8/1/2011

THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT STRATEGY

SUBTHEME 8: SKILLS OF EAPs AND GOVERNMENT OFFICIALS

SSI Environmental: Janet Loubser & Mark Freeman

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Table of Contents

1. SUBTHEME 8: SKILLS OF EAPS AND GOVERNMENT OFFICIALS 1
   1.1. Problem Statement 1
   1.2. Objectives and Goals 2
2. BACKGROUND AND PROJECT METHODOLOGY 4
   2.1. Background 4
   2.2. Mandate 7
   2.3. Definitions 8
3. APPROACH TO STUDY 12
4. METHODOLOGY 16
   4.1. Ten Year Review of Effectiveness and Efficiency of EIA system in South Africa 17
   4.2. Environmental Sector Skills Plan 19
   4.3. Integrating the environmental driver into Sector Skills Plans 33
   4.4. Human Capital Development Strategy for the Biodiversity Sector 36
   4.5. National Skills Development Strategy (NSDS III) 39
   4.6. what are the skill requirements for professional registration? 40
   4.7. Criteria for the certification of EAPs (Interim process) 46
   4.8. Criteria for registration (EAPASA) 48
   4.9. Institutional arrangements 50
   4.10. SWOT Analysis 54
5. PRINCIPLES AND STRATEGIC OUTCOMES 56
   5.1. Respond to changing global environment 56
   5.2. Ensure the Attraction and Retention of Skills 57
   5.3. Ensure Career development planning 60
   5.4. Promote Continuing Professional Development 60
   5.5. Promote Knowledge Transfer and Learning 64
   5.6. Promote Inter-disciplinarity 68
   5.7. Increase focus on Monitoring and Enforcement 71
6. WHAT SKILLS DO WE REQUIRE? 73
   6.1. Generic Skills proposed for EAPs 73

6.2. SKILLS REQUIRED TO EFFECT THE INTEGRATED ENVIRONMENTAL MANAGEMENT (IEM) PHASES 78
6.3. SKILLS REQUIRED FOR EFFECTIVE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) MANAGEMENT 81
6.4. SKILLS DEVELOPMENT FOR OTHER RELATED PROFESSIONS 100
7. OBSTACLES TO SUCCESSFUL IMPLEMENTATION 102
8. SUMMARY OF PROPOSALS 104
9. CONCLUSION 115

List of Figures

FIGURE 1: THE MANDATE AND SCOPE FOR SKILLS DEVELOPMENT AS SET OUT IN NEMA 8

FIGURE 2: INTEGRATIVE ROLE OF ENVIRONMENTAL PRACTITIONER 13

FIGURE 3: METHODOLOGY 16

FIGURE 4: ESSP LINKS TO HUMAN CAPITAL DEVELOPMENT STRATEGIES 21

FIGURE 5: MODEL SHOWING THE FULL SUSTAINABLE DEVELOPMENT VALUE CHAIN AND ASSOCIATED SKILLS NEEDS 31

FIGURE 6: TRENDS IN DEVELOPMENT AND INNOVATION (MONTAVALDO, 2009) 34

FIGURE 7: BIODIVERSITY SECTOR HUMAN CAPITAL DEVELOPMENT STRATEGY 38

FIGURE 8: DEFINITIONS OF DISCIPLINARITY, MULTIDISCIPLINARITY AND INTERDISCIPLINARITY 69

FIGURE 9: DEFINITION OF TRANS-DISCIPLINARITY 70

FIGURE 10: GENERIC SKILLS PROPOSED FOR EAPS 77

FIGURE 11: INTEGRATED ENVIRONMENTAL MANAGEMENT CYCLE 78

FIGURE 12: SKILLS REQUIRED TO EFFECT INTEGRATED ENVIRONMENTAL MANAGEMENT 81

List of Tables

TABLE 1: FOCUS AREAS FOR SUBTHEME 8 4

TABLE 2: COMPARATIVE REVIEW OF EIA PROCEDURES SPECIFICALLY FOCUSING ON SKILLS 18

TABLE 3: APPROXIMATE NUMBER OF ENVIRONMENTAL EMPLOYEES IN SOUTH AFRICA 22

TABLE 4: CRITICAL SKILLS GAPS IDENTIFIED ACROSS THE ENVIRONMENTAL SECTOR 24

TABLE 5: SUMMARY OF SCARCE SKILLS IDENTIFIED AT SUB-FOCUS LEVEL 25

TABLE 6: SUMMARY OF IDENTIFIED SCARCE SKILLS IN THE ENVIRONMENTAL SECTOR 28

TABLE 7: VACANCY RATES IN THE PUBLIC BIODIVERSITY SECTOR 36

TABLE 8: SUMMARY OF THE KEY REQUIREMENTS FOR EXISTING EAP REGISTRATION ORGANISATIONS IN SA 44

TABLE 9: ACADEMIC QUALIFICATION REQUIREMENTS 46

TABLE 10: CERFTIFICATION REQUIREMENTS 47

TABLE 11: SWOT ANALYSIS 55

TABLE 12: COMPETENCY DIRECTORY 73

TABLE 13: LINKING COMPETENCIES AND SKILLS TO THE IEM PHASES 79

TABLE 14: SKILLS REQUIRED FOR EFFECTIVE EA MANAGEMENT (BASIC ASSESSMENT) 84

TABLE 15: SKILLS REQUIRED FOR EFFECTIVE EA MANAGEMENT (SCOPING AND ENVIRONMENTAL IMPACT REPORTING) 88

TABLE 16: SUMMARY OF PROPOSALS 104

TABLE 17: SKILLS DEVELOPMENT IN RELATION TO EIAMS SUBTHEMES 112

List of Annexures

Annexure A Excerpt from the enabling document specifically for the Energy (and Water) SETA

Annexure B ESSP Recommendations

Annexure C Environmental Education courses

ACRONYMS

ABET	Adult Basic Education and Training
CPD	Continuing Professional Development
CPE	Continuing Professional Education
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioners of Southern Africa
EIA	Environmental Impact Assessment
EIAMS	Environmental Impact Assessment and Management Strategy
ELO	Exit Level Outcome
EMI	Environment Management Inspectors
EMF	Environmental Management Framework
EMP	Environmental Management Programme
ESSP	Environment Sector Skills Plan
FET	Further Education and Training
GET	General Education and Training
GIS	Geographic Information System
HCD	Human Capital Development
HCDPF	Human Capital Development Planning Forum
HET	Higher Education and Training
I&AP	Interested and Affected Party

ICT	Information and Communications Technology
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
MTSF	Medium Term Strategic Framework
NEMA	National Environmental Management Act
NQF	National Qualifications Framework
NPO	Non Profit Organisation
NSDS	National Skills Development Strategy
REAP	Registered Environmental Assessment Practitioner
RPL	Recognition for Prior Learning
SAQA	South African Qualifications Authority
SACNASP	South African Council for Natural Science Professionals
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SWOT	Strengths, Weaknesses, Opportunities and Threats

1. SUBTHEME 8: SKILLS OF EAPS AND GOVERNMENT OFFICIALS

1.1. PROBLEM STATEMENT

At the "Ten Years of EIA in South Africa Conference" (2008) it was agreed that an **Environmental Impact Assessment and Management Strategy (EIAMS)** should be formulated for SA. The strategy should facilitate a participatory process that, in the context of the objectives of integrated environmental management contained in Section 23 of NEMA and the principles of sustainable development of Section 2 of NEMA, revises the environmental management terrain in a systematic and rigorous manner. The sub-directorate: Environmental Impact Management Strategy at the **Department of Environment Affairs (DEA)** has been tasked with the development and promotion of this comprehensive strategy to help better manage natural resources and the environmental impacts of development in South Africa.

The DEA therefore conceived a project that has to look at the desired future state for the EIAMS and path the way to achieve it within the mandate provided by Chapter 5 of NEMA and within a strategic policy context.

The project was conceived as a conglomerate of smaller tasks and studies, arranged around specific themes. Within this context, the DEA appointed **SSI Engineers & Environmental Consultants** to assist the Department with specialist studies in relation to the development of the national EIAMS. This specific specialist report relates to **Subtheme 8: Skills of EAPs and Government officials** under the **Theme: Capacity, skills and transformation**.

In workshopping and developing this report, it is clear that a **broader definition** of an Environmental Assessment Practitioner (EAP) is required to include private sector consultants, environmental specialists, government officials, NGOs, developers and I&APs, and not only those practitioners involved in environmental assessment. This broader definition applies throughout the report even though the Terms of Reference and title of the subtheme refers to the "Skills of EAPs and Government officials".

The Specialist Report has the aim of **mapping a way forward** that will ensure that authorities are sufficiently capacitated with skilled and experienced officials and those environmental practitioners, and other stakeholders active in the environmental management field, are capacitated and empowered. This will ensure improved competence and quality with regard to their investigations and assessments and thereby enhance the effectiveness and efficiency of the national Environmental Impact Assessment and Management Strategy (EIAMS).

1.2. OBJECTIVES AND GOALS

The key objective of the project is:

> **To ensure that Environmental Assessment Practitioners (EAPs), environmental practitioners, environmental management inspectors (EMIs) and government officials have the recognised set of skills for effective analysis, assessment and decision-making in the environmental impact assessment and management process.**

The goals for the project are:

1. To determine existing/ available skills of EAPs and government officials;
2. To determine minimum required skills in other professional fields to ensure integrated environmental management within other professions;
3. To determine a set of skills that is needed/ minimum requirement for EAPs, other environmental practitioners and government officials for tools identified in Subtheme 9 and registration requirements as determined in Subtheme 5; and
4. To ensure that the necessary training mechanism and instruments are provided to ensure that EAPs, environmental practitioners and government officials have the necessary set of skills.

The deliverables for the project are:

Criteria for accredited processes, programmes, training and other processes to ensure that EAPs, other environmental practitioners, and government officials have a recognised set of skills for effective analysis, assessment and decision-making in the environmental impact assessment and management process.

2. BACKGROUND AND PROJECT METHODOLOGY

2.1. BACKGROUND

The research for the Subtheme 8 report addresses a number of distinct steps or issues, as detailed in Table 1 below, as provided for in the Terms of Reference. It starts off with a skills inventory investigating existing skills of EAPs, other environmental practitioners and government officials in South Africa, and then looks at a recognised set of skills that is a necessity or minimum requirement for environmental management. The minimum set of skills for environmental professionals and other professions, such as engineering, town planning and architecture, is flagged to ensure integrated environmental management can be achieved across many disciplines. Knowledge transfer in the context of existing induction processes, coupled with aspects relating to staff retention, institutional knowledge and job satisfaction is then earmarked for investigated as well as proposals for training and knowledge development. The collated knowledge is then used to align the process for professional registration (e.g. EAP registration). Finally, a SWOT analysis is undertaken with a view to achieving the objectives of the project and how to address obstacles in the implementation process. To assist in mapping the way forward, a summary table of proposals in included at the end of the report.

During the course of the investigations, cross-referencing with other sub-theme specialist investigations took place, specifically with Subtheme 1: Procedures and Organisational Structures, Subtheme 5: Quality Assurance and Independence of EAPs and Subtheme 9: Existing and new Environmental Management Tools.

TABLE 1: FOCUS AREAS FOR SUBTHEME 8

Key Focus	Description	Assessment method
1. **Set Goals and Objectives**	Compile goals and objectives for achieving the main mission of skills development	DEA consultation
2. **Skills inventory**	Investigate existing/ available skills and profession of EAPS, other environmental practitioners and Government Officials.	DEA and stakeholder consultation.
3. **Skills inventory for**	Recognised set of skills that is a necessity/ minimum requirement for EAPs, other environmental practitioners	Skills inventory for EAP development

Key Focus	Description	Assessment method
EAP development	and government officials in the environmental field in line with SAQA qualification process.	
4. Interdisciplinary skills	Development of recognised set of skills that is a necessity/ minimum requirement in other pertinent fields (such as engineering, town planning, architecture) to ensure integrated environmental management as contemplated in Section 23 of NEMA and in accordance with the Principles set out in Section 2 of NEMA.	Consultation with other disciplinary professional bodies (e.g. ECSA)
5. Knowledge Transfer and Learning	Propose mechanisms and processes to ensure that EAPs, environmental practitioners and government officials have the recognized set of skills. Evaluate existing induction processes and comment on the efficacy of knowledge transfer and institutional learning.	Consultation with other disciplinary professional bodies (e.g. ECSA).
	Investigate staff turnover rates within public sector, staff retention, succession planning, evaluation of management skills, reviews, experience etc. Evaluate existing strategies and how the loss of institutional knowledge can be curtailed (Brain Circulation).	
	Address the causes of staff turnover and propose mechanisms to promote staff retention, institutional memory and job satisfaction	Interviews and consultation with industry leaders and human resources (via PSC workshops).
6. Training and knowledge development	Propose practical and academic short and long term training programmes for defined skill levels to augment skills, introduce instruments and update skills. Align with the theme “Existing and new Environmental Impact Management Tools” under “Impacts and Instruments”. These programmes should include	Investigation of universities and leading research organisations course content and training programmes

Key Focus	Description	Assessment method
	practical and academic components.	
	Recognise the role and knowledge of field experts in both the private and public sectors and civil society. Recognise different levels of training for different professions, and experience levels.	Interaction with registration bodies
	Propose process to align formal training at education institutions with training requirement as determined in this subtheme.	
	Continuing Professional Development	
7. Professional registration	Propose process to align professional "registering requirement" and proposed EAP's registration or other environmental practitioner registration process as determined in Subtheme 5 with required list of skills as determined in this subtheme.	Professional registration
8. SWOT Analysis	Identify and report on any threats to attaining the objective of this sub-theme, and problem areas which may prevent implementation.	SWOT Analysis

The purpose of the EIAMS process is therefore to facilitate a participatory process in order to compile a strategy that gives effect to the objectives of IEM as contained in Section 23 of NEMA within the context of the principles of sustainable development (Section 2 of NEMA). The strategy must look at the desired future state for the IEM system and path the way to achieve it within the mandate provided by Chapter 5 of NEMA and within a strategic policy context. Figure 1 outlines this strategic policy context which includes *inter alia* the Strategy for Sustainable Development and Climate Change Strategy, and which in some instances extends beyond the mandate of the Department of Environment Affairs, and will require co-operation and alignment between spheres of government (such as municipal SDFs and IDPs).

The desired future includes an environmental impact assessment and management system, consisting of voluntary and regulated instruments in the next 5 years, where:

- the inefficiencies and ineffectiveness of the current system have been corrected and the efficiencies and effectiveness optimized;
- regulated EIA is used only when it is the most appropriate tool;
- IEM is given effect through a variety of other instruments that would, depending on the nature of (proposed) activities and/or the receiving environment supplement, compliment or replace EIA (and respond to new threats to the environment such as climate change);
- EIAM takes place within a strategic context of environmentally informed spatial instruments, sector strategies and policies;
- ***authorities are sufficiently capacitated with skilled and experienced officials;***
- ***other stakeholders are capacitated and empowered to ensure maximum impact on the effectiveness and efficiency of the strategy;***
- government regulatory processes have been as far as possible integrated, or at least aligned; and
- all stakeholders are equally committed to make it work: Government, EAPs, developers, community etc.

2.2. MANDATE

The Mandate of the EIAMS Strategy stems from NEMA chapter 5 with specific reference to Section 23: General objectives. The purpose of this subtheme report is to interrogate the development of environmental sector skills in order to ensure the integrated environmental management of activities. Activities in this instance mean policies, programmes, processes, plans and projects. Of critical importance, is the need to focus on the skills required to fulfill this mandate.

The Specialist Report has the aim of mapping a way forward that will ensure that authorities are sufficiently capacitated with skilled and experienced officials and those environmental practitioners, and other stakeholders active in the environmental management field, are capacitated and empowered. This will ensure improved competence and quality with regard to their investigations and assessments and thereby enhance the effectiveness and efficiency of the national Environmental Impact Assessment and Management Strategy (EIAMS).

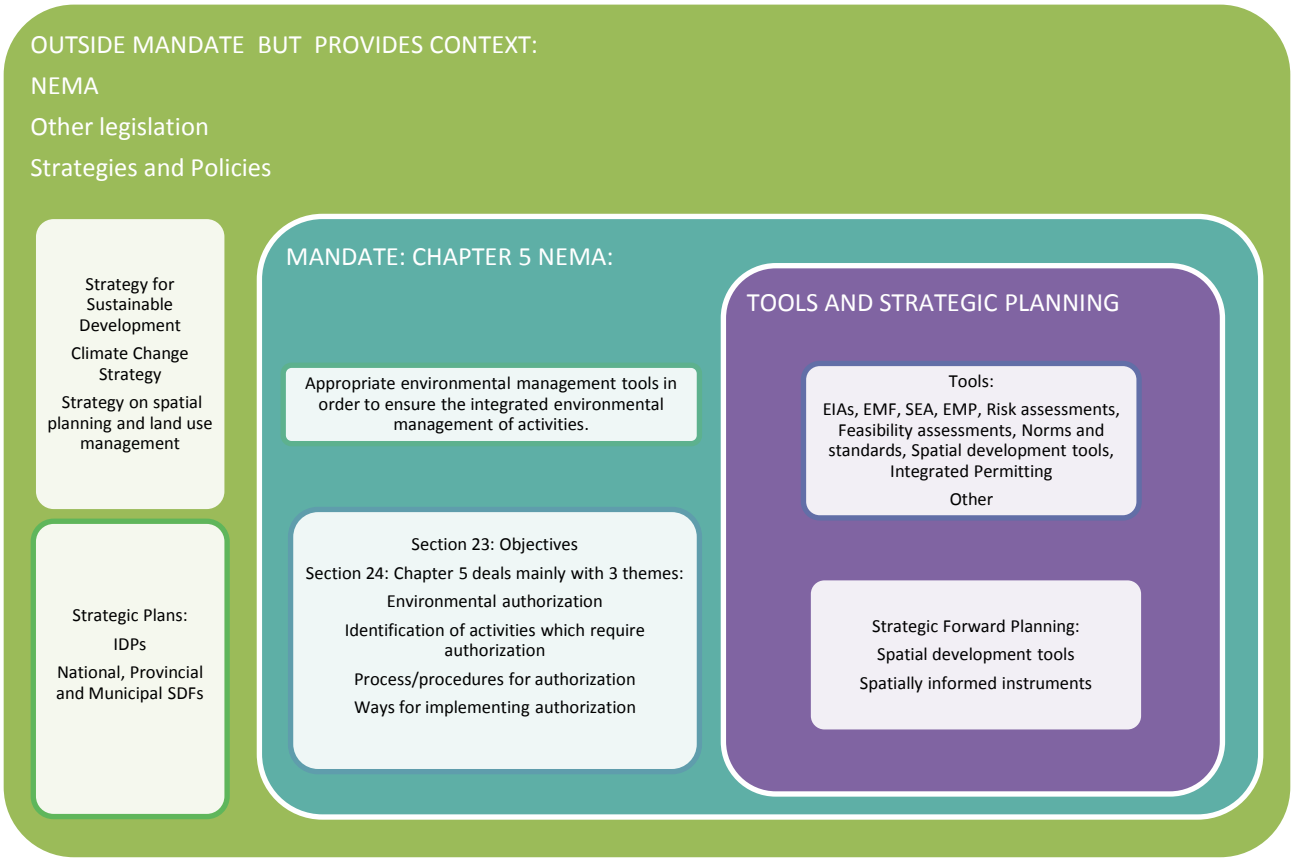

FIGURE 1: THE MANDATE AND SCOPE FOR SKILLS DEVELOPMENT AS SET OUT IN NEMA

2.3. DEFINITIONS

2.3.1. Environment

In terms of section 24 of the Constitution, everyone has the right to an environment that is not harmful to their health or well-being and to have this environment protected for future generations. The environment is defined as the surroundings within which humans exist and include land, water and atmosphere of the earth, micro-organisms, plant and animal life, as well as the physical, chemical, aesthetic and cultural properties of the environment that influence human health and well-being.

The definition of the term “environment” is generally accepted to include biological, physical, economic, political and cultural aspects and as reflected in recent South Africa legislation and policy. This definition embraces a more holistic interpretation of “environment” extending far beyond natural resources and ecosystems to include socio-economic aspects. As a result environmental practitioners consist of a wide range of professions and disciplines, which again results in a complex set of required skills and competencies.

2.3.2. Environmental Assessment Practitioner

Section 1 of the NEMA Amendment Act, Act 8 of 2004 provides the following definition:

> “‘environmental assessment practitioner’, when used in Chapter 5, means the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations;”

The Final Draft Constitution for the EAPASA uses the following definition:

> “EAP means an environmental assessment practitioner, namely a person responsible for the planning, management, co-ordination and review of environmental impact assessments, strategic environmental assessments, environmental management plans or any other environmental assessment instruments introduced through legislation, either in the role of assessor or in the role of a reviewer of existing assessments.”

Environmental Assessment Practitioners of South Africa’s definition of an EAP:

> “… someone who co-ordinates, manages and integrates the various components of environmental assessment throughout the planning process” (EAPSA, 2002)

However, in relation to this study, an Environmental Assessment Practitioner (EAP) refers to environmental practitioners that cover a wide range of Integrated Environmental Management aspects from environmental assessments to specialist areas (such as ecologists, botanists, hydrologists, etc), and from government officials to NGOs, developers, I&APs and private sector service providers. A much **broader more inclusive definition** of an EAP is adopted in this context to promote inclusivity within the environmental industry by extending the definition

beyond the field of environmental impact management. The definition of EAPs has been the focus of much discussion and debate and will no doubt continue to do so in future.

2.3.3. Integrated environmental management

Integrated Environmental Management (IEM) refers to an approach to environmental management that takes society, economy and the natural environment into account. Integrated and adaptive environmental management refers to an approach to environmental management that takes changing circumstances into account, thus requiring management approach to be adapted to these changing circumstances.

2.3.4. Skill

A skill can be defined as the learned capacity to carry out pre-determined results often with the minimum outlay of time, energy, or both. Skills can often be divided into domain-general and domain-specific skills. For example, in the domain of work, some general skills would include time management, teamwork and leadership, self motivation and others, whereas domain-specific skills would be useful only for a certain job. Skill usually requires certain environmental stimuli and situations to assess the level of skill being shown and used.

2.3.5. Competency

Competence (or competency) is the ability of an individual to perform a job properly. Some scholars see "competence" as a combination of knowledge, skills and behavior used to improve performance; or as the state or quality of being adequately or well qualified, having the ability to perform a specific role. For instance, management competency might include systems thinking and emotional intelligence, and skills in influence and negotiation.

2.3.6. Scarce and Critical Skills

Scarce Skills, as per the definition of the Department of Labour, refers to occupations in which there is a scarcity of qualified and experienced people, currently or in future, either because such people are not available (*absolute scarcity*), or because they are available but do not meet the employment criteria (*relative scarcity*) (ESSP, 2010).

Critical skills refer to specific skills within an occupation, and include generic skills (e.g. problem solving, report writing etc.), and particular occupational skills (e.g. using GIS). Vacancy rates, considered within a trend analysis period of 5 years, are used as proxy for identifying skills demands. Severe skills shortages are experienced when the vacancy rate exceeds 5%. According to Organisational Design and Human Resources Development Principles, acceptable organisational vacancy rate is 13%, while that of specialists' positions is 23% (ESSP, 2010).

2.3.7. Continuing Professional Development

Continuing Professional Development (CPD) or Continuing Professional Education (CPE) is the means by which members of professional associations maintain, improve and broaden their knowledge and skills and develop the personal qualities required in their professional lives. CPD is defined as a commitment to structured skills enhancement and personal or professional competence (DTI (2002), Accelerating Change). CPD can also be defined as the conscious updating of professional knowledge and the improvement of professional competence throughout a person's working life. It is a commitment to being professional, keeping up to date and continuously seeking to improve. It is the key to optimizing a person's career opportunities, both today and for the future (Chartered Institute of Personnel and Development (2000)). CPD should be engaging, informative and progressive, embracing 'best practice' and easily digestible knowledge. It should neither be excessively demanding nor uninteresting. It should stimulate a desire to learn more about your profession and participate in it (The Association of Personal Assistants).

3. APPROACH TO STUDY

The discipline of environmental management is relatively young. It started to emerge as a new profession during the 1960s when concerns about the impact of human activities on the environment became prevalent in the United States and Europe. These concerns led to the development of the Environmental Impact Assessment (EIA) tool, which has subsequently been adopted as a legislated requirement by most countries in the world for activities expected to have detrimental impacts on the biophysical and socio-economic environments.

