 4.6).

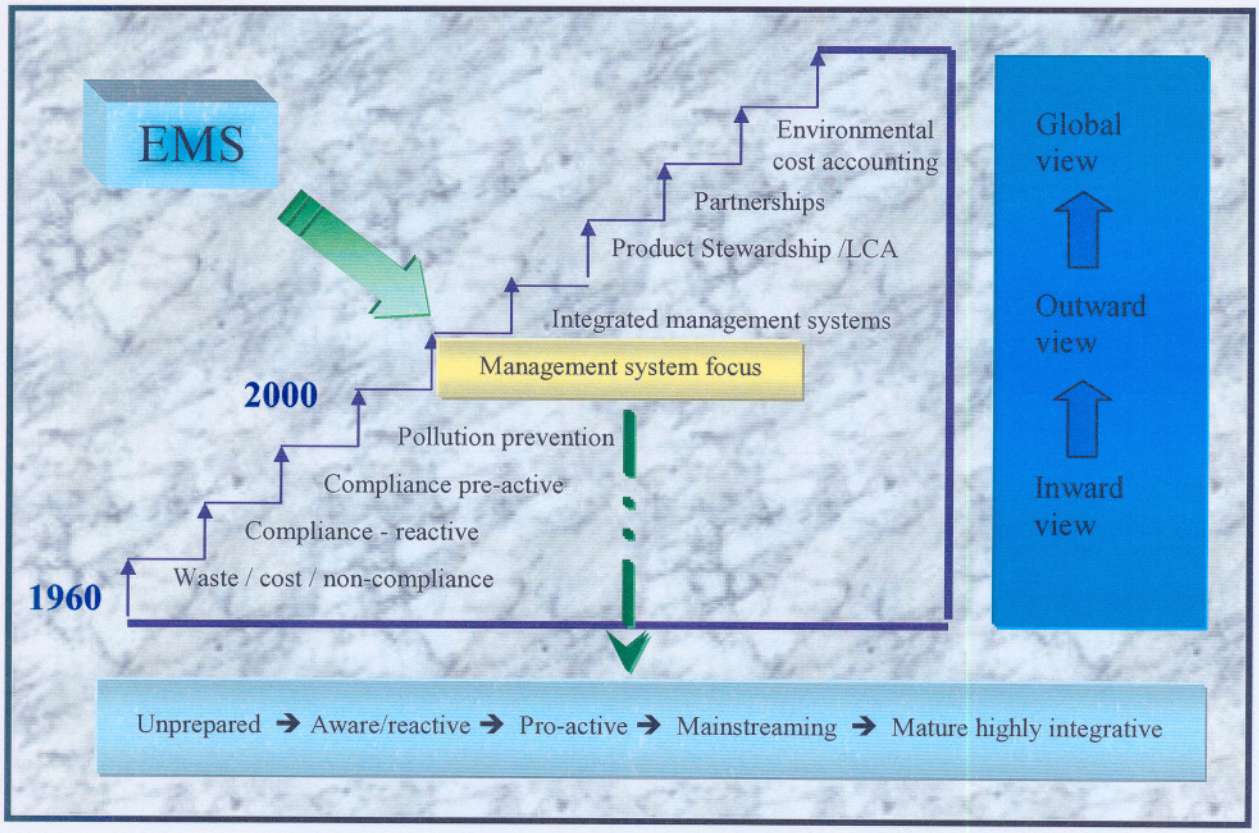


FIGURE 4.6: Step towards business excellence (modified from PU for CHE, 2002).

4.3.5 Parallels between Environmental Management, Environmental Management Systems (EMS) and Total Quality Management (TQM)

The most effective way of comparing TQM with environmental management in general, and with Environmental Management Systems (EMS) specifically, is by means of an explanatory table. SABS ISO 14001 was used as a reference to EMS. Table 4.3 addressed both similarities and differences.

TABLE 4.3: Parallels between TQM and EMS (PU for CHE, 2002)

TQM	EMS
1. P-D-C-A cycle (continual improvement)	Environmental Policy, planning, implementation and operation, checking and corrective action, and management review cycle (continual improvement)
2. Both rely on an Environmental Policy to provide direction and to convey top management's vision with regards to environmental management	
3. Employee involvement is essential	
4. Senior management must be involved and committed	
5. Capacity building, training and awareness creation is an integral part of the entire process	
6. Both are long-term processes	
7. Holistic thinking through customer identification	
8. Provide a competitive edge	
9. Promote sustainable development	

(i) The ISO standards are a fairly straightforward application of the quality model to environmental management (Figures 4.4 and 4.5):

Planning during the EMS includes:

- Initial environmental review;
- Impacts and aspects;
- Legal register;
- Environmental Policy statement;
- Formulation of objectives and targets; and
- Formulation of Environmental Management Programme.

Doing includes:

- Defining roles, responsibilities and authorities;
- Training to achieve objectives and targets;
- Establish communications;
- Establish emergency preparedness and response programmes; and
- Document the system and keep records.

Checking includes:

- Monitoring and measurement;
- Applying corrective and preventive actions; and
- Establishing environmental auditing procedures and programme.

Actions include:

- Correct any identified problems; and
- A periodic management review ensures responsiveness to changing circumstances.

4.4 SOUTH AFRICAN PERSPECTIVE ON ENVIRONMENTAL MANAGEMENT PRACTICES

South Africa adopted the concept of "*environmental assessment*" in the mid-1970 with the constitution of the Environmental Planning Professions Interdisciplinary Committee (EPPIC) which has been operational since 1974 but ceased existence in the late 1990's. A number of environmental assessments were conducted through this period, but it was only in 1992 with the publication of the Integrated Environmental Management (IEM) guidelines series by the then Council for the Environment, that a formal environmental assessment process was recognised in South Africa. In 1997 the Department of Environmental Affairs and Tourism published EIA regulations in support of sections 21, 22 and 26 of the Environment Conservation Act (Act 73 of 1989) that legally enforced the requirement of an environmental assessment process prior to developing certain identified activities. Chapter 5 of NEMA (Act 107 of 1998), section 23, promotes the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities.

4.4.1 The concept of Integrated Environmental Management (IEM) by the Council for the Environment (1989:13)

The environmental implications of all proposed actions which could have significant adverse environmental effects should be subjected to continuous and systematic scrutiny from the early planning phase to the final operational or decommissioning phase. This should take place whether these actions are private or public sector endeavours, and whether they are proposed projects, programmes or policies.

There are four stages in the development process:

- the "*proposal generation stage*", in which possible actions are identified to meet some specific purpose and need;
- the "*assessment stage*", in which these possible actions are investigated and evaluate;
- the "*decision stage*", in which the preferred action is chosen; and
- the "*implementation stage*", in which the chosen action is put into effect.

Integrated environmental management (IEM) is a systematic approach for ensuring the structured inclusion of environmental considerations in decision-making at all stages of the development process. The objective of IEM is not to impede development, but to provide an effective approach, using interactive and iterative evaluation techniques, to improve a proposal, or suggest more environmentally acceptable ways of meeting the purpose and need of a proposal. This will assist the responsible authority in identifying those actions, which will be in the best overall interest of society.

Although some constraints, the concepts and principles stated in the IEM approach proposed in 1989 and the IEM guidelines series in 1992, are still valid and applicable today. For example the activity should follow the project life cycle approach, which should be interactive and iterative. Alternatives should be considered during a participatory process. Environmental impact assessment should be performed on activities that have a certain level of possible significant impact on the environment. These concepts were placed in practice, in South Africa, through the EIA regulations and when the NEMA (Act 107 of 1998) was enacted.

4.4.2 Integrated Environmental Management approach

Integrated Environmental Management (IEM) has been in use in South Africa for some years and is generally widely accepted as an overall guideline for environmental impact management of projects that may significantly affect the environment through pollution and/or resource use. However, the IEM procedure (DEAT, 1992) was as such never legislated and focused on "project specific" developments. The procedure failed to address the environmental impacts on

strategic level decision-making of spatial policies and programmes such as Land Use Zoning Plans, Environmental Management Frameworks, and Spatial Development Initiatives (SDI's).

The IEM is currently being revised to cater for the full range of activities, including development actions such as policies, programmes, plans and projects. The revised IEM procedure will deal with "strategic" level decision-making, according to existing spatial policies, standards, values, norms and criteria, before commencing with "project specific" environmental assessments, and also not focusing on environmental impact assessments (EIA's) *per se*.

The National Environmental Management Act (NEMA) promotes IEM in its Chapter 5. Integrated Environmental Management aims to, amongst others, maintain the environment in good condition for a variety of short and long range sustainable uses and to co-ordinate planning and management of human activities in a defined environmental system, to achieve and balance the broadest possible range of environmental objectives (Table 4.4). IEM provides overarching guidance and a range of instruments (tools) for environmental impact management to monitor and manage activities that generate environmental impacts as presented in Table 4.6 (DEAT, 1998). It is intended to guide the development process by providing a positive, interactive approach to gathering and analysing useful data and presenting the findings in a form that can easily be understood by non-specialists. It is a procedure that is designed to ensure that the environmental considerations are fully integrated into all stages of the development process in order to achieve a desirable balance between conservation and development (Council for the Environment, 1989).

The IEM procedure has been revised to align it with the NEMA (Act 107 of 1998), in order to legislate IEM. EIA is the most often used process within the IEM procedure and the only legislated environmental tool. It is a project specific process, which looks at how a proposed development might impact on the environment, and at how those impacts might be mitigated. In South Africa, the purpose of any EIA is to aid planning, development and decision-making, so as to ensure that positive aspects of a development are maximised, while the negative consequences are kept to a minimum; also to propose solutions to problems that arise from conflicting needs of development and the environment; and to effectively communicate information to decision-makers and interested and affected parties.

TABLE 4.4: Integrated Environmental Management underpins the following principles:

- *Lead agent*
- IEM undertaken to ensure the *highest feasible level of decision-making*
- *"Cradle to grave"* environmental management approach for information used for decision-making in the project life cycle
- *Equity*
- An *open, participatory approach* in the planning of proposals
- *Comprehensiveness* in the consideration of activities and their impacts, tempered by realistic limits on the scope of the IEM process
- Due considerations of *alternatives*
- Focus on *important issues*
- *Integrated planning and environmental management founded on demand management*
- *"Polluter Pays"* principles
- *Environmental sustainability* and *environmental capital*
- *Environmental justice*
- *Access to information*
- *Accountability* for information used for decision-making
- *Compensation* for reductions in the value of environmental resources
- *Due process*
- *Inclusivity*
- Adherence to "*Precautionary principle*"
- *Restriction on alienation of resources*
- Encouragement of *co-regulation, shared responsibility and sense of ownership*
- *Informed, accountable and dynamic decision-making*
- Setting of clearly prescribed *environmental quality goals*
- *Avoidance and management of conflict* of interest

One should cater for sensitive environments, facilitate the incorporation of environmental considerations at the earliest possible stage of the activity and at the highest possible level, and also provide for improved environmental management practices after the impacts have been identified, and advocate the use of a range of available environmental assessment procedures and instruments for sound environmental management.

4.4.3 Environmental assessment and management tools

Environmental tools are different methods or techniques to use so as to achieve the environmental policy goals. Success depends on finding the most effective method for a particular situation. Depending on the situation, one particular tool may be effective on its own, or it may be more effective to combine several tools.

There should, however, be a planning (decision-making), a management, a check and balances, as well as a reporting and communication tool in the project life cycle of a development project. How many tools are used within the different stages depends on the nature and extent of the project (Table 4.6). Table 4.5 describes the characteristics of an environmentally effective tool (DEAT, 1998).

TABLE 4.5: Characteristics of an effective environmental tool.

- Lead to a change in behaviour,
- reduce creation of waste,
- consider life cycles of resources and products,
- not transfer negative effects from one environmental medium to another,
- promote the use of efficient technology,
- promote reuse and recycling,
- encourage efficient and sustainable use of renewable resources,
- protect future resources potential, and
- focus on causes and not on symptoms.

Environmental assessment and management has to be integrated into all phases of the policy, plan and project life cycle. In meeting the specific requirement of sound environmental management, a range of tools have been classified and developed for the planning and feasibility (decision-making), construction and operation (execution/implementation), and decommissioning phases of the engineering life cycle of a project (Table 4.6). The environmental assessment and management tools should be linked to the environmental governance instruments (Figure 4.3) and classified in terms of the Deming P-D-C-A cycle as presented in Table 4.6 and Figure 4.4 and should follow the continues environmental improvement approach as depicted in Figure 4.5 (Nel and Du Plessis, 2001).

4.5 CRITICAL PATHWAY FOR SOUND ENVIRONMENTAL MANAGEMENT PRACTICES

An environmental management and governance system is described below as set out in Barnard, (1999):

TABLE 4.6: Environmental assessment and management tools (modified from Nel, 2002).

PLAN		DO	CHECK	ACT
Analytical Tools & Planning	**Criteria & Standards**	**Management Tools**	**Checks & Balances**	**Report & Communication**
SEA	Sectoral environmental performance standards	SDMS	Environmental monitoring	Environmental reporting
EIA	ISO 14000 family of management standards	Cleaner Technology	Inspection, analysis and records	Environmental communication
SIA	Water Quality guidelines	EIMS	Environmental Auditing	State of the Environment Reports
Environmental Planning	Environmental legal guide	Integrated waste management	Monitoring & Auditing protocol	Public Participation
Emergency Planning	Environmental best practice guideline and specifications	Pollution prevention		Improvement plans
ERA	Groundwater protocol	Emergency detection and response plans		ESM&RS Awareness course
LCA	E-DSS	EMP		CEIMP
Impact & Aspect Register		EMPR		
Cumulative effect management		Rehabilitation Plans		

This proliferation in environmental legislation does have several advantages however. The promulgation of environmental measures reflects the growth in "*environmental awareness*".

There is a change in legislative environmental control from the command-and-control approach to the environmental management approach. The protection of the environment was previously focused on the prevention of environmental degradation. Government departments identified activities detrimental to the environment and passed legislation prohibiting such activities. This is typical of many similar so-called "*command-and-control*" measures also found in legislation dealing with other forms of pollution. The focus in law enforcement was on the pollutive or degrading action.

The new *"environmental management approach"* focuses on a planning approach to avoid environmental degradation. This means that pollution is avoided before it could be caused. Legislation requires such planning in the preparation of environmental impact assessments among others, according to Regulation 1183, and for obtaining permission in principle from other government departments, where necessary. The organisation that introduces good environmental management systems invariably finds that its profits increase. This is a sort of carrot-and-stick approach.

Other environmental management approaches are the use of *"fiscal measures"* and *"economic incentives"*. The basis is to price the use of resources such as water, air, and the soil to such monetary value that the user will find it cheaper to apply the environmentally preferable options. An example is the National Water Act (Act 36 of 1998) that, in certain respect, will allow the market mechanism of supply and demand to determine the price of water. In areas where water is scarce and demand exceeds supply, water can become expensive. The charge discharge charge system applied by DWAF promotes the *"polluter pays"* principle.

Another component to sound environmental management system is the way in which parties that might be affected by proposed developments are involved in decision-making processes. Growing *"community empowerment"* is reflected in the extension of *locus standi* and mechanisms ranging from private prosecutions to measures reducing the risk of legal costs as contained in the National Environmental Management Act (Act 107 of 1998).

Only if an organisation, despite all these measures, still degrades the environment, will the command-and-control mechanism of the environmental management strategy become necessary. The best practice will be a combination of these environmental management and governance instruments, with co-regulation and shared responsibility in the forefront as being promoted by the NEMA.

Once a company has assessed its status, identified its customers and set its improvement objectives, an action plan is needed to begin the process of continual improvement (Figure 4.7). One widely used tool for developing an action plan, is the Deming P-D-C-A cycle for TQM. Elements and principles of SABS ISO 14001 standards for sound environmental management systems and practices are also illustrated and integrated in the process as depicted in Figure 4.7.

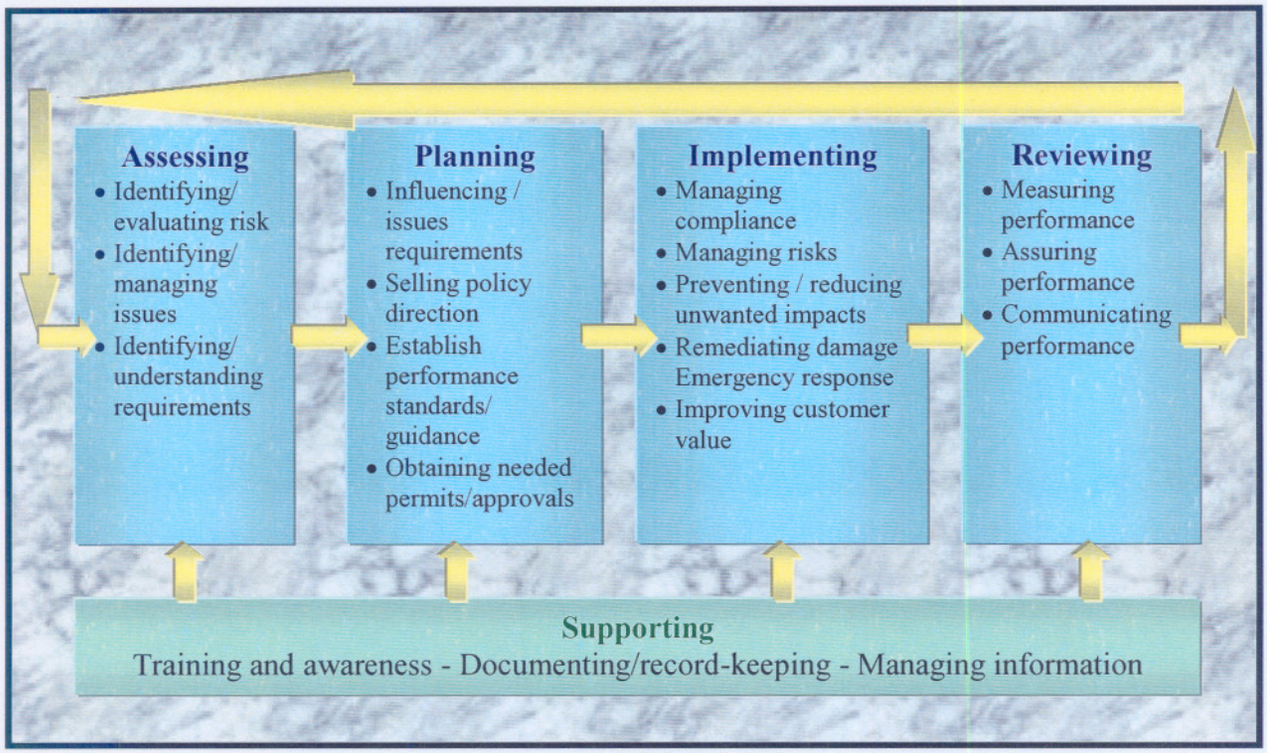


FIGURE 4.7: Environmental management process (PU for CHE, 2002).

4.6 SUMMARY

Adherence to legislation is an integral part of the planning and management process of any business. Legal norms determine the management process from the establishment of a business until its termination and can therefore not be ignored. The unconditional belief that environmental law can solve all the environmental problems is unrealistic, but the total elimination of legal instruments as tools for environmental protection certainly would lead to the collapse of protection.

The concept of Total Quality Management (TQM) does not only aim to promote sustainable development at the project level, but it also benefits any company implementing and maintaining it in the long-term. In order to maintain TQM at the project level, all employees must be involved. Top management must provide direction through the development of an Environmental Policy containing clear objectives. Capacity must be built on a continuous basis at all levels.

The main similarities between TQM and EMS are that both are dynamic processes and lead to continual improvement and business excellence. TQM is in line with the current trends of *"environmental thinking"* namely to integrate and to manage holistically. In working towards a management system and triple bottom line approach will increase the business value of an organization and encourage sustainable business development.

CHAPTER 5: CURRENT ENVIRONMENTAL MANAGEMENT APPROACH OF THE DWAF

- INTRODUCTION
- BACKGROUND
- CURRENT DWAF INTEGRATED ENVIRONMENTAL MANAGEMENT PROCEDURES
- DIFFICULTIES EXPERIENCED WITH CURRENT DWAF-IEM APPROACH
- SUMMARY

CHAPTER 5: CURRENT ENVIRONMENTAL MANAGEMENT APPROACH OF THE DEPARTMENT OF WATER AFFAIRS AND FORESTRY

5.1 INTRODUCTION

The Department of Water Affairs and Forestry (DWAF) endeavored to apply elements of the Integrated Environmental Management (IEM) process to the department's major water related infrastructure prior to the promulgation of the Environment Conservation Act (Act 73 of 1989) and thereafter the establishment of the environmental impact assessment (EIA) regulations in 1997.

New environmental management practices and processes, which received prominence in South Africa, together with updates to South African water and environmental legislation, have necessitated the revision and alignment of the DWAF's existing environmental management procedures with current national environmental assessment and management requirements and international trends.

The need for a departmental integrated environmental management procedure is enhanced by the overlapping environmental requirements of several departmental policies, strategies, guidelines and regulations. For example, but not limited to, the National Water Resources Strategy (NWRS), Integrated Water Resources Management (IWRM), Catchment Management Strategy (CMS), Resource Directed Measures (RDM), Source Directed Controls (SDC), the Stream Flow Reduction (SFR) activities, and the Water Use Licensing System.

This chapter attempts to give a *background* to environmental management practices within the DWAF in section 5.2, while section 5.3 explains the *"current DWAF-IEM procedure"* that is followed to manage the impacts of the development projects with respect to water resources. Section 5.4 highlights the *"difficulties experienced"* with regards to sound environmental management practices (Figure 5.1).

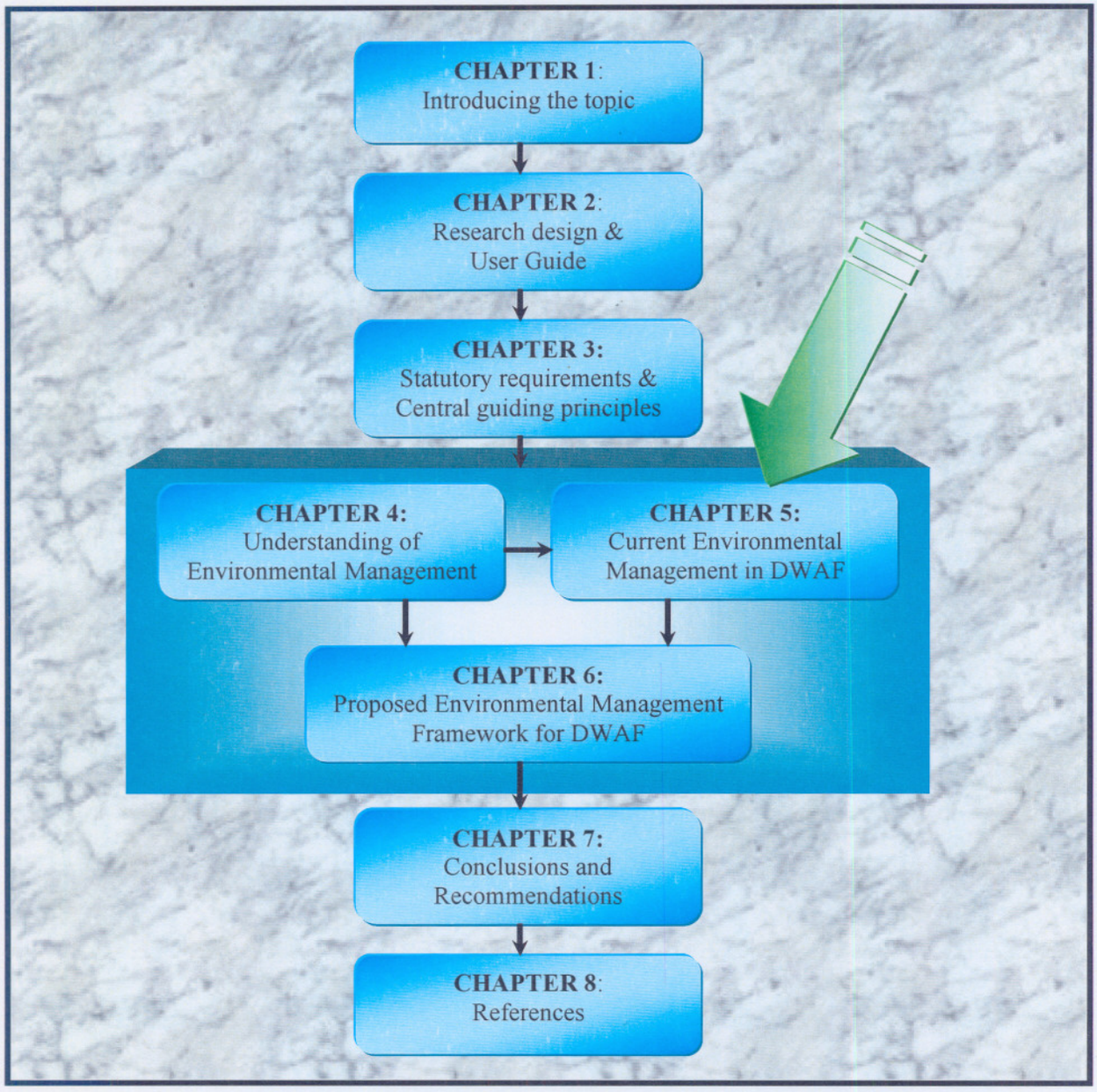


FIGURE 5.1: "Road map" of study: Chapter 5.

5.2 BACKGROUND

The incorporation of environmental considerations into the project planning and design phases was instituted in the 1970's with the Department of Water Affairs and Forestry. During 1978 (last revision in 1989), the Department collated a document entitled "*General Guidelines to rehabilitate landscapes during the planning; design, construction and implementation of projects*". This document was aimed at the mitigation measures necessary during project development rather than as a pro-active assessment of impacts that could result from a proposed development (DWAF, 2003).

Thereafter a document named the "*Guidelines for the practical implementation of integrated environmental management*" was produced in 1986 and revised in 1989. Besides mitigation, the document emphasised those aspects, which environmental implications might have in the different stages of development. The document mainly contained detail of the practical application of implementation during the different elements within IEM. This document was further refined and called "*A Guide to the Process of Integrated Environmental Management as Applied by the Department of Water Affairs*" which was published in 1990 (DWAF, 1990). The IEM procedure, later amended by the Department of Environment Affairs as part of an Integrated Environmental Management Guideline Series in 1992, was followed by DWAF and linked to its own engineering stages for bulk water related infrastructure projects.

During the years 1992-1994, the principles of the procedure were applied to numerous proposed development projects for WRM and various flaws were identified in the IEM procedure, which led again to an amended DWAF IEM procedure. This DWAF-IEM procedure was last amended and documented in 1995 (Louw, 1995). Since then the proposed DWAF-IEM procedure was applied to DWAF's engineering stages, these being: Reconnaissance, Pre-Feasibility, Feasibility, Design, Construction and Operation as presented in Figure 5.2. The efficiency and adequacy of this DWAF's IEM procedure was last evaluated in 1995.

As part of the development of DWAF's IEM procedure, the ROIP (an Afrikaans acronym for Relevant Environmental Impact Prognosis) was developed and the final revised version was documented as a *"ROIP Manual"* in 1995. The ROIP was a tool that described and evaluated the impacts of a proposed development project on the environment at a planning phase of the WRM engineering business process (Louw, 1995).

Since that time a number of documents pertaining to the environment have been published; however, none have dealt with aspects of integrated environmental management. This had led the department to deal with environmental management in a linear fashion, whereby environmental issues were seen as an "add on" rather than an integral part of the department's business processes. As environmental management progressed in South Africa, the linear IEM approach needed to be revisited and replaced with an approach that considers the entire project life cycle in a sustainable manner (DWAF, 2002). The Water Services component has only started about three years ago recognising environmental requirements in their functions.

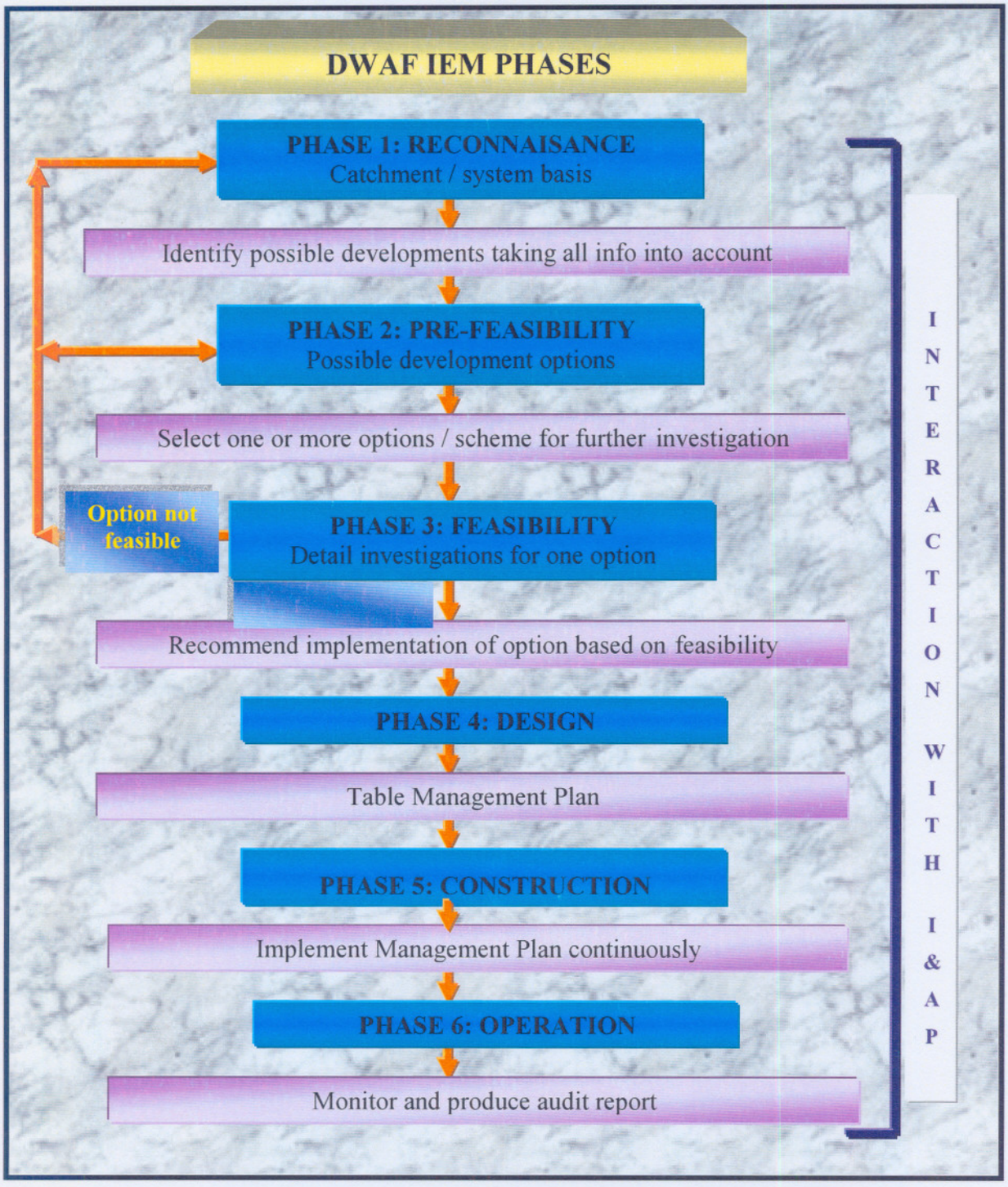


FIGURE 5.2: The DWAF-IEM process for development projects in the WRM functional area (until late 1990's and prior to the EIA regulations) (DWAF, 1990).

5.2.1 The following DWAF initiatives indicate the department's past and ongoing commitment to IEM (DWAF, 2003):

- General guidelines to rehabilitate landscapes during the planning, design, construction and implementation of projects in 1978;
- Formulating departmental procedures for applying the IEM process in 1989;
- Compiling a manual for applying the IEM process in 1990;
- Amending the 1989 departmental IEM procedures to comply with the national IEM guideline series of 1992;
- Amending and documenting the DWAF_IEM procedure again in 1995;
- Developing and documenting the Relevant Environmental Impact Prognosis (ROIP) Manual in 1995;
- Translation of DWAF's IEM procedures into the English language in 2001;
- Environmental legal register in 2002;
- Development of a standardised guideline for Environmental Management Plans (EMPs) for Water Resources Management in 2002;
- Development of a standardised guideline for Environmental Site Management and Rehabilitation Specifications (ESM&RS) for construction sites in 2002;
- Development of an Environmental Impact Management System (EIMS) for water services related projects in 2002;
- Development of a guideline Environmental Management Plan (EMP) for the Limpopo regions for Community Water Sanitation and Supply Projects in 2002;
- Update of legal register and development of Environmental Legal Guide in 2004;
- Development of an Environmental Decision Support System (E-DSS) and associated tools in 2004;
- Development of environmental monitoring and auditing protocol in 2004; and
- Development of environmental best practices guideline and specifications in 2004.
- Revision of the DWAF-IEM procedures and commencing the development of an IEMF for application and implementation at a strategic level for the water sector 2004;

5.3. CURRENT DWAF INTEGRATED ENVIRONMENTAL MANAGEMENT PROCEDURES

The department has followed the DWAF IEM procedure as presented in Figure 5.2 and the ROIP Manual, until the EIA regulations came into effect in 1997. From 1997 the department followed a combination of the EIA process and DWAF-IEM procedure. A formal amendment of the DWAF-IEM procedure was not documented with the new water and environmental legislation that was promulgated since 1995. Although compliance to environmental legislation was adhered to by DWAF, a formal, systematic environmental management procedure and system for ensuring a structured inclusion of environmental considerations in decision-making at all stages of the development process were needed. The environmental management approach informally conducted for DWAF's water resource management development project is presented in Figure 5.3.

5.3.1 Planning phases for proposed development projects for WRM

DWAF's Directorate National Water Resources Planning normally conducts planning investigations at three basic levels, *viz.* reconnaissance, pre-feasibility and feasibility. The pre-feasibility and feasibility investigations may in turn be augmented through bridging investigations in order to ensure that the next level of work, whether further investigation or actual implementation (design and construction), is being supported by all the necessary information required for that particular activity (Geringer, 2002).

5.3.1.1 Reconnaissance phase

The main goal of a reconnaissance investigation is to determine all potential water resources within a particular catchment(s) for future development by considering all available information.

(i) Project development actions

A reconnaissance study is initiated by the Directorate National Water Resource Planning of the DWAF:

- when a water shortage has been identified in an area;

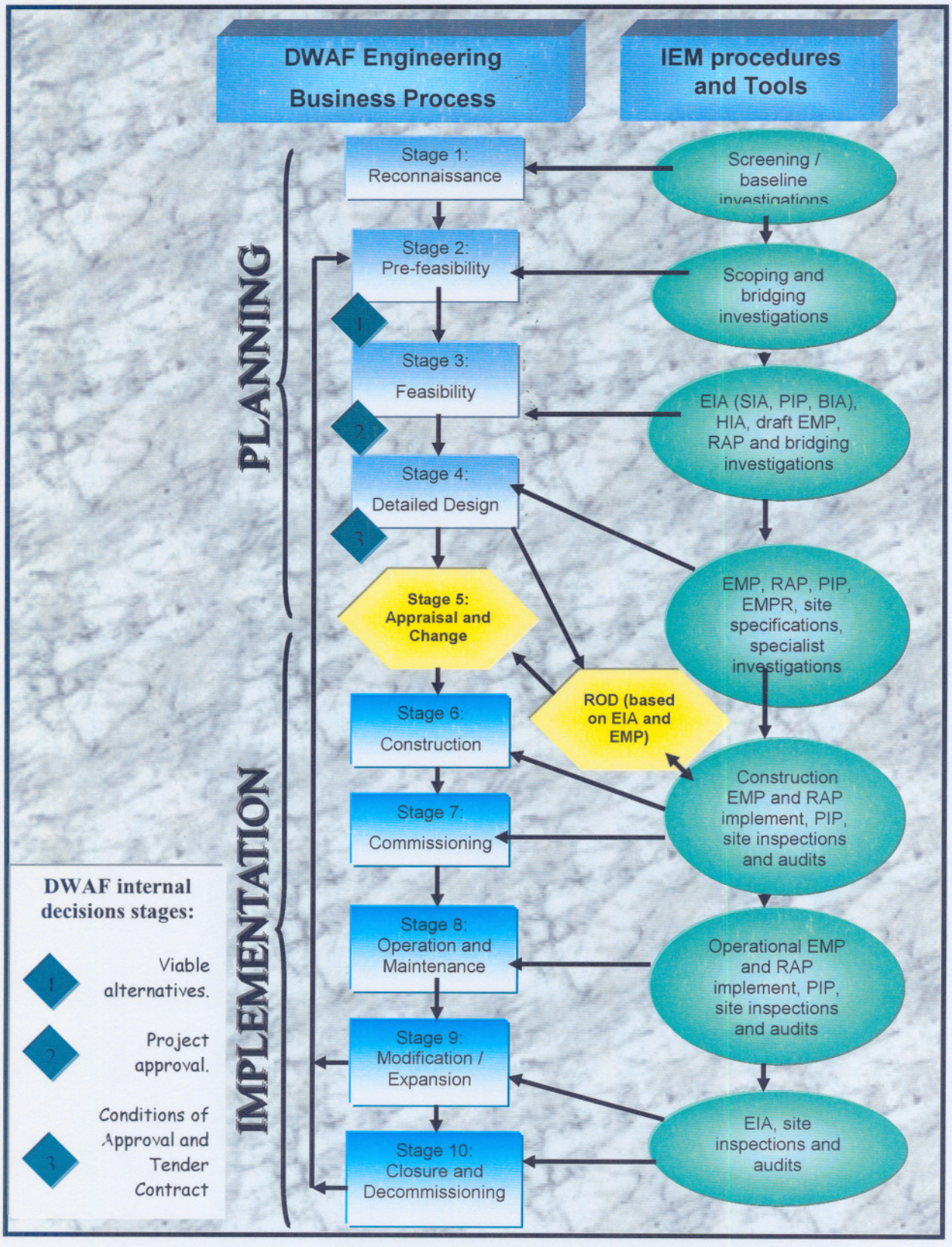


FIGURE 5.3: The current informal environmental management procedure applied for DWAF's Water Resources Management development projects.

- when investigations are necessary to determine whether or not water is available to exploit in a catchment; and
- when there exists a lack of knowledge on the broad water situation in a catchment.