Whilst the EIA tool has been widely adopted, there are many other tools and processes which have been developed to address environmental issues at different scales or for specific purposes. These include Strategic Environmental Assessment (SEA), Environmental Management Frameworks (EMFs), environmental risk assessment, Environmental Management Plans or Programmes (EMPs), environmental monitoring and auditing etc. As new issues or problems emerge, particularly at a regional or global scale, the need for further new tools, such as carbon foot-printing to help tackle climate change and environmental resource economics, will continue to be developed. This trend can be expected to accelerate as environmental issues mainstream in terms of economic, financial and political decision making.

By its very nature, environmental management is **multi-disciplinary**. To facilitate decision-making, impact assessment draws on the skills and knowledge of a wide range of specialist input and these specialists cover a plethora of subjects covering the natural scientific and socio-economic professions (such as geology and soils, botany and zoology, aquatic and atmospheric scientists, sociologists, economists, heritage practitioners, public participation specialists and many others). At the heart of bringing these disparate subjects together is often what is increasingly called the Environmental Assessment Practitioner (EAP).

The EAP is the project manager usually at the centre of an EIA process or other evaluation tool tasked with bringing together all of the many findings of the specialists and evaluating them in order to make recommendations for the decision-maker, as illustrated in the figure below.

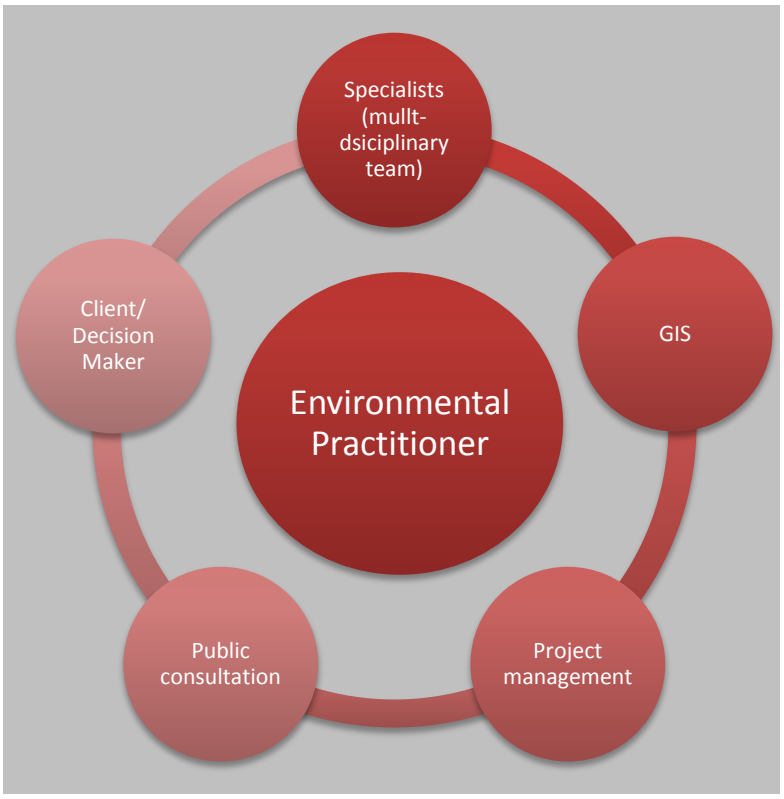

FIGURE 2: INTEGRATIVE ROLE OF ENVIRONMENTAL PRACTITIONER

Because the discipline of environmental management is both young and multi-disciplinary, it has meant that entry to the profession may come from many different directions. It has also resulted in inexperienced or insufficiently trained people sometimes being placed in important roles in the environmental decision-making process for which they are ill-equipped. Insufficient skills and competencies amongst environmental practitioners are a real problem that does need urgent attention. The ultimate aim of all roleplayers in the environmental management field should be to protect and conserve natural resources whilst contributing to social and economic growth and development. The application of skills is often distorted due to emphasis on the latter or as a result of undue pressure for development, and environmental practitioners need the relevant skills to be steadfast custodians of the environment.

This has lead to a need to better regulate the profession and register those wishing to work as EAPs. What possibly distinguishes the environmental profession from other disciplines and specialist areas, however, is the desire to

evaluate and ***integrate*** the findings and recommendations of specialist inputs into a coherent whole. This has led to the use of the term Integrated Environmental Management (IEM) in South Africa.

Environmental managers come from a wide range of backgrounds, but over recent years, they have increasingly been sourced from academic institutions which offer tertiary education and degrees in environmental management. The discipline has frequently been allied with geography or town planning departments which offer the student the required broad overview of the environmental management and planning fields.

In strengthening the academic qualifications, training, skills, development and accreditation of those practising in the environmental field, it will be essential to find consensus on how best to facilitate this need and to agree on certain principles which characterise the profession.

For example, the focus on IEM may require that academic institutions develop training and tools that specifically recognise the need to integrate and evaluate specialist area results (for both EAPS and Government reviewers). At the same time, there is a need to accommodate and accredit the many **specialists** involved in impact assessment (in many instances these specialists are fully devoted to environmental impact assessment work) to ensure that they are not neglected at the expense of EAPs.

An **inclusive approach** to skills development is thus required which will allow those already working in the environmental management field, as well as those wishing to enter it, to further develop their skills and obtain accreditation. In line with the multi-disciplinary nature of the discipline then, such an approach will need to accommodate multi-level entry to the profession whilst allowing both generalists and specialists the ability to follow a number of career paths that permit them to switch direction or specialise in the environmental management field through the acquisition of specific skills, qualifications and accreditation. In short, all roleplayers in the environmental industry should have a path to accreditation be they EAPs, government officials (decision-makers) and specialists.

In achieving the above, it will be necessary to **identify gaps in knowledge and skills** in the environmental management field, whilst recognising the multi-disciplinary nature of the profession. Government policies in terms of skills and human resource development (e.g. the Environmental Sector Skills Plan ((ESSP)) will need to be taken on board.

Furthermore, the Regulation in terms of Chapter 5 of NEMA require that the Competent Authority checks that the reports contain the "the **expertise of the EAP** to carry out... assessment procedures" but, the guideline gives no indication of what is regarded as adequate expertise, nor are the regulations explicit in what is required of the authority if the EAP is not qualified to prepare the application (say because of scale, scope or other complexity). It is therefore incumbent on the industry to set the standard in terms of “expertise” and to encourage professional registration to ensure a level of competence and quality assurance.

It will also require a number of players to **work together for the common good of this multi-disciplinary field** such as the SAQA, the DEA, academic institutions and training bodies, EAPASA, SACNASP, professional bodies representing other generalist and specialist disciplines and areas, the SETAS etc. This is where the challenge will lie.

4. METHODOLOGY

The methodology employed for this study has four main components. Firstly, a Status Quo assessment interrogated current literature, processes and institutional arrangements. Following this was an analysis of the current situation which looked at the criteria for EAP certification, demand and supply of environmental skills and a high-level SWOT analysis. The third phase synthesized the information into a set of principles with associated strategy outcomes, and then proposed skills during the IEM cycle and EIA process. Finally, a set of proposals was developed which focused on the seven strategic objectives.

The team conducted interviews with representatives of the Department of Environmental Affairs (Directorate of Education, Training and Development Practices), and included relevant outcomes and proposals from other Subthemes of the EIAMS. Table 17: Skills Development in relation to EIAMS Subthemes also outlines key aspects relating to skills development emanating from the other Subthemes that are important for the successful implementation of the EIAMS.

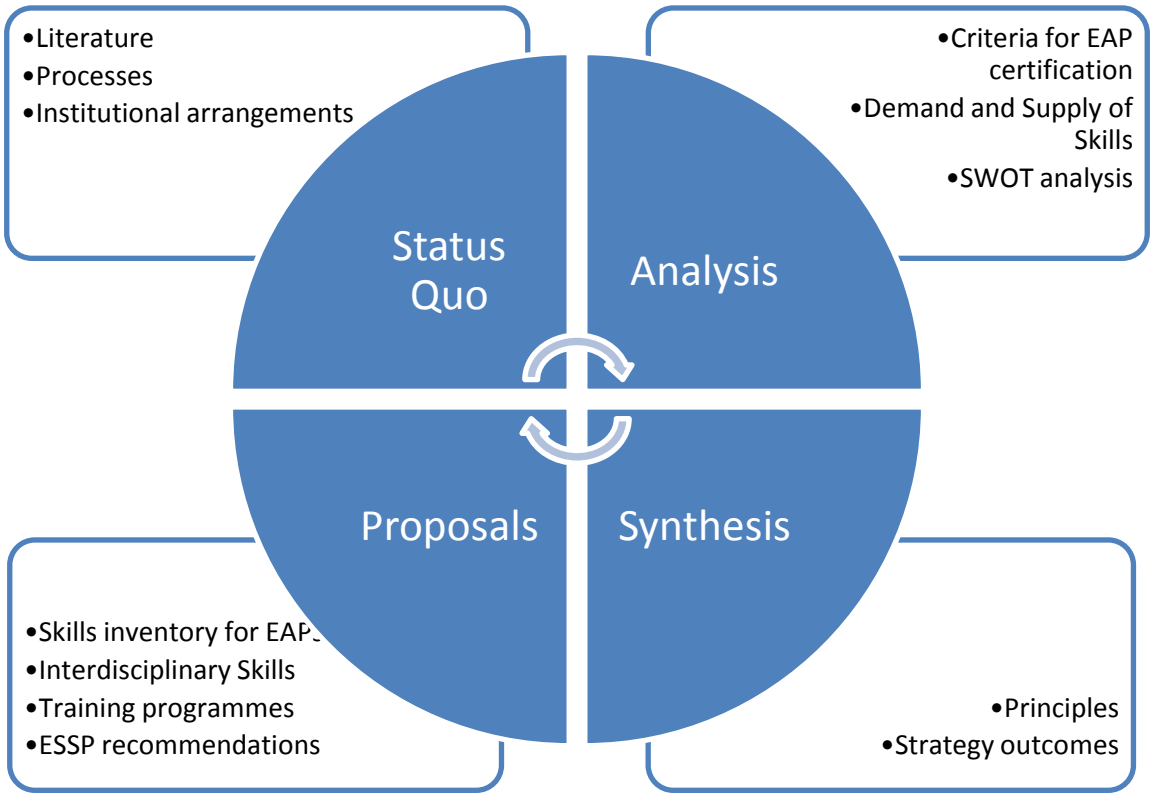

FIGURE 3: METHODOLOGY

WHAT IS THE CURRENT SITUATION?

This section provides an overview of the literature associated with skills development and human capital development in the environmental sector in South Africa. A number of initiatives have been undertaken over the past few years regarding the development of skills for EAPs and government officials. A summary of key issues identified in the following documents is provided:

- 10 Year Review of Effectiveness and Efficiency of EIA System in South Africa
- Environmental Sector Skills Plan
- Enabling document for all Sector Education and Training Authorities
- Human Capital Development Strategy for the Biodiversity sector
- National Skills Development Strategy (NSDS III)

4.1. TEN YEAR REVIEW OF EFFECTIVENESS AND EFFICIENCY OF EIA SYSTEM IN SOUTH AFRICA

This study addresses shortcomings and limitations in the integrated environmental management system in South Africa particularly relating to skills development. It is therefore appropriate to ascertain what comments and suggestions were included in the 10 year review of EIAs in South Africa. The "Review of Effectiveness and Efficiency of the Environmental Impact Assessment (EIA) system in South Africa" report of November 2008 highlights the following issues regarding skills and human capital that are pertinent for this study.

The report is concerned with the high turnover of staff in both public and private sector organisations. This is particularly disruptive in terms of project implementation but also for the development of skills and capacity within organisations. "Institutional memory" is a key consideration in the development of human capital through sharing of experiences and providing useful insights and lessons. It is argued that the constant change of personnel contributes to inefficiency and ineffectiveness in the EIA system. What is needed is a constant supply of environmental practitioners to build capacity at all levels within an organisation and to develop appropriate career paths for employees.

As part of the evaluation, a general questionnaire was distributed to obtain responses for the effectiveness and efficiency of EIA. In terms of skills development, Question 68 is relevant where the response to the question "The

officials who review and evaluate EIAs do not possess the requisite skills or experience to manage the complexity of the EIA process" was strongly agree (13.46%), agree (34.62%), neither (28.85%), disagree strongly (11.54%), disagree (5.77%), and do not know (5.77%). Although there were respondents that agreed with the statement, there were also those that disagreed and while there was no conclusive indication either way, it is evident that there are concerns regarding the ability and competency of officials to deal with EIA.

Furthermore, as part of a comparative review of EIA procedures and practices in developed and developing countries, including South Africa, the following comment is provided:

TABLE 2: COMPARATIVE REVIEW OF EIA PROCEDURES SPECIFICALLY FOCUSING ON SKILLS

Developed countries	EIA in developing countries	EIA in South Africa
A multi-disciplinary approach. Involvement of experts with expertise in a variety of disciplines.	Lack of trained EIA professionals often leads to the preparation of inadequate and irrelevant EIA reports in developing countries.	Preparation of EIA is done by EAPs with various skills levels. The selection criterion for the organisation is often fees/ cost based.

In developed countries, the emphasis is on a multi-disciplinary approach with involvement of a range of disciplines, whereas in developing countries the capacity constraints were highlighted resulting in inadequate products or outcomes. The South African context also refers to the involvement a multiplicity of skills and professionals in the environmental management field, where the cost component was highlighted (in the context of limited resources to adequately address the tasks at hand, and the requirement for the appointment of an independent EAP to undertake the requisite environmental studies).

In the section on measures to improve EIA effectiveness, the following comment was made regarding skills development:

- EIA should be strongly linked with, and integrated into, environmental management systems.
- Post-implementation monitoring and auditing should be enforced.
- ***For EIA to be credible and play a meaningful role, the capacity of the implementing authorities - in terms of both numbers and skills - needs to be improved.***

- Compile central database of baseline information accessible to all decision-making authorities, practitioners and developers.
- Produce resource materials that are useful to EIA (e.g. atlas, profiles, biodiversity country study, state of the environment reports).
- Implement post-authorisation monitoring of the implementation of the conditions of the authorisation.

4.2. ENVIRONMENTAL SECTOR SKILLS PLAN

The most significant and comprehensive study regarding environmental skills development is the **Environment Sector Skills Plan** (ESSP) which was developed by DEA during 2009/2010. The aim was to review the current status of environmental skills issues in South Africa, and to identify priorities for skills development in the environmental sector. The ESSP was the first of its kind as no previous comprehensive assessment of environmental skills had been done in South Africa. It was intended that the ESSP should inform the Workplace Skills Plans and ensure alignment with government's Medium Term Strategic Framework (MTSF), specifically Objective 9, which focuses on the sustainable use of natural resources.

The ESSP describes the current situation with regards to supply and demand of environmental sector skills, and provides best available information on scarce and critical skills in the sector at present from a supply and demand perspective. It also identifies new trends influencing skills development needs in the sector; mainstreaming of environment into development; new science and technology directions in South Africa; and the green economy. It also provides guidance on improving environmental sector skills development planning and implementation within the national education, training and skills development system. It sets objectives for Human Capital Development Strategic Planning for the Environmental Sector, and provides guidelines for Human Capital Development Planning (ESSP, 2010).

In the ESSP, skills refer to occupational categories, but also to the knowledge, values and skills needed to fulfill environmental mandates. The ESSP uses the categories of high, intermediate and entry level skills to differentiate skills development needs.

- **high skills** refers to qualified personnel at levels 7-10 on the South African National Qualifications Framework (Bachelors degree and above);
- **intermediate skills** refers to qualified personnel at levels 2-6 on the National Qualifications Framework (Grade 9, Further Education and Training (FET) and diploma qualifications); and
- **entry level skills** refers to personnel with levels 1 (Grade 9/ ABET level 4) and below on the National Qualifications Framework (ESSP, 2010). Note: South Africa's National Qualifications Framework (NQF) recognises three broad bands of education: General Education and Training, Further Education and Training, and Higher Education and Training.

The environmental sector referred to in the ESSP includes public, private, parastatal, academic and research institutions, and Not for Profit Organisations (NPOs). It covers the environmental focus areas of Air Quality, Waste and Chemicals Management, Pollution Incident Management, Environmental Impact Management, Conservation and Sustainable Use of Biodiversity, Marine and Coastal Management *as well as* cross cutting support functions: Environmental Law and Compliance, Environmental Education, Training and Community Empowerment, but *excludes water,* since the Department of Water Affairs has undertaken a similar study to establish skills development needs in the Water Sector (ESSP, 2010).

Importantly, there is a need for alignment and co-operation between various role-players in the environmental sector. Improvement should be evident between the Departments of Water Affairs and Environment Affairs as these two departments reside in a single ministry, and therefore combined efforts could be undertaken to improve skills development.

The ESSP is linked to, and has informed a number of Human Capital Development (HCD) Strategies, which provide for micro-level or sub-sector skills planning and implementation. This is necessary within a differentiated system of skills provisioning, which in the case of the environmental sector is differentiated according to key priorities and legislative mandates, but also according to specific skills demands at different levels of the system.

The DEA ESSP has therefore influenced the design of a Human Capital Development Strategy for the Biodiversity Sector (led by SANBI); and the Department of Science and Technology's Global Change Grand Challenge Human Capital Development Strategy. Links have also been made to the Department of Water Affairs' Human Capital Development Strategy; and a Human Capital Development Strategy being developed for sustainable natural resource management in forestry, agriculture and fisheries. The ESSP has an associated DEA **Human Capital Development Strategy** that plans key interventions to support the five year Strategic Plan for the Environmental Sector (2009-2013). To address the need for co-ordination of these skills planning efforts, a Human Capital Development Planning Forum (HCDPF) (refer to Figure 4) has been formed with key stakeholders involved in human capital development strategy planning to ensure synergy and efficiency.

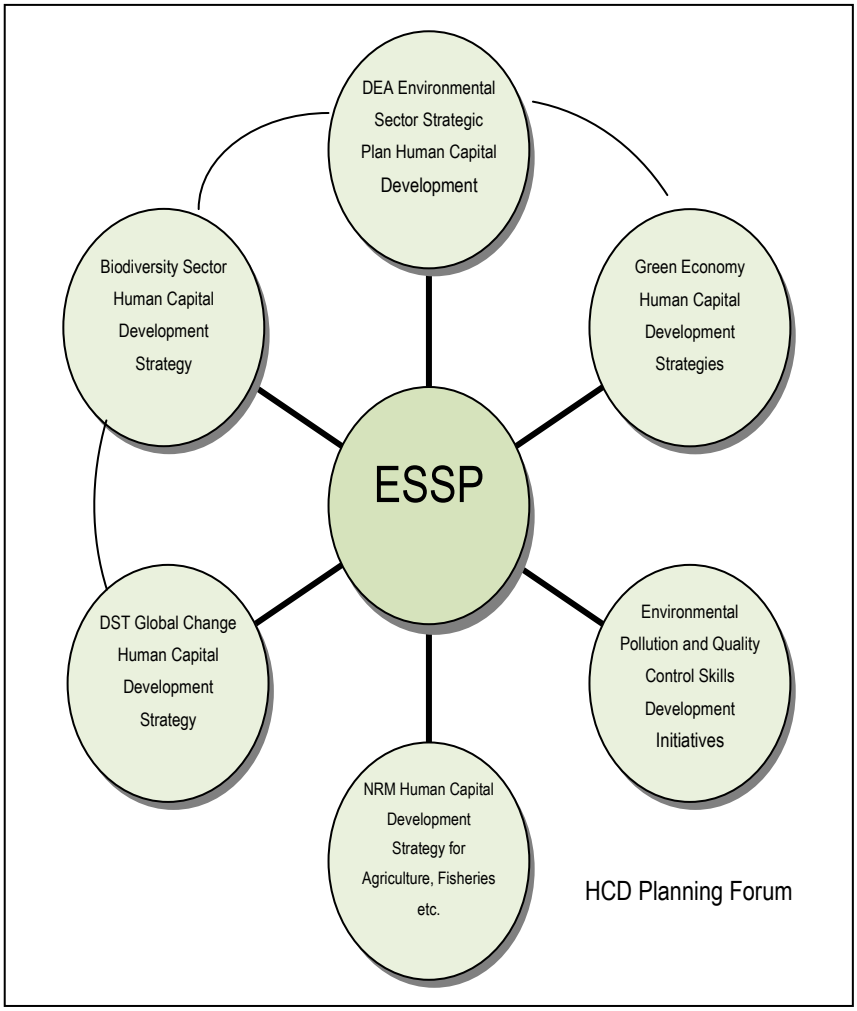

FIGURE 4: ESSP LINKS TO HUMAN CAPITAL DEVELOPMENT STRATEGIES

The ESSP states that this process is demonstrating the influence of a document such as the ESSP on other skills development planning processes. Lessons learned at the interface of sector wide macro-planning and sub-sector niche area micro-level planning are captured in a set of ***Guidelines for Skills Development Planning in the Environmental Sector*.**

It is estimated that the approximate number of employees in the environmental sector in South Africa is 233 000 (ESSP, 2010). The breakdown between employer groupings is indicated below. These are based on the best available (conservative) assessment of environmental employment in South Africa. This indicates that environmental employment is a significant "new" area of employment in the country; and is linked to both new environmental policy and legislation (new mandates); and new opportunities for development and growth. Of critical concern, however, is the poor available knowledge of the profile and growth of employment in environmental occupations, which can only impede accurate skills planning (ESSP, 2010).

TABLE 3: APPROXIMATE NUMBER OF ENVIRONMENTAL EMPLOYEES IN SOUTH AFRICA

Employer Groupings	Estimated numbers
National and Provincial Government (excluding water)	4 500
Local Government (environmental employees including environmental health practitioners)	37 000
Environmental Parastatals (National and Provincial)	7 000
NPOs (NGOs, CSOs, CBOs)	33 000
SMMEs and Industry (including private consulting firms)	150 000
R&D (including Higher Education)	2 300
TOTAL Estimated Employment in Environmental Sector (excluding water, and school teachers)	**233 000**

It is therefore evident from these figures that the environmental sector is fairly substantial and encompasses a wide range of employer groupings. It is timeous that focus be placed on the planning for and implementation of environmental skills development in South Africa.

It is clear that environment is a cross-cutting concern, and ideally every SETA needs to undertake specific research to quantify environment skills needs and relating training requirements. Should South Africa continue with a more reactive approach to skills development for environmental functions, our ability to use new development opportunities associated with the "sustainable development" paradigm will be limited.

A more proactive approach to skills development can "maximize new development opportunities, save resources, ensure greater efficiency in the use of resources, and avoid environmental damage which is costly to recover or rehabilitate, and improve public health and service delivery' (DEA, 2010). Therefore the demand for environmental skills is changing and the sector needs to be in a position to respond to these.

The ESSP elaborates that the **main drivers of skills demand and supply** in the environmental sector are:

- Policy drivers (MTSF Goal 9, sustainable development);
- Macro-economic drivers (green economy, integration into national skills development planning, strategy and human resource development frameworks);
- Macro-ecological drivers (risk prediction and risk management, sustainability innovation, complex systems analysis, building system resilience, and adaptive management);
- Skills system drivers (quality of schooling, quality of science and environmental education, improvement in educational quality and relevance); and
- New science and technology drivers (high level scientific and technological skills).

A further development is the drive towards **professional registration and accreditation** which will give further impetus to the need for skills development in the environmental sector.

The ESSP identified a number of key areas of skills demand in the environmental sector, all of which are particularly significant to the efficacy of service delivery in the public sector, and which also affect efficacy and developmental competitiveness of the private sector. These are:

- Leadership skills – supply and stability;
- Supply and development of scarce skills where skills gaps exist,
- More strategic planning and provisioning for re-skilling and updating of capacity in key areas where critical skills needs were identified;
- Development of new skills for greening the economy, sustainable development planning and managing risk (e.g. sustainable development planning and climate change risk assessment) (new green skills),
- Skills for mainstreaming environment into development (greening of existing skills); and
- Skills to develop and expand the sector; which include Environmental Education and Training skills to ensure that there is adequate capacity to deliver environmental training to an emerging and rapidly growing sector (ESSP, 2010 available at www.environment.gov.za).