This is normally a *"screening exercise"* to identify potential water resources in a catchment(s) for possible future development. In some cases this could also be referred to as a baseline study, a catchment study, system analysis or a project specific reconnaissance study. Generally this is conducted at a very low level of detail and may or may not be supported by a Strategic Environmental Assessment (SEA). Such a study consists of various covering topics such as soils, climate, vegetation, irrigation, demography, environmental sensitivity, hydrology, geomorphology, possible dam sites, water infrastructure, physical and economic activities, forestation, recreation, tourism and nature reserves, rainfall, water quality and sediment (Louw, 1995). The findings of such investigations are typically utilised for Catchment Management Strategies (CMS) and the National Water Resources Strategy (NWRS).

An engineering consultant is usually appointed to undertake this study which is guided by a Steering Committee, existing of DWAF, other government authorities and non-governmental organisations (NGO's). This type of study can take up to two years.

(ii) DWAF IEM actions

An environmental task group (ETG) is initiated to assist with the compilation of the environmental modules, which forms part of the study. The Terms of Reference (TOR) of the ETG is to ensure that the IEM is applied during all stages of the project. The members of the ETG evaluate all environmental reports and acts as reviewers of the reports and process. The information that should be supplied by the technical reports is the environmental characteristics of the study area and identification of probable sensitive areas. If any project developments are identified during this phase, an initial assessment, from an environmental viewpoint, can be made regarding their acceptability.

The ETG comprises representative of organisations such as conservation agencies, social agencies, authorities involved in nature conservation such as the provincial nature conservation departments and DEAT National and relevant Provincial environmental authorities, DWAF environmental units and the consultants. The representation depends on the nature of the project and the study area. The ETG reports to the Steering Committee (Louw, 1995).

During the course of the study, a process is designed that insures that the public at large is aware of the study and that a forum exists for the exchange of information between the public and DWAF. Public meetings to inform on studies form part of this process.

This reconnaissance study does not necessarily lead to a project proposal or further studies on the proposed development and thus a public participation process is not launched at this stage, in order to avoid unnecessary conflict and not to raise any false expectations with the public. No further environmental actions are undertaken if no project development studies are undertaken.

The environmental information contained in the reconnaissance study should be sufficient to identify whether significant impacts are anticipated for identified development options. The purpose of the *Reconnaissance phase* is thus to identify the red flags or no-go development options from an environmental, technical, and financial point of view. DEAT is part of this process as a stakeholder and invited to the Steering Committee and to form part of the ETG.

The Environmental authorisation process as required by the Environment Conservation Act (Act 73 of 1989) in terms of sections 21, 22 and 26 and the National Environmental Management Act (Act 107 of 1998) in terms of section 24 is not initiated at this stage.

5.3.1.2 Pre-feasibility phase

The main goal of a pre-feasibility investigation is essentially to identify feasible option(s) free of any fatal flaws from both an environment and an engineering perspective that can be investigated further at a feasibility level.

(i) Project development actions

The *pre-feasibility phase* is usually initiated when the reconnaissance study indicates that sufficient water could be available for exploitation. The purpose of the pre-feasibility study is to investigate all possible options.

In the pre-feasibility study, a series of preliminary investigations is undertaken for development option(s) identified during the reconnaissance phase. The results of the pre-feasibility study, should lead to a decision on which option(s) should proceed to the next phase (feasibility phase) for more detailed investigation.

A pre-feasibility investigation utilises the information obtained from a reconnaissance investigation but is normally conducted in a much greater level of detail than the reconnaissance study. Its purpose being mainly to identify and select the most feasible development option against criteria such as the environment (both social and bio-physical), availability and magnitude of water resources, engineering economics, macro-economics, geo-technical features of development sites, regional development, etc. (Geringer, 2002).

This type of investigation also includes a public involvement process (PIP) but at a lower level than that of a feasibility level investigation. These investigations normally include the initiation of an environmental impact assessment (EIA). When it is identified that a particular option will not be feasible from a technical or economic consideration, then an EIA is not required to be conducted for that option. However, should a proposed option appear feasible, an EIA may be required, since this option will be taken forward to the feasibility phase.

The pre-feasibility phase is again steered by a Steering Committee. An engineering consultant is usually appointed as main consultant to undertake this study. The timeframe for the pre-feasibility study is typically six (6) to twelve (12) months.

(ii) DWAF IEM actions

If the pre-feasibility phase was preceded by the reconnaissance phase, the ETG formed at that phase will continue for the pre-feasibility phase. If an ETG does not exist, it will be established. The Terms of Reference (TOR) and role of the ETG is the same as described in the reconnaissance phase, but can be reviewed if necessary (Louw, 1995).

The impact assessment for such an option normally takes the shape of a *"scoping exercise"* based on existing published bio-physical information and local knowledge as well as a quick assessment of social impacts based on available information and a site visit.

Once the preferred option is selected, the impact assessment is intensified for that option in order to improve the confidence level of the assessment, to ascertain that the preferred option will not encounter any fatal flaws, and to identify any shortcomings that would require further work. This work would typically include a Social Impact Assessment (SIA) and a Biophysical Impact Assessment (BIA) but at a lower level than required for a feasibility investigation.

The conducting of impact assessment in pre-feasibility studies follows an iterative process and is designed to minimise the EIA costs for options that may not be feasible and to rather spend money on those options that have a better chance to be selected for further investigation. However, there may be cases where two identified options compete so closely with each other that it is difficult to decide which option is the best alternative. In such a case both the technical and the impact assessment investigation may have to go into much more detail, and it may be a recommendation of the pre-feasibility study to investigate both of them at a feasibility level (Geringer, 2002).

Application for environmental authorisation with provincial environmental authority and the national office of DEAT, and the submission of a Plan of Study for Scoping (also called a Terms of Reference) of the study could start at this phase, depending on the level of confidence of preferred site and financial resources available. A field visit is initiated with the relevant environmental authorities (national and provincial) as the pre-application consultation meeting. The advertisement is published in the media as identifies in this meeting. The relevant environment authorities are invited as stakeholders and members of the multi-sectoral stakeholders committee.

5.3.1.3 Bridging investigations[1]

Some components of the biophysical investigations may be affected by seasonal observations, which may be critical for making sensible recommendations. However, mainly as a result of budget and programme constraints, this work cannot be performed within the scope of the pre-feasibility investigation.

5.3.1.4 Feasibility phase

Recommend a preferred option (s) based on detail environmental and technical investigations

(i) Project development actions

The option(s), recommended in the pre-feasibility phase are assessed during this *feasibility phase*. All aspects of the proposed option(s) are investigated in sufficient depth to enable the decision-maker to make an informed and accountable decision. A final recommendation on the preferred option will be made, and this will be submitted with motivation top management for approval and funding.

The main goal of a feasibility investigation is to refine the scheme configuration and costs and to propose final measures to mitigate environmental impacts. It is not meant to identify any fatal flaws from either engineering or an environmental perspective. This should already have been done during the pre-feasibility investigation. The duration of this phase is typically 9-18 months.

(ii) DWAF IEM actions

This level of investigation is normally done at a great level of detail since it needs to describe the final configuration of the scheme, its environmental impacts, and address issues identified in the pre-feasibility investigation and proposed mitigation measures and the overall costs. The investigation is usually so designed that it will identify all relevant information required for the detail design of the project, including all physical and institutional mitigation measures of environmental impacts (Geringer, 2002).

The application for environmental authorisation from DEAT for a proposed development starts for most of the cases in this phase, if not already initiated in the pre-feasibility phase. During this stage a detailed EIA process is conducted on the proposed development option(s) that comprises the following components:

Social Impact Assessment (SIA):

This identifies all social impacts and recommends mitigation measures with regards to the affected (Geringer, 2002):

- land (for example, land has to be expropriated);

- land owners (will their water abstractions from streams or impoundments be affected; will they have to adopt new farming practices; will they suffer loss of opportunities; etc.);
- businesses;
- communities (retrenchment and resettlement of people due the expropriation of land, relocation of people, disruption of communities and local access links, etc.);
- job opportunities (either lost or created);
- infrastructure (likes roads, telephone and power lines, etc.); and
- archaeological, paleontological, cultural and heritage sites.

It must also address issues such as the utilisation of the water resource for both recreational and commercial purposes, operating rules of the scheme from a social requirement perspective, aesthetics of proposed structures, potential change of local climate due to the development of the water resource, impact of induced seismicity on privately owned local structures, etc.

Apart from the above-mentioned issues related to the completed project it must also address issues related to the construction phase like heavy traffic of construction vehicles, noise, dust and other pollution, influx and accommodation of labour, crime, etc.

These investigations require considerable field work and liaison with I&AP's to ensure the comprehensive capturing of data for the recommendation of reasonable mitigation measures which will also be taken up in the draft EMP. The investigation should also produce a reasonably accurate summary of costs for the mitigation of social impacts. The investigation should also identify any further work that needs to be done but which could not be included in the current investigation due to time and budget constraints. The SIA forms an integral part of the EIA report.

Biophysical Impact Assessment (BIA):

This study identifies all bio-physical impacts and recommends mitigation measures with regards to (Geringer, 2002):

- Wild life (i.e. fish incl. fish and eel passages, amphibians, invertebrates, birds, mammals);
- Botany (in and around the proposed impoundment or scheme, riparian vegetation, etc.);
- Wetlands (i.e. rehabilitation of degraded off-site wetlands to compensate for wetlands that will be inundated; creation of conservation areas; etc.);

- Geomorphology (i.e. associated with dam or river bank erosion, quarries, cuts and embankments, etc);
- Water quality; and
- Reserve and reserve operating rules.

These investigations may require considerable field investigations to ensure a comprehensive capturing of data in order to propose sound mitigation measures that will also be taken up in the draft EMP. This investigation should also identify any further work that needs to be done but which could not be included in the current investigation due to time and budget constraints. The BIA forms an integral part of the EIA report.

Public Involvement Process (PIP):

The public involvement process is designed to inform the general public, interested and affected parties (IAPs) and specific stakeholders about the proposed project and its consequences in order to obtain their comments and concerns and to feed identified issues into both the SIA and BIA for further attention. The PIP process may either continue after the investigation stage and into the implementation stage, or may discontinue if for some reason implementation of the proposed project is to be delayed for a considerable number of years. However, at the end of the feasibility investigation the PIP is captured in a separate volume of the EIA report.

Draft Environment Management Programme (EMP):

Taking cognisance of both the SIA and BIA, a draft EMP is compiled for inclusion in the EIA report. The draft EMP is essentially to aid both the developer (DWAF) and the regulator (DEAT, etc.) with the drafting of a final EMP at the project implementation stage, especially in those cases where the implementation of a project may have been delayed by several years.

Draft Relocation Action Plan (RAP):

The involuntary resettlement requires a resettlement and compensation process. This process is known as the Relocation Action Plan (RAP) or Integrated Compensation Development Plan (ICDP) within the DWAF. Taking cognisance of both the SIA and BIA, a draft RAP or ICDP, depending on project manager or consultant, is compiled as a specialist report.

Broad concepts of this report are incorporated in the EMP, but this resettlement and compensation process is usually only required as a condition of the ROD in order to ensure that those people affected by the development project receives benefit from it.

The work and reports undertaken during the feasibility phase are still a further iteration to assess impacts of actions in more detail. The environmental authorisation process followed as prescribed in EIA regulation guideline document.

5.3.1.5 Bridging investigations[2]

As in the case of pre-feasibility investigations, bridging investigations may also be required for feasibility studies. The recommendations on the proposed mitigation of environmental impacts identified by environmental bridging investigations will normally be captured and referenced in the Environment Management Plan (EMP).

A review of certain issues of the EIA may also be required if a long period passed between the original planning study and the implementation. The final environmental impact report (EIR) is submitted to the relevant environmental authorities for the Record of Decision (ROD). When the environmental authorisation has been issued DWAF places an advertisement in the local newspapers, in terms of Regulation 1183 of the Environment Conservation Act, inviting appeals against the authorisation of the project (30 days response time required).

In terms of Section 110(b) of the NWA, DWAF publishes a Notice in Government Gazette inviting comment on the proposed scheme (minimum 60 days response time). DWAF starts to secure funds to construct the preferred scheme.

DWAF should also at this stage apply for all necessary licenses for water use (to impound, to expand abstraction works, etc.). DWAF should also initiate the Reserve determination process, if the Reserve has not been determined and classified, yet.

Other environmental authorisation processes, except that of DEAT, should be initiated, for example when borrow pits and stockpiling activities is planned during construction then an Environmental Management Programme Report (EMPR) needs to authorised by Department of Minerals and Energy (DME) before construction commences.

A Heritage Impact Assessment (HIA) needs to be conducted and authorised for archeological, paleontological and cultural sites by SAHRA before construction commences.

5.3.1.6 Design phase

Undertake investigations for detail designs and environmental specifications. Table an Environmental Management Plan (EMP) and Environmental Site Management and Rehabilitation Specification (ESM&RS) within the Tender Contract

(i) Project development options

Detailed engineering design for the project proceeds, taking into account specific requirements identified in the previous DWAF-IEM phase. Contract documents are finalised in preparation for construction. An operation manual for proposed operation of the project is also initiated. The timeframe of this phase is typically 9-18 months.

For the development of a dam an approved professional person (APP) is appointed to supervise the design of the dam, in terms of Dam Safety Requirements, section 119 of the National Water Act (Act 36 of 1998).

(i) DWAF IEM actions

Finalise the EMPs for both construction and the later operation of the scheme. This may include monitoring actions. EMP for construction should be finalised before construction commences and should be captured in the contact document.

The department has developed an *Environmental Site Management and Rehabilitation Specification* (ESM&RS) protocol for construction sites which should be read in conjunction with the South African Bureau of Standards (SABS) Standardised Specification for Civil Engineering Contacts. This specification covers the principles, responsibilities and requirements generally applicable to implement effective environmental management during the execution of any construction contract and is incorporated in the EMP. At this stage the RAP is also finalised and included to the EMP.

When DEAT approve the Construction EMP, and the associated specifications, DWAF issues a directive to construct. In the case of a dam, DWAF prepare a design report and obtain a license to construct, in terms of the Dam Safety Regulations of the National Water Act.

5.3.2 Implementation phase for proposed development projects for WRM

This is normally followed by the implementation stage during which the information collated by the feasibility investigation and any subsequent bridging investigations is taken further to set the necessary wheels in motion in order to implement the recommended mitigation measures. However, during the implementation stage further investigations may be required to deal with issues ommitted during the feasibility and subsequent bridging investigations or only identifiable through detail design (Geringer, 2002).

5.3.2.1 Construction phase

Implement and Manage the Construction EMP

(i) Project development actions

During this phase, the proposed development is constructed and the operation manual is finalised. In the case of a dam, appoint an approved professional person (APP) to supervise construction and also prepare a construction completion report.

DWAF prepare scheme operation rules, and in case of a dam, must submit an *Operation and Maintenance Manual* for the dam to the Dam Safety Office of DWAF. A license is required to start impounding, in terms of the Dam Safety requirements of the NWA from the DWAF Dam Safety Office.

(ii) DWAF IEM actions

Perform all requirements as set out in the Construction EMP and submit the EMP for scheme operation to relevant environmental authorities. On-site investigations are conducted for compliance with specifications as specified in the ESM&RS protocol and tender documents. The resettlement and compensation process as specified in the RAP is initiated at this stage.

DEAT should check whether requirements of the EMP have been complied to. This usually does not happen due to capacity constraints and the DWAF in-house environmental specialist fulfills this function, *via* site inspections. DEAT should also approve scheme's Operation and Maintenance EMP.

5.3.2.2 Operation phase

Implement and Manage Operational EMP. Monitor compliance for EMP and compile Audit reports

(i) Project development actions

The operational and maintenance manual guides the operation of the project. It will include provision for managing the natural environment. DWAF or its appointed Agent operates the scheme in accordance with the approved scheme operating rules. Implement a 5-year dam safety inspection programme and ensure adherence thereto, in terms of Dam Safety Requirements of the National Water Act.

(ii) DWAF IEM actions

DWAF implements the scheme's operation and maintenance EMP. Site inspections are performed to monitor compliance to EMP *via* in-house environmental specialists or an appointed Environmental Control Officer (ECO).

5.3.2.3 Decommissioning phase

Closure and Rehabilitation of scheme

According to Geringer (2002) the decommissioning of existing DWAF dams is often mentioned but one comes under the impression that this matter has not yet been clearly thought through. The following entails possible reasons for the decommissioning of a dam and criteria that should be considered during this phase (Geringer; 2002):

- *A dam may become completely silted up and loose its usefulness*;
- *The structural safety of a dam may become so inhibited that it cannot be repaired and need to be demolished*;

- *The water quality of a dam's impoundment may deteriorate to such an extent that the water from the dam cannot be utilized anymore;*
- *The usefulness of the dam as a water resource may have become redundant due to a subsequent water resource development supplying water more cheaply and at the same time offering a greater water availability at higher assurance of supply; and*
- *A redundant dam that has outlived its purpose may have to be demolished for environmental reasons.*

It is anticipated that the decommissioning of dams may be subject to several legal requirements, the Dam Safety Regulations in terms of the NWA being only but one. The EIA process and a close-out audit are required at this stage within DWAF. Decommissioning of dams is a rare phenomenon within DWAF.

5.3.3 Planning and Implementation phases for proposed development projects for Water Services functions

The Department of Water Affairs and Forestry (DWAF) has indicated commitment to sustainable development through the legislation and policies that it has developed and implemented. In order to give effect to this commitment, the Department has among other strategies, undertaken to develop tools to assist the water sector in managing the implementation of water services projects and related activities in an environmentally sustainable manner. The tools are intended to operationalise existing policy and legislation. The so-called *Masibambane sector support programme* forms part of this overall strategy. Through theme two (2) of the programme, namely; service delivery, the impact on the environment of both abstraction of water for services delivery, construction of infrastructure and the accommodation of wastewater and industrial effluent into natural waters, as well as the impact of on-site dry sanitation, is being taken into account.

Many of the larger water related projects fall within the listed activities for which a compulsory environmental impact assessment is required. These listed activities and the process to be followed, when seeking authorisation to undertake them, are described in the EIA regulations 1182-1184 issued by the Department of Environmental Affairs and Tourism (DEAT) under sections 21, 26 and 28 of the Environment Conservation Act (Act 73 of 1989). However, many of the activities undertaken for the purpose of water services delivery are not listed activities under the current EIA regulations but nonetheless have the potential to have a detrimental impact on the environment.

The water services provisioning function of the Department of Water Affairs and Forestry (DWAF) has been transferred to local government and it includes the construction, development, operation of infrastructure. The DWAF remain the water sector leader and regulator. Therefore DWAF will with regard to water services delivery activities monitor and audit compliance to the protection of the water resource in respect of section 19 of the National Water Act (Act 36 of 1998). Water Services component will also provide a supporting role to local government in developing necessary protocol, systems, tools and guidelines to assist in environmental management obligations and provide the necessary training.

A generic Environmental Impact Management System (EIMS) and associated environmental assessment and management tools have been developed to assist the officials of local government in the management and monitoring of potential negative environmental impacts of non-listed water services related project and activities. The proposed Environmental Impact Management System (EIMS) takes in consideration the environmental needs of a project throughout its life cycle from a systems viewpoint. It provides a mechanism and tools for ensuring that the environmental impact assessments provide timely and reliable information to inform decision-making at the various stages of the project cycle, as well as ensuring a systematic follow-up on decisions for long-term protection of the environment, and the water resource in particular (DWAF, 2002). The EIMS, however, is under revision and has as yet not been tested or implemented.

A monitoring and auditing protocol, nodes in the project life cycle and checklists were developed to support the EMF to assist the department in its regulatory function with regards to water resource protection.

5.3.4 Resource Protection in terms of the National Water Act (Act 36 of 1998)

One of the cornerstones of the National Water Act (Act 36 of 1998) is the commitment to protect the water resources, which is reflected in three main aspects:

- Protection of the basic human needs (water quality and quantity);
- Protection of aquatic ecosystems in order to ensure ecologically sustainable development and utilisation, and
- Protection of the water quality requirements of water users.

The protection of water resources is fundamental related to their use, development, conservation, management and control. Series of measures are incorporated to ensure the comprehensive protection of all water resources. The resource protection approach integrates two key features. These are *resource-directed measures* for protection, which entail focusing on the water resource, as an ecosystem, and setting clear objectives that represent the desired level of protection for the resource. Objectives are set for resource quality, which encompasses not only the water quality, but also the water quantity, habitat integrity and biotic integrity, which are necessary for maintenance of a healthy aquatic ecosystem (Table 5.1).

Secondary, there are *source-directed measures* or *controls* as presented in Table 5.1. These include a wide range of regulatory measures, which are focused on the *sources of impacts* on water resources and which are intended to control impacts such that the objectives for resource protection are achieved. Source-directed controls encompasses requirements for end-of-pipe quality of point source discharges, requirements for on-site management practices, and requirements for clean-up and rehabilitation of water resources, which are implemented through, *inter alias*, incorporation in license conditions.

These resource protection measures should be aligned with the IEM procedure of NEMA and the proposed Environmental Management Framework (EMF) of DWAF.

Table 5.1: Protection of the water resource will be achieved by applying a suit of Resource-directed and Source-directed measures.

Resource-Directed Measures (RDM) *(Quantification of resource characteristics required for a given level of protection)*	**Source-Directed Controls (SDC)** *(Quantification of limits on impacts for given level of protection)*
• Classification of water resources within a prescribed classification system; • Resource quality objectives (RQO); • The (ecological) Reserve.	• Waste (effluent) standards; • Best management practices; • Economic incentives and penalties; • Stream flow reduction and controlled activities; • Preventing and remedying the effect of pollution; • Control of emergency incidents.

In particular the Reserve determination should be aligned with the engineering business process of development projects and the life cycle approach. For example the recommendations on water releases from a dam, in order to mitigate some impacts on the downstream river regime, should be taken into account in the infrastructure design, the upstream and downstream water quality and the operating rules. These recommendations could have either social or biophysical impact implications or both. Large dams should be designed, modified and operated to provide for environmental flow releases to help maintain downstream ecosystem integrity and community livelihoods.

The preparation of a Reserve determination should run concurrently with the environmental authorisation process, and water use licensing process, where as the results of these studies will compliment each other and strengthens accountability of these processes and also avoids duplication of work, which will ultimately have a cost implication.

5.4 DIFFICULTIES EXPERIENCED WITH CURRENT DWAF-IEM APPROACH

The current environmental management processes within the department is fragmented and inconsistently applied, not only for development projects but also for other DWAF functions and activities. There are currently two different environmental procedures and systems applied for Water Resource Management and the Water Services functions. This leads to stakeholder confusion on when to utilise what process. Lessons learnt from a project are not documented to improve on in the next project.

The current environmental legislation and consequently the DWAF's IEM approach focus mainly on the environmental impact assessment (EIA) process, and do not make use of other environmental assessment and management tools. These results in that mostly the planning component of the project life cycle is considered and minimal time and effort is place in considering the environment on the implementation and management components of the project.

The current approach do not consider parallel environmental authorisation processes of other government departments than that of the DEAT soon enough, such as the Environmental Management Programme requirements for borrow areas and stockpiling of the Department of Mineral and Energy Affairs (DME). Without these authorisations's constructing activities of the project may not commence, resulting in a delay of the project and cost implications (Table 5.2).

Further to the above-mentioned it is an accepted fact that various delays occur with the planning and implementation of DWAF water resource development projects and as a consequence thereof the DWAF faces the possible de-registration of a project in terms of Regulation 1183 if the status of the project is not reported on a 3-monthly basis to the national and provincial DEAT. This puts an unnecessary administrative burden on DWAF's finite number of staff.

The DWAF planning investigations can be delayed by several years due to several causes, e.g. new information becoming available, new issues arising during the course of an investigation, proposed developments in adjacent catchments, contractual problems experienced with consultant, and study budgets being reduced. The implementation of a project can be similarly delayed for years (Geringer, 2002).

Table 5.2: Difficulties experienced within the current DWAF-IEM procedure (modified from Geringer, 2002).

STAGES	DIFICULTIES EXPERIENCED
Planning and approval of water related infrastructure	There is a need for earlier involvement of the DEAT national and provincial in the planning of DWAF bulk water supply projects than that of late pre-feasibility or at feasibility stage. Although DWAF is responsible for the development and provision of bulk water related infrastructure, a stronger link should be established between the DWAF, local authorities and provincial environmental departments at all stages of the water service delivery process in the planning stage. Provincial environmental departments have a role to play in giving technical advice. Conflict in interpreting the National Water Act as related to minor- and emergency works where an EIA is not considered necessary in term of the National Water Act. DEAT legislation does not make provision for these exceptions. Agreement needs to be reached on which Act takes precedence in the case of emergency and small-scale bulk infrastructure. These conflicting interpretations can lead to a situation of environmental mismanagement, resulting in an acceleration of environmental degradation. Although not bulk water infrastructure, farm dams are also regulated by DWAF and the relevant environmental authorities. The involvement of local government is not yet clear. The significance of this activity in terms of its potential impact on wetlands, watercourses and downstream water users necessitates its inclusion.
Design of infrastructure	Planning and design should be more inter-linked. The EMP and site management and rehabilitation specifications are not consistently applied to development projects. Environmental requirements are not comprehensive enough incorporated in the tender contract.
Implementation of infrastructure	Post-implementation monitoring and auditing is inconsistent and rather on an *ad hoc* basis within DWAF. Penalties and incentives to be built in the tender contract with regard to environmental compliance and performance. Provincial authorities to play a more proactive role in monitoring compliance with mitigation measures. EMP's are not monitored on a regular basis for compliance.
Operation and maintenance of infrastructure	Currently, the role of provincial environmental departments is limited to reviewing EIA applications, making recommendations for mitigation measures in the Record of Decision and monitoring the implementation of these mitigation measures. There is scope for greater involvement in the longer-term monitoring of environmental management plans of bulk infrastructure projects. Monitoring of compliance with Reserve requirements needs attention

5.5 SUMMARY

During the last three to four years the project life cycle approach was informally followed during the development projects of the Water Resource Management functional area, although not formally adopted and documented by the DWAF.

Environmental management was applied through complying with environmental legislation as required in the ECA (Act 73 of 1989) and the NEMA (Act 107 of 1998). EIA management and project management functions are integrated in order to consider the interface between human science and technology on the environment, people and their health.

Effective integration of project management schedules with the possible required EIA schedule is important to minimise any risk resulting from the loss of synchronisation between these schedules. Construction may not commence before and Record of Decision (ROD) has been authorized by DEAT. Another possible risk is that a project may be delayed due to possible environmental specialist studies required by DEAT.

Managing the impacts of development projects from cradle to grave, typically consists of several phases within DWAF, namely: (1) reconnaissance or project proposal, (2) pre-feasibility (3) feasibility, (4) design, (5) construction, (6) commissioning and (7) operation, and (8) decommissioning (closure). Where as the *planning and decision-making components* consist of the reconnaissance; pre-feasibility; feasibility; and design phases and the *implementation component* consist of the construction; commissioning; operation and maintenance; expansion and modifications; and finally the decommissioning phases. On the other hand, an EIA consists mainly of three phases, namely: (1) the application for authorisation, (2) the environmental scoping report, and finally (3) the environmental impact report (EIR). Ideally, the EIA must be completed before basic engineering of the project is initiated. This allows the I&AP's to comment on the proposed project and project alternatives during the public involvement process. Normally, development projects initiated at DWAF such as construction for weirs, canals, etc. progress to a phase (2) (scoping report) and bulk water infrastructure projects progress to a phase 3 (EIR) of the EIA process (Figure 5.4).

At a project level, the IEM principles have been aligned with the engineering stages of the development project life cycle to ensure that environmental management is dealt with, although outdated with latest environmental and water legislation. Since the inception of this approach, a range of projects, varying in size, type and environmental sensitivity have been undertaken, and many lessons have been learnt. These lessons have been incorporated into subsequent projects in the pursuit of continual environmental improvement.

PLANNING AND APPROVAL OF INFRASTRUCTURE
Reconnaissance, pre-feasibility and feasibility studies are undertaken to decide whether there is a need for bulk infrastructure. The EIA process is initiated. The DWAF Minister approves the decision for bulk infrastructure development, based on the EIA recommendation by the DEAT Minister or provincial MEC.
DESIGN OF INFRASTRUCTURE AND PROGRAMMING
An approved professional person (water infrastructure design engineer) is appointed by DWAF on condition that the Engineering Council of South Africa approves him/her. A monitoring group made up of DWAF, interested and affected parties including provincial environmental departments ensures that the design complies with EIA mitigation measures. In terms of programming, a plan for the implementation of mitigation measures, especially relating to the social impacts is prepared by DWAF. This responsibility is vested in the independent environmental consultant as per EIA Regulations. It is normally included in the EMP drafted upon conclusion of the EIA in consultation with the approved professional person.
CONSTRUCTION OF INFRASTRUCTURE
The construction is the responsibility of DWAF who can contract out to a construction firm. EMP and rehabilitation specifications are implemented. Site inspections and audits.
OPERATION AND MAINTENANCE OF INFRASTRUCTURE
Bulk infrastructure projects are operated and maintained by operating authorities such as Catchments Management Agencies (still to be introduced), Water User Associations; Water Boards, DWAF or contracted agents such as private firms, mines or local authorities. Operation authorities are given an operation & maintenance manual, which they must implement and are responsible for. Operational EMP implemented with monitoring programme. Environmental Audits.

FIGURE 5.4: WRM engineering business process aligned to the EIA process.

CHAPTER 6

PROPOSED ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR DWAF RELATED PROJECTS

- INTRODUCTION
- BACKGROUND
- DWAF WATER SECTOR FUNCTIONS
- IMPLICATION OF LEGISLATION TO DWAF'S IMPACTING FUNCTIONS WITH REGARD TO DEVELOPMENT PROJECTS
- INCORPORATE INTERNATIONAL ENVIRONMENTAL BEST PRACTICES INTO DWAF'S BUSINESS PROCESS FOR DEVELOPMENT PROJECTS
- ALIGNMENT OF PROPOSED IEM PRINCIPLES / ENGINEERING BUSINESS STAGES OF DWAF IN THE LIFE CYCLE APPROACH
- ALIGNMENT OF ENVIRONMENTAL ASSESSMENT & MANAGEMENT TOOLS AT EACH STAGE OF THE PROJECT LIFE CYCLE
- KEY DECISION-MAKING (STOP-GO) POINTS FOR THE ENGINEERING BUSINESS STAGES AND THE PROJECT LIFE CYCLE
- PROPOSED ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR DWAF RELATED DEVELOPMENT PROJECTS

CHAPTER 6: PROPOSED ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR DWAF RELATED PROJECTS

6.1 INTRODUCTION

Integrated Environmental Management (IEM) principles such as accountable decision-making, participatory management, and consideration of alternatives, environmental sustainability, equity, co-regulation, cradle-to-grave approach, and precautionary principle gained prominence as essential facets to environmental management in South Africa. The above-mentioned IEM principles, environmental legislation as well as international trends would therefore play a central guiding role in the environmental management practices within the Department of Water Affairs and Forestry (DWAF). These concepts are discussed in sections 6.2 to 6.5.

The department wishes to develop and adopt a project life cycle process, based on the principles of Integrated Environmental Management (IEM), so as to ensure effective environmental management of development projects for the department's water sector component. Section 6.6 aligns the IEM procedure and life cycle process with the engineering stages of a development project, with specific requirements and deliverables for each stage of the engineering business process. Relevant environmental assessment and management tools is linked to each stage of the engineering business process, as described in section 6.7, to guide managers on the usage of the most applicable environmental tool at a specific engineering stage. By following this approach, the department attempts to ensure that the recommendations of the environmental impact assessment (EIA) or related impact assessment tools for mitigation of impacts are carried through from the project proposal to the project implementation stages, through introducing management tools, such as the environmental management plan (EMP) and the environmental site management and rehabilitation specifications (ESM&RS).

In section 6.8, decision-making (Stop-Go) points are introduced to the engineering business stages within the project life cycle process, so as to ensure that all the environmental requirements and deliverables have been met before continuing to the next engineering stage of the life cycle process (Figure 6.1). Auditing nodes has been linked to these decision-making points throughout the project life cycle to evaluate environmental compliance and performance to facilitate corrective actions and continual improvement.

FIGURE 6.1: "Road map" of study: Chapter 6.

It is recognised that the life cycle process is not quite suitable for all water related development projects, in particular, the small-scale water supply schemes. In these projects (water provision to previously unarticulated areas), environmental management, within the context of the philosophy and framework of IEM, needs to be pragmatic and flexible to ensure mitigation of impacts, whilst keeping within realistic and tight financial and time constraints. Therefore the auditing nodes for DWAF as regulator and auditor with regards to water resources protection needs to provide for and built in its process the difficulties mentioned above.

6.2 BACKGROUND

IEM was referred to in the late 1980s as *"a systematic approach developed for ensuring the structured inclusion of environmental considerations in decision-making at all stages of the development process"* (Fuggle, 1989). The IEM procedure, as proposed by the Department of Environment (1992), and in the National Environmental Management Act (Act 107 of 1998), focuses on the decision-making aspects of a project (essentially the environmental assessment, with its requirements for information) and for project acceptance from an environmental perspective.

It is experienced that some project criteria change during the design stage of a project, i.e. post-project acceptance and approval. Such alterations can have bearing on the environmental aspects of the project, as the original EIA recommendations can not guarantee impact mitigation without further environmental input during project implementation.

There is limited guidance for mitigation of impacts during the post-decision stages of a project. This often results in an informed decision being made with respect to the most environmentally sound development options, and the identification of mitigation measures, without formal provision for the implementation of recommendations.

The proposed EMF procedure for DWAF attempts to address the above-mentioned difficulty by making provision for conditions of approval through *"decision-making (Stop-Go)" points within the life cycle process.* These being requirements such as compiling an environmental management plan (EMP); conform to environmental site management and rehabilitation specification (ESM&RS) and an agreed environmental contract. The above-mentioned conditions for approval are not required steps of the IEM decision-making process, except when it is stipulated as conditions in the record of decision (ROD) issued by DEAT. Experience has shown that it is these decision-making points, which are fundamental to effective and sustainable environmental management of a project. The approach adopted by the department attempts to ensure that all stages of a project are managed effectively in terms of the environment.

6.3 DWAF WATER SECTOR FUNCTIONS

The provision of water services involves the planning, design, implementation and operation of water resources infrastructure and intervention programmes to ensure South Africa has sufficient water availability of adequate quality.

There are two separate yet interlinked components to the delivery of water, namely bulk infrastructure and water services infrastructure. In most instances, water services are not developed without the necessary bulk infrastructure in place, and bulk infrastructure is not developed in isolation from service delivery. However, for the purpose of this paper, the processes are discussed separately due to functional mandate in this respect.

Bulk infrastructure refers to the dams, canals, tunnels, pump-stations and pipelines needed to ensure reliable availability of bulk unpurified water. Water services infrastructure refers to the purification works, pump-stations, reservoirs, pipelines and reticulation methods required to bring purified water from the bulk unpurified sources to industrial and domestic end-users (Table 6.1).

In order to meet growing demands, including the increasing rural water supply schemes, the department is planning, constructing and commissioning massive infrastructure developments. These infrastructure developments are keeping with the department's vision of: *"serves the public loyally, meets its responsibilities with energy and compassion and acts as a link in the chain of integrated and environmentally sustainable development"*.

In the Consolidated Environmental Implementation Management Plan (CEIMP) of DWAF in 2001, the impacting and management functions are highlighted for the three core functional areas of DWAF, namely; Water Resource Management, Water Services and Forestry. For the purpose of this study attention will be focused on the DWAF's water sector functions. Table 6.1 summaries the priority environmental impacting and managing functions, after the restructuring of the department in 2003.

Figure 6.2 gives an indication of the existing impact and management role of the department as well as the progressive change and shifting of DWAF's responsibilities. Even though the department is currently performing a dual function, being both manager and implementer, the future role of the department in terms of delivery of water will change to that of monitoring, auditing and regulator (CEIMP, 2001).

TABLE 6.1: Summary of DWAF's priority functions and processes affecting the environment (modified from CEIMP, 2001).

PRIORITY FUNCTIONS IMPACTING THE ENVIRONMENT

WATER RESOURCE MANAGEMENT	WATER SERVICES
• Water resource infrastructure planning, development and operation: ➢ Construction, upgrading and maintenance of bulk water resource infrastructure ➢ Storage of waste and water containing waste ➢ Stream flow reduction activities ➢ Intentional recharge of an aquifer ➢ Clearing activities	• Handed over responsibilities of water and sanitation program *via* the development and implementation of water services business schemes to local government

PRIORITY FUNCTIONS MANAGING THE ENVIRONMENT

WATER RESOURCE MANAGEMENT	WATER SERVICES
• Policy and strategy development ➢ Legislation and regulations ➢ National Water Resources Strategy ➢ Catchment Management Strategy ➢ Pricing Strategy • Water resource protection ➢ Resource Directed Measures ➢ Source Based Controls ➢ Water conservation and demand management • Regulating and control water use ➢ Authorising and regulating water use ➢ Setting water use charges ➢ Development of a waste discharge charge system • Authorising controlled activities. • Monitoring, evaluation and auditing. • Information management	• Developing and maintaining policy and strategies. • Regulation, support and intervention • Water Services planning and development ➢ Construction, upgrading and maintenance of water supply infrastructure ➢ Construction of on-site sanitation • Operation and maintenance of water related activities ➢ Disposal of waste and water containing waste ➢ Controlled activities: irrigation with waste water ➢ Discharging of waste or water containing waste into a water resource • Monitoring, evaluation and auditing. • Information management

The EMF is a DWAF initiative to ensure that the organisation has factored in all aspects of sound environmental management in its business functions either as a Developer and/ or Operator of schemes (Implementing, Operations and Maintenance) with an impacting function on the environment or as a Regulator, with a management function, to control activities that may have an impact on the environment and water resource *per se*.