While almost every environmental sub-sector identified different types of critical skills gaps relevant to their areas of specialization, there are, however, a number of common critical skills gaps that were identified across the environmental sector (Table 4:).

TABLE 4: CRITICAL SKILLS GAPS IDENTIFIED ACROSS THE ENVIRONMENTAL SECTOR

	Identified common critical skills gaps (across environmental sub-sectors)
High skills (Senior Management)	Leadership skills Risk assessment and risk management Environmental law and policy skills Organisational development Integrative skills (e.g. policy and science)
High Skills (Middle Management)	Human Resources Management Skills (including mentoring and coaching skills) Environmental law and policy ICT skills, including use and interpretation of GIS and modelling technologies

	Identified common critical skills gaps (across environmental sub-sectors)
	Project Management skills Research skills Report writing skills
High Skills (Technical Professional)	Environmental law and policy Integrative skills ICT skills, including use and interpretation of GIS and modelling technologies Integrative skills (e.g. ICT and science; science and policy etc.) Monitoring, modelling and evaluation skills Report writing skills

TABLE 5: SUMMARY OF SCARCE SKILLS IDENTIFIED AT SUB-FOCUS LEVEL

Note: Exact quantities are not known and need to be established at sub-sector level, through ongoing monitoring and analysis

	Waste Management	Air Quality Management	General Environmental Management (including Sustainable Development and Climate Change)	Environmental Impact Management and Pollution Control	Marine and Coastal Management	Biodiversity
High Skills (Management)	Senior Managers Middle Managers in public sector	Senior Managers Middle Managers in public sector	Senior Managers Middle Managers in public sector	Senior Managers Middle Managers in public sector	Senior Managers Middle Managers in public sector	Senior Managers Middle Managers in public sector
High Skills	Waste	Air pollution	Environmental	Environmental	Environmental	Bioregional

	Waste Management	Air Quality Management	General Environmental Management (including Sustainable Development and Climate Change)	Environmental Impact Management and Pollution Control	Marine and Coastal Management	Biodiversity
(Specialist Professionals)	Researchers and Scientists Toxicologists Soil Geochemists Remediation Specialists Landfill Designers and Managers	control officers Air Quality Specialists Engineers Atmospheric Dispersion Monitoring Atmospheric Scientists	managers (at local government level) Long range modellers Climate change risk assessors Nanotechnologists Space Scientists Climatologists Environmental Engineers Astronomers	Impact Management Officers (56% shortage at provincial level) Environmental Management Inspectors Environmental Risk Assessors Hydrologists Entomologists Cleaner Production Skills	Management Inspectors & Compliance Officers Researchers Climate Change Specialists Oceanographic Engineers Aquaculture Skills Coastal Zone Sustainable Development Planning	Planners Taxonomists Soil Scientists Scientific Curators Physical Curators Climate Change specialists Bio-systematics Stewardship and Extension (Relative Scarcity) Environmental Compliance Officers (EMI) Bioprospecting Biosafety
Intermediate Skills	Environmental Science Technicians	Air Quality Compliance Monitoring	Environmental Science Technicians	Environmental Science Technicians	Fisheries Control Officers	Extension and social ecology skills

	Waste Management	Air Quality Management	General Environmental Management (including Sustainable Development and Climate Change)	Environmental Impact Management and Pollution Control	Marine and Coastal Management	Biodiversity
	(with specialist competence for waste management)	Technicians Licensing Officers		Cleaner Production Technicians	Oceanographic Technicians Community based Monitoring Skills (for coastal zone) Monitoring skills (for monitoring fish stocks)	Databasers Herbaria technical staff
Elementary Occupation Skills	Waste recyclers (relative scarcity, related to formalisation of recycling industry and new Waste Management Act)				Community based Natural Resource Management Skills	Community based Natural Resource Management Skills

Priority skills development programmes identified that could service the entire sector include:

- Environmental law and policy;
- Integrative skills programmes;
- Mentoring and coaching;
- ICT skills programmes, including use and interpretation of GIS and modelling technologies;
- Sustainable development planning;
- Monitoring, modelling and evaluation of environmental change;
- Green procurement and green economy planning skills; and
- Environmental ethics and social justice practices in the environmental sector.

Regarding the identification of scarce skills in the environmental sector, the following table provides a summary.

TABLE 6: SUMMARY OF IDENTIFIED SCARCE SKILLS IN THE ENVIRONMENTAL SECTOR

Level	Scarce skills
High Skills	Leadership and Management skills Risk assessment and management skills Integrated environment and sustainable development planning skills
High Skills (Specialist Professionals)	Environmental law and compliance (environmental inspection) Specialist scientific skills (particularly black women scientists) Specialist technical skills Climate change risk and opportunity assessment skills Environmental Modelling and ICT skills Sustainable development planning skills Green Economy skills (resource economists, ecological economics, skills for green jobs development and training)

Intermediate level	Technical environmental monitoring skills (e.g. waste, water, coastal, environmental sciences)
Low skills	Environmental Practices (e.g. recycling, waste practices, greening, basic horticulture, rehabilitation technical skills etc. – a range of formalised operational level skills for the environmental sector)

Priority generic skills development programmes that need to be developed to service the sector as a whole include:

- Environmental Compliance and Environmental Management Inspection skills;
- Sustainable development and Green Economy leadership skills;
- Adaptive environmental management and sustainable development planning and implementation;
- Climate change risk and opportunity assessment and monitoring;
- Environmental monitoring and modelling skills;
- Environmental economics/ resource economics and Green Economy planning;
- Environment scientific skills; and
- Environmental technical skills (with specialist applications).

The Department of Labour Scarce Skills List identifies the following:

- It identifies Management Specialists – but it does not identify managers for the environmental sector;
- It does not list resource or environmental economists;
- It identifies a need for Engineers and Engineering Technologists, but it does not identify environmental/ air quality or water quality engineers or engineers with cleaner production skills on the list;
- It identifies the need for Natural and Physical Science Professionals including 100 Geologists, 150 Geophysicists, 500 Bioengineers and Biotechnologists, 200 Astronomers; 200 Astrophysicists; 200 Atmospheric Physicists, but it does not list all environmental scientific skills that are in demand (e.g. climate change scientists, soil scientists etc.); and
- It identifies a need for 250 Earth Science Technicians; and 1000 Biological Science Technicians, but it does not reflect all environmental technician scarcities (e.g. oceanographic technicians; environmental science technicians; cleaner production technicians etc.)

Based on the above, at least the following scarce skills need to be placed on the Department of Labour's Scarce Skills List for 2010/11/12:

- Climate Change Risk Assessors/ Long-Range Modellers
- Environmental Science Technicians
- Toxicologists
- Geochemists
- Hydrologists
- Taxonomists
- Oceanographic Engineers and Technicians
- Cleaner Production Engineers and Technicians
- Resource Economists / Environmental Economists
- Sustainable Development Planners

The Department of Labour also includes HRD skills and Training Skills on the National Scarce Skills List, both of which have been found to be needed in the environmental sector:

- Environmental Education and Training Skills
- Human Resource Management Skills for the Environmental Sector are also needed.

The ESSP also highlights that a pro-active approach to sustainable development in South Africa requires that the *full sustainable development value chain* be considered in skills planning at macro, and at micro-institutional level (Figure 5: Model showing the Full Sustainable Development Value Chain and Associated Skills Needs).

For example, if the skills value chain is missing environmental educators, the public will not be adequately engaged in sustainable development practices, or the quality of environmental training will be neglected. If the system lacks modellers, it will be difficult to predict impact, thus affecting planning and policy efficacy.

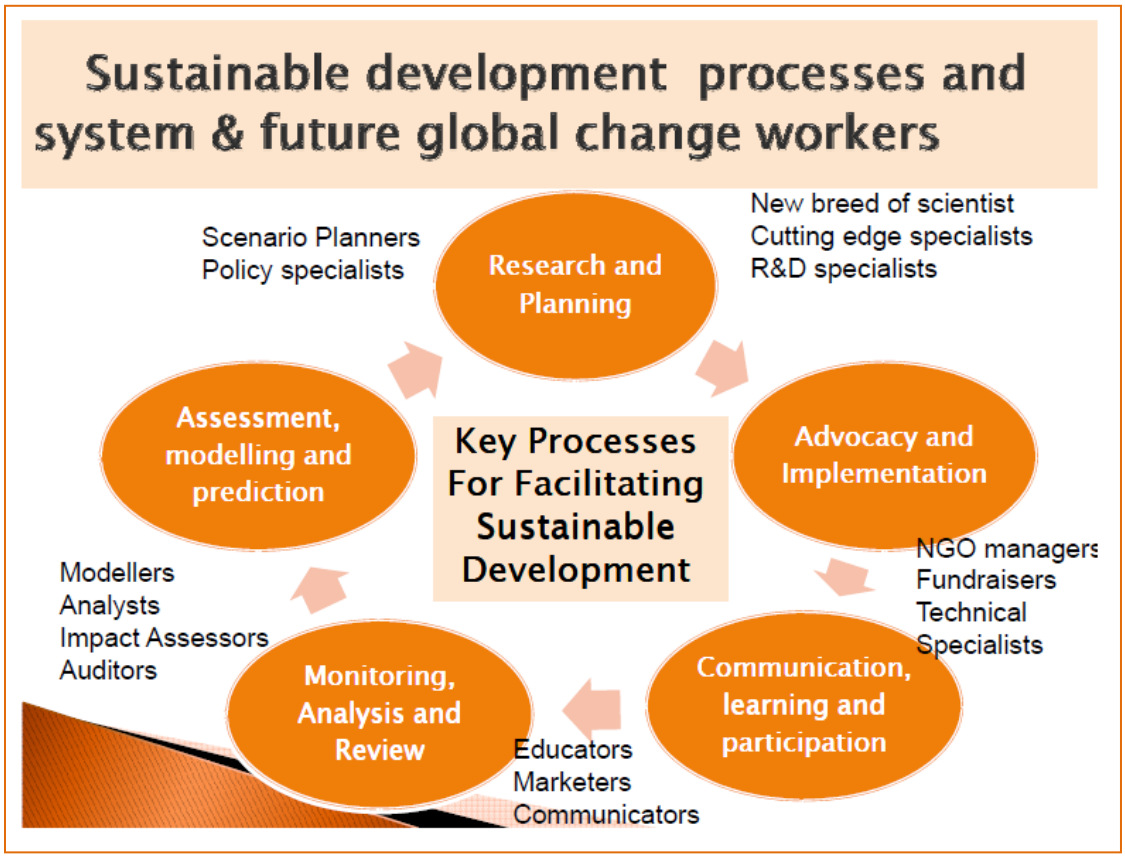

FIGURE 5: MODEL SHOWING THE FULL SUSTAINABLE DEVELOPMENT VALUE CHAIN AND ASSOCIATED SKILLS NEEDS

As shown in Figure 5, **skills for the sustainable development value chain** include:

- policy and planning skills;
- advocacy and critical implementation skills;
- communication learning and participation skills to build community and business resilience and participation;
- monitoring, analysis, impact management and review skills; and
- assessment modelling and prediction skills.

These skills involve a range of occupational categories including scenario planners, policy specialists, scientists, Research and Development specialists, NGO managers, fundraisers, technical specialists, educators, marketers,

communicators, modellers, analysts, impact assessors, auditors (amongst others). Within the scope of the ESSP it was not possible to fully assess the range of skills required to service the sustainable development value chain. Such studies need to be undertaken at micro-levels, where Human Capital Development Strategies provide for finer scale planning (ESSP, 2010).

In order to progress in the arena of environmental skills development, it is important to align with current processes so as to bring about the necessary improvements. The outcomes of the ESSP process proposed a number of recommendations which are crucial for the success of skills development in the environmental industry. A systems approach was adopted to ensure a pro-active, longer term, more sustainable skills development system for the environmental sector. These recommendations are targeted at the entire environmental industry and the role that government has in this regard. Many of the recommendations are therefore directed at the various institutions and processes dealing with environmental skills development.

These recommendations propose to:

- Address the immediate **demand and supply issues** for effective service delivery and implementation of existing and new environmental legislation;
- Address **capacity needs for growing the sector** in relation to the emerging Green Economy (economic, science and technology development drivers) as well as to address increased demands created by ongoing **environmental degradation and new risks** such as climate change (ecological drivers), transformation demands and the demands of instituting pro-active approaches to environmental management and sustainable development; and
- Build capacity and enabling innovation which involves ensuring that adequate environmental education and training capacity exists for developing the skills needed to **respond to the current gaps, and future needs**; and that environmental entrepreneurship and skills for public education, participation and empowerment are available to the environmental sector (ESSP, 2009).

Recommendations, framed in the form of **Objectives for Environmental Sector Skills Planning in South Africa**, are therefore directed at all three of the above needs, and are framed to ensure a systems approach to skills development in the environmental sector. It should be noted that in some instances the recommended actions have

been implemented or are currently underway (such as the inclusion of the environmental driver in sector skills planning).

The following Objectives were identified in the ESSP:

Objective 1: Address Environmental Sector Skills at Macro-System Level

Objective 2: Address Scarce and Critical Skills in the Environmental Sector

Objective 3: Put measures in place to ensure longer term, more sustainable supply of quality skills to the environmental sector

Objective 4: Put measures in place to ensure a pro-active, transformative and innovative skills development system for the environment al sector

Objective 5: Support Human Capital Development Strategy Planning at sub focus and institutional levels

Objective 6: Establish a system for Monitoring and Evaluation of Skills Planning and Development in the Environmental Sector

The full set of recommended actions is included in **Annexure B.**

4.3. INTEGRATING THE ENVIRONMENTAL DRIVER INTO SECTOR SKILLS PLANS

The Department of Environmental Affairs, together with the National Environmental Skills Planning Forum, has developed an enabling document for all SETAs aimed at integrating the environmental driver into Sector Skills Plans. The environmental driver refers to the influence of environmental factors on the skills development landscape. The purpose of the document is "to facilitate discussion with SETAs during Sector Skills Planning, and to support integration of the environmental driver. It is not prescriptive, but enabling in orientation. It will also be used for review of Sector Skills Plans by DEA" (DEA, 2010).

The premise of the document is that there are "significant new development opportunities associated with green growth and sustainability. Issues such as climate change, energy shortages, natural resource degradation and high energy prices are driving the emergence of a sustainable development paradigm, locally and internationally". Green growth refers to a paradigm of development that seeks to grow economic opportunity and benefit without wasting resources unnecessarily, or without causing unnecessary damage to ecosystems and natural life support systems.

New innovation waves reflect a trend to the 6th wave of Sustainability combined with 3rd generation eco-innovators as reflected in Figure 6. Coupled with the international policy shifts, there is increasing focus sustainability including the sustainable use of natural resources and a green economy.

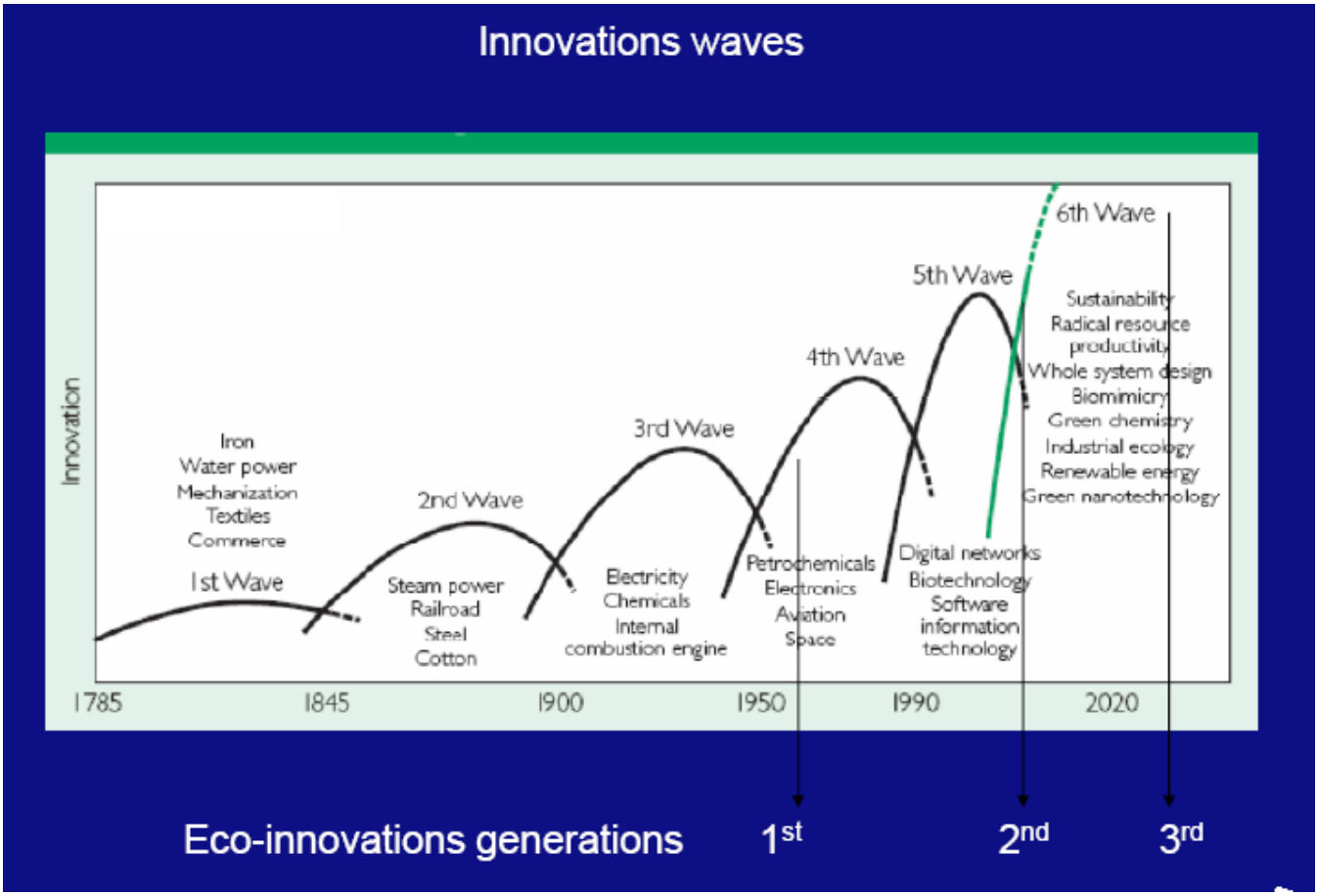

FIGURE 6: TRENDS IN DEVELOPMENT AND INNOVATION (MONTAVALDO, 2009)

This policy shift is reflected in government's Medium Term Strategic Framework (MTSF), specifically Objective 9, which focuses on sustainable use of natural resources. In addition, many sectors within South Africa have environmental compliance obligations and therefore the integration of environmental aspects into policy formulation, as well as human capital development, becomes imperative.

It is evident that in order to attain Objective 9 and ensure compliance to environmental legislation and policy, the introduction of environmental aspects into the skills development landscape is crucial. This process to engage with

the SETAs in terms of responding to the environmental driver, as set out in the MTSF Goal 9, is set out in the enabling document.

It is clear that environment is a cross-cutting concern, and ideally every SETA needs to undertake specific research to quantify environment skills needs and relating training requirements (DEA, 2010). Should South Africa continue with a more reactive approach to skills development for environmental functions, our ability to use new development opportunities associated with the "sustainable development" paradigm will be limited. A more proactive approach to skills development can "maximize new development opportunities, save resources, ensure greater efficiency in the use of resources, and avoid damage which is costly to recover or rehabilitate, and improve public health and service delivery' (DEA, 2010).

The enabling document for SETAs therefore aims to assist SETAs to adopt a pro-active approach to environmental skills in order to address MTSF Goal 9, and to maximize new development opportunities and job creation possibilities (DEA, 2010).

As such, the document makes recommendations for each SETA on:

- Interventions to address environmental critical skills relevant to the sector;
- Intervention to address scarce skills needed for a green economy and sustainable use of natural resources;
- Research and innovation interventions to strengthen environmental skills development in each sector; and
- Recommendations for flagship programmes that could also form the basis of partnership development with DEA and other stakeholders (DEA, 2010).

The SETA landscape is changing with the establishment of a new SETA, namely the Energy and Water SETA. There is currently no dedicated "environmental" SETA but it is possible that over time the environment may be included within this SETA which would provide a "home" in the SETA landscape for the environmental sector. Although the current arrangement also has its benefits as environment is a cross cutting issue relevant to all SETAs. DEA has adopted the approach to engage with all SETAs to ensure that the environmental driver is considered in all sector skills plans.

Annexure A includes an excerpt from the document (Integrating the Environmental Driver into Sector Skills Plans, July 2010) specifically looking at the Energy (and Water) SETA outlining the approach adopted by DEA, and the recommendations for the SETA in terms of critical skills, scarce skills, research and innovation and flagship programmes.

4.4. HUMAN CAPITAL DEVELOPMENT STRATEGY FOR THE BIODIVERSITY SECTOR

SANBI in partnership with the Lewis Foundation, DEA and sectoral organisations have developed a Human Capital Development Strategy for the Biodiversity sector. The rationale for the strategy is twofold – to effect transformation within the biodiversity sector and address the problem of scarce biodiversity skills. In summary, some of the key features of the research indicate that transformation is underway in the sector and much of this is "invisible". Of concern is the difficulty experienced by the sector in delivering on the expanded biodiversity management mandate. In addition, are the high vacancy levels particularly within the public sector together with high levels of under-qualified staff. This is nevertheless countered by high levels of passion and commitment within the biodiversity sector. There are also a considerable number of employees in the biodiversity sector within private consulting firms.

If vacancy rates are viewed as indicative of a lack of skills in the public sector, the following table is cause for concern (Vulindlela 2007/08).

TABLE 7: VACANCY RATES IN THE PUBLIC BIODIVERSITY SECTOR

Occupations in the public sector	Number of Posts	Number of Posts filled	Vacancy Rate
Nature conservation & oceanographical related technicians	910	441	51.5
Life sciences related professionals	4	2	50.0
Geologists, geophysicists, hydrologists & related professionals	348	193	44.5
Natural Science professionals	853	538	36.9
Computer occupations	272	178	34.6

Generic professionals	5036	3385	32.8
Veterinarians	300	205	31.7
Agricultural, oceanography, forestry & other scientists	1415	974	31.2
Environmental health professionals	45	32	28.9
Agricultural related support	1915	1376	28.1
Generic managers	1442	1046	27.5
Biochemistry, zoology & life science technicians	1517	1110	26.8
Veterinary assistance	79	59	25.3
Biologists, botanists, zoologists & related professionals	137	103	24.8
Generic associate professionals	2902	2187	24.6
Administrative	13823	10954	20.8
Other occupations	30479	24304	20.3
Farming, forestry advisors & managers	356	284	20.2
Horticulturists, agricultural & forestry technicians	2797	2233	20.2
Archivists, curators and related professionals	4	4	0.0
TOTAL	64637	49611	23.2

Further findings indicate that 34% of core staff in the biodiversity sector have responsibilities for which they are not qualified (where qualification is according to SACNSP). Interventions are proposed across a variety of spheres from primary school through High School and FET Colleges to Higher Education Institutions to the workplace, as depicted in the figure below.