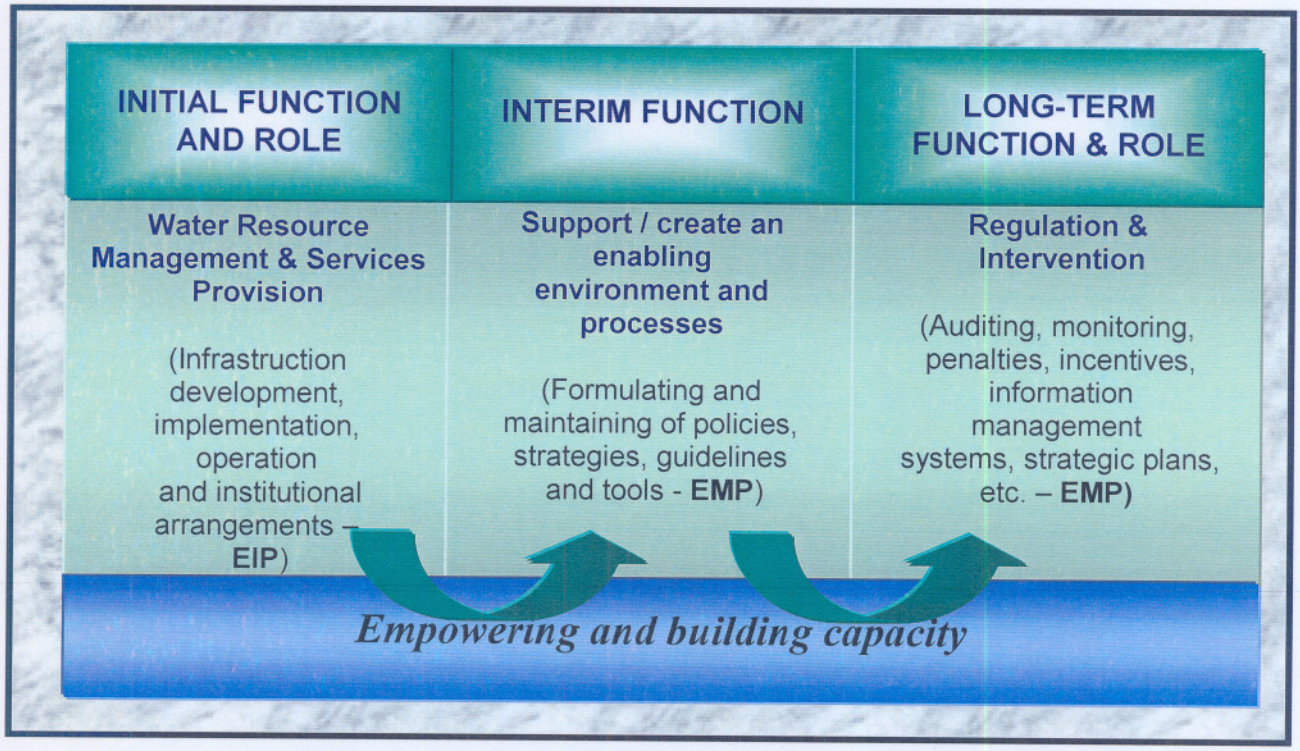


FIGURE 6.2: The progressive change of DWAF's functions and role from that of manager and implementer to monitoring and regulation (modified from CEIMP, 2001:32).

Figure 6.3 illustrates the position of the EMF within the department's strategic framework and in context to the department's impacting and management functions on the environment. The department's development projects business process is also presented in the diagram (Figure 6.3).

6.4 IMPLICATION OF LEGISLATION TO DWAF'S IMPACTING FUNCTIONS WITH RESPECT TO DEVELOPMENT PROJECTS

The planning and delivery of both bulk and small-scale water services infrastructure have a direct impact on the water resource and the greater environment.

The principles for environmental management in the National Environmental Management Act (Act 107 of 1998, the NEMA) guide the development of the bulk infrastructure delivery process in South Africa. In addition, section 24 (1) of NEMA require organs of state to consider, investigate and assess the potential environmental impacts of activities that may significantly affect the environment.

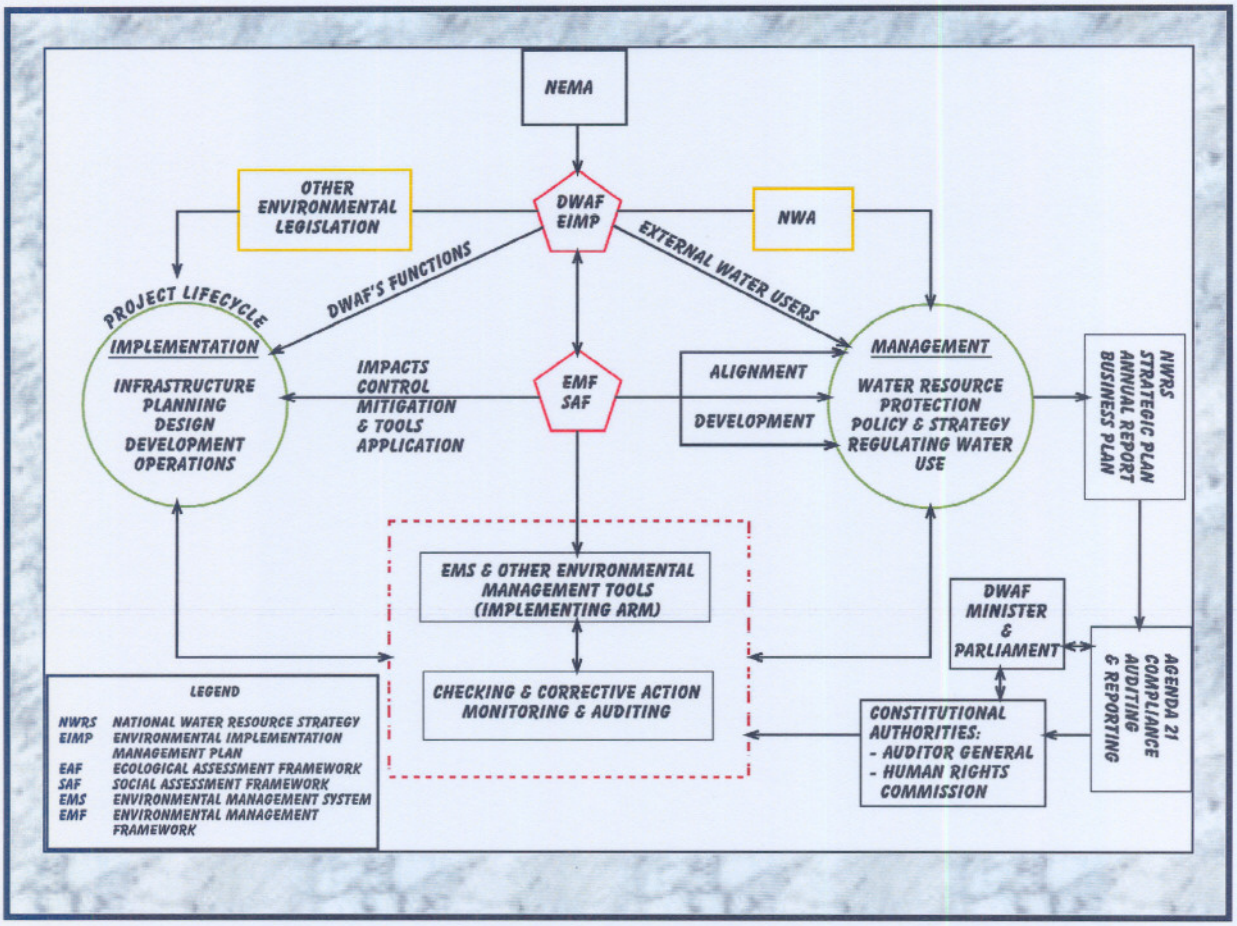


FIGURE 6.3: Positioning of the Environmental Management Framework (EMF) and DWAF's impacting functions in context with DWAF's management functions (modified from DWAF, 2002).

The Environment Conservation Act (Act 73 of 1989) requires all bulk infrastructure developments to undergo an environmental impact assessment. In terms of this Act, the design, construction and operation of bulk infrastructure is required to take into account mitigation measures provided for in the record of decision (ROD).

Additionally, in terms of the National Water Act (Act 36 of 1998) in section 110(1) (a), before constructing waterworks (including bulk water infrastructure), the Minister of the Department of Water Affairs and Forestry must prepare an environmental impact assessment relating to the proposed development, and where the Minister considers it appropriate, must comply with the requirements contained in regulations made under section 26 of the Environment Conservation Act (1989).

Laws, policies, standards and norms applicable for the protection of the environment, and the water resource in particular, for the department's development projects is presented in Table 6.2, but not limited to, these requirements. These laws should be read with all regulations framed there under and amendments there to.

TABLE 6.2: Relevant environmental and water legislation to adhere to throughout the project life cycle of a development project.

STEPS	RELEVANT LEGISLATION / STANDARDS
Planning and approval of infrastructure	• National Water Act (Act 36 of 1998) gives the Minister of DWAF the authority to make decisions about the provision of water services in South Africa. • National Environmental Management Act (Act 107 of 1998) requires compliance with NEMA principles. • Environment Conservation Act (Act 73 of 1989), section 22, requires environmental impact assessments (EIA's) for listed activities (section 21). EIA Regulations 1182-1184 of 1997. • National Building Regulations and Building Standards Act (Act 103 of 1977). • National Heritage Resources Act (Act 25 of 1999) requires and Heritage Impact Assessment. • Water Services Act (Act 108 of 1997). • The Local Government Municipal Systems Act (Act 32 of 2000). • Development Facilitation Act (Act 67 of 1995). • Water Policy White Paper (1997). • Water Supply and Sanitation Policy White Paper (1994). • White Paper on Environmental Management Policy (1999). • White Paper on Local Government (1998).
Design of infrastructure	• The National Water Act (Act 36 of 1998) requires environmental matters to be considered by the approved professional person (APP) in the design and construction of bulk infrastructure. The duty of care principle applies to the approved professional person who, for the rest of his/her life, is held liable for any damages, which may occur as a result of faulty design or construction. Dam Safety Regulations. • National Environmental Management Act (Act 107 of 1998) principles to be considered in design and section 24 (1) regarding the assessment of environmental impacts. NEMA section 28 (4) applies to approved professional person. • Environment Conservation Act (Act 73 of 1989) required the design to take into account mitigation measures provided for in the Record of Decision.

- The Mineral Petroleum Resources Development Act (Act 28 of 2002) requires an Environmental Management Programme for borrow pits and stockpiling before construction commences.
- National Building Regulations and Standards Act (Act 103 of 1977).
- Expropriation Act (1975)

Implementation of infrastructure

- National Water Act (Act 36 of 1998), section 110, requires that construction of government works comply with the requirements of the EIA Regulations. Dam safety regulations.
- Water Services Act (Act 108 of 1997).
- Environment Conservation Act (Act 73 of 1989) compliance with mitigation measures and in terms of project ROD.
- National Environmental Management Act (Act 107 of 1998).
- Atmospheric Pollution Prevention Act (Act 45 of 1965).
- National Parks Act (Act 75 of 1976).
- Conservation of Agricultural Resources Act (Act 43 of 1983).
- Animal Protection Act (Act 71 of 1962).
- Mountain Catchment Act (Act 63 of 1970).
- Occupation Health and Safety Act (Act 85 of 1993).
- Provincial and Local Government Ordinances and Bylaws.
- National Road Traffic Act (Act 93 of 1996).
- Fencing Act (Act 31 of 1963).
- SABS 1200.
- State Land Disposal Act (Act 48 of 1961).

Operation and maintenance of infrastructure

- National Water Act (Act 36 of 1998), section 110, requires that construction of government works comply with the requirements of the EIA Regulations. *Operation and maintenance manuals* prepared by DWAF provide operating authorities with specific guidelines for the operation and maintenance of the bulk infrastructure. These guidelines require operating authorities to prepare environmental management plans. Dam safety regulations.
- Environment Conservation Act (Act 73 of 1989) compliance with mitigation measures and in terms of project ROD. Decommission requires an EIA.
- National Environmental Management Act (Act 107 of 1998).
- Water Services Act (Act 108 of 1997).
- Atmospheric Pollution Prevention Act (Act 45 of 1965).
- Public Health By-laws and regulations.
- National Building Regulations and Standards Act (Act 103 of 1977).
- Occupation Health and Safety Act (Act 85 of 1993).
- Heath Act (Act 63 of 1977).
- Hazardous Substances Act (Act 15 of 1973).
- Development Facilitation Act (Act 67 of 1995).
- The Local Government Municipal Systems Act (Act 32 of 2000).

6.5 INCORPORATE ENVIRONMENTAL BEST PRACTICES INTO DWAF'S BUSINESS PROCESS FOR DEVELOPMENT PROJECTS

6.5.1 Environmental Management and Governance instruments

The current perspective on integrated environmental management and governance in modern environmental framework legislation is the integration of multiple environmental policy and governance instruments as well as environmental management tools as illustrated in Figure 6.4. Government instruments (indicated in blue block) are classified in four general disciplines, namely: command-and-control, market-based (fiscal arrangements), civil-based and co-regulation, while the environmental management tools (Table 4.5:4-18) are classified in terms of the Deming PDCA cycle. According to Nel and Du Plessis (2001) the shift away from command-and-control to environmental governance towards a hybrid use of multiple instruments is initiated to achieve sustainability.

The above-mentioned trend could be employed by the department to achieve its Integrated Water Resources Management (IWRM) objectives. A proposed concept of integrating the governance instruments and environmental management tools with the department's IWRM functions to achieve sustainability and customer satisfaction is presented in Figure 6.4.

6.5.2 Principles and Elements for Environmental Management Systems and Frameworks

Any Environmental Management System (EMS) can be divided into three main categories (Hillary, 1997):

- ***Planning:*** the objectives and targets, which are set up front to drive the management system and programme.
- ***Implementation:*** the operating management plans which ensure that the various activities involved take cognisance of the objectives and targets set up front.
- ***Measurement and evaluation:*** the monitoring, auditing and reviewing functions, which ensure that the objective and targets are met or complied with.

An environmental management system and implementation framework consists of *core* elements and *supporting* elements, which are illustrated in Figure 6.5.

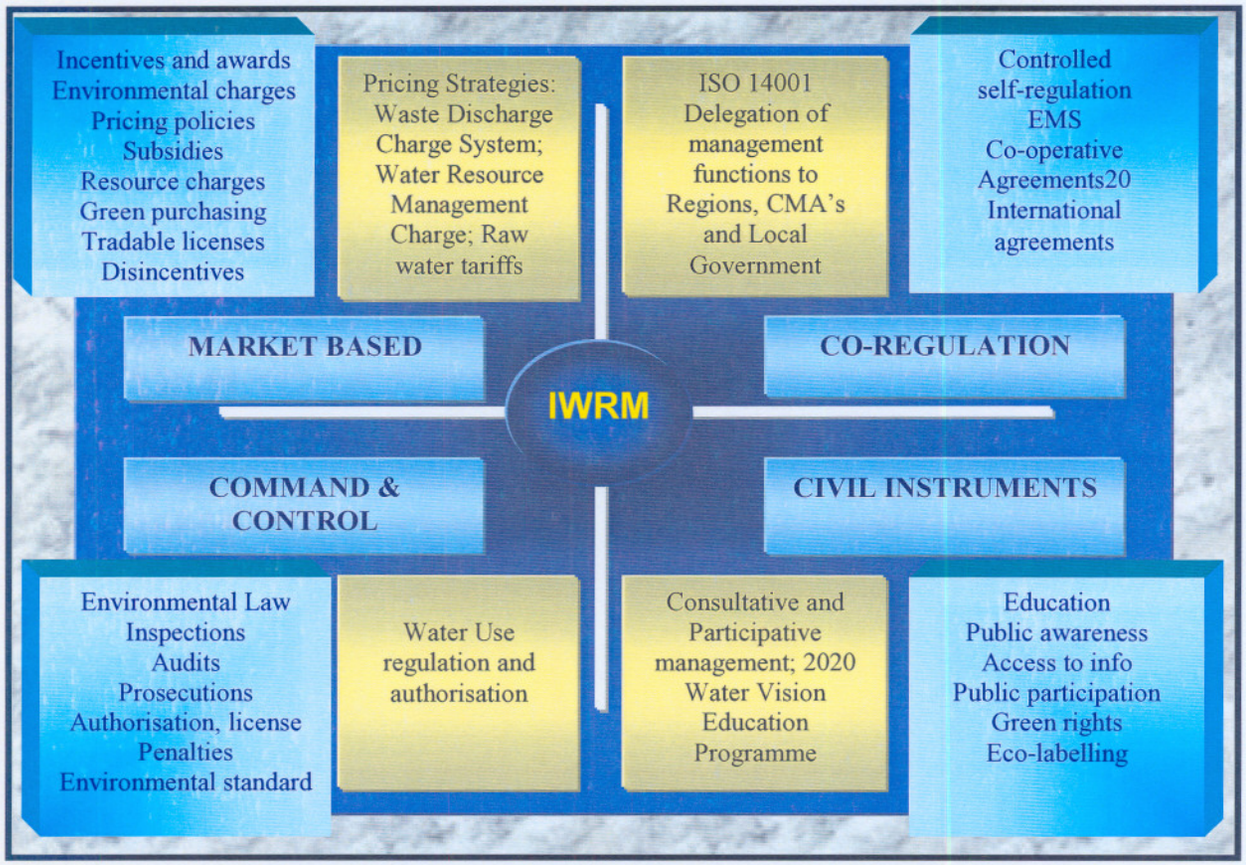


FIGURE 6.4: Environmental Management and Governance instruments to enhance Integrated Water Resource Management (IWRM) within DWAF (modified from Nel and Du Plessis, 2001; and van Wyk, 2001).

6.6 ALIGNMENT OF PROPOSED IEM PROCEDURES / ENGINEERING BUSINESS STAGES OF DWAF IN THE LIFE CYCLE APPROACH

6.6.1 DWAF and the life cycle approach

DWAF has recognised that in order to manage its impacts on the environment in terms of infrastructure and water resources development projects, it is imperative that environmental management does not merely form part of the decision-making process, but is implemented in a structured manner throughout the life of the project.

The generic DWAF project life cycle consists of nine stages, namely:

- Stage 1: Need Identification (project identification and proposal)
- Stage 2: Conceptualisation (Reconnaissance, Pre-feasibility and Feasibility - planning and prioritisation of alternatives)

- Stage 3: BP or project approval
- Stage 4: Detailed Design or plan
- Stage 5: Appraisal and Change (Tender contract)
- Stage 6: Execution (Construction and Commissioning)
- Stage 7: Operation and Maintenance
- Stage 8: Expansions & Modifications
- Stage 9: Closure and Decommissioning

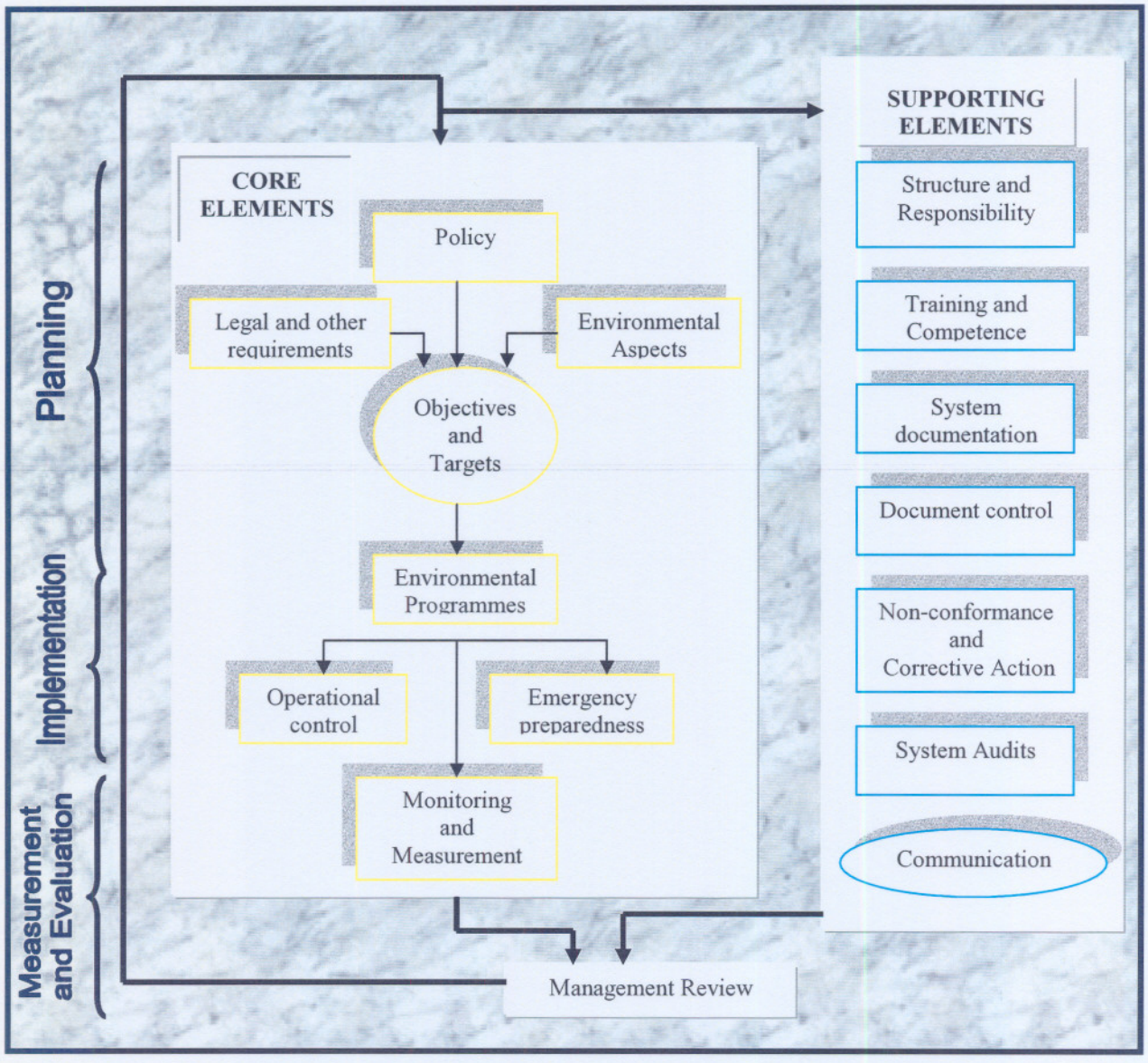


FIGURE 6.5: Core and supporting elements of an Environmental Management System (modified from PU for CHE, 2003; and Hillary, 1997).

Each of the stages within the generic project differs in terms of the type and level of detail of information required (Figure 6.6). The overall long-term success of a project is dependent on the successful completion of each stage within the project cycle. Given the nature of some of DWAF's large civil projects the timeframe between stage 1 and the remaining stages can be considerable. This creates a number of unique challenges for the proposed EMF.

In addition, internal DWAF decision-making stages have not been reflected as separate stages in the generic DWAF project cycle. However, the transition within stage 2: Reconnaissance to Pre-Feasibility to Feasibility stage implies an internal DWAF decision that reflects the identification of a viable project and or alternatives. This internal decision is a key stage in the overall project selection and execution process. This will be further discussed in section 6.8 where decision-making points are introduced in the development projects of the department for accountable and sustainable decision-making.

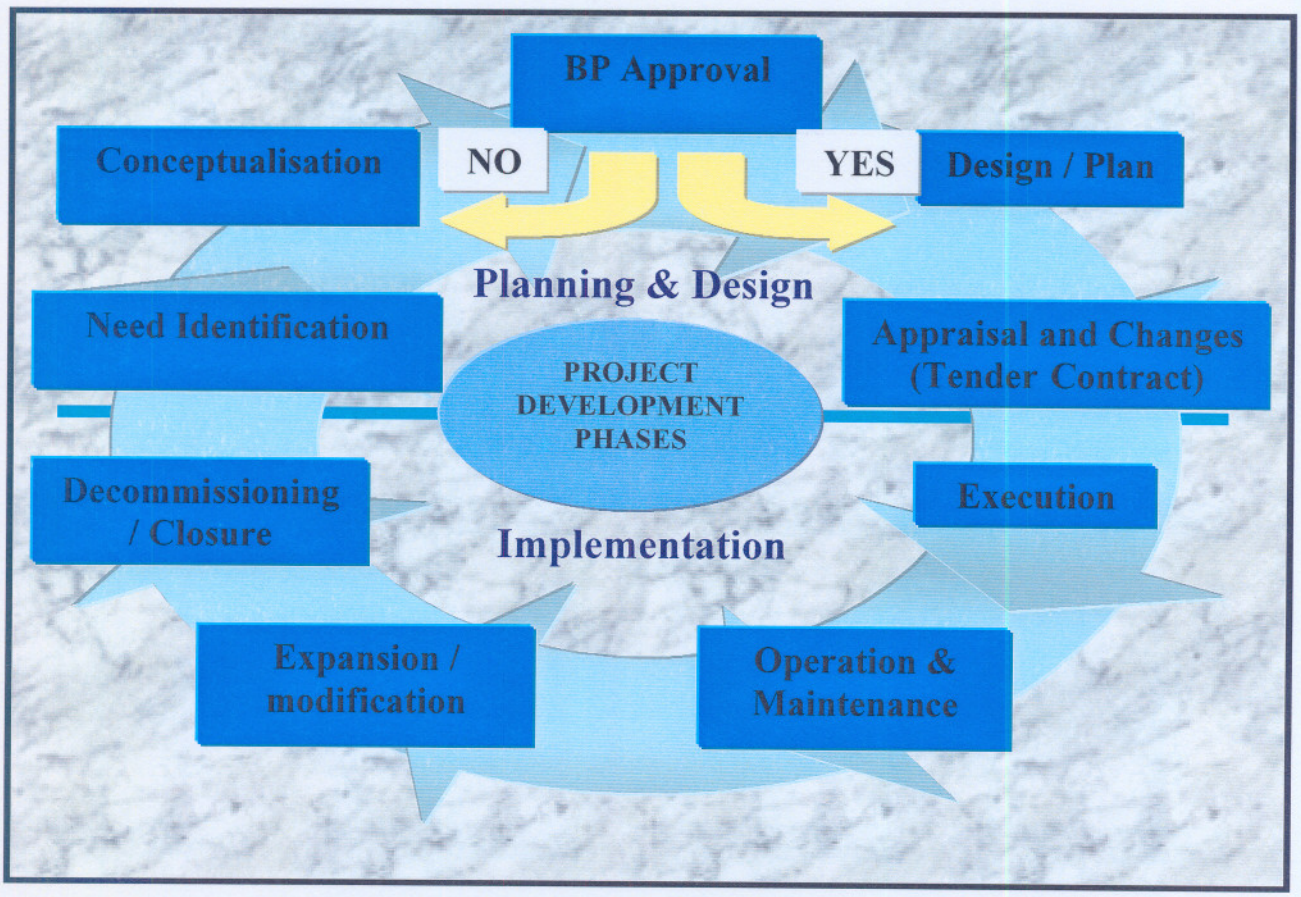


FIGURE 6.6: Generic DWAF's project life cycle for development projects.

The provision of safe, reliable and potable water is a priority, with the projects having constrained financial and time resources. Many of there projects are fast-tracked, thus precluding strict adherence to the traditional project life cycle and ideal approach for environmental management as proposed for water resources management. Further to this, not much scope exists for alternative options, other than slight modifications to the design criteria, to be investigated when water supply has been finally identified as a need within a specific community. As such, the opportunity for pro-active planning is limited in many of these projects, with the result that the EIA tends to be secondary to active planning for impact mitigation during project implementation.

The execution of these projects have posed challenges to the department in terms of evaluating compliance to the technical, social and water resource protection requirements. The process for the best practical manner to deal with these projects in terms of environmental management is still in its early development phase.

Although the businesses processes for both water resource management and water services are different, the integrated environmental management principles and project life cycle approach are applied in the same manner. Environmental tools should be selected for a specific stage, depending on the time frame, budget, scope of work, but still eliminating significant impacts on the environment and achieve the same objective. Figures 6.7 and 6.8 illustrate the project development phases for the department's water resource management impacting and management functions and for water services management functions with their key environmental management requirements, taking a project from the beginning to the end, within the context of the IEM principles.

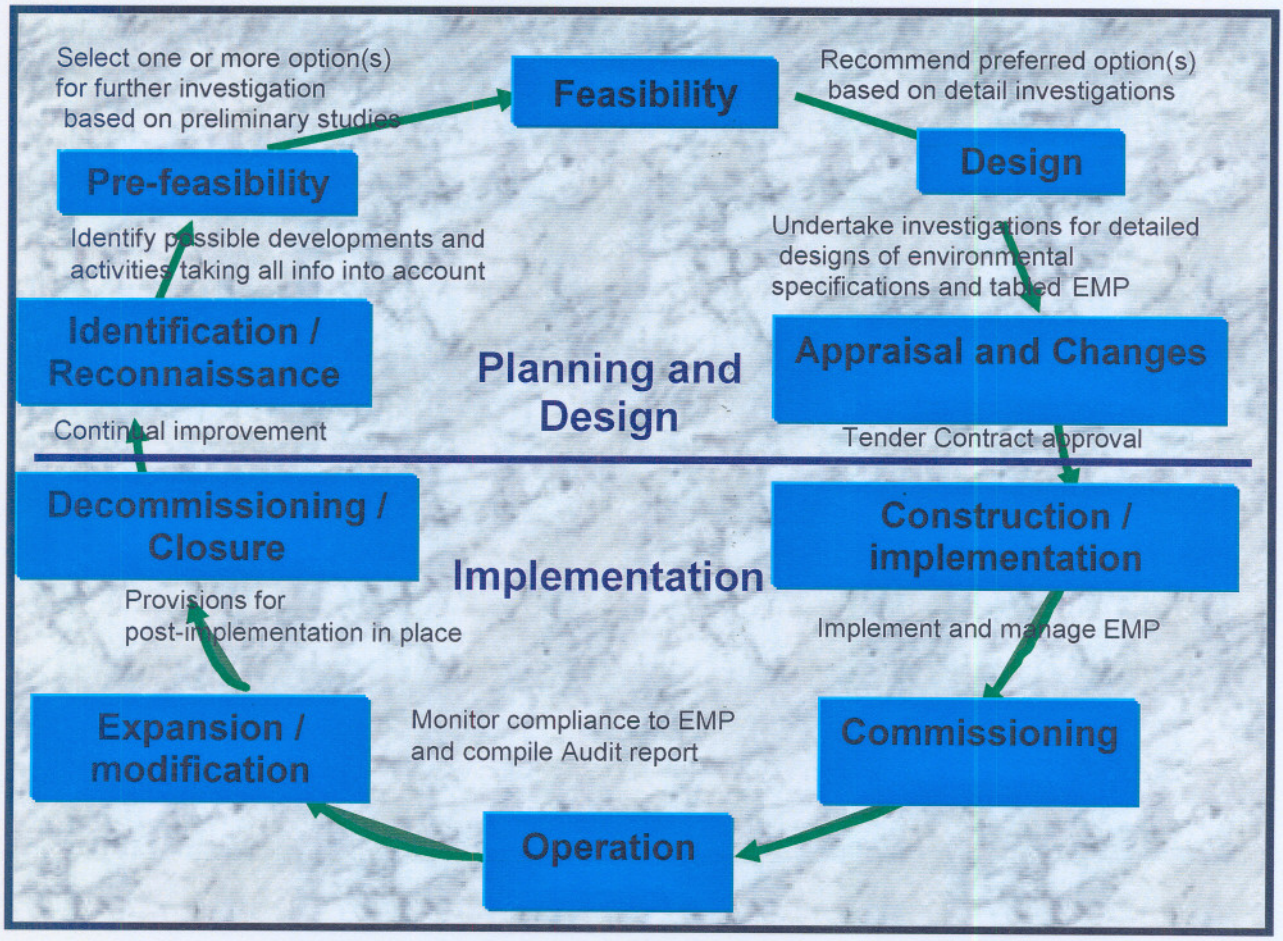


FIGURE 6.7: Proposed DWAF-IEM approach aligned with WRM business stages for development projects, as Regulator and Developer and /or Operator.

6.7 ALIGNMENT OF ENVIRONMENTAL ASSESSMENT AND MANAGEMENT TOOLS AT EACH STAGE OF THE PROJECT LIFE CYCLE

6.7.1 IEM during Project Proposal and Planning

The department identified the necessity to align the principles of IEM with existing project development and engineering phases and to build on management procedures supporting each project stage. The IEM procedure has thus been tailored to suit the engineering stages of a project and the concept of *"IEM within the business life cycle"* has been adopted. In this way, environmental management is integrated with the technical aspects of any infrastructure and water resources development projects, with environmental deliverables, as for technical aspects, required at the completion of each project stage (Figure 6.9).

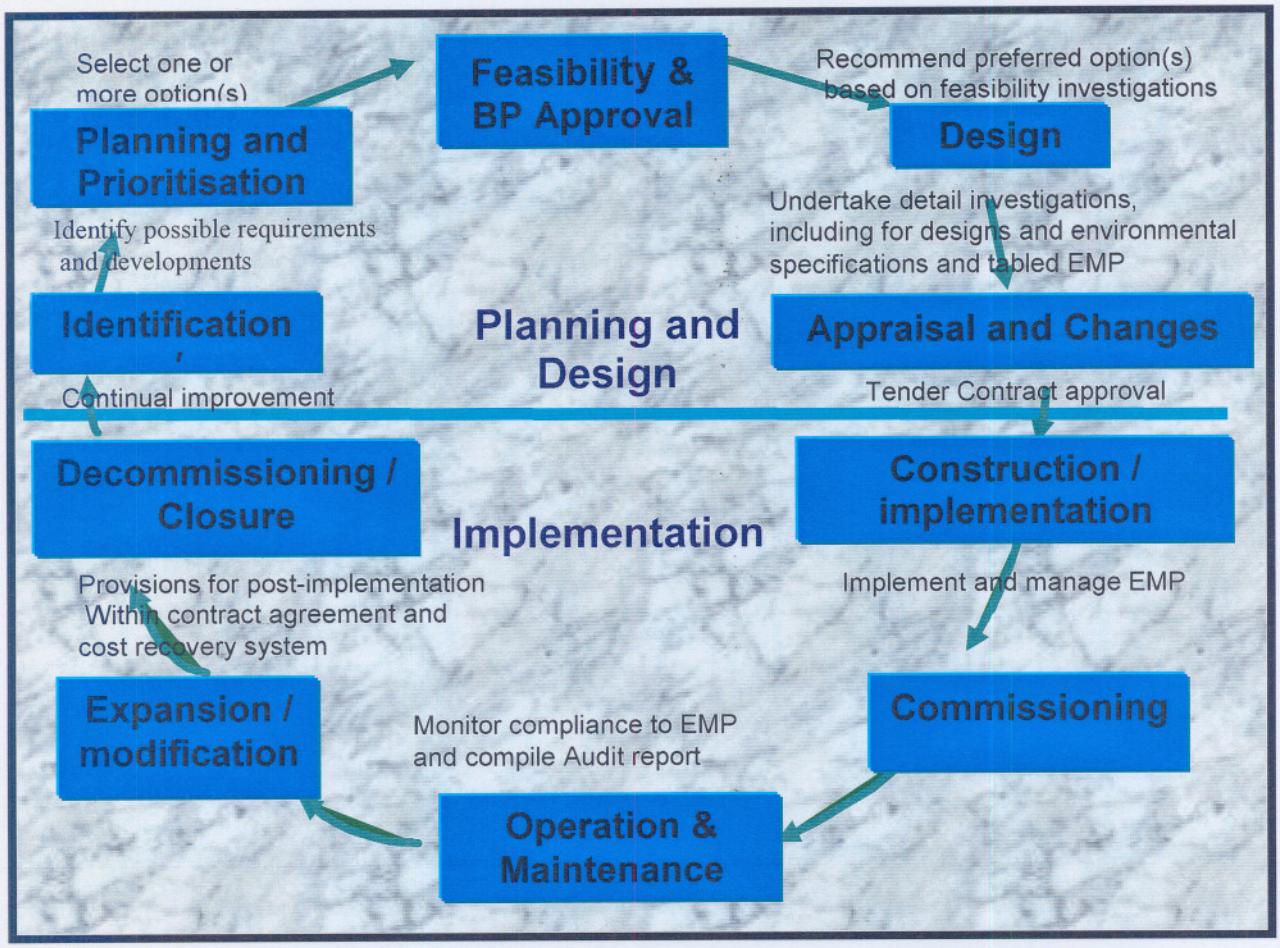


FIGURE 6.8: Proposed DWAF-IEM approach aligned with local government business stages for development projects, as Regulator.

The adoption of this process ensures that IEM is taken to its logical conclusion, and not merely halted mid-project with the delivery of an EIA report, which is ultimately an *"assessment and decision-making tool"*. Furthermore, the process ensures that a practical tool for managing environmental impacts during and post-project implementation is provided as illustrated in Figure 6.9.

An Impact and Aspect register (I&AR) is being developed for activities not listed in DEAT's EIA regulations but have a detrimental significant impacts on the environment. This tool can also be used for emergency schemes and as motivation for exemption for an environmental authorisation for a particular activity that have a minimal impact on the receiving environment. This tool could also assist local government in the planning phase to assess the impacts of their proposed water provision and sanitation activities before the approval of the Business Plan (BP) and could easily be transformed into an EMP (Figure 6.10).

It must be further recognised that the view of the department's role, the "no-go" option for a water provision project, is highly unlikely. Within this context, the department's approach to IEM is to ensure that the most feasible option (from both an environmental and technical perspective) is selected within the parameters of water demand requirements, with further emphasis being placed on ensuring practical management of the project impacts.

6.7.2 IEM during Design and Construction

It is important to recognise that although the selected project option identified during the feasibility investigations has been found acceptable through the EIA process, construction specific impacts of the implementation phase are often inadequately identified during the environmental assessment. These require further attention during these project stages to ensure mitigation of all project impacts.

A construction method statement with a master layout site plan should be utilised in conjunction with the Impact and Aspect Register for emergencies schemes and weirs undergoing improvements and modifications.

(i) Design stage:

Project impacts identified at the feasibility stage can be addressed in a number of ways during detailed design. The proposed environmental tools available for impact mitigation at this stage include:

- Interaction with the project team design engineers to consider alternative designs or techniques in order to minimise impact;
- Development of an environmental management plan (EMP) to avoid, manage and mitigate impacts during the construction phase;
- Draft environmental specifications, based on the EMP, for inclusion in the project contract to force the contractor to comply with environmental requirements.

EMP:

This is a pro-active management tool and should be viewed as the vehicle by which the broad-based impact mitigation recommendations of the EIA are transposed into a practical plan, which is implementable on site.

It is also the management tool against which environmental performance and compliance on site can be monitored. The EMP is a working document giving guidance on how to minimise the environmental impacts of a project in the construction and operation phases.

Contract specifications:

To ensure that the requirements on an EMP are contractually binding, it is vital that they are transposed into environmental specifications for inclusion into the contract document. The specification should also allow the contractor to make financial provision for mitigation requirements in his contract tender price.

The department has developed a standardised environmental site management and rehabilitation specification (ESM&RS) for construction sites (now called the environmental best practice guide and specifications), which is included in all civil engineering contract documents at the tender stage. A Bill of Quantities should be included for direct measurement and payment items to ensure environmental specification compliance. The departmental ESM&RS should be read with the SABS 1200 Standards Specification for Civil Engineering Construction, published in 1990.