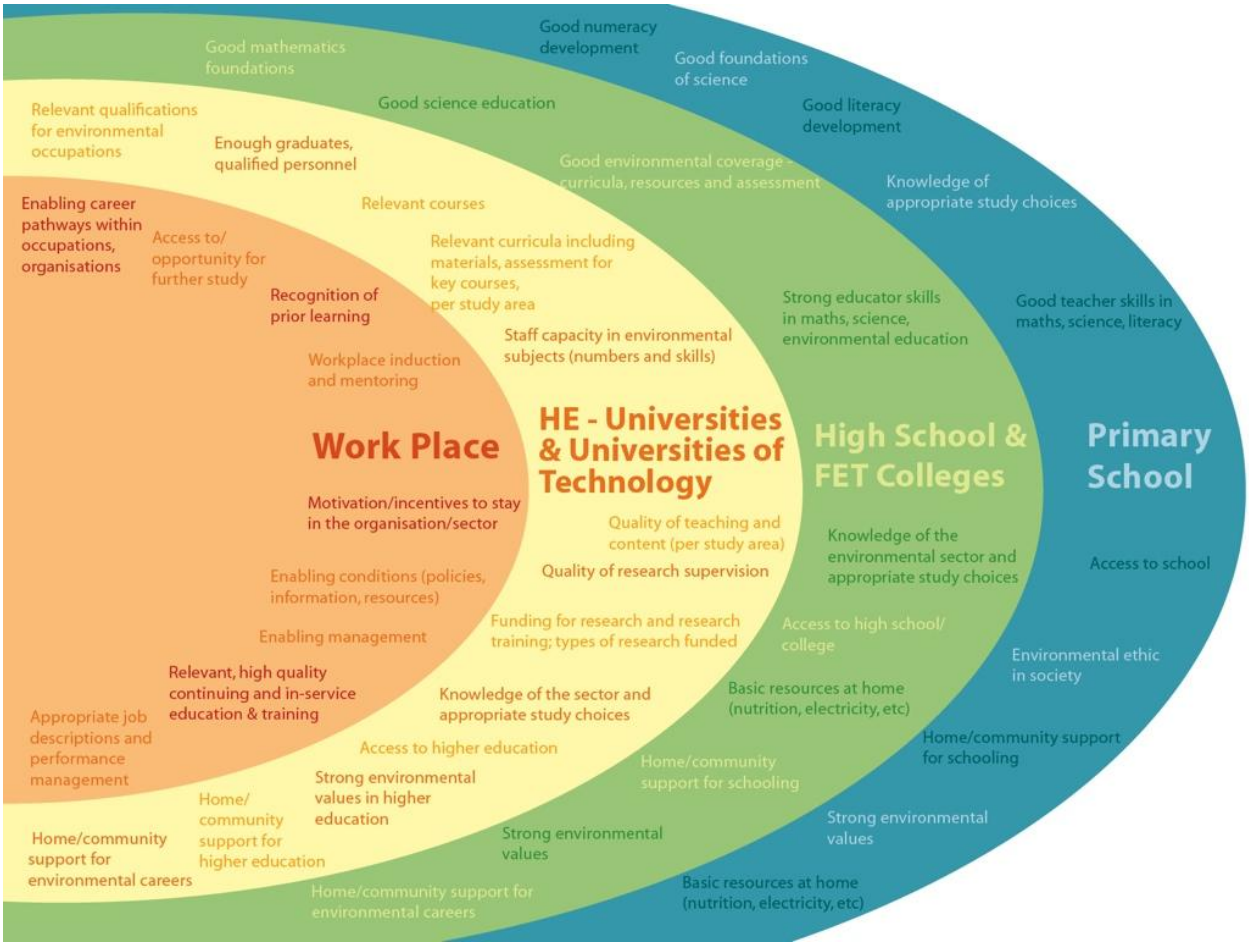

FIGURE 7: BIODIVERSITY SECTOR HUMAN CAPITAL DEVELOPMENT STRATEGY

The Biodiversity Human Capital Development Strategy outlines the following seven strategic objectives:

- **Promote the biodiversity sector** among key decision-makers and all South Africans, including Black school leavers and graduates, as a sector with a strong vision of transformation and opportunities for interesting, fulfilling work that contribute to the national development agenda;
- **Extend existing capacity and pride** – Improve the skills of those already in the workplace, and under-qualified or under-skilled, in a manner that contributes to diversity and a sense of identity;
- **Improve retention** of suitably skilled people in the sector (diversity management, talent management, pathways for professionals and managers, incentives etc);
- **Increase employer - provider interactions** towards greater relevance and quality of educational provisions in a wider range of HE institutions;

- **Contribute to better science, maths, literacy and environmental learning in schools** with potential/ strong management capacity;
- **Increase the impact of the collective effort** of HCD initiatives relevant to the sector, through articulation and promotion;
- **Increase the supply of scarce skills through targeted initiatives in one or more of these areas**:
    - Post-graduates across all qualifications
    - Biodiversity information management – modellers, managers, technicians
    - Resource economists working on biodiversity
    - Curators of plant and animal collections
    - Soil scientists and wetland specialists
    - Wildlife veterinary scientists

4.5. NATIONAL SKILLS DEVELOPMENT STRATEGY (NSDS III)

Environmental policy in South Africa has been actively developed over the past 12 years, since promulgation of NEMA. New issues have emerged that have required new policy (e.g. climate change); and new approaches to environmental management (e.g. cradle to cradle approaches to waste management). In addition, the National Sustainable Development Framework has been developed, and most recently a Sector Strategy is being developed to mainstream Green Economy and Climate Change Responses into government and all sectors. This new policy regime requires pro-active skills development (both generic and specialist skills) to ensure compliance capacity, public participation and capacity for service delivery and effective vertical and horizontal governance (DEA, 2010).

As the environment sector is new, the integration of the sector in the skills development landscape is also emerging in South Africa. To date, environmental skills needs have not been fully integrated into existing skills development system, structures and processes as it was not included in the National Skills Development Strategy II and has been poorly represented in the Sector Skills Plans.

It has been acknowledged that the sector has also experienced difficulties using the skills system, due to this 'newness' and inadequate time to pro-actively build capacity within a systemic framework. The net effect of this is

that the country's sustainable development policies have not been accommodated and there is inadequate provisioning of environmental skills planning in the NSDS and SETA landscape. The submission to NSDS III will address this in a systematic manner.

During June 2010, DEA through the Sector Education, Training and Development directorate and the Environmental Skills Planning Forum made a submission to the National Skills Authority (NSA) on the NSDS III and the proposed SETA landscape. The review of the SETA landscape is aimed at leveraging greater alignment with South Africa's growth and development strategies and plans thereby ensuring quality and relevant skills development to support and enhance the success of these strategies.

At the heart of the submission is a strong argument for the inclusion of the **environmental driver** and **sustainability education and training** within the National Skills Development Strategy, the National Qualifications Framework (NQF), the SETA Sector Skills Plans and within learnerships, qualifications and curricula.

As a result of ongoing consultation between DEA and the Department of Higher Education and Training, DEA has undertaken a number of initiatives, including:

- Engagement with the SETAs and the NSDS III process early on in the process to ensure quality sector skills outcome aligned to government Medium Term Strategic Framework (especially Goal 9: to ensure that the country follows a sustainable development trajectory for now and into the future);
- Participation in the National Skills Authority (NSA) consultation process;
- Participation in the Technical Workshop Group of the Human Resource Development Strategy;
- Arrange a workshop to review the Sector Skills Plans (SSPs); and
- Engagement with all SETAs.

4.6. WHAT ARE THE SKILL REQUIREMENTS FOR PROFESSIONAL REGISTRATION?

The process of professional registration for environmental practitioners is a key aspect when considering the skills development requirements of the environmental sector. The question is whether the requirements included in the

professional registration are applicable and appropriate in the broader context of integrated environmental management.

In the absence of certification for environmental practitioners (who do not have a natural sciences background), there has been increasing support for the certification of EAPs in South Africa. The process was initiated in May 1998 when a working group, consisting of representatives from a number of organisations, was established and commenced with the development of a system of voluntary certification for environmental practitioners.

By June 1999, a Certification Advisory Committee was established to develop criteria for certification and to initiate a process leading to the establishment of an Interim Certification Board. This was finalised in February 2001 under the auspices of the Southern African Institute of Ecologists and Environmental Scientists.

As it stands currently there is no official registration body, but the Interim Certification Board (ICB) has been established as precursor to the CBEAPSA (Certification Board for Environmental Assessment Practitioners of South Africa) and is providing interim certifications thereby providing an operating structure for the certification process.

This is similar to the SACNASP (South African Council for Natural Scientific Professions) certification that is required if a person intends to do specialist work in any of the natural sciences.

The effectiveness of Integrated Environmental Management is directly dependent on the quality and ethical values of professionals working in the environmental assessment field. Internationally, quality assurance, including the ethical conduct of EAPs, is enabled through professional registration or certification processes and independent peer review.

Example: What is certification and why do we need it?

Environmental assessment has been practised extensively in South Africa since the 1970s as a means of considering the environmental implications of development, although there were no legal requirements at that stage to do so. In 1989, the Council for the Environment developed and promoted the Integrated Environmental Management procedure which reinforced the use of environmental assessment as a tool to be used throughout the planning process in an iterative way to minimise negative impacts of proposed activities and optimise benefits, and to strive for sustainable development.

The promulgation of the Environmental Impact Assessment Regulations (R1182 and R1183 of September 1997) in terms of the Environment Conservation Act, 1989 (Act 73 of 1989) has made it compulsory to undertake environmental assessments for those activities likely to have a "substantial detrimental effect" on the environment. Also, the Regulations require the use of independent environmental consultants to carry out such environmental assessments. In response to these requirements, there has been a rapid growth in the number of environmental practitioners entering the environmental assessment field. As more and more practitioners enter the environmental management profession, the need to uphold professional standards and provide some level of assurance about the quality of environmental assessment work is underlined, and the imperative for certification grows.

The benefits for both practitioners and their clients of a system of certification include providing a safeguard for clients and recognising the professionalism of members.

Source: CBEAPSA (Certification Board for Environmental Assessment Practitioners of South Africa) Information Booklet

The aims and objectives; requirements; support and endorsement and registration of these professional bodies are outlined below. A more detailed assessment of professional registration requirements is contained in Subtheme 5: Quality Assurance and Independence of Environmental Assessment Practitioners. It should be noted that the Environmental Assessment Practitioners' Association of South Africa (EAPASA), which will apply to be recognised as a registration authority in terms of section 24H of NEMA, has been launched on 7 April 2011, however, this is the

first step in a process of providing for quality assurance in environmental assessment practice. Once established EAPASA will apply formally to be recognised as a Registration Authority in terms of section 24H of NEMA.

There are three key bodies providing for the registration or certification of EAPs:

- The **Interim Certification Board (ICB) of EAPSA (Environmental Assessment Practitioners of South Africa** has provided a voluntary certification system for EAPs in SA since 2001 providing mostly for EAPs working in the private consulting sector. *Note: The ICB is the Interim Certification Board's primary task will be to establish a Certification Process for the voluntary Certification of Environmental Assessment practitioners. After a two year period it will hand over the Certification Process and Organisational Structure to the new permanent regulatory body. CBEAPSA stands for the Certification Board for Environmental Assessment Practitioners of South Africa. CBEAPSA is the name currently being used to refer to the permanent regulatory body which will take on the responsibility of Certifying EAPs from the ICB when its term expires. Its primary task will be to provide an operating structure for the certification of Environmental Assessment Practitioners (EAPs). In addition, once EAPASA is recognised, the Minister will publish a date by which all EAPs practicing in terms of NEMA must be registered. This date will provide for a reasonable phase-in period of between 18 months and 3 years.* http://www.eapsa.co.za/

- **South African Council for Natural and Scientific Professions** (SACNASP) provides for the registration of natural scientists and environmental scientists working as EAPs who hold a science qualification.

- The **South African Institute of Ecologists and Environmental Scientists** (SAIE&ES) provides for the certification of ecologists and environmental scientists.

Table 8: Summary of the Key Requirements for existing EAP registration organisations in SA represents a summary of the three key bodies currently registering EAPs (modified version of table compiled by DEA) (Source: Subtheme 5: Quality Assurance and Independence of EAPs).

TABLE 8: SUMMARY OF THE KEY REQUIREMENTS FOR EXISTING EAP REGISTRATION ORGANISATIONS IN SA

Dimensions	Interim Certification Board (ICB) for Environmental Assessment Practitioners of South Africa	South African Council for Natural Scientific Professions (SACNASP)	Southern African Institute of Ecologist and Environmental Scientist (SAIE&ES)
Professional representation	The ICB was founded and is supported up of representatives from 17 participating organisations from diverse fields and professions	Scientific professionals in a range of fields	Scientific professionals in a range of fields
Legal Standing	Voluntary	Governed by the Natural Scientific Professions Act, 1993 (Act 106 of 1993); compulsory for professional natural scientists	Voluntary
Formal qualification	A degree in environmental practice from a South African university or Technikon (or recognised equivalent);	BSc Honours in Natural Science	Honours degree (or equivalent) in an appropriate discipline, and a further postgraduate degree in ecology, environmental science or equivalent
	OR	At least one subject that can be used to qualify the applicant in one of the professions as listed in Annexure I, section A of Act	
	A degree from a South African university or Technikon (or recognised equivalent) PLUS a further post-graduate degree or short course in environmental practice, from a South African University or Technikon (or recognised equivalent);	Human, as opposed to natural scientists, are not eligible to register with SACNASP. Environmental practitioners without a natural science degree, similarly, cannot register with SACNASP.	
	OR A degree.		

Dimensions	Interim Certification Board (ICB) for Environmental Assessment Practitioners of South Africa	South African Council for Natural Scientific Professions (SACNASP)	Southern African Institute of Ecologist and Environmental Scientist (SAIE&ES)
Professional Experience	Degree in environmental practice and/or a degree plus postgraduate degree in environmental practice - 3 years subsequent experience in responsible charge	3 years minimum	3 years
	Degree and a short course or diploma in environmental practice - 5 years subsequent experience in responsible charge		
	Diploma in environmental practice - 6 years subsequent experience in responsible charge		
	An academic qualification with no formal training in environmental practice - more than 6 years subsequent experience in responsible charge		
Core Competencies	Ten areas in which core competency must be demonstrated.	-	-
Codes of Conduct and/or Ethics, and disciplinary procedures	Yes	To be drawn up	Yes
References/ referees/sponsors	2 sponsors who are either ICB referees or certified EAPs	2 referees. At least one referee to be registered with SACNASP	2 referees already registered with SAIE&ES

4.7. CRITERIA FOR THE CERTIFICATION OF EAPS (INTERIM PROCESS)

The Certification of Environmental Assessment Practitioners of South Africa (EAPSA) states that there are three considerations used to evaluate environmental practitioners, namely: their ***substantive knowledge***, gained through formal training; ***skills and competence***, gained with experience; and their ***values or ethics***. These considerations effectively translate into the need for applicants to satisfy a combination of criteria to achieve professional certification, as listed below. In addition, certified environmental assessment practitioners would need to undertake formally to conduct themselves in a responsible and ethical manner.

4.7.1.1. Academic qualifications (substantive knowledge)

According to EAPSA, the following academic qualifications are a requirement.

TABLE 9: ACADEMIC QUALIFICATION REQUIREMENTS

Degree in environmental practice	OR
A degree in environmental practice[1] from a South African university or Technikon (or recognised equivalent), OR at least a degree from a South African university or Technikon (or recognised equivalent) AND a further post-graduate degree in environmental practice, from a South African University or Technikon (or recognised equivalent)	A degree AND considerable experience.

It should be noted that consideration would also be given to those applications who have a diploma in environmental practice, as well as to graduates who have attended short courses in environmental assessment. Relatively more professional working experience would, however, be required in such cases.

[1] 'Environmental practice' is defined as interdisciplinary study covering the fields of both the biophysical and socio-economic environment, including an environmental assessment component which provides training in the core competencies.

4.7.1.2. Professional experience (skills and competence)

The requirements for certification in terms of professional experience obtained subsequent to the academic training are given in the table below.

TABLE 10: CERFTIFICATION REQUIREMENTS

Qualifications from a University, Technikon or Recognised Equivalent	Minimum Experience in Responsible Charge Needed
Degree in environmental practice	3 years subsequent professional experience
Degree AND a postgraduate degree in environmental practice	3 years subsequent professional experience
Degree AND a short course or diploma in environmental practice	5 years subsequent professional experience
Diploma in environmental practice	6 years subsequent professional experience
An academic qualification	Considerable experience in reviewing and/or undertaking environmental assessments in South Africa.

4.7.1.3. Core Competencies (skills and competencies)

Applicants would have to show competence in the following areas:

- Demonstrated ability to think holistically about the structure, functioning and performance of the environmental system, not simply focusing on maximising the efficiency of one of its elements.
- Proven competence in analysing the affected environment in such a way as to identify significant issues, problems and/or characteristics, and distinguish between underlying causes and superficial symptoms.
- Proficiency in integrating and co-ordinating significant components of both the socio-economic and biophysical environments in such a way as to evaluate options and trade-offs, and facilitate sound decision making.

- Demonstrated ability to make balanced judgements and objectively evaluate alternatives.
- Proven competence in the application of tools contained in the Integrated Environmental Management 'toolbox', including:
    - Scoping and public participation.
    - Systematic and explicit assessment and evaluation of environmental impacts.
    - Mitigation and optimisation of impacts.
    - Monitoring and evaluation of impacts.
    - Environmental management plans/ programmes.
- A thorough understanding of the concept of sustainable development, embracing:
    - Ecological sustainability, recognised as the enabling factor for sustainable development. *[That is, the maintenance of life-support systems and biodiversity on which development depends should be seen as a priority, and a risk-averse and cautious approach should be followed where there is uncertainty about impacts on the natural environment].*
    - Social sustainability, equity and environmental justice.
    - Economic efficiency.
- A sound working knowledge of environmental legislation and policy.
- Demonstrated ability to manage competently an interdisciplinary team.
- Proven ability to recognise when to involve specialists, to select and appoint appropriate specialists, and to draw up sound Terms of Reference for these specialists that address the particular needs of that project or piece of work.
- Demonstrated proficiency in interpersonal and communication skills, both in oral and written form.

4.8. CRITERIA FOR REGISTRATION (EAPASA)

With the recent launch of the Environmental Assessment Practitioners Association of South Africa, the specific Criteria for registration have been further refined and include the following basic requirements:

Formal certificate of competence: A SAQA accredited qualification, the Advanced Certificate: Environmental Assessment Practice, NQF Level 7, has been established and includes specified exit level outcomes and

associated assessment criteria for the assessment of competence arising from formal study or recognition of prior learning.

Registration would require an Advanced Certificate: Environmental Assessment Practice:

a) Issued by an accredited educational programme, OR

b) Issued by a competent and accredited assessor based on a Recognition of Prior Learning assessment.

Nature and length of professional experience necessary for effective practice as an EAP. The minimum requirements for appropriate professional experience are as follows:

a) A minimum of three years appropriate professional experience; and

b) A minimum of three Environmental Assessments (EAs) or Reviews, at an appropriate scale, conducted in that time in which the applicant has held primary responsibility for the conduct or review of the EAs and which demonstrate the required level of competence given the context of the EAs in each of the Exit Level Outcomes listed below and, as relevant, adequately meet the criteria specified for each of these in the Advanced Certificate: Environmental Assessment Practice:

ELO 1: Demonstrate a conceptual understanding of the environment; sustainable development; environmental assessment; and, integrated environmental management. *(Range: Conceptual understanding includes but is not limited to performance, quality, function, structure and thresholds).*

ELO 2: Demonstrate the ability to think holistically, systemically, systematically, spatially and in an integrative manner and to discern what is relevant to decision-making.

ELO 3: Identify and apply environmental assessment and management procedures and methods.

Working Group Final Draft Proposal, 26 February 2010 Proposal for the Establishment of the Environmental Assessment Practitioners Association of South Africa

ELO 4: Review and monitor environmental assessment procedures and methods.

ELO 5: Conduct applied research activities in a specific context *(Note: An EAP is not required to conduct specialist studies).*

ELO 6: Meet specific communication requirements at all levels through environmental reporting processes and stakeholder engagement.

In addition, REAPs and Candidate EAPs would need to formally undertake to conduct themselves in a responsible and ethical manner in accordance with the **Code of Ethical Conduct and Practice**.

The change that has been effected is the criteria regarding formal qualification which is now evaluation against the standard namely the SAQA accredited qualification, the Advanced Certificate: Environmental Assessment Practice, NQF Level 7.

4.9. INSTITUTIONAL ARRANGEMENTS

4.9.1. South African Qualifications Authority

The South African Qualifications Authority (SAQA) is the highest entity in South Africa in the education and training arena. SAQA's role is to advance the objectives of the National Qualification Framework (NQF); oversee the further development of the NQF; and co-ordinate the sub-frameworks.

SAQA must advise the Ministers of Education and Labour on NQF matters in terms of the NQF Act. The Board is required to perform its tasks after consultation and in co-operation with all bodies and institutions responsible for education, training and certification of standards which will be affected by the NQF. It must also comply with the various rights and powers of bodies in terms of the Constitution and Acts of Parliament. The office of SAQA is responsible for implementing the policies and decisions of the Board.

In 1998, SAQA published the National Standards Bodies (NSB) Regulations whereby provision was made for the registration of National Standards Bodies and Standards Generating Bodies. In 2005, and in line with the recommendations of the NQF Study Team appointed by the Ministers of Education and Labour, the NSBs were allowed to complete the second cycle and were disestablished. Their qualifications scrutiny function was taken on by specially convened Consultative Panels. The Consultative Panels consist of subject matter experts as well as qualifications experts and their role is to evaluate qualifications and standards from the perspective of the sector for which the qualifications or standards have been developed using SAQA criteria. The Standards Generating Bodies and Task Teams are responsible for generating standards and qualifications and recommending them to the Standards Setting Directorate (www.saqa.org.za).

In terms of the NQF Act No. 67 of 2008, the Quality Councils will amongst others:

- develop and manage their sub-frameworks, and make recommendations thereon to relevant Minister;,
- ensure the development of qualifications or part qualifications as are necessary for their sectors, which may include appropriate measures for the assessment of learning achievement; and
- recommend qualifications or part qualifications to the SAQA for registration.

SAQA has the following role with respect to qualifications:

1. SAQA must develop and implement policy and criteria, after consultation with the QCs for the development, registration and publication of qualifications and part-qualifications, which must include the following requirements:
   - The relevant sub-framework must be identified on any document relating to the registration and publication of a qualification or part-qualification;
   - Each sub-framework must have a distinct nomenclature for its qualification types which is appropriate to the relevant sub-framework and consistent with international practice.
2. SAQA must register a qualification or part-qualification recommended by a QC if it meets the relevant criteria;
3. SAQA must develop policy and criteria, after consultation with the QCs, for assessment, recognition of prior learning and credit accumulation and transfer.

The **Education and Training Quality Assurance** (ETQA) regulations were also published in 1998 and provided for the accreditation of Education and Training Quality Assurance bodies. These bodies are responsible for accrediting providers of education and training standards and qualifications registered on the NQF, monitoring provision, evaluating assessment and facilitating moderation across providers, and registering assessors.

The ETQA responsibilities of SETAs will remain according to the mentioned SAQA regulations, until such time as the Minister of Labour publishes new Regulations replacing the existing regulations, thereafter the responsibilities will reside with the Quality Council for Trade and Occupations (QCTO).

SAQA has the following role with respect to professional bodies:

- must develop and implement policy and criteria for recognising a professional body and registering a professional designation for the purposes of this Act, after consultation with statutory and non-statutory bodies of expert practitioners in occupational fields and with the QCs; and
- recognise a professional body and register its professional designation if the relevant criteria have been met.

The functions of SAQA are:

- to oversee the development of the NQF by formulating and publishing policies and criteria for registration of bodies responsible for establishing education and training standards or qualifications and for accreditation of bodies responsible for monitoring and auditing achievements in terms of such standards and qualifications; and
- to oversee the implementation of the NQF by ensuring the registration, accreditation and assignment of functions to bodies referred to above, as well as the registration of national standards and qualifications on the framework. It must also take steps to ensure that provisions for accreditations are complied with and where appropriate, that registered standards and qualifications are internationally comparable.

SAQA's primary objective is the promotion of a high quality education and training system in South Africa that embraces the concept of life-long learning for all. In order to realise this objective, SAQA has established and maintains the following:

- a system for setting nationally recognised and internationally comparable education and training standards and qualifications from NQF Level 1 (Grade 9 or Adult Basic Education and Training Level 4 - the exit point from General Education and Training) to NQF Level 8 (post-graduate qualifications);

- a national quality assurance system to ensure that education and training is delivered to the set standards; and
- an electronic management information system which records all relevant information on the achievements of South African learners (the National Learners' Records Database) (www.saqa.org.za).

A Consultative Process has been underway since early 2006 regarding the establishment of a Registration Authority for Environmental Assessment Practitioners. An important component has been the registration of a qualification for environmental assessment practice within the National Qualifications Framework in collaboration with the SAQA. The draft Qualification was advertised for comment in the Government Gazette on 30 April 2008 and the Advanced Certificate: Environmental Assessment Practice (Level 7) was registered in terms of the National Qualifications Framework in November 2008. This was a significant milestone as for the first time, a qualification standard exists against which qualifications and training offerings can be benchmarked. It also enables the necessary systems for Recognition of Prior Learning, which is a mechanism provided for in the National Qualifications Framework, for individuals who have qualified previously or who have been working in the environmental assessment field prior to the registration of the qualification. The qualification is a key criterion for registration and a cornerstone of the proposed registration system (Laros, 2011: Subtheme 5: Quality Assurance and Independence of EAPs).

The Environmental Assessment Practitioners Association of South Africa (EAPASA) was launched on 07 April 2011 and once established will apply formally to be recognised as a Registration Authority in terms of section 24H of NEMA. Once established the Registration Authority will apply to be accredited as the **Education and Training Quality Assurance Body** (ETQA) for environmental assessment practice. This role will assist significantly in ensuring that education and training offerings for EAPs can be accredited in terms of the SAQA - registered EAP qualification – the Advanced Certificate: Environmental Assessment Practice (the Certificate of Competence).

4.9.2. Sector Education and Training Authority (SETA)

In terms of the Skills Development Act (No 97 of 1998) as amended by the Amendment - Skills Development Act (2003), and Proposed Amendments to SETA's June 2006, the functions of a SETA are *inter alia* to develop a sector skills plan within the framework of the national skills development strategy; and implement its sector skills plan by establishing learnerships; approving workplace skills plans; allocating grants in the prescribed manner and in accordance with any prescribed standards and criteria to employers, education and training providers and workers; and monitoring education and training in the sector.

Currently, there is no specific environmental SETA. Many issues relating to environmental management may be dealt with in the Energy (and Water) SETA. Over time it may transpire that “environment” also be housed within this SETA.

4.10. SWOT ANALYSIS

The following high-level SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) summarises the current state of environmental skills and training development in South Africa. While strengths and weaknesses are characteristics of the internal system, opportunities and threats arise from outside the current system.

TABLE 11: SWOT ANALYSIS

	Helpful to achieving the objective	Harmful to achieving the objective
Internal origin	**Strengths** • Qualified environmental practitioners • Appropriate qualifications • Range of technical and scientific skills • Experience and expertise in relatively young industry • Mentorship and learnerships • Internships • CPD • Professional registration processes (established or underway) • ESSP completed with identified strategies • EPASA launched • IAIAsa	**Weaknesses** • Skills development is reactive, ad hoc and inefficient • Lack of systemic integration • Limited registration of environmental learnerships • |High staff turnover • Limited experience and under-qualified staff • Inappropriate or inadequate qualifications • Limited training and capacity building • Technical specialists "lost" to management positions • Skills shortages (e.g. leadership, scientific, management and technical skills)
External origin	**Opportunities** • Skills development initiatives (training, capacity building etc) required at all levels • Environment as a cross-cutting issues in the SETA landscape • Changing global economy (green economy) • Human Capital Development Planning Forum to co-ordinate and implement ESSP recommendations • ESSP to inform workplace skills plans	**Threats** • No specific "environment" SETA • Disregard from established SETAs for environmental issues • Inability to respond to changing global economy (green economy) • Quality of training • Insufficient funding to support training • Inappropriate training courses

5. PRINCIPLES AND STRATEGIC OUTCOMES

The aim of this study is to ensure that authorities are sufficiently capacitated with skilled and experienced officials and those environmental practitioners and other stakeholders are capacitated and empowered to ensure maximum impact on the effectiveness and efficiency of the national Environmental Impact Assessment and Management Strategy (EIAMS). In progressing towards implementation, the following key principles are applicable:

5.1. RESPOND TO CHANGING GLOBAL ENVIRONMENT

It has been said that sustainability is the single biggest business opportunity of the 21st century which will be the next main source of competitive advantage. Interestingly this links the need for sustainability considerations in business to a competitive advantage, and not as a moral or ethical obligation. As such, the skills that are required to meet this challenge today are entirely different to those expected two decades ago. It is clear that environment is a cross-cutting concern, and should South Africa continue with a more reactive approach to skills development for environmental functions, our ability to use new development opportunities associated with the "sustainable development" paradigm will be limited. A more proactive approach to skills development can "maximize new development opportunities, save resources, ensure greater efficiency in the use of resources, and avoid damage which is costly to recover or rehabilitate, and improve public health and service delivery' (DEA, 2010).

Whilst the EIA tool has been widely adopted, there are many other tools and processes which have been developed to address environmental issues at different scales or for specific purposes. These include Strategic Environmental Assessment (SEA), Environmental Management Frameworks (EMFs), environmental risk assessment, Environmental Management Plans or Programmes (EMPs), environmental monitoring and auditing etc.

As new issues or problems emerge, particularly at a regional or global scale, the need for further new tools, such as **carbon foot-printing** to help tackle **climate change** and **environmental resource economics**, will continue to be developed. This trend can be expected to accelerate as environmental issues mainstream in terms of economic, financial and political decision making.

In responding to the changing global environment, there is a need to develop capacity for integrating and costing skills planning into the strategic plans being developed for the green economy and green job development planning; and to support the continued efforts in the development of a Training of Trainers Programme to expand Provider Capacity for Green Jobs and Green Economy Training and Capacity Development as proposed by the ESSP. Many Higher Education institutions are responding to this call and are structuring course content to address this, such as the University of Pretoria depicted in the text box below.

Example: Centre for Environmental Studies at the University of Pretoria

The Centre for Environmental Studies is a graduate training programme for multi-disciplinary studies in the environmental sciences. The emerging discipline of Environmental Studies requires a new generation of graduates capable of facing the challenges posed by this multidisciplinary subject as well as expanding and rapidly changing market requirements.

The latest developments in national legislation with respect to the environment, as well as the consumer-driven environmental awareness of the industry at an international level, has generated a need for suitably qualified professionals who can implement these new developments in the environmental industry.

A sensitive balance between subject related specialisation (research expertise) and a thorough but broad understanding of the varied and interacting dimensions of general environmental problems is required.

Source: University of Pretoria, Centre for Environmental Studies, Information brochure, 2010.

5.2. ENSURE THE ATTRACTION AND RETENTION OF SKILLS

Ensuring the attraction and retention of skills requires that employers recruit and retain employees with the necessary skills and competencies at the correct places, which would have a positive effect on the delivery of quality services and growth of the business. It requires the management of people to ensure directed and motivated employees; to remunerate people competitively and to reward excellent performance; to develop people and retain the best through continued professional development; and providing a work environment that is attractive and supportive. Stability in the workplace will contribute to the effective and efficient implementation of the IEM system as employees are less disrupted by change, able to focus on the tasks at hand, and can grow and develop within an organisation. It is

imperative that the skills pool in the environmental sector in South Africa be nurtured so as to grow the industry and associated competencies.

The attraction and retention of skills is a key issue in environmental sector skills training and development. Stability in the workplace (lower levels of staff turnover) will contribute to the effective and efficient implementation of the integrated environmental management system as employees are less disrupted by change, able to focus on the tasks at hand, and can grow and develop within an organisation.

Staff turnover is essentially as a result of a small supply of appropriate skilled and qualified people, and once the skills pool grows there should be a reduction in the level of staff turnover. In order to increase the skills pool, young people need to be attracted to the environmental sector. Increased education and awareness of the career opportunities within the environmental sector is required, across the entire spectrum of South African society. In order to redress the demographic profile of environmental practitioners increased number of PDI need to be shown the benefits of pursuing a career in environmental management. Environmental education and awareness in schools can contribute significantly to attracting young people to the profession.

Furthermore, a National Strategy for Mathematics, Science and Technology Education was approved by Cabinet in 2004 as one of the means of enhancing the development of high-level skills capacity. This is a joint co-operation between the Departments of Science and Technology and Education to address the skills gap in mathematics, science and technology. This includes the natural sciences and the environmental industry needs to pay attention to the objectives of the strategy in order to obtain incentives to attract and retain suitably qualified individuals in the sector.

Anecdotal evidence shows that skills retention is enhanced when young professionals have an opportunity to be mentored by more experienced environmental practitioners. The suggestion has been made in the environmental sector for a 2 year mentorship programme for young professionals. In such a system, more experienced environmental practitioners could mentor young professionals by coaching and sharing experiences, and also provide exposure to a range of opportunities to promote broader experience.

Similarly, internship is a system of on-the-job training for young professionals, similar to an apprenticeship. Interns are usually post-graduate students, but they can also be high school students or post graduate adults seeking skills for a new career. Student internships provide opportunities for students to gain experience in their field, determine if they have an interest in a particular career, create a network of contacts, or gain course credits.

The value of this on-the-job training is that the young professional gains the necessary experience that will improve the chance of permanent employment but also develop the necessary skills through practical application. Internships in the environmental sector would contribute to a pool of young professionals gaining valuable knowledge and skills from more experienced professions.

It is also proposed in Subtheme 7: Empowerment of Marginalised Communities, that community activists from marginalized communities can also be brought into existing capacitated organisations as interns. Interns are then able to attend courses to gain knowledge and to gain experience working in the organization, mentored by experienced NGO environmental professionals. This knowledge can then be taken directly back into the community (The Green Connection, 2011).

The ESSP calls for the establishment of an initiative to provide for, and strengthen Environmental Leadership Skills, which includes giving attention to retention of environmental leadership skills in the sector, with emphasis on provincial and local government capacity, but not neglecting national level leadership in the public sector, Non Profit Organisations and business. In addition, the reduction of vacancies in the public environmental sector remains a priority, particularly in provinces where vacancies in critical environmental occupations are on the rise, especially in specialist professional occupations and management positions.

5.3. ENSURE CAREER DEVELOPMENT PLANNING

In organizational development, the study of career development looks at how individuals manage their careers within and between organizations and, how organizations structure the career progress of their members, it can also be tied into succession planning within some organizations.

In the environmental management sector it is important to retain the necessary skills to ensure effective integrated environmental management. How individuals manage their careers within and between organizations and, how organizations structure the career progress of their members is therefore important. Professionals wish to direct and manage their careers within the plethora of environmental disciplines, but should also be mindful of the EAPASA requirements of re-registration every 5 years.

Succession planning is tied to career development where successors to senior positions are identified and nurtured to fulfill that role at a later stage. Succession plans consider the steps in career development over a timeframe, skills and competencies, changes since previous plan was drawn up, follow up actions (including training, coaching, target setting, career changes, and potential).

5.4. PROMOTE CONTINUING PROFESSIONAL DEVELOPMENT

Continuing Professional Development (CPD) or Continuing Professional Education (CPE) through the ongoing maintenance, improvement and broadening of knowledge and skills by environmental practitioners will translate into the effective and efficient implementation of integrated environmental management. As the knowledge and skills of individuals and organisations develops and expands so the quality of the system improves.

The concept of life-long learning has particular relevance in the environmental sector due to the rapidly changing legislative and policy context, coupled with the changing global economy and environmental circumstances. The ability to remain up-to-date with these changes can be addressed through CPD. Organisations can structure incentives and benefits according to targets relating to CPD. In particular, the benefits of short courses cannot be under-estimated. These short courses allow for busy professionals the time to undertake specific training, and these can be tailor-made or specific to a particular topic or activity.

5.4.1. EAPASA Guidelines for CPD

The working group for the establishment of the EAPASA has prepared **Guidelines for Professional Development and Continuing Professional Development** (February 2010). A distinction is made between a Professional development of registered Candidate EAPs leading to registration as an EAP; and Continuing Professional Development of Registered EAPs.

With reference to CPD the following should be noted: "Once registered, the focus of an EAP's Continuing Professional Development will differ according to his/her area of work; background training; competencies; experience; and, career aspirations. Continuing Professional Development (CPD) is defined as: "The systematic maintenance, improvement and broadening of knowledge and skills and the development of personal qualities necessary for the execution of professional and technical duties, and contribution to capacity building in the field, throughout an environmental assessment practitioner's working life.

Demonstration of CPD shows a commitment to ongoing professional development, maintenance of high standards and professional competence. A well-defined CPD requirement in terms of professional registration also helps EAPs' employers to justify the allocation of time and money for staff development"

Who benefits from CPD?

The registered environmental assessment practitioner will benefit as CPD:

- Maintains or increases one's level of technical competence;
- Extends one's range of skills;
- Develops new areas of expertise;
- Promotes confidence and pride in one's work; and
- Establishes links with fellow professionals, thereby increasing one's career options.

The public and employers will benefit. A registered EAP, having to comply with CPD obligations, means that the public and employers can rely on:

- Professionals whose skills are being maintained and developed;

- Skilled professional service; and
- Technical competence.

CPD Requirements

All registered EAPs are required to submit CPD record sheets (Annexure 3B) when applying to renew their registration. Failure to submit evidence of CPD will result in renewal of registration being reviewed by the appropriate committee and applicable sanctions being imposed.

In order for an EAP to optimize his/her CPD, it is recommended that the EAP explicitly identifies and prioritises those particular areas within his/her current and/or foreseeable future work, including specific personal and career ambitions, that would benefit from additional learning or skills acquisition. The CPD programme should strive to address those priority areas.

The rationale for CPD activities should be captured on the CPD record sheet. To this end, it is recommended that the following information be captured in an introductory section prepared by the registered EAP in support of the CPD record sheet:

a) tasks expected to perform in current work position;
b) related areas of required expertise;
c) skills needed to perform tasks well;
d) longer term career ambitions;
e) priority areas for professional development; and
f) a planned CPD programme for the coming year/s.

The CPD record sheet should show progress in two key areas, namely:
Area 1: Evidence of the EAP's updating and improving his/her knowledge and understanding of environmental assessment, and technical skills.
CPD could target areas needed:

- to undertake current environmental assessment (EA) work more effectively;

- to keep in touch with EA issues not directly related to one's day-to-day work;
- to develop skills complementary to professional EA activities, and designed to help career progression or to maintain competence (e.g. managerial skills, knowledge management, etc.).

The examples given below are not exhaustive. If unsure whether or not an activity will be deemed relevant, it should be included:

- Attending an 'outside' seminar, conference, congress, colloquium or workshop;
- Attending meetings of associations or professional organizations in the field of impact assessment or related fields;
- Attending an accredited training course at a university or technikon;
- Attending a training course run by a voluntary environmental assessment organization approved by the Registration Authority;
- Attending 'in-house' training or small-group discussions or colloquia; and
- Study through distance learning programmes.

Area 2: Contribution to the EA industry, capacity building and awareness raising: evidence of the EAP's having 'given back' his/her knowledge, understanding or related skills of environmental assessment to peers, candidate EAPs and the wider public.

Examples include:

- Giving presentations or talks on impact assessment or related topics;
- Building capacity in professional impact assessment teams through advice or guidance;
- Voluntary work in support of sustainability, environmental or conservation bodies, including assisting non-government organizations or community-based organizations with EA or related work on a *pro bono* basis;
- Involvement in boards, committees or sub-committees, working groups, focus groups, forums or panels related to environmental assessment;
- Reading relevant journals/ articles;
- Networking with other EAPs, EA organizations or institutions;
- Providing training, tutoring, and/or lecturing in EA or related topics;
- Co-ordinating and/or running short courses;

- Mentoring Candidate EAPs and/or supporting the development of other aspiring EAPs; and
- Writing papers and articles on environmental assessment.

In each Area:

- List discrete activities;
- List activities in chronological order;
- List details such as the dates, time spent on each activity, and a brief description of the subjects covered.

5.5. PROMOTE KNOWLEDGE TRANSFER AND LEARNING

An effective way of promoting knowledge transfer and learning is through Learning Networks or Communities of Practice (CoP), which is a group of people who share ideas, experiences, lessons learnt and insights on specific themes and help one another find solutions to problems and develop a common practice or approach to the field. The ability to learn from one another and share experiences (positive and negative lessons) is important to enhance the skills development capacity in the environmental sector. Learning networks should therefore be encouraged and supported.

Many organisations offer training courses in the environmental management sector, and these range from private training academies, Higher Education and Training institutions, NGOs, NPOs and CBOs and all spheres of government. Attached, as Annexure C, is a list of training courses that the Green Connection and WESSA compiled in 2010. This database illustrates the range and extent of training courses that are offered in the environmental field. The issue is perhaps one of access to these courses (costs, travel, unproductive time etc).It is encouraging to note the diversity and extent of short courses offered in the environmental industry. Attendance of short courses to focus on specific learning and knowledge transfer is an important action in the short term.

The appropriateness and suitability of training programmes is the key to ensuring competence to give effect to integrated environmental management. Practitioners require practical knowledge and skills to be able to execute their tasks. Skills development should therefore be geared to assist with the execution of duties and to expedite the entire environmental management system.

In relation to environmental tools, environmental practitioners must be trained in the use of various environmental management tools, in order to be able to guide EAPs and understand their application. In addition, the application of sector-specific tools must be restricted to EAPs who have the necessary qualifications or skills, and similarly, reviewed by officials or peers with the same abilities. The application of tools can also have a spatial component where the training for EAPs and officials operating in national biodiversity priority areas, for example, should become a requirement.

Training programmes can be provided through a number of sources from government, to NGOs, to training institutions, which should be accredited through SAQA. The intention is to leverage all role-players to improve environmental awareness and build environmental skills and capacity. There are numerous active NGOs providing training to communities aimed at building capacity and skills within communities, hopefully in the longer term, reducing their dependence on outside experts.

Example: Training for EAPs to assist in the empowerment of marginalised communities

One of the key issues raised with regarding to empowering marginalized communities is to have local knowledge and expertise both recognized and adding value to environmental decision making. It is further suggested that NGOs could be funded to design and implement further courses specifically focused on EIAMS.

It is proposed that training institutions, working with NGOs and affected communities can design and implement short courses that are accredited through SAQA, thereby enabling community participants to gain qualifications that recognize their local community knowledge. This would go a long way to ensure that vulnerable and marginalised communities are capacitated and empowered to engage meaningfully in the environmental impact assessment and management process.

As part of empowering marginalized communities, there is a need for existing EAPs and other specialist consultants to undergo training which should focus on:

- Providing technical information in an accessible jargon-free format;
- Gaining an understanding and sensitivity to the needs of marginalized communities that is then applied to the design of the EIA process; e.g. transport to meetings, language of information, timing of engagement etc.
- Gaining an understanding of the value of local knowledge and how to work within marginalized communities to ensure that this essential knowledge is addressed/ incorporated into the project where appropriate.
- All EAPs should have conflict management training

Source: The Green Connection, 2011 - Subtheme 7: Empowerment of Marginalised Communities

The national Department of Environment Affairs has an important role to play in capacitating and developing skills in the environmental sector. The ESSP has been developed and the focus now is one implementation through an integrated approach of the various roleplayers. Nevertheless, currently the Capacity Building and Training unit at DEA is severely under-capacitated. The focus is an internal one where training for DEA and Provincial officials. Various training courses are facilitated by this unit according to needs expressed by officials. It is proposed that the scope of this unit be expanded to include the facilitation of skills development for other professionals (such as town planners, engineers etc).

In order to achieve this, the DEA would need to enter into negotiations with professional bodies such as the Engineering Council of South Africa (ECSA), and South African Council for Planners (SACPLAN), and draw of support and assistance to change the environmental skills development profile.

Example: Department of Water Affairs

Lessons can be learnt from the Department of Water Affairs, where the Sub-Directorate Environmental and Recreation provides training and capacity building to internal and external stakeholders on various water related issues. Any specialist studies and report submitted to the department (such as a Water Use License Application) would need to be undertaken by a specialist who has done the courses with the department. A similar approach could be adopted by DEA to ensure quality of deliverables and effective quick skills development.

In addition, the Department's Learning Academy recruits graduate trainees and exposes them to water sector work, as they are placed and rotated within difference directorates of DWA unit for a period of three years. This approach ensures that a pool of young graduates get sufficient work experience and significantly develops the necessary skills.

5.6. PROMOTE INTER-DISCIPLINARITY

As is mentioned above, due to the very nature of environmental management a number of skills and professions will be involved in project design, planning and implementation. This introduces the concept of inter-disciplinarity. Inter-disciplinarity is however not simply "achieved through the accumulation of different brains. It must occur inside each of the brains" (Max-Neef, 2005). Patrick and Turton (CSIR, 2006) elaborate that there is often a perception that integration can be achieved by ensuring a representative from each major relevant discipline on a project team and through a collection of chapters written by different specialists bound together in a single report.

Max-Neef (2005) defines the terms disciplinarity, multi-disciplinarity, inter-disciplinarity and trans-disciplinarity where:

- *Disciplinarity* focuses on one discipline which represents specialisation in isolation,
- *Multi-disciplinarity* involves many disciplines where team members undertake their analyses separately as seen from the perspective of their own disciplines without any integrating synthesis,
- *Inter-disciplinarity* can be defined by two hierarchical levels, and
- *Trans-disciplinarity* is defined as the co-ordination of all four hierarchy types described above.

Patrick and Turton (CSIR, 2006) argue that there is co-ordination between disciplines at the lower level due to a common sense of purpose being introduced as defined by the higher level in the hierarchy. In other words, co-ordination between many disciplines is driven by a higher order purpose as illustrated in Figure 8.

Max-Neef (2005) identified four examples of interdisciplinary hierarchies; the empirical hierarchy which includes for example disciplines such as economics, ecology and sociology; the pragmatic hierarchy which includes disciplines such as engineering, architecture and agriculture amongst others; the normative hierarchy which includes planning, politics, and environmental design amongst others; and the value hierarchy which includes disciplines such as ethics, philosophy and theology.

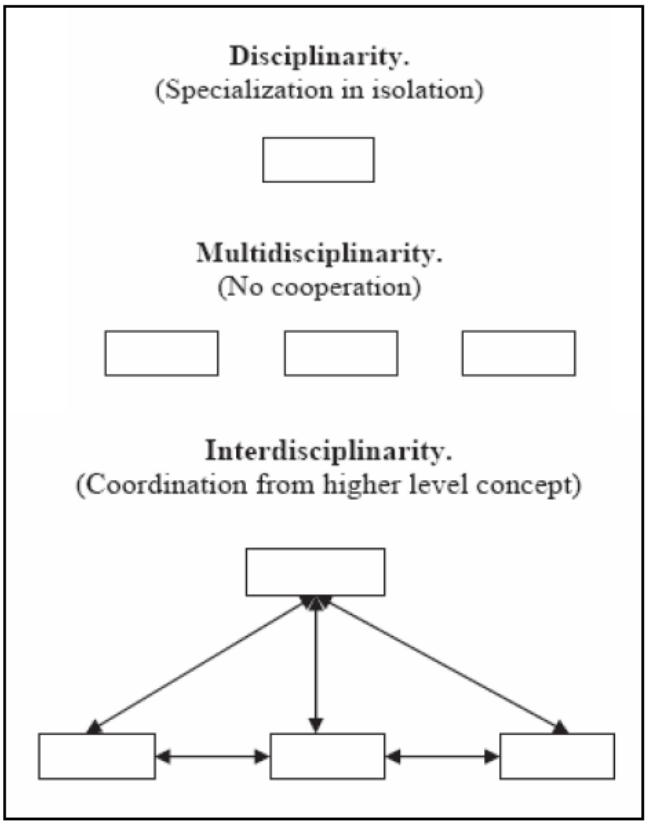

FIGURE 8: DEFINITIONS OF DISCIPLINARITY, MULTIDISCIPLINARITY AND INTERDISCIPLINARITY

The disciplines at the base of the pyramid describe the world as we see it and asks and answers the question ***What exists?***

The next level is composed mainly of technological disciplines and asks and answers the question ***What are we capable of doing?***

The normative level asks and answers the question ***What is it we want to do?*** and the value level asks and answers ***How should we do what we want to do?*** Refer to Figure 9: .