(ii) Construction stage:

Construction is a disruptive and environmentally destructive activity. Whilst, reasonable measures for controlling the impacts of the project should be included in the EMP and contract document. The success during construction will depend on the degree of commitment from site staff for ensuring implementation of the EMP. An environmental control officer (ECO) should be assigned to the project to oversee the contract in terms of environmental compliance and to provide expertise and advice to the site staff with regard to the environmental aspects of the project. The duties of the environmental officer include raising environmental awareness on site, monitoring and reporting functions.

Monitoring and Auditing:

The site should be monitored (site inspections) by the project environmental officer on a regular and *ad hoc* basis. The frequency of inspections should be determined relative to the environmental sensitivity of project, with all project team members being informed of the monitoring intention at the onset of the construction phase.

Upon completion of construction activities, a list of outstanding environmental requirements should be compiled. Attention to these issues, in addition to outstanding technical items, should be a pre-requisite for the contract completion certificate.

At least one post-construction monitoring inspection and audit should be undertaken prior to the end of the defects liability period (normally twelve months after issues of the completion certificate) to ensure compliance with reinstatement and rehabilitation requirements.

It is recommended that environmental audits for environmental compliance and performance should be performed on a three monthly basis and a final audit of the project should be undertaken to assess its performance in terms of the objectives in the environmental management plan.

Environmental management during construction is a relatively young field which is still evolving. The audit function is therefore critical in identifying weaknesses and successes of existing approaches and utilising this information to improve and refine environmental management techniques for future projects and initiatives.

Reporting:

The results of the monitoring inspections should be recorded on a standardised audit sheet, which has been designed to record non-compliance issues. Recording of exceptional performance should, however, be encouraged so that it may be recognised and rewarded.

A section dedicated to *"Environmental Matters"* should be included on all site meeting agendas, with the monitoring results recorded in the site minutes. The results of all site monitoring inspections and audits should be forwarded monthly to the environmental manager (EM), Regional Engineer (RE) and Project Manager (PM).

Environmental auditing and reporting is a means of assessing compliance and performance relating to set objectives, criteria and standards, and is anticipated to become an important project life cycle component to ensure continual improvement.

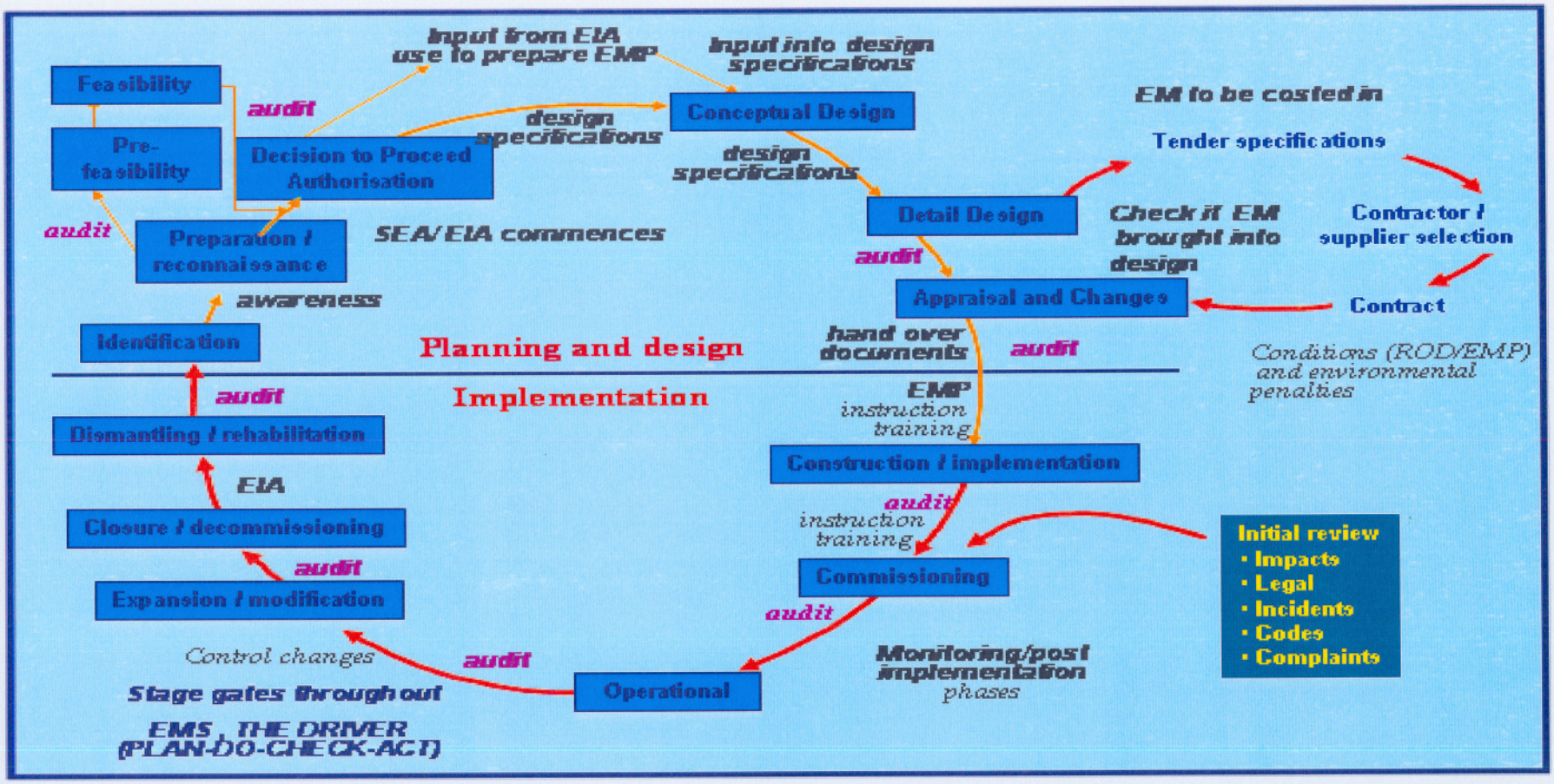


FIGURE 6.9: Proposed Environmental management and auditing nodes and project life cycle approach for water resource infrastructure development (modified from Nel, 2001).

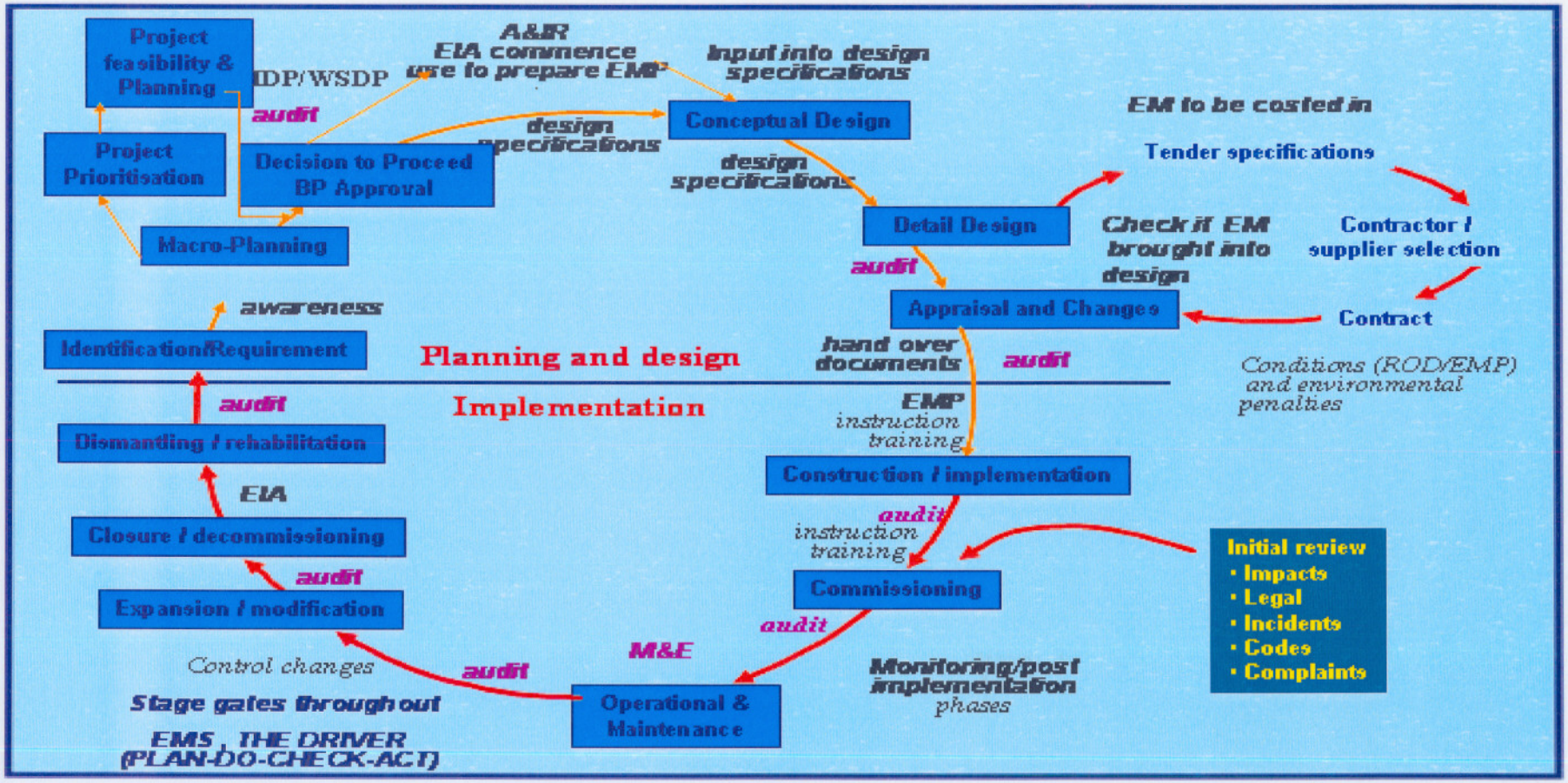


FIGURE 6.10: Proposed environmental management and auditing nodes and project life cycle approach for water services infrastructure development (modified for Nel, 2001).

The DWAF engineering business process and stages are aligned with the project life cycle approach and best practical environmental tool for usage at a particular stage. This approach is refined from Nel (2001) to tailor-make for DWAF's water resource development projects and is presented in Figures 6.9. The same approach has been followed for water services development projects to support local government to integrate sound environmental management principles in there business life cycle and decision-making processes The proposed environmental management and project life cycle approach and associated environmental tools is illustrated in Figure 6.10.

6.8 KEY DECISION-MAKING (STOP-GO) POINTS FOR BUSINESS STAGES IN THE PROJECT LIFE CYCLE

Five key stages and associated decision-making points have been identified in the World Commission on Dams report (2000:263). These decision-making points have been modified to fit within DWAF's water sector component development projects (Figure 6.11). The first two relate to water planning, leading to decisions on a preferred development plan.

1) Need assessment: validating the need for water services.

Confirmation is required that plans for water development reflect local and national needs through consultation process.

- Ecological baseline study to be assessed at a strategic level,
- Environmental legal requirements assessed and meet,
- Determine the Resource Quality Objectives (RQO) to understand and social, economic and ecological requirements, functions, values and impacts, and
- Ensure stakeholder involvement.

2) Selecting alternatives: identifying the preferred development plan from various options.

The preferred development plan is selected through a participatory assessment that gives the same significance to social and ecological aspects as to technical, economic and financial aspects. Within this process investigations and studies (feasibility studies) are commissioned on each option to inform decision-making.

- Strategic impact assessment (SEA) provides an initial level of screening to remove alternatives that have unacceptable social and ecological consequences,

- Some options will need reconnaissance, pre-feasibility, and feasibility studies appropriate to the stage in the process and incorporating social and ecological surveys and impact assessment. Findings of the studies are fed back to into the screening process for consideration with all the other remaining options for project approval.

Where infrastructure development emerges from this process a preferred development alternative, three further critical points occur.

3) Project preparation: verifying that agreements are in place before tender of the construction contract.

The preparation stage covers detailed planning and design. Environmental authorisation issued for development of project incorporating any conditions that emerge from the assessment process. In the case of the development of a dam a license to construct should be required and a water use license. Tendering the construction contract is conditional upon reaching negotiated agreements for benefit sharing mechanisms and for mitigation, compensation, development and compliance measures, in addition to technical requirements.

- Social and ecological mitigation measures should be defined in the tender in similar detail to construction elements, namely the "bill of quantities", and
- The tender should clearly identify responsibilities of the contractor and the developer with regards to the environmental management plan, measures to mitigate adverse social impacts, including development opportunities for affected communities; the construction method, schedule and camp; impact monitoring and reporting during the operations stage and compliance instruments, but not limited to the above.

4) Project implementation: confirming compliance before commissioning.

The implementation stage covers procurement and construction. Issuing the license to operate is contingent on implementation of specific benefit sharing and mitigation measures at various stages through the implementation period. The license will contain a number of conditions in the operation stage, including compliance with the operational rules, public notifications, dam safety, monitoring and periodic review. Compliance with all relevant time-bound commitments is required before commissioning the project. Operating license should include:

- Agreement on environmental flow releases to the to the downstream river and users,
- Operating rules during normal an exceptional floods,
- Operating Environmental Management Plan, and
- Monitoring and reporting.

5) Project operation and maintenance: adapting to changing contexts.

Any decisions to modify facilities, operating rules, and license conditions to meet changing contexts are based on a participatory review of project performance and impacts.

- Adaptive management is needed to continuously assess and adjust the operating decisions within the changing context of ecological, social, physical, and market conditions and benefits and dam safety,
- Operations take account of environmental flow requirements (quantity and quality) and ecosystem and social impacts are monitored,
- Monitoring and evaluation programme should include all aspects of impacts, interactions between impacts, and cumulative impacts,
- Annual reports of project monitoring programme, including social and ecological aspects, are issued and corrective measures are initiated to address issues raised in the report, and
- Feasibility study, alternative analysis and impact assessments should be undertaken for all major changes including decommissioning where infrastructure are no longer required or are too expensive tot maintain.

The most fundamental of these is selection of the preferred development plan (option). This will determine what options will be pursued to meet the needs. This decision is only taken after the needs have been fully assessed. At each decision point it is essential to test compliance with preceding processes before giving authority to proceed to the next stage. These points are not exhaustive and within each stage any other decisions are taken and agreements reached (WCD, 2000:262). This concentrates on how development projects needs to be planned, designed and implemented in an environmentally sustainable manner and to place it in line with the department's water resources plan and service delivery initiatives. These key stages can also facilitate compliance verification. The auditing nodes as identified for the project life cycle of development projects, to evaluate as a Regulator whether compliance and performance have been achieved, and if not to initiate corrective actions for improvement, are align with these decision-making points.

The decision points are supported by a set of key criteria that describe the processes required for compliance. The criteria are presented in the form of environmental checklists for each decision point and cover the full planning and project cycle and include aspects related to development projects (Table 4.5:4-18).

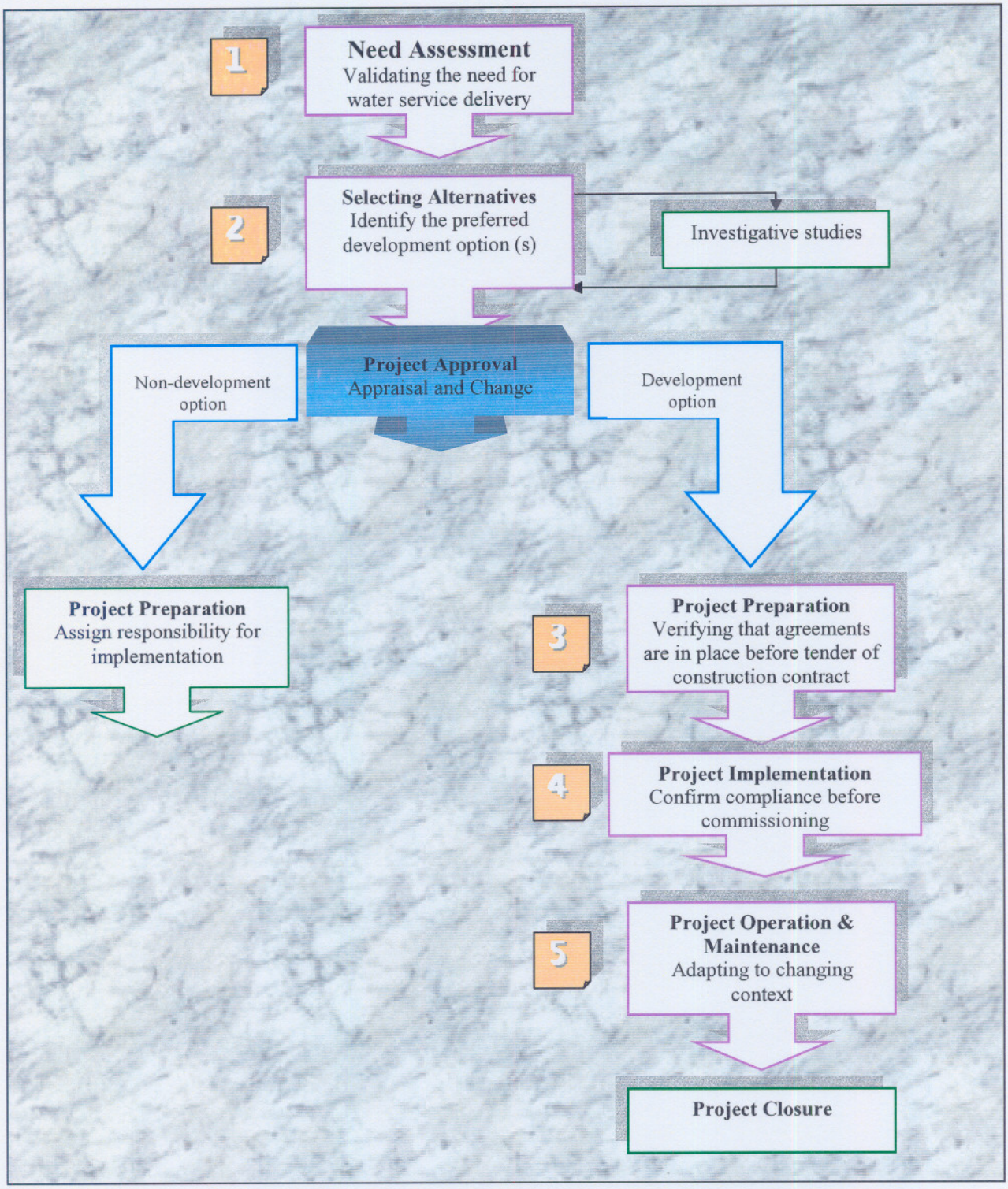


Figure 6.11: Key decision-making points in planning and project development (modified from WCD, 2000: 263)

These five (5) key decision-making points (Figure 6.11) will safeguard rights, reduce the risk of conflicts emerging, and lower overall costs. The framework provides the opportunity to screen out unfavourable alternatives at any stage. It is attended to open communication channels between stakeholders, increase mutual understanding and assist decision-makers, practitioners and affected people.

6.9 PROPOSED ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR DWAF RELATED DEVELOPMENT PROJECTS

A systematic approach for an integrated Environmental Management Framework (EMF) is developed, and illustrated in Figure 6.12 for DWAF's related functions and projects. This has been achieved by incorporating principles and elements of integrated environmental management (IEM) procedure and of environmental management systems into the proposed environmental management framework. The Deming PDCA-cycle for Total Quality Management (TQM) is also aligned to the management framework to establish the continual environmental improvement concept into DWAF's vision of managing and protecting water resources in South Africa.