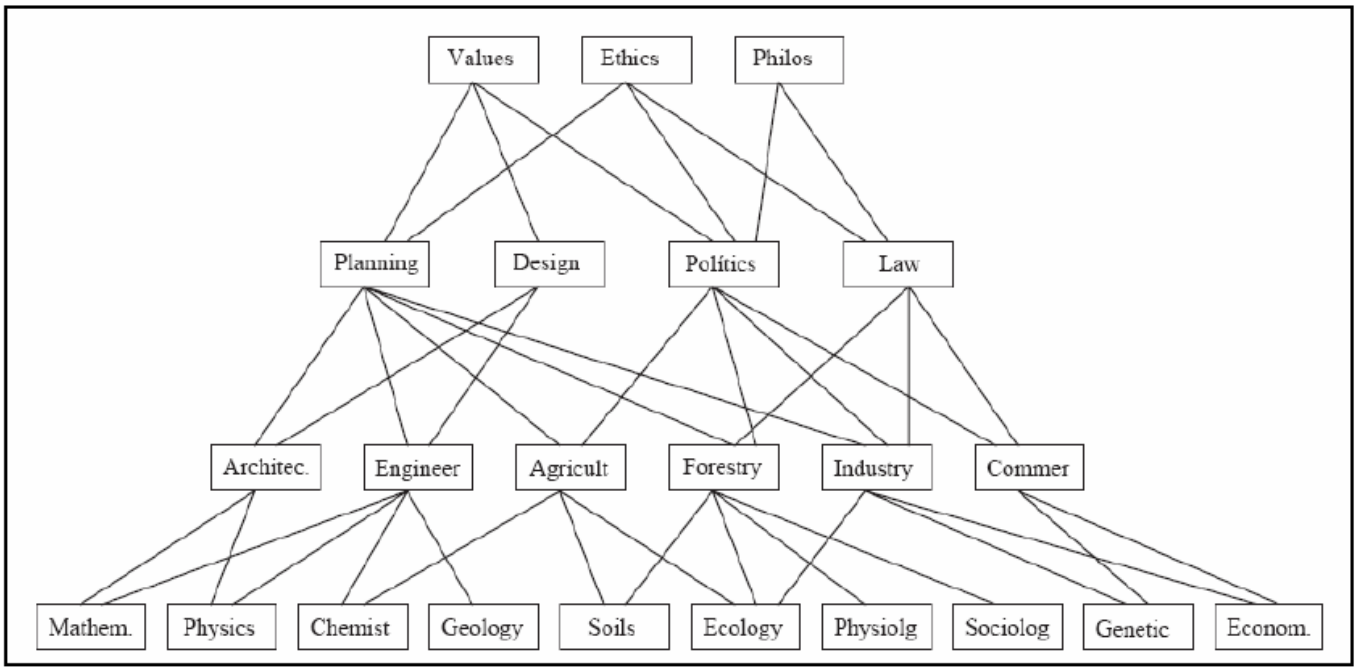

FIGURE 9: DEFINITION OF TRANS-DISCIPLINARITY

Academic institutions for a number of reasons, such as competition for research funds, academic prestige and disciplinary autonomy, do not advocate a trans-disciplinarity approach (Max-Neef, 2005) resulting in silos of understanding based on academic disciplines. This isolation of disciplines has impeded the expansion of knowledge and the ability of researchers to interrogate and understand complex issues.

This concept can be applied to other organisations, such as government and private businesses, as the organisational structures are often not in support of collaboration and inter-disciplinarity. Similarly, this limited this expansion of knowledge and ability to interrogate and understand complex issues such as those presented in integrated environmental management.

To facilitate decision-making, impact assessment draws on the skills and knowledge of a wide range of specialist input and these specialists cover a plethora of subjects covering the natural scientific and socio-economic professions (such as geology and soils, botany and zoology, aquatic and atmospheric scientists, sociologists, economists, heritage practitioners, public participation specialists and many others). At the heart of bringing these disparate subjects together is the EAP). The EAP is the project manager usually at the centre of an EIA process or other evaluation tool tasked with bringing together all of the many findings of the specialists and evaluating them in order to

make recommendations for the decision-maker, as illustrated in Figure 2. It is therefore important for the EAP to understand and acknowledge the role and contribution of different disciplines to a project or study. Professions are trained and educated in particular paradigm that directly influences their approach and execution of a project.

Linked to the notion of inter-disciplinarity is the leveraging of knowledge at a local scale. This is particularly pertinent where decisions are taken at a higher sphere of government (provincial and national government) where there is a risk that the local circumstances are not fully understood leading to conflict for example between environmental authorizations and local planning requirements. Local government, especially metropolitan municipalities have experienced personnel that are well placed to assist with such decisions because of their knowledge of the planning field coupled with that of EIA. It is therefore important that there is structured engagement with local authorities and stakeholder to ensure that this is addressed.

It is therefore more important for the EAP to be able to integrate the inputs from various disciplines (at various levels) into a coherent whole that aids decision-making and contributes to integrated environmental management.

The EAP is the project manager usually at the centre of an EIA process or other evaluation tool tasked with bringing together all of the many findings of the specialists and evaluating them in order to make recommendations for the decision-maker. It is therefore important for the EAP to understand and acknowledge the role and contribution of different disciplines to a project or study. Professions are trained and educated in particular paradigm that directly influences their approach and execution of a project.

It is therefore more important for the EAP to be able to integrate the inputs from various disciplines into a coherent whole that aids decision-making and contributes to integrated environmental management.

5.7. INCREASE FOCUS ON MONITORING AND ENFORCEMENT

Due to increasing concern regarding the impact of human activities on the environment the Environmental Impact Assessment (EIA) tool was developed. EIA has subsequently been adopted as a legislated requirement by most countries in the world for activities expected to have detrimental impacts on the biophysical and socio-economic environments. As a result, skills development has traditionally focused on the assessment and review phase of IEM, particularly environmental impact assessment.

Skills for monitoring and evaluation, as well as enforcement and feedback outlined in Figure 11: Integrated Environmental Management Cycle have lagged behind. The establishment of enforcement and compliance units such as the Green Scorpions has done much to formally address the deficiencies in monitoring and review of environmental authorisation and legislative compliance. Ongoing and regular training and capacity building of all stakeholders in these aspects should remain a focus in future.

6. WHAT SKILLS DO WE REQUIRE?

In addressing the question of what skills do EAPs and government officials require, the section is structured into four parts, namely:

- Generic skills
- Skills required to effect the Integrated Environmental Management (IEM) phases
- Skills required for effective Environmental Impact Assessment (EIA)
- Skills development for other related professions

6.1. GENERIC SKILLS PROPOSED FOR EAPS

The following table represent a proposed generic competency directory (skills inventory) that could be adopted as recommended minimum requirements for EAPs, environmental practitioners and government officials in the environmental sector. This competency directory is generic by nature so as to address the wide range of professions and specialists within the sector.

TABLE 12: COMPETENCY DIRECTORY

COMPETENCY	DEFINITION
Leading and Deciding	
Deciding and initiating action	Takes responsibility for actions, project and people; takes initiative and work under own direction; initiates and generate activity and introduces changes into work processes; makes quick decisions which may include tough choices or considered risks.
Leading and supervising	Provides others with a clear direction; motivates and empowers others; recruits staff of a high calibre; provides staff with development opportunities and coaching; sets appropriate standards of behaviour.
Supporting and Co-operating	
Working with people	Shows respect for the views and contributions of other team members; shows empathy; listens supports and cares for others; consults others and shares information and expertise with them; builds team spirit and reconciles conflict; adapts to the team and fits in well.

COMPETENCY	DEFINITION
Adhering to Principles and Values	Upholds ethics and values; demonstrates integrity; promotes and defends equal opportunities, build diverse teams; encourages organisation and individual responsibility towards the community and the environment.
Interacting and Presenting	
Relating and Networking	Easily establishes good relationships with clients, constituencies and staff; relates well to people at all levels; builds wide and effective networks of contacts; uses humour appropriately to bring warmth to relationships with others.
Persuading and Influencing	Gains clear agreement and commitment from others by persuading, convincing and negotiating; makes effective use of political processes to influence and persuade others; promotes ideas on behalf of oneself or others; makes a strong personal impact on others; takes care to manage one's impression on others.
Presenting and communicating information	Speaks fluently; expresses opinions, information and key points of an argument clearly; makes presentations and undertakes public speaking with skill and confidence; response quickly to the needs of an audience and to their reaction and feedback; projects credibility.
Analysing and Interpreting	
Writing and Reporting	Writes convincingly; writes clearly, succinctly and correctly; avoids the unnecessary use of jargon or complicated language; writes in a well structured and logical way; structures information to meet the needs and understanding of the intended audience.
Applying Expertise and Technology	Applies specialist and detailed technical expertise; uses technology to achieve work objectives; develops job knowledge and expertise (theoretical and practical) through continued professional development; demonstrates and understanding of different organisation departments and functions.
Analysing	Analyses numerical data and all other sources of information, to break them into component parts, patterns and relationships; probes for further information or greater understanding of a problem; makes rational judgements from the available information and analysis; demonstrates and understanding of how one issue may be a part of a much larger system.
Creating and Conceptualising	
Learning and Researching	Rapidly learns new tasks and commits information to memory quickly; demonstrates an immediate understanding of newly presented information; gathers comprehensive information to support decision making; encourages an organisational learning approach (i.e. learns from successes and failures and seeks staff and customer feedback)

COMPETENCY	DEFINITION
Creating and innovating	Produces new ideas, approaches, or insights; creates innovative products of designs; produces a range of solutions to problems.
Formulating strategies and Concepts	Works strategically to realise organisational goals; sets and develops strategies; identifies, develops positive and compelling visions of the organisations future potential; takes account of a wide range of issues across and related to the organisation.
Organising and Executing	
Planning and Organising	Sets clearly defined objectives; plans activities and projects well in advance and takes account of possible changing circumstances; identifies and organises resources needed to accomplish tasks; manages time effectively; monitors performance against deadlines and milestones.
Delivering Results and Meeting Customer Expectations	Focuses on customer needs and satisfaction; sets high standards for quality and quantity; monitors and maintains quality and productivity; works in a systematic, methodical and orderly way; consistently achieves project goals.
Following Instructions and Procedures	Appropriately follows instructions from others without unnecessarily challenging authority; follows procedures and policies; keeps to schedules; arrives punctually for work and meetings; demonstrates commitment to the organisation; complies with legal obligations and safety requirements of the role.
Adapting and Coping	
Adapting and Responding to Change	Adapts to changing circumstances; tolerates ambiguity; accepts new ideas and change initiatives; adapts interpersonal style to suit different people or situations; shows and interest in new experiences.
Coping with Pressure and Setbacks	Maintains a positive outlook at work; works productively in a pressurised environment; keeps emotions under control during difficult situations; handles criticism well and learns from it; balances the demands of a work life and a personal life.
Enterprising and Performing	
Achieving Personal Work Goals and Objectives	Accepts and tackles demanding goals with enthusiasm; work hard and puts in longer hours when it is necessary; seeks progression to roles of increased responsibility and influence; identifies own development needs and makes use of developmental or training opportunities.

COMPETENCY	DEFINITION
Entrepreneurial and Commercial Thinking	Keeps up to date with competitor information and market trends; identifies business opportunities for the organisation; maintain awareness of developments in the organisational structure and politics; demonstrates financial awareness; control costs and thinks in terms of profit, loss and added value.

(Source: SHL Universal Competency Framework, White Paper, 2006)

This is visually depicted in the figure below (Figure 10: Generic Skills proposed for EAPs).

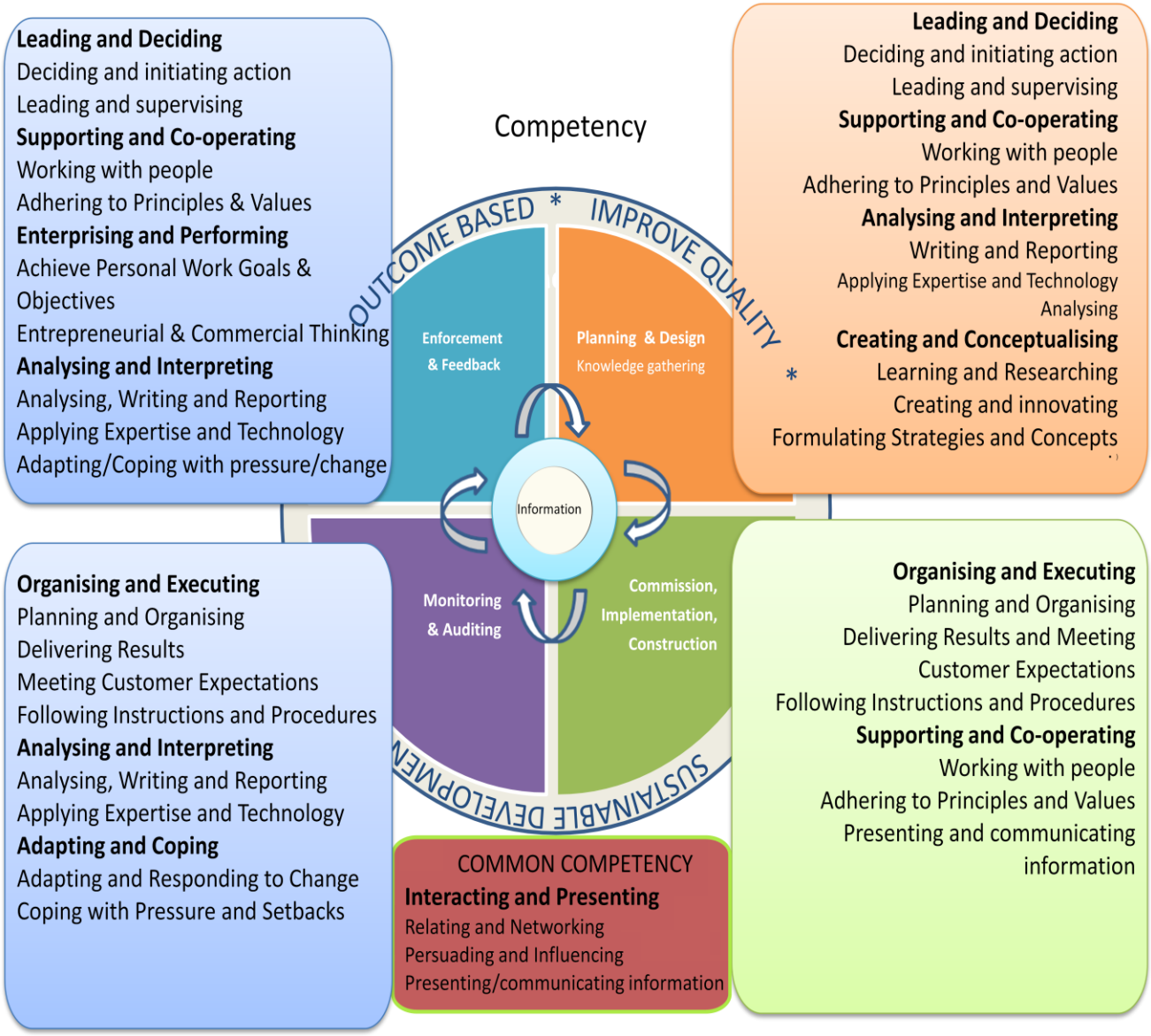

FIGURE 10: GENERIC SKILLS PROPOSED FOR EAPS

6.2. SKILLS REQUIRED TO EFFECT THE INTEGRATED ENVIRONMENTAL MANAGEMENT (IEM) PHASES

The Integrated Environmental Management cycle is based on a typical management cycle progressing through an Initiate, Plan, Execute and Monitor cycle, as illustrated in Figure 11: Integrated Environmental Management Cycle.

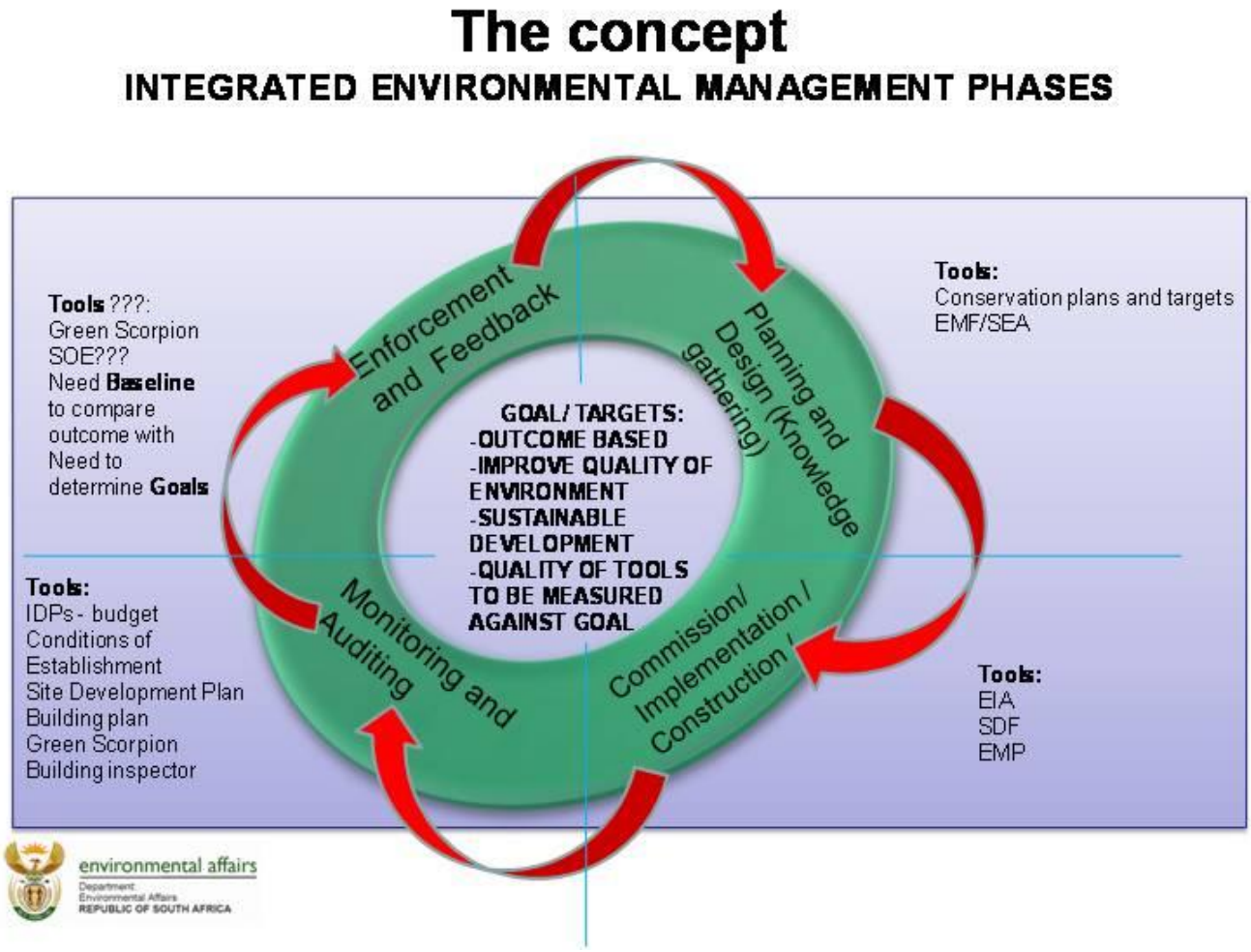

FIGURE 11: INTEGRATED ENVIRONMENTAL MANAGEMENT CYCLE

The following table links each of the four phases to the skill outlined in the generic competency directory and required skills to give effect to integrated environmental management. The depth and breadth of skills required to give effect to IEM is illustrated in this table.

TABLE 13: LINKING COMPETENCIES AND SKILLS TO THE IEM PHASES

IEM phase	Competency directory	Required skills
Planning and Design	**Leading and Deciding** • Deciding and initiating action • Leading and supervising **Supporting and Co-operating** • Working with people • Adhering to Principles and Values **Interacting and Presenting** • Relating and Networking • Persuading and Influencing • Presenting and communicating information **Analysing and Interpreting** • Writing and Reporting • Applying Expertise and Technology • Analysing **Creating and Conceptualising** • Learning and Researching • Creating and innovating • Formulating Strategies and Concepts	Data collection Analytical skills Research skills Integration and consolidation skills Spatial planning skills Report writing Policy specialists Scenario planners Impact assessment Public participation skills Organisational skills Project Management People skills Communication skills Environmental law and policy skills ICT skills, including use and interpretation of GIS and modelling technologies
Commission/ Implementation/ Construction	**Organising and Executing** • Planning and Organising • Delivering Results and Meeting Customer Expectations • Following Instructions and Procedures **Supporting and Co-operating** • Working with people • Adhering to Principles and Values **Interacting and Presenting** • Relating and Networking • Persuading and Influencing • Presenting and communicating information	Integration and consolidation skills Impact assessment Organisational skills Project Management People skills Communication skills Environmental education skills Risk assessment and risk management
Monitoring and Auditing	**Organising and Executing** • Planning and Organising • Delivering Results and Meeting Customer Expectations • Following Instructions and Procedures	Data collection Analytical skills Integration and consolidation skills Report writing Organisational skills Impact assessment Project Management People skills

IEM phase	Competency directory	Required skills
	Analysing and Interpreting • Writing and Reporting • Applying Expertise and Technology • Analysing **Adapting and Coping** • Adapting and Responding to Change • Coping with Pressure and Setbacks **Interacting and Presenting** • Relating and Networking • Persuading and Influencing • Presenting and communicating information	Communication skills Monitoring, modelling and evaluation skills Auditing skills Risk assessment and risk management ICT skills, including use and interpretation of GIS and modelling technologies
Enforcement and Feedback	**Leading and Deciding** • Deciding and initiating action • Leading and supervising **Supporting and Co-operating** • Working with people • Adhering to Principles and Values **Interacting and Presenting** • Relating and Networking • Persuading and Influencing • Presenting and communicating information **Enterprising and Performing** • Achieving Personal Work Goals and Objectives • Entrepreneurial and Commercial Thinking **Analysing and Interpreting** • Writing and Reporting • Applying Expertise and Technology • Analysing **Adapting and Coping** • Adapting and Responding to Change • Coping with Pressure and Setbacks	Analytical skills Integration and consolidation Report writing Organisational skills Project Management People skills Communication skills Leadership skills

This is visually depicted in the figure below (Figure 12: Skills required to effect Integrated Environmental management).

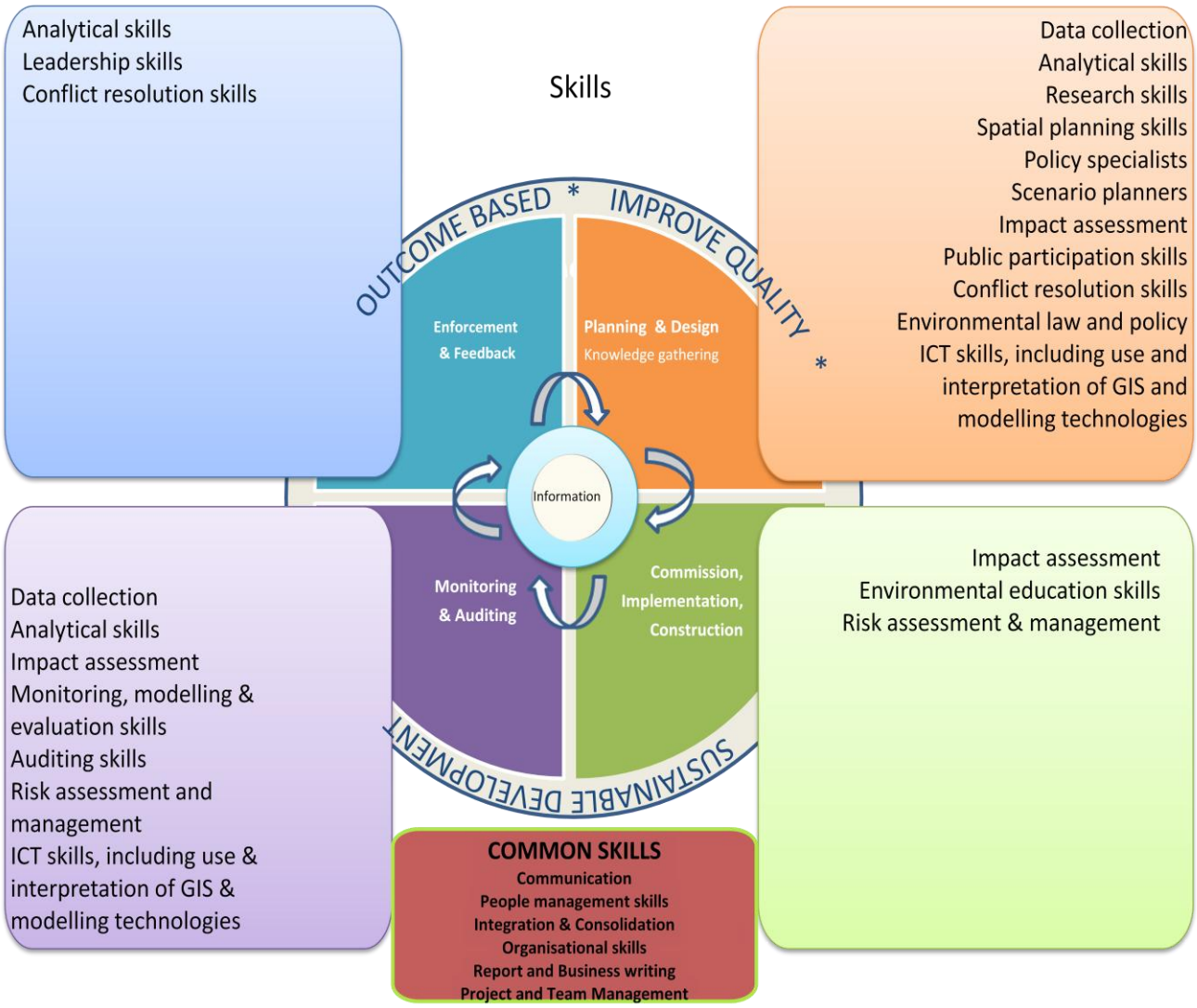

FIGURE 12: SKILLS REQUIRED TO EFFECT INTEGRATED ENVIRONMENTAL MANAGEMENT

6.3. SKILLS REQUIRED FOR EFFECTIVE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) MANAGEMENT

In order to contextualize the requirement for skills it is pertinent to look at the EIA process and the associated skills that are required to ensure that the process is both effective and efficient. The following table outlines the environmental authorization process according to the Environmental Impact Assessment regulations of June 2010 (Notice R 543), and proposed skill requirements for EAPs, government officials and the public.