The documentation and decision-making tools required within the EMF is also presented in Figure 6.11, which will also give effect to environmental compliance and performance. The generic DWAF engineering business process and stages for development projects is aligned, in Figure 6.12, with the principles and elements of IEM and EMS and associated decision-making tools and documentation. The environmental authorisation processes and documentation from the different government departments is aligned and streamlined in the proposed EMF for DWAF. The proposed EMF for DWAF development projects should be read in conjunction with the core and supporting elements of an appropriate environmental management system as highlighted in Figure 6.5 and integrate the environmental management and governance instruments presented in Figure 6.4 into the evaluation of regulatory controls for protection of the water resource.

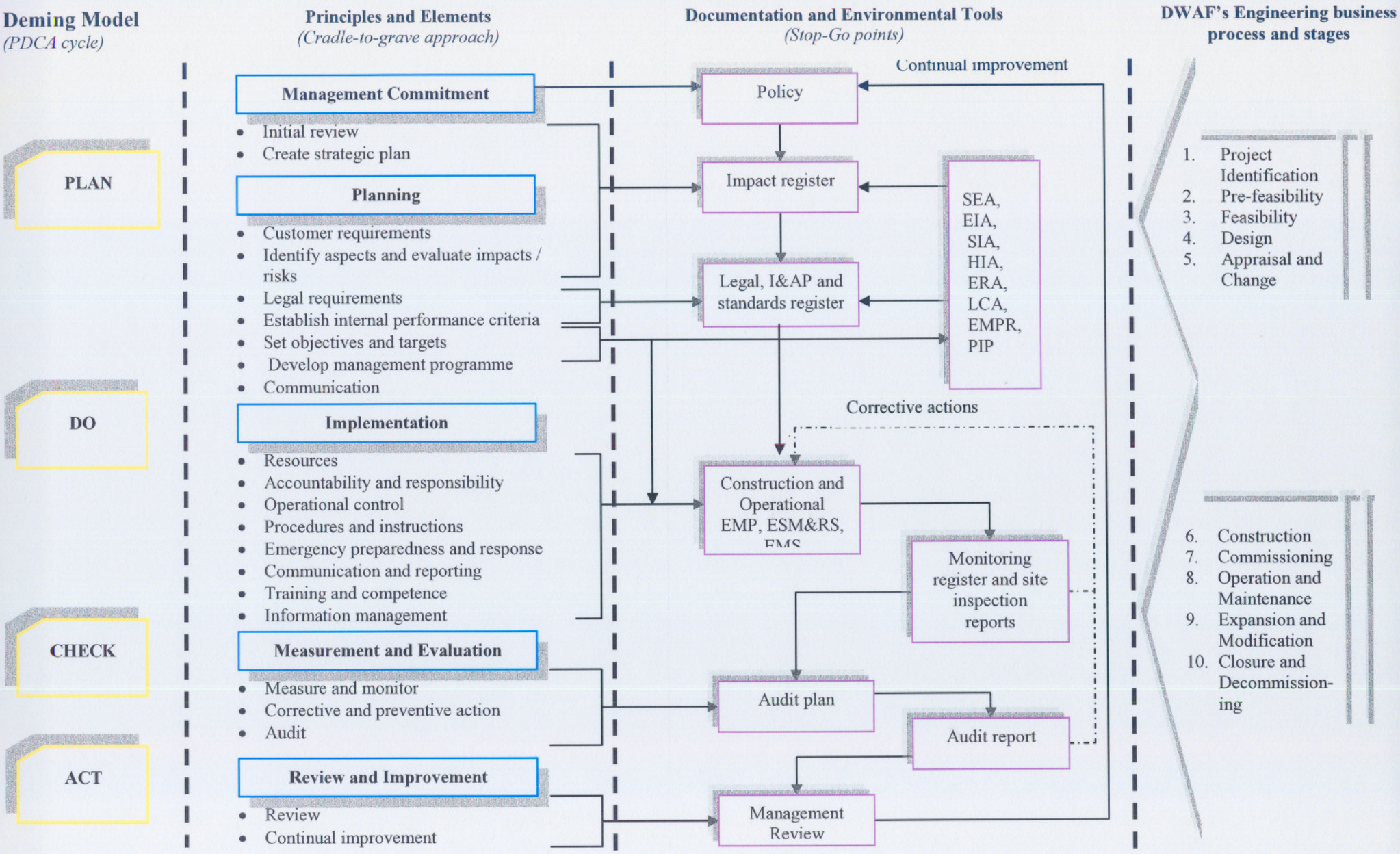
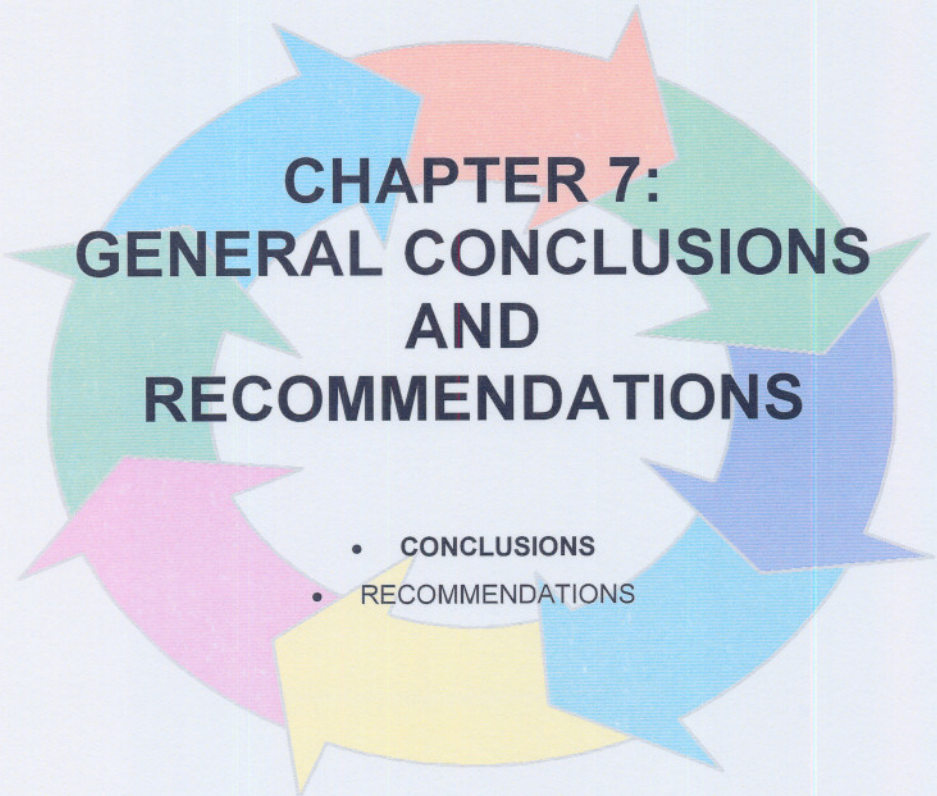


FIGURE 6.12: Proposed Environmental Management Framework (EMF) for DWAF and alignment with the engineering business process for development projects.



CHAPTER 7: GENERAL CONCLUSIONS AND RECOMMENDATIONS

- **CONCLUSIONS**
- RECOMMENDATIONS

CHAPTER 7: GENERAL CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The purpose and the objectives of this study have been achieved to develop a proposed Environmental Management Framework (EMF) for the Department of Water Affairs and Forestry (DWAF) related projects.

To this end it is concluded that the study succeeded to (Figure 7.1):

- To position the reader by introducing the topic on Environmental Management and Sustainable Development, and integrated resource management challenges associated with the implementation of integrated environmental management;
- To decide on the research methodology and the purpose, objectives and scope of this study, as well the structural layout;
- To investigate the relevant policy and legislation requirements and central guiding principles pertaining to Environmental Management, in general, and the implementation of sound environmental management practices within DWAF, in particular,
- To establish a general understanding of best practices of environmental management within the International arena and what is happening locally in South Africa.
- To describe the current Integrated Environmental Management approach within DWAF with regard to development projects.
- To develop a proposed Environmental Management Framework (EMF) for DWAF related development projects and for water sector support.

7.1.1 The following criteria were identified as specific requirements when developing DWAF-IEM framework:

- to fit within the functions of the department;
- to comply with the principles of IEM as recommended by the National Environmental Management Act (No 107 of 1998) and environmental impact management required in the Environment Conservation Act (Act 73 of 1989);
- to consider holistically all components of the environment, all phases of the development process and all I&AP involved;

- to consider activities that have a detrimental effect on the environment, which are not included in regulation 1182;
- not to focus on the environment conservation as such, but rather on the management of water resources to serve all interests simultaneously and optimally;
- to feed into the information system required for decision-making;
- to be practical, cost effective and not cause unnecessary delays;
- to be amenable to financial control and budgeting, and to produce documentation, and
- to be a decision support system.

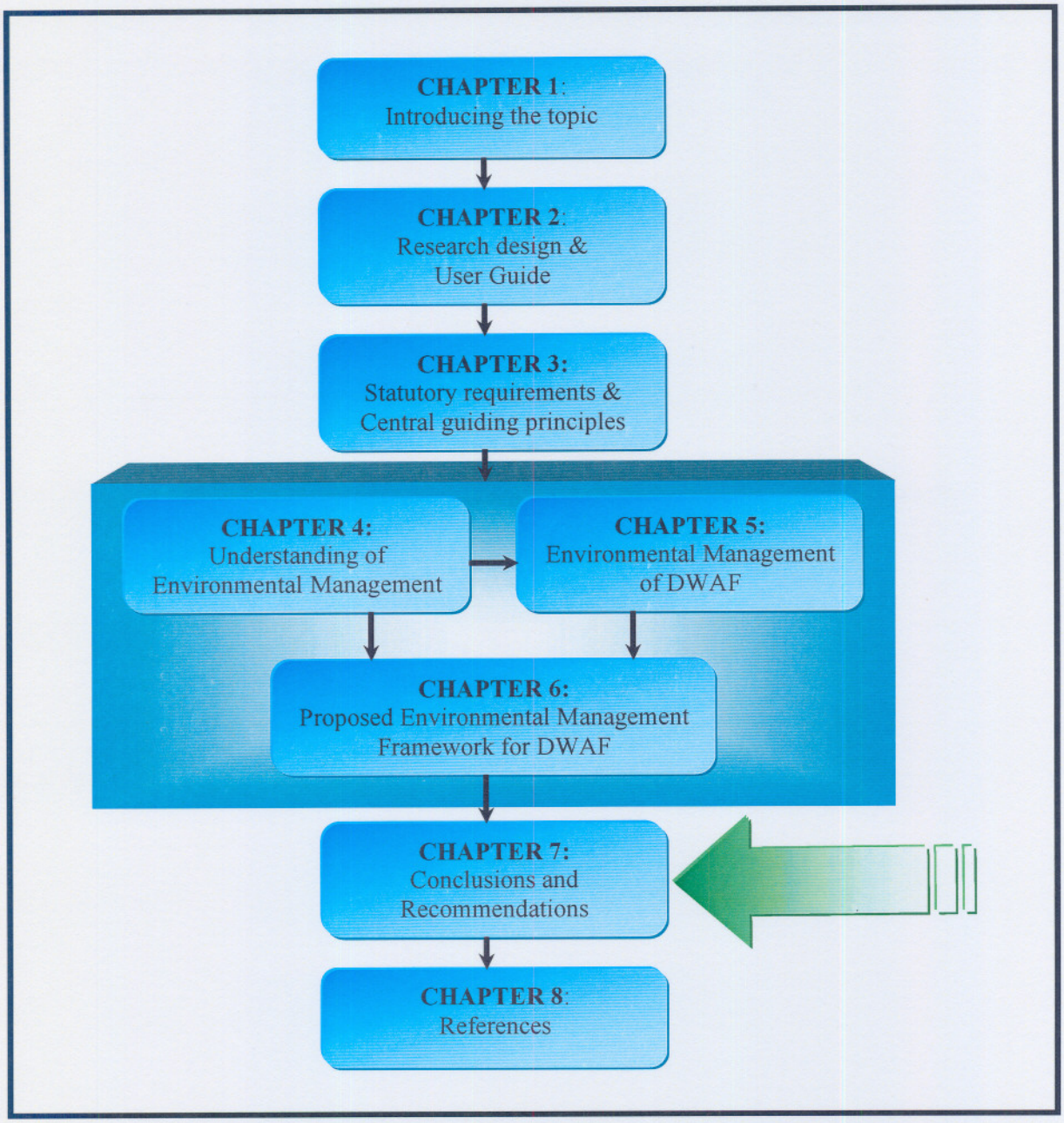


FIGURE 7.1: "Road map" of study: Chapter 7.

As a collective result and systematic approach of the above-mentioned achievements of the study, described in each chapter, the purpose and objectives of this study could be met as indicated below.

7.1.2 Purpose of Study

The purpose of this study is to review the current IEM procedures applied by the Department of Water Affairs and Forestry (DWAF) and to develop an Environmental Management Framework for DWAF related projects for the water sector's component. This will ensure the implementation of Integrated Environmental Management (IEM) principles within departmental water sector projects and activities, in order to ensure compliance with environmental legislation and to promote sound environmental management practices.

The focus of IEM to date has tended to be on the decision stage of the procedure, with the delivery of the EIA report identifying the potential impacts of the project.

Experience has however shown that continuance of the process, with the translation of EIA recommendations into practically implementable criteria is imperative for effective environmental management of a project throughout the entire life cycle.

It is proposed that the Environmental Management Plan (EMP) and environmental contract should be prescribed steps of the procedure, and with the execution phase of the project, monitoring, auditing and reporting tools to be prescribed ensuring continued environmental management throughout the full life of a project.

7.1.3 Objectives of Study

The *primary goal* of this study is to ensure that environmental considerations are efficiently and adequately taken into account at all stages of the planning, development and implementation phases of DWAF related projects for the water sector component. The following actions are required to achieve the purpose and the primary goal of the study:

- To revise the current IEM procedure of the DWAF and to ensure that development activities and projects meet the environmental legislation and associated requirements

Relevant environmental legislation has been incorporate into the proposed EMF and the current DWAF-IEM approach have been revised with available environmental assessment and management tools and international best practices and for an integral part of the EMF. The project life cycle approach has been adopted to ensure the environment will be considered in a structure manner from the project planning phase until the decommission phase of a project.

- To align, optimise and integrate the environmental management processes required by law (i.e. the principles of IEM and the EIA process, but not limited to) with the business engineering stages of the DWAF's development projects throughout the project life cycle

Internal environmental management procedures of the department have been incorporated into the five key stages and associated decision-making points of the proposed EMF, and the environmental management processes governed by other environmental legislation is incorporated in both the decision-making points for development projects and the generic EMF aligning the technical reports and information gathering so as to streamline these processes, but also to strengthen the information base and results and avoid duplication of similar studies.

- To align and integrate other environmental assessment and management tools (i.e. SEA, EMP, EMS, SIA, monitoring and auditing, etc.) within the project life cycle

The environmental assessment and management tools have been aligned with the IEM principles in the project life cycle for DWAF development projects. New environmental tools have been developed to ensure the environment has been considered at each engineering business stage of DWAF's development projects. These tools could also be used by local government for their unique situation and short period for project planning and assessment before project approval. These environmental tools i.e. Impact and Aspect register (I&AR) and associated EMP can be applied to non-development projects as well.

- To identify key decision-making points (stop-go) points before commencing with next phase) in the business engineering stages for project planning and development

Five (5) key stages and associated decision-making (stop-go) points have been tailor-made for DWAF's water sector impacting and management functions. These Stop-go points or safe guards is based on documentation and budget control to ensure that all environmental considerations and deliverables have been met before entering the next stage of the project life cycle. The auditing nodes are linked to these stages.

- To design auditing nodes throughout the project life cycle so as to facilitate environmental compliance and performance and also trigger implementation of IEM principles and continual improvement in day-to-day activities

Auditing nodes have been developed for the business processes to and activities of DWAF to ensure environmental compliance and performance throughout the life cycle of a project so as to fulfill DWAF's regulating and auditing functions for water service delivery.

- To develop a proposed Environmental Management Framework, from above-mentioned actions, for DWAF related projects for the water services component, which fits within the functions of DWAF, complies with environmental legislation, is practical, cost effective, and does not cause unnecessary delays, produce deliverables (reports) and act as a decision support system.

The IEMF aims to align Integrated Environmental Management (IEM) principles and environmental assessment and management tools with DWAF's impacting and management functions, processes and activities throughout the life-cycle affecting water resources.

Each objective that has been met during this study has contributed to the building blocks in developing the proposed Environmental Management Framework (EMF) for DWAF' related project.

The EMF is considered the interim management plan and forerunner to the Environmental Management System and provides strategic guidance to the implementation of IEM principles in DWAF.

During the study it has been proven that although the business processes for the water sector is different, the Environmental Management principles stays the same. Meaning that different environmental tools will be applied at certain stages of the project life cycle, depending on time and financial resources, but will still achieve the same level of environmental quality goal and ultimate objectives of the project.

As such, the Department has applied IEM to these projects as a guiding philosophy and framework within which pragmatism and flexibility has been employed to ensure all projects are executed in terms of the principles of the IEM.

7.2 RECOMMENDATIONS

7.2.1 The following should be considered for future improvement of implementation of sound environmental management practices and governance within DWAF:

- Project level to be updated to program and policy levels,
- Social and economic issues to be fully incorporated to achieve an Integrated Environmental Management Framework (IEMF),
- Forestry and Working for Water components be included in the IEMF,
- The IEMF be extended to non-development projects which have an impacting and management function on the environment,
- Environmental Policy and Statement to be developed for DWAF,
- Environmental Strategy to be developed for ISP to give guidance to CMS regarding environmental management practices,
- Environmental Reporting through CEIMP should be risk based,
- Information Management System should be developed for DWAF to assist in environmental monitoring and auditing,
- Electronic Environmental Decision Support System (E-DSS) and supporting tools, checklists and guidelines to assist in application
- Environmental Management System to be developed to ensure environmental management and governance within DWAF, and use the IEMF as a building block to implement an appropriate EMS,
- Environmental Communication and Awareness strategy and action plan,
- Internal training material and courses, and
- Consolidate all above initiatives into an IEM series.

In terms of an effective Environmental Management System, the approach should be to divisionalise dedicated environmental management staff, rather than to have a centralised environmental management section. In this way, the Environmental officer is part of the daily interactions within the division, and a truly multi-disciplinary and integrated approach to project implementation is achieved. It is essential to stress the importance of a holistic project team within the context of project development, as the life cycle process will only be successful if all project team members are committed to a common goal, i.e. successful project in terms of technical, environmental, social and financial aspects.

It is argued that the responsibility of the environment does not lie with the project environmentalist officer alone, but with the project team as a whole, since environmental management is not an environmental issue but a business issue.

Fundamental to the success of implementing a project in an efficient manner is the formulation of a team representative of all project aspects, namely financial, technical and environmental. In terms of the life cycle approach the project team should be identifies upfront at the start of the pre-feasibility phase and remains in place until the completion of construction.

The main role players on the project team are the client representative, the project manager, the engineer and the environmental officer. The contractor will be included at the start of construction. Roles and responsibilities of the key project team members should be defined in order to ensure effective sound environmental management. Contractual agreements within the framework of the project for successful implementation of the project are a necessity. The players on the project team might change, but the functions must continue through to the end of the project.

"Our liquid planet glows like a soft blue sapphire in the hard edged darkness of space. There is nothing else like it in the solar system. It is because of water."

John Todd

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