It is quite a lengthy list and there may be a need in future for further disaggregation of the various skills associated with the different steps in the EIA process. At this stage, the intention is however to capture all the proposed skills areas that could be required at each of the stages in the process.

The skills have been divided into those relating to the environmental authorisation process (referred to as **process skills**) which are those skills that assist in the effective management of the process. These are predominantly generic skills such as communication and project management skills. The second group of skills are those associated with the environmental authorisation process specifically (referred to as **technical assessment skills**). These skills include the understanding of the strategic context within which the EIA application is located, and may include an understanding of spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change etc.

The common skills that are required at most stages throughout the process are listed below. Any skills development initiatives should, as a starting point, focus on these areas in future.

- Report and Business writing
- People management skills
- Communication
- Analysis and synthesis
- Project and team management
- Organisational skills
- Knowledge of legislation and procedural requirements
- Assessment and significance rating
- Problem solving
- Conflict resolution

In order to address the recommendations in Subtheme 3 (Public Participation) and Subtheme 7 (Empowerment of Marginalised Communities), EAPs will need to develop additional skills in order to provide an executive summary of reports in a simpler/ understandable language and capacity should be developed for translation of reports into other languages. For example, it could be argued that many of the problems with EIA are not necessarily due to the EIA

itself but to the fact that they are poorly written and poorly regulated. The problem with poor quality reports is not uniquely South African. In the United States a number of proposals have been put forward relating to the quality and structure of the Environmental Impact Statement report writing skills as a result of a court judgement in the case of Oregon Environmental Council v. Kunzman. Various proposals to improve the quality EIA reports (through appropriate skills development) could include:

- Limiting the length of the report;
- Need for a succinct and informative summary of the report;
- Plain language and appropriate graphics should be used;
- A standard format for reports should be used;
- Certain aspects should be rigorously evaluated with reference to supporting scientific and technical authority, e.g. the issue of alternatives and mitigation measures;
- Data and analysis should be commensurate with the importance of the impact;
- Verbose and bulky descriptions of the affected environment should be avoided;
- Reports should utilize appendices to cut down on bulk of the report;
- Appendices should be used to contain material which substantiates any analysis fundamental to the impact assessment; and
- Comments from interested and affected which are substantive, and/or show opposing views that are readily apparent should be responded to in good faith through reasoned analysis and justified by scientific or other authority, rather than just “noted.”

TABLE 14: SKILLS REQUIRED FOR EFFECTIVE EA MANAGEMENT (BASIC ASSESSMENT)

Application subject to basic assessment	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
Submission of application to competent authority and steps to be taken after submission of application	**Process Skills:** Report writing People management skills Communication (verbal skills, presentations) Project and team management **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application Public participation	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application
Content of basic assessment reports	**Process Skills:** Report writing People management skills Communication (verbal skills, presentations) Contracts Conflict resolution	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Conflict resolution

Application subject to basic assessment	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	Project and team management Problem solving Organisational skills **Technical assessment skills:** GIS and mapping Knowledge of legislation, policies, environmental management instruments, plans Specialist areas dealing with geographical, physical, biological, social, economic, financial, engineering and cultural aspects, such as: water resources, wetlands, air quality, heritage, soil, biodiversity (fauna and flora), social, economic, etc. Specific specialist knowledge relating to the application (such as Acid Mine Drainage, technological engineering	**Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Trade-offs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling	**Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Trade-offs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling

Application subject to basic assessment	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	processes) Integration and consolidation of inputs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Analysis and synthesis of information Scenario generation Trade-offs Modelling		
Submission of basic assessment report to competent authority	**Process Skills:** Report writing Communication (verbal skills, presentations) Project and team management Organisational skills		

Application subject to basic assessment	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
Consideration of application	**Process Skills:** Communication (verbal skills, presentations) Project and team management Organisational skills	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) **Technical assessment skills:** Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation	**Process Skills:** Communication (verbal skills, presentations) Organisational skills
Decision on application		**Process Skills:** Writing Communication Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements	

TABLE 15: SKILLS REQUIRED FOR EFFECTIVE EA MANAGEMENT (SCOPING AND ENVIRONMENTAL IMPACT REPORTING)

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
Submission of application to competent authority	**Process Skills:** Business writing Communication (verbal skills, presentations) Project and team management **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application	
Steps to be taken after submission of application	**Process Skills:** Report writing Public participation People management skills Communication (verbal skills, presentations) Database management Project and team management	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management **Technical assessment skills:**	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) **Technical assessment skills:** Knowledge of legislation and procedural requirements pertaining to the application

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	Organisational skills **Technical assessment skills:** Knowledge of legislation and procedural requirements Analysis and synthesis of information	Knowledge of legislation and procedural requirements	
Content of scoping reports	**Process Skills:** Report writing People management skills Communication (verbal skills, presentations) Contracts Conflict resolution Project and team management Organisational skills **Technical assessment skills:** GIS and mapping Knowledge of legislation, policies, environmental management	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management **Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Understand the strategic context	**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Conflict resolution **Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	instruments, plans Specialist areas dealing with geographical, physical, biological, social, economic, financial, engineering and cultural aspects, such as: water resources, wetlands, air quality, heritage, soil, biodiversity (fauna and flora), social, economic, etc. Specific specialist knowledge relating to the application (such as Acid Mine Drainage, technological engineering processes) Integration and consolidation of inputs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts,	(spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling	use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	biodiversity targets, ecological resilience, climate change, etc.) Analysis and synthesis of information Scenario generation Trade-offs Assessment and significance rating Modelling Problem solving		
Submission of scoping reports to competent authority	**Process Skills:** Report writing Communication (verbal skills, presentations) Project and team management Organisational skills		
Consideration of scoping reports		**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management	

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
		Technical assessment skills: Knowledge of legislation and procedural requirements Knowledge of legislation, policies, environmental management instruments, plans Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Analysis and synthesis of information Scenario generation Trade-offs	
Environmental impact assessment reports	**Process Skills:** Report writing People management skills	**Process Skills:** Business writing People management skills	**Process Skills:** Business writing People management skills

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	Communication (verbal skills, presentations) Contracts Conflict resolution Project and team management Organisational skills **Technical assessment skills:** GIS and mapping Knowledge of legislation, policies, environmental management instruments, plans Specialist areas dealing with geographical, physical, biological, social, economic, financial, engineering and cultural aspects, such as: water resources, wetlands, air quality, heritage, soil, biodiversity (fauna and flora), social, economic, etc.	Communication (verbal skills, presentations) Database management **Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Trade-offs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling	Communication (verbal skills, presentations) Conflict resolution **Technical assessment skills:** GIS and mapping Knowledge of legislation and procedural requirements Analysis and synthesis of information Scenario generation Trade-offs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Modelling

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	Specific specialist knowledge relating to the application (such as Acid Mine Drainage, technological engineering processes) Integration and consolidation of inputs Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Analysis and synthesis of information Scenario generation Trade-offs Problem solving Modelling Assessment and significance rating		

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
Specialist reports and reports on specialised processes	**Process Skills:** Report writing People management skills Communication (verbal skills, presentations) Project and team management Organisational skills **Technical assessment skills:** GIS and mapping Specialist areas dealing with geographical, physical, biological, social, economic, financial, engineering and cultural aspects, such as: water resources, wetlands, air quality, heritage, soil, biodiversity (fauna and flora), social, economic, etc. Specific specialist knowledge relating to the application (such as Acid Mine		

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	Drainage, technological engineering processes) Integration and consolidation of inputs Analysis and synthesis of information Modelling		
Content of draft environmental management programme	**Process Skills:** Report writing People management skills Communication (verbal skills, presentations) Project and team management Organisational skills **Technical assessment skills:** GIS and mapping Understanding of the construction/ commissioning/ implementation process in respect of: planning and design, pre-construction and		

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
	construction activities, operation or undertaking of the activity, rehabilitation of the environment, and closure (where relevant) Integration and consolidation of inputs Analysis and synthesis of information Modelling		
Consideration of environmental impact assessment reports		**Process Skills:** Business writing People management skills Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements Knowledge of legislation, policies,	

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
		environmental management instruments, plans Understand the strategic context (spatial planning (such as SDF, IDP, EMFs), land use trends and management, human settlements, sense of place, cumulative impacts, biodiversity targets, ecological resilience, climate change, etc.) Analysis and synthesis of information Scenario generation	
Decision on application		**Process Skills:** Business writing Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements	

Application subject to scoping and environmental impact reporting	Skill requirements: EAP	Skill requirements: Government official	Skill requirements: Public
Issue of environmental authorisation		**Process Skills:** Business writing Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements	
Content of environmental authorisation		**Process Skills:** Writing Communication (verbal skills, presentations) Database management **Technical assessment skills:** Knowledge of legislation and procedural requirements	

6.4. SKILLS DEVELOPMENT FOR OTHER RELATED PROFESSIONS

Other professionals (such as town planners, engineers, architects, landscape architects) are in many instances directly managing and undertaking environmental management projects. This raises the question as to what skills are required for these professions to ensure that integrated environmental management is effected as conceived in NEMA.

Fundamentally, it is crucial that these professions understand that environment is a cross-cutting issue and therefore aspects of integration and trans-disciplinarity assume greater importance. It is however difficult to teach skills in integrative and holistic thinking and this often comes with experience. Nevertheless, the following three aspects are considered as basic skill requirements:

Firstly, an understanding of the National Environmental Management Act, particularly the **principles** of NEMA, as well as the concept of **Integrated Environmental Management** is crucial for other professions. Secondly, an understanding of a **systems approach to environmental management** is required for all professions, specifically the notion that all aspects are inter-connected and inter-related, and changes to one part cause changes to others.

Thirdly, other professions need to understand the value of **ecosystem goods and services** so that development interventions are not harmful or destructive of ecologically valuable resources, and that environmental sensitivities are taken into consideration in project implementation. An understanding of the value of areas of biodiversity value (including ridges, water courses and wetlands, sensitive ecosystems and the presence of red data fauna and flora, etc) and the ecological goods and services that they provide, are critical for other professions.

Lastly, other professionals need to understand the variety of **environmental management tools**, and the appropriate application and purpose. This will assist in the effective use of environmental management tools thereby improving the current situation and progression to IEM.

Issues around quality assurance in relation to other professions are dealt with in detail in Subtheme 5: Quality Assurance and Independence of EAPs. Nevertheless, it is important to recognise prior learning within other

degree/ diploma courses against the Advanced Certificate: Environmental Practice. In this instance, a professional that has a Town Planning or Landscape Architecture qualification would be able to be certified as an EAP through the RPL process.

7. OBSTACLES TO SUCCESSFUL IMPLEMENTATION

The following obstacles to implementation have been gathered during the preparation of this report from a number of different stakeholders:

- Inappropriate skills development or inappropriate training programmes which don't address the real need
- Prohibitive costs associated with training courses
- Time intensive training courses which often limit participation
- Poor quality training
- Require practical hands-on training rather than a theoretical abstract focus
- Access to training for rural and under-resourced communities is extremely difficult
- High turn-over of staff within the environmental sector results in increasing difficulty to retain appropriate skills and experience
- Fixation on training for EIA and limited focus on other environmental management tools
- Limited skills development on other environmental tools
- Access to funding sources for training is limited
- Bureaucratic and lengthy process and costs associated with course accreditation
- Lack of applicable unit standards for environmental courses, necessitating the unit standards being registered first before applying for the course to be accredited
- Lengthy process to have HET institutions accredited in terms of the Advanced Certificate: Environmental Assessment Practice (could take up to 5 years)
- Changing legislation requires courses to be amended and further accreditation of the course which is a time consuming process
- Continued need for EIA capacity building as well as other aspects such as strategic environmental planning tools, public participation techniques, specialist fields, etc
- Enormous need for information regarding the EIA processes (despite the course being accredited or not)

- EIA is cross-cutting aspect and capacity is required in a wide range of stakeholders and not just focused on the environmental sector – other important stakeholders include politicians, financial institutions, rural and under resourced communities etc
- Courses shouldn't be focused at a particular audience such as government officials – often the most value is gained from interaction between different stakeholders which leads to greater understanding and building of relationships (based on knowledge and trust)
- Access to legislation and understanding environmental legislation is a major problem
- EIA is becoming increasingly complex and in order to understand it properly, people need some kind of formal capacity building. Currently the ability of the majority of I&APs to engage and respond meaningfully in the EIA process is poor and the process does not offer sufficient and effective learning space to address this shortfall
- No dedicated environmental SETA with the result that environmental issues are currently dealt with through other SETAs
- Formal registration of the Advanced Certificate: Environmental Assessment Practice

8. SUMMARY OF PROPOSALS

The following table summarises key proposals relating to the development of skills in the environmental sector. These relate to the seven strategic objectives discussed above.

TABLE 16: SUMMARY OF PROPOSALS

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION

Respond to changing global environment	• Develop capacity for integrating and costing skills planning into the strategic plans being developed for the green economy and green job development planning;
	• Support the continued efforts in the development of a Training of Trainers Programme to expand Provider Capacity for Green Jobs and Green Economy Training and Capacity Development as proposed by the ESSP;
	• The ESSP (2010) also suggests the following strategies to address scarce and critical skills in the environmental sector:
	  • Work with the Ministry of Higher Education and Training and the Department of Science and Technology to improve systemic attraction to, and graduation rates in environment related sciences and other scarce skill areas, particularly historically disadvantaged individuals.
	  • Review the current allocations of skills development funding to adequate allocation of funding for adequate bursary funding to facilitate skills development in scarce skills areas, and for life long learning linked to career path development in scarce skills areas.
	  • Establish an initiative with the Ministry of Higher Education and Training to further examine and address the need for environmental technical skills needed in the environmental sector.

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION

- Undertake a scoping of Universities of Technology to establish which ones can immediately begin to address the need for environmental technical skills in South Africa, and link graduates to work placements, post-qualification internships and potential employment opportunities.
- Support the development of skills programmes for the sector that address critical skills gaps identified across the sector, especially:
    - Sustainable Development Planning Skills
    - Climate Change Risk and Opportunity Assessment
    - Environmental law and policy
    - Integrative skills programmes
    - Mentoring and coaching
    - ICT skills programmes, including use and interpretation of GIS and modelling technologies
    - Monitoring, modelling and evaluation of environmental change
    - Green procurement and green economy planning skills
    - Environmental ethics and social justice practices in the environmental sector
- Commission further research of the profile and growth of employment in environmental occupations, as well as the current skills profile within the environmental sector;
- Align the course content of HET institutions with the needs of the market;
- Engage with the Basic Education Department of integrate environmental aspects (natural sciences) into leaner subjects (subject curricula) at school level;

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION
	• Support/ Replicate Science & Maths Schools such as LEAP and strengthen environmental (natural sciences) component; and • Fast track the accreditation of short courses aimed at addressing scarce and critical skills.
Ensure the Attraction and Retention of Skills	• Focus at school level to attract young people to the environmental sector; • Target undergraduate students for financial assistance through bursaries (via the National Student Financial Aid Scheme); • Establish learnerships for National Diploma graduates; • Promote longer term learnerships (3 years) to allow for adequate experiential training and professional registration; • Substantially increase environmental learnerships – currently 2,4% of all learnerships facilitated by SETAs are environmental; • Develop national training programme for environmental aspects through all SETAs; • Offer training and development (in-service, succession plans, career pathing, skills development, training courses, seminars, conferences, etc); • Work environment (including physical work environment, safe and healthy working conditions and other aspects such as the perception on being valued, future opportunity for continued growth, adequate and fair compensation; and equity among all employees); • Career management; • Review of the recruitment and selection processes; • Exchange programmes;

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION
	• Compensation related incentives (such as incentive schemes, separate salary structure for scarce skills, increased percentage for merit awards); • Structured salary packages; • Collaboration with Higher Education institutions ; • Establishment of public private partnerships (e.g. grade 12 pupils with potential (bursaries/ scholarships) • Partnerships with donor agencies; • Bursaries and learnerships (especially for scarce and critical skills); • Sabbaticals; • Rotation; • Succession planning; • Range of projects and programmes; • Rewarding innovation; • Employee ownership schemes/ shares; • Embracing and valuing diversity; and • Corporate Social Responsibility programmes.

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION
Career development planning	• Encourage individuals to manage and structure their careers; • Instil culture of career development planning within organisation; • Promote succession planning within the organisation and compile succession plans (timeframe, skills and competencies, changes since previous plan was drawn up, follow up actions (including training, coaching, target setting, career changes, and potential)); • DEA to explore possibility of funding or incentivising mentorships; • Increase organisational capacity for mentoring; • Better Work Place Skills planning in organisations; and • Improved statistics of environmental occupations and better aligned job titles.
Promote Continuing Professional Development (CPD) or Continuing Professional Education (CPE)	• Encourage CPD through the ongoing maintenance, improvement and broadening of knowledge and skills by environmental practitioners; • Organisations can structure incentives and benefits according to targets relating to CPD; • Encourage the attendance of short courses which allow for busy professionals the time to undertake specific training, and these can be tailor-made or specific to a particular topic or activity; • Professionals should familiarise themselves with the EAPASA requirements for CPD and ensure documentation of all CPD activities; and • Accreditation of training courses to aid the accumulation of CPD points

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION
Promote Knowledge Transfer and Learning	• Encourage participation in learning networks and Communities of Practice (CoP) such as the IAIAsa or other more informal arrangements; • Formalise internal institutional training and knowledge sharing (e.g. brown bag sessions, lunch time talks) • Continue with the engagements for the inclusion of the environmental driver into SETA functions and operations, and to avoid duplication and maximise coherence of approach to environmental training; • Ensure that induction sessions are held for all new employees (particularly within spheres of government), that material is relevant and current, and that information is readily accessible; • Ensure a knowledge management system is implemented within organisations so limit institutional memory loss; • Promote opportunities (financially, KPA targets and motivation) for employees to participate in social-network building and the development of contacts through the attendance of conferences, workshops and meetings, and professional organisations and voluntary associations; • Encourage (or stipulate) professional registration; • Presentation of paper and/ or poster at conferences at regular intervals; • Include skills development and training (such as attendance of short courses, conferences, seminars) as part of Performance Management systems; • EAPs must be trained in the use of various environmental management tools, in order to be able to guide EAPs and understand their application e.g. the application of tools can also have a spatial component where the training for EAPs and officials operating in national biodiversity priority areas, for example, should become a requirement; • DEA to support training initiatives through financial and other means;

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION

	• DEA should investigate the training courses offered by the Department of Water Affairs who currently offer short courses on various water related issues as well as the Department's Learning Academy, and how a similar approach could possibly be applied to the environmental sector;
	• Increase the human resources and financial allocation to the Capacity Building and Training unit at DEA to expand their scope and operations beyond DEA and provincial officials, to include local governmental officials and other national departments; and
	• The DEA Capacity Building and Training unit to engage with other professional bodies such as the Engineering Council of South Africa (ECSA), and South African Council for Planners (SACPLAN) regarding professional registration requirements and RPL.
	• The following short term, based on the detailed proposals the following short term skills development programmes are proposed:
	  • Interdisciplinary skills development for EAPs, Government officials and other professionals such as town planners, engineers, landscape architects and environmental specialists etc.;
	  • Detailed specialist course on the principles of NEMA to be based on a guideline document to be compiled for EAPs, Government officials and other professionals such as town planners, engineers, landscape architects and environmental specialists etc.;
	  • The systems approach to environmental management;
	  • Value of ecosystem goods and service rendering;
	  • The outcome based approach: Training will be required on how to determine outcome criteria/ indicators and

STRATEGIC OBJECTIVE	PROPOSED INTERVENTION
	targets and the compilation of authorizations and conditions in line with these indicators; • Training in the usage and compilation of other tools to be introduced by Subtheme 9 such as life cycle assessments, risk assessment, cost benefit analysis, monitoring reporting, desired state of the environment etc.; • Specialist public participation training focusing on public participation within marginalised communities in line with Subtheme 3 and 7 recommendations; • Monitoring and enforcement skills and procedures; and • Information systems training in line with system development introduced by Subtheme 2.
Promoting Inter-disciplinarity	• Train the EAP to understand and acknowledge the role and contribution of different disciplines to a project or study; • Train the EAP to be able to integrate the inputs from various disciplines into a coherent whole that aids decision-making and contributes to integrated environmental management; • Ensure contribution of different disciplines at various scales to integrated local knowledge and circumstances; and • Set up project teams to ensure inter-disciplinarity and representation from a variety of professions from project inception.
Increased focus on implementation not assessment	• Focus skills development and incentivise training programmes to focus on monitoring and evaluation, as well as enforcement and feedback phases of the environmental management cycle.

Of particular, importance is the alignment of this Subtheme on skills development and capacitation to other Subthemes, and the importance of skills development to ensure that the recommendations of the EIAMS are met. The following table outlines the key skills development aspects that will have to be addressed in order to achieve the EIAMS outcomes.

TABLE 17: SKILLS DEVELOPMENT IN RELATION TO EIAMS SUBTHEMES

SUBTHEME	SKILLS DEVELOPMENT ACTION
Subtheme 1: Procedures and Organisational Structures	• Skills development and training on IEM procedures and system addressing concepts such as ecological sustainability vs. environmental sustainability; sustainability outcomes and targets etc. • Skills development and training in terms of the proposed shift to projects not activities; • Skills development and training in terms of proposed organisational structures e.g. National Commissioner – roles, responsibilities, mandate, etc.; • Build capacity within local government to ensure co-operative governance within IEM between spheres of government.
Subtheme 2: Knowledge and Information	• Information systems training on NEAS and other systems need to be developed for EAPs and Government officials; • Information systems training in line with system development introduced by Subtheme 2.
Subtheme 3: Public Participation	• Skills required for effective management of environmental authorisation processes: In order to address the recommendations in Subtheme 3, EAPs will need to develop additional skills in order to provide an executive summary of reports in a simpler/understandable language and capacity should be developed for translation of reports into other languages; • The development of public participation specialists' skills also becomes more important, specifically specialist public

SUBTHEME	SKILLS DEVELOPMENT ACTION
	participation training focusing on public participation within marginalised communities in line with Subtheme 3 recommendations.
Subtheme 4: Monitoring and Enforcement	• Skills required for effective compliance monitoring and enforcement as outlined in Subtheme 4, particularly within government departments.
Subtheme 5: Quality Assurance and Independence of EAPs	• Alignment and complimentarity between EAPs registration requirements and the provision of training courses; • Once established the Registration Authority will apply to be accredited as the Education and Training Quality Assurance Body (ETQA) for environmental assessment practice. This role will assist significantly in ensuring that education and training offerings for EAPs can be accredited in terms of the SAQA-registered EAP qualification – the Advanced Certificate: Environmental Assessment Practice (the Certificate of Competence).
Subtheme 6: Representivity within Sectors	• Initiatives and incentives required for the attraction and retention of historically disadvantaged individuals to the environmental industry (refer to section on attraction and retention of skills); • Provide training experience to environmental practitioners from historically disadvantaged backgrounds that are currently very poorly represented in the environmental sciences and environmental practitioner's profession.
Subtheme 7: Empowerment of Marginalised Communities	• Skills required for effective management of environmental authorisation processes: In order to address the recommendations in Subtheme 7, EAPs will need to develop additional skills in order to provide an executive summary of reports in a simpler/understandable language and capacity should be developed for translation of reports into other languages. • The development of public participation specialists' skills also becomes more important, specifically specialist public

SUBTHEME	SKILLS DEVELOPMENT ACTION
	participation training focusing on public participation within marginalised communities in line with Subtheme 7 recommendations.
Subtheme 9: Existing and New Tools	• Legislating new tools will require high degree of training, administration and capacity within government; • Training to ensure the more effective use of existing tools and the ability to choose the "correct" tool; • Training in the compilation and use of other tools to be introduced by Subtheme 9 such as life cycle assessments, risk assessment, cost benefit analysis, monitoring reporting, desired state of the environment etc.; • Improved application and use of the EIA process and its constituent parts will require not only the presence of the necessary skills and capacity of the EAPs administrating the process, but also the authorities who make the decisions following the EIA process.
Subtheme 10: Co-operative governance	• Skills development to facilitate and ensure co-operative governance between various spheres of government (various working groups, forums, co-ordinating committees, etc); • Capacity building of government officials to determine targets as per outcomes based approach; • Capacity building on proposed co-operative governance as outlined in NEMA.
Subtheme 11: Quality of Tools	• Training on the proposed screening process on how to capacitate local government within the EIAMS. The concern is the risk associated with the abuse and corruption of discretion by government officials on whether the project should go through an EIA or not which will require specific capacity building to resolve this; • Training on the development of norms and standards and outcomes based approach; • Training to ensure the more effective use of existing tools and the ability to choose the "correct" tool.

9. CONCLUSION

In conclusion, environmental practitioners come from a **wide range of backgrounds**, but over recent years, they have increasingly been sourced from academic institutions which offer tertiary education and degrees in environmental management. As with other sectors, fulfilling the diverse requirements of becoming a professional takes time and dedication. EAPs are expected to have an enormous depth and breadth of skills in order to fulfil the role of an EAP, and often competence in this regard comes with experience over time.

In strengthening the academic qualifications, training, skills, development and accreditation of those practising in the environmental field, it will be essential to find consensus on how best to facilitate this need and to agree on certain **principles** which characterise the profession. Over the past 5 years a number of initiatives have been undertaken to address environmental skills development in South Africa. In a fairly short space of time the sector has come a long way in establishing a baseline of what are the skills shortages, the supply and demand drivers of environmental skills, the environmental employment profile and new trends influencing skills development needs in the sector. Further work needs to be undertaken to disaggregate the information further and to provide clear guidance on improving environmental skills development planning.

For example, the focus on IEM may require that academic institutions develop training and tools that specifically recognise the need to integrate and evaluate specialist area results (for both EAPS and Government reviewers). The development of the **Advanced Certificate: Environmental Assessment Practice** will go a long way in ensuring standardisation of qualifications within the environmental profession although the accreditation of various courses in line with the Certificate may take some time still. Professional registration and accreditation will give further impetus to the need for skills development in the environmental sector.

An **inclusive approach** to skills development is thus required which will allow those already working in the environmental management field, as well as those wishing to enter it, to further develop their skills

and obtain accreditation. Measures must be put in place to ensure long-term more sustainable supply of quality skills to the environmental sector. In line with the multi-disciplinary nature of the discipline then, such an approach will need to accommodate multi-level entry to the profession whilst allowing both generalists and specialists the ability to follow a number of career paths that permit them to switch direction or specialise in the environmental management field through the acquisition of specific skills, qualifications and accreditation.

Partnerships are recommended to leverage resources and knowledge sharing in pursuit of strengthening and developing environmental skills in South Africa. The success will depend on a number of roleplayers working together for the common good of this multi-disciplinary field such as the HCDPF, the SAQA, the DEA, academic institutions and training bodies, EAPASA, SACNASP, professional bodies representing other generalist and specialist disciplines and areas, the SETAS, as well as environmental practitioners and the public.

The achievement of many of the proposals contained in the report may **take quite some time** due to organisational structures and priorities, the nature of humans to resist change, and the competing demands for skills development and capacitation across many sectors in South Africa. In the short term the focus should be on the development of skills programmes to address those skills in demand, and to encourage the attendance of short courses to bring about an efficient and effective IEM process.

In conclusion, the outcomes of the **EIAMS** will have a direct bearing on capacitation and skills development in the environmental sector. In particular, the recommendations contained in the various Subthemes will result in the need for focused capacity building and skills development for professionals to be able to contribute to the successful implementation of the EIAMS.

REFERENCES

Centre for Environmental Studies (2010), MSc/MA and PhD studies 2011 Information Brochure, University of Pretoria, Pretoria

DEA (2009) Draft Project Business Plan, Development of a National Environmental Impact Management Strategy for the Department of Environmental Affairs and Tourism, Version 1.0, Pretoria

DEA (2010) Integrating the Environmental Driver into Sector Skills Plans: An Enabling Document for all SETAs, Pretoria

DEA (2009) Submission to National Skills Development Strategy, Pretoria

DEA (2009) Environmental Sector Skills Plan for South Africa – a systems approach to skills planning and human capital development, Summary Document, Pretoria

DEAT (2005) Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19, Department of Environmental Affairs and Tourism (DEAT), Pretoria

Mosakong Management cc (in association with Environomics cc, Savannah Pty Ltd and environmental counsel cc (2008) Review of the Effectiveness and Efficiency of the Environmental Impact Assessment (EIA) system in South Africa

Oregon Environmental Council v. Kunzman, 817 F.2d 484 (9th Cir. 1987), available at http://ftp.resource.org/courts.gov/c/F2/817/817.F2d.484.85-4266.85-4308.86-3779.html

Patrick, MJ and Turton, AR (2006) Governance of Transboundary Waters: Roles of Young Professionals, Council for Scientific and Industrial Research (CSIR): Natural Resources and the Environment, South Africa

South Africa, 2010: National Environmental Management Act, 1998, Environmental Management Framework Regulations, Government Notice No. R.547, Government Gazette No. 33306, 18 June 2010

ANNEXURE A

Energy (and Water) SETA

The following is an excerpt from the enabling document specifically for the Energy (and Water) SETA (Integrating the Environmental Driver into Sector Skills Plans, July 2010):

Introduction

The environmental driver must be integrated into all Sector Skills Plans, for two reasons. Firstly, government departments aim to promote a green growth path that is environmentally sustainable, has a low carbon footprint, and is pro-labour creation. By pursuing green growth South Africa could benefit from the opportunities opened up by global and local green economic activity, eco-innovations and green jobs. Many companies have seen the need to both optimise environmental opportunities and to avoid environmental risks, and they require associated skills.

Secondly, the sustainable use and management of natural resources is a national priority outlined in the *Medium Term Strategic Framework,* MTSF 2009-2014 (Goal 9). It is a state priority to implement the *National Sustainable Development Framework,* with attention to the protection and fair distribution of scarce water resources; to food security and rural livelihoods; integrated environmental management and the protection of biodiversity; energy efficiency; and mitigating the risks of climate change, particularly to the most vulnerable members of society.

How is a green growth path relevant to the Energy (and Water) SETA?

Energy and water management in South Africa are directly impacted by the environmental driver in ways that involve both opportunities and risks. For example:

Given the significant risk of being unable to adequately provide for the South African economy's energy needs, the Department of Minerals and Energy have set reduction of energy demand at 12% by 2015. Renewable and alternate sources of energy, coupled with an emphasis on energy efficient building design have become key priorities in this sector. Examples include Gas to Electricity Generation Projects which extract gas from landfill sites to help generate electricity (e.g. eThekwini Municipality). The required innovations require new skills: in research and development; new technologies (production and application); procurement, generation and management.

Industries and businesses aiming to reduce their environmental impact by minimising their waste stream or carbon footprint, becoming water neutral, or simply reducing production (water and electricity) costs, are becoming significant drivers of a shift towards green energy and the search for eco-technologies and innovations to 'do more with less'. Energy and water efficiency requires re-skilling across all occupations, and large companies are implementing programmes to involve all occupations in reducing energy and water use and consumption.

A shift towards clean and renewable energy and a low carbon future is a key component of greening the economy, as it requires substantial investment (in people, research and financial resources) in new technologies and systems. As such it creates new economic and job creation opportunities, and it has significant skills requirements (e.g. skills to design, develop, produce, install and service renewable energy generation plants or energy efficient devices, as has been shown by the need for technical skills necessary for solar water heater installation in South Africa).

How is Sustainable Natural Resource Use and Management (MTSF Goal 9) relevant to the Energy (and Water) SETA?

Scarce natural resource – Through the processes of energy generation, strain is exerted on scarce water resource (used in coal fire stations). Freshwater is also affected by acid rain caused by the sulphur and nitrous oxides that are by-products of coal fire power generation. These by-products, along with $C0_2$ and others, also contribute to the accelerated greenhouse effect and associated climate change, which may have far reaching effects on economic activities and the livelihoods of vulnerable groups in society. Various industrial activities from mining to agriculture reduce the quality of South Africa's freshwater resources. While these development activities have an impact on the natural resource base, such impacts can be minimised with improved management practices, and new technologies (e.g. biotechnology is being used to treat waste water in the mining industries, and some mines are recycling and re-using this water after such treatment). Solutions do exist, and they provide new opportunities for development, job creation and innovation towards a more sustainable approach to development where end-of-pipe problems are anticipated and reduced. Government is therefore encouraging industries to reduce their carbon emissions, and to be more energy efficient, and to manage their use of water resources to prevent pollution, and contamination of water sources. Systems of cleaner production are being encouraged, and

the Departments of Trade and Industry, and Science and Technology are, for example, supporting research to produce cleaner production innovations.

Water is a particularly scarce resource in South Africa and already a constraining factor in development. While many Water Management Areas in the country have already allocated all available freshwater resources, there are also many households without easy access to a regular supply of potable water. In addition, there is need for an Ecological Reserve in order to keep freshwater systems in rivers, wetlands and estuaries intact, so that they can keep supporting livelihoods, economic activity and biodiversity, in the long run. The Department of Water Affairs has conceptualised an approach to water management that foregrounds the importance of managing water for development in South Africa. Without adequate management of water resources, development will be compromised. With innovative water management approaches, development opportunities can be expanded.

Research into eco-efficient energy production, green technologies such as wind farms, water harvesting, soil conservation measures, and carbon trading must be stepped up, along with research into the potential and risks of using nuclear energy, biofuels and other alternate energy sources. Research and technology innovations must be shared to change practice. If successful, the sector can create new significant numbers of new 'green' jobs.

Environmental risks - South Africa remains one of the highest emitters of Greenhouse Gas $C0_2$ per capita in the world. $C0_2$ and smoke emitted are of serious concern to residents living near industrialised areas, e.g. Vanderbijlpark in Gauteng. Alternate and cleaner fuels and cleaner energy production methods need to be sought to reduce gas emissions, and to ensure the health of vulnerable communities living in polluted areas. Air quality management and monitoring has been identified as a 'scarce skill' by the DEA. Household air pollution caused by the heavy reliance on wood, paraffin and other sources of energy, particularly in poor households, creates a significant health risk, and. environmental health education is needed, together with alternative energy resource innovations.

Sustainability reporting - there is a growing demand for diligent sustainability reporting. Global reporting standards have increasingly integrated sustainability practices into their criteria for best practice, and the King III report argues strongly for the full integration of environmental considerations with the economic and social aspects of sustainability. Companies in a number of sectors, including manufacturing, finance,

banking and engineering, as well as mining, are involved in sustainability reporting, and require associated skills.

Proposed cross cutting programmes: Critical Skills

Short course and PIVOTAL programmes for Skill Level 4 & 5 (Director; Business Training Managers; Mechanical, Civil and Environmental Engineers; Sustainability Managers; Project Managers; Research and Development Managers; Policy Analysts and Statisticians (modellers); Environmental Scientists; Earth and Atmospheric Sciences Technicians (Water and Soil Technician; Waste Water Treatment Officer / Technician; Water Resources Technical Officer); Environmental Science Technicians.

Energy and Water:

- Sustainable Development Principles and Planning
- Climate Change Risk and Opportunity Assessment
- Integrated and Adaptive Environmental Management
- Risk modelling and managing for uncertainty

Energy:

- Innovations to reduce household air pollution and health risks
- Business opportunities for a low carbon economy
- Alternative Energy Technologies (e.g. Solar; Biofuels etc.) potential; risk; investment; returns
- Carbon reduction, capture and storage; carbon trading - risks and benefits
- Energy efficiency
- Air Quality Monitoring (for environmental officers/ environmental science technicians in local government and relevant industries)

Water:

- Leadership and Management: strategic, financial and developmental skills are required in municipalities. Developmental skills relate to municipalities' role in LED arid poverty reduction.
- Water for Development - Integrated, Sustainable and Adaptive Management Approaches
- Water quality monitoring (for environmental science technicians in local government and relevant industries).

- Water treatment plant operation
- Water use and setting reserves: water resources management
- Research skills - effective ways to deliver potable water to a growing population, environmentally friendly sanitation services, sustainable water resource management and governance

Short course for Skill level 2 (Water Inspector; Community Health Facilitators):

- Water quality monitoring and reporting
- Health and Hygiene (water, household air quality)

Recommended Programmes to address Scarce Skills

OFO Code	Occupation (SCARCE SKILL)	Job titles	Recommended Interventions Based on Scarce & Critical Skills
224 301	Economist (Skill Level 5)	Environmental Economist	BURSARIES HET PIVOTAL PROGRAMME
233 101	Chemical Engineer (Skill Level 5)	Energy Engineer; Energy Services Engineer; Environmental (Water, Air, Soil) Engineer	HET CURRICULUM INNOVATION & HET PIVOTAL PROGRAMMES: Solar power and renewable energy technologies: Solar Water Heater Production and Installation; Clean coal technologies, Carbon Capture and Storage; Energy options for a low carbon economy Energy efficiency technologies Water quality management and pollution control
233 102	Chemical Engineering Technologist (Skill Level 5)	Energy Technologist; Environmental (water, air, soil) Technologies	BURSARIES HET PIVOTAL PROGRAMMES AND CURRICULUM INNOVATION
233 201	Civil Engineer (Skill Level 5)	Biosystems Engineer; Environmental Engineer Water engineers	BURSARIES HET PIVOTAL PROGRAMMES AND CURRICULUM INNOVATION Clean energy technologies - Biofuel development NOTE: in 2007 3000 civil engineers were required for the water sector

233 202	Civil Engineering Technologist (Skill Level 5)	Biosystems Technologist; Environmental Technologist	BURSARIES HET PIVOTAL PROGRAMMES AND CURRICULUM INNOVATION Clean Energy Technology; Biotechnology
234 303	Environmental Research Scientist (Skill Level 5)	Air Pollution Analyst	BURSARIES HET PIVOTAL PROGAMMES Smart meters and monitoring tools (critical skill)
	Water Scientists (Skill Level 5)	Microbiologist Biochemists Analytical chemists Liminologist Hydrologist hydraulics, hydrogeology and geology; water purification sciences	BURSARIES HET PIVOTAL PROGRAMMES (particularly to place and retain graduates in public sector): Microbiology *(study microbes in relation to water quality),* biochemistry, analytical chemistry, Limnology *(true scarcity - skill to determine how much water can be extracted so there is still an ecological reserve),* Hydrology *(to predict flow regimes e.g. in relation to climate change),* hydraulics, hydrogeology and geology; water purification sciences.
234 903	Meteorologist (Skill Level 5)	Atmospheric Scientist; Climate Scientist; Climatologist	BURSARIES HET PIVOTAL PROGRAMMES Long range modelling skills (critical skill)
311 901	Earth and Atmospheric Science Technician (Skill Level 4)	Air Quality Technician Water and Soil Technician Waste Water Treatment Officer/ Technician Water Resources Technical Officer	BURSARIES HET PIVOTAL PROGRAMMES HET Innovation - especially at Universities of Technology FET Curriculum Innovation in Environmental Practices (to provide foundational programmes for this occupational category in Universities of Technology). 4000 water technicians and artisans are required urgently
311 903	Environmental Science Technician (Skill Level 4)	Conservation Scientific Officer; Environmental	BURSARIES HET PIVOTAL PROGRAMMES HET Innovation - to develop energy and water related technical

		Technical Officer	skills FET College Curriculum and Programme Innovation - Environmental Practices
312 907	Chemical and Biochemical Engineering Technician (Skill Level 4)	Energy Technician	HET INNOVATION - especially at Universities of Technology
	Health and Hygiene Practitioners and Educators/ Facilitators (level 2-4)		This scarcity is acute in Rural Areas. HET PIVOTAL PROGRAMME (level 2-4) Learnership for Public Environmental Health (Citizen Science and Sustainability/ Healthy Living/ Healthy Environment) in Rural Areas as development programme for Youth

Proposed Research and Innovation interventions

- Higher Education and Training Curriculum Innovation – particularly in FET Colleges and Universities of Technology: to address water and energy technical skills gaps
- New Energy Technology/ Green Energy Job Skills Assessment: Undertake a full study to assess the skills development demands associated with a low carbon economy and the emergence of new energy technologies - link this to Green Economy studies on new energy future development opportunities.

Proposed flagship programmes

- HET Pivotal Programme Skills for Climate Modelling and Monitoring - emphasis on long range modelling, risk assessment and reporting
- HET Pivotal Programme: Engineers for a new energy future
- HET Pivotal Programme: Engineers for Sustainable water management
- Environmental Technical Skills Development Programme – with Universities and Universities of Technology focusing on water quality management/ water plant operation management - ensure long term offering of qualifications for these technical skills.

- FET Curriculum Innovation: Environmental Practices Level 1, 2 and 3 Qualifications - for Energy and Water Technologies (linked also to waste, pollution control and biodiversity technical skills).
- Access Programme: Healthy Living, Healthy Environment Learnership for community health workers and community learning facilitators on environmental health, hygiene and sustainability practices, with components such as:
    - *Build and live safe*
    - *Clean hands/sanitation*
    - *Feeding the family/ optimum nutrition/ hygiene/ food gardening*
    - *Fuel safety in the home/ living with electricity*
    - *Healthy environment, healthy community*
    - *Keeping the air clear*
    - *Ways with waste, etc*

Note: Implement this programme in partnership with Dept of Health, Dept of Environmental Affairs, Dept of Water Affairs, municipalities and NGOs for Skill level 2, 3. Note: This programme must be supported by skills development for Environmental Health Practitioners to supervise the Community Health and Hygiene Workers.

- Environmental Education and Training skills development programme for providers to integrate the environmental driver into the sector's skills development system.
- Career Guidance focusing on low carbon development careers and water management careers" (DEA, 2010).

ANNEXURE B

ESSP RECOMMENDATIONS

OBJECTIVE	ACTION
Objective 1: Address Environmental Sector Skills at Macro-System Level	• Include the environmental driver into the National Skills Development Strategy, the Occupational Learning System, and the Vocational Education and Training System in South Africa – including the Human Resources Development Strategy (2010-2013). • Motivate to the Ministry of Higher Education and Training and the QCTO for the establishment of an inter-SETA structure to ensure inclusion of the environmental driver into SETA functions and operations, and to avoid duplication and maximise coherence of approach to environmental training. • Engage with the implementers of the National System of Statistics and with the South African Qualifications Authority to ensure adequate information management systems exist for monitoring and capturing environmental employment in the South African employment system, and in Education Information Management Systems.
Objective 2: Address Scarce and Critical Skills in the Environmental Sector	• Establish an initiative to provide for, and strengthen Environmental Leadership Skills, which includes giving attention to retention of environmental leadership skills in the sector, with emphasis on provincial and local government capacity, but not neglecting national level leadership in the public sector, Non Profit Organisations and business. • Prioritise the reduction of vacancies in the public environmental sector, particularly in provinces where vacancies in critical environmental occupations are on the rise, especially in specialist professional occupations and management positions. • Work with the Ministry of Higher Education and Training and the Department of Science and Technology to improve systemic attraction to, and graduation rates in environment related sciences and other scarce skill areas. The emphasis

	should be on enabling and extending the participation of black women in the environmental sciences, but should not neglect attracting black men to the sector.
	• Review the current allocations of skills development funding to adequate allocation of funding for adequate bursary funding to facilitate skills development in scarce skills areas, and for life long learning linked to career path development in scarce skills areas.
	• Establish an initiative with the Ministry of Higher Education and Training to further examine and address the need for environmental technical skills needed in the environmental sector. Undertake a scoping of Universities of Technology to establish which ones can immediately begin to address the need for environmental technical skills in South Africa, and link graduates to work placements, post-qualification internships and potential employment opportunities.
	• Support the development of skills programmes for the sector that address critical skills gaps identified across the sector, especially:
	  • Sustainable Development Planning Skills
	  • Climate Change Risk and Opportunity Assessment
	  • Environmental law and policy
	  • Integrative skills programmes
	  • Mentoring and coaching
	  • ICT skills programmes, including use and interpretation of GIS and modelling technologies
	  • Monitoring, modelling and evaluation of environmental change
	  • Green procurement and green economy planning skills
	  • Environmental ethics and social justice practices in the environmental sector

Objectives 3: Put measures in place to ensure longer term, more	• Engage the Ministry of Higher Education and Training to integrate environmental technical skills development in the Further Education and Training College Curricula and Programmes, with learning pathways into the Universities of Technology –

sustainable supply of quality skills to the environmental sector	Environmental Practices Level 1, 2, and 3 qualifications (amongst others) can be revised for use in FET Colleges. This should include giving attention to the training of lecturers for these new FET college programmes, and curriculum innovations in Universities of Technology. • Support and motivate for support for Environmental Education and Training Capacity Development within the Education, Training and Skills Development SETA and within University Education Faculties to ensure adequate education and training capacity for providing training in the sector, and for teacher education. • Support the development of tools for monitoring and improvement of workplace skills development planning and short course development and participation to address critical skills gaps in relation to Key Performance Areas, with attention to improving efficiency, quality, impact and relevance of short course programmes and workplace skills expenditure. • Develop capacity in the environmental sector to make better use of the learnership system to address critical and scarce skills (e.g. training of environmental compliance officers; new waste management training; environmental impact management training). Learnerships do not have to be restricted to Level 1-4, but can be used at level 5, 6, and 7 too.
Objective 4: Put measures in place to ensure a pro-active, transformative and innovative skills development system for the environmental sector	• Develop capacity for integrating and costing skills planning into the strategic plans being developed for the green economy and green job development planning. • Support the development of a Training of Trainers Programme to expand Provider Capacity for Green Jobs and Green Economy Training and Capacity Development. • Develop a national training initiative and national materials (potentially based on Environmental Practices Level 1, 2, and 3 qualifications) to develop entry level skills. Modules (skills programmes based on these qualifications can be used in EPWP training, and extended into learnerships for Youth Development Environment and Sustainability Citizen Sciences (e.g. for participation in monitoring and recycling activities at community level), and other green job development contexts at elementary occupation level (e.g. development of recycling jobs in local government contexts). Train providers to use these materials to ensure quality of provision. This training can be used to strengthen skills at elementary occupation level in

	Local Government, and conservation organisations, since environmental training at elementary occupation level is almost completely absent in the system at present.
Objective 5: Support Human Capital Development Strategy Planning at sub focus and institutional levels	• Support Human Capital Development Strategy Planning at sub-focus level, to address the range of skills demands in the environmental sector at meso and micro levels. Support such strategies to adopt a systems approach to Human Capital Development, and to take account of quality related issues in the system. • Develop guidelines and support co-ordinated approaches to Human Capital Development Strategies in the Environmental Sector through a Human Capital Development Planning Forum, and through an ongoing emphasis on quality provisioning in the Environmental Sector through activities of the Environmental Learning Forum.
Objective 6: Establish a system for Monitoring and Evaluation of Skills Planning and Development in the Environmental Sector	• Facilitate the establishment of a coherent national system for monitoring and evaluating skills planning and development in the environmental sector, particularly to establish an 'intelligence system' that informs skills development programmes and processes and that provides a national system of information for guiding environmental sector skills planning. This should be established in partnership with the Ministry of Higher Education and Training, the National Skills Authority and SETA system, SAQA and other institutions responsible for skills development planning in South Africa.

ANNEXURE